CITY OF WINDSOR

Technical Volume 2 Report - Flood Reduction Alternative Solution Development

Sewer and Coastal Flood Protection Master Plan

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1.0 Introduction

This document is the second volume summarizing the technical and engineering works completed as part of the Sewer Master Plan. This report, the Sewer Master Plan – Technical Report Volume II, includes the following:

- Identification of level of service criteria for basement and surface flooding solutions including development, discussion with the technical committee and comparisons to other municipalities;
- Explanation of existing level of service for basement and surface flooding risk in the City of Windsor;
- An overview of the solution development process including alternatives for flooding solutions including source control programs, conveyance/storage measures, end of pipe improvements and coastal flooding protection measures; and,
- A background review of coastal flooding risk and level of service criteria. A summary of the development process for coastal flooding alternative solutions.

1.1 Windsor Sewer Master Plan Integration with Technical Work

This technical report, Technical Report Volume II, supplements the EA Master Plan Report and summarizes details related to the engineering, design, and scientific works completed as part of the Windsor Sewer and Coastal Flood Protection Master Plan. Two other technical reports summarize key design, engineering, and modelling details related to the project as follows:

Technical Report Volume I, which includes:

- Identification of new sewer and drainage data collected in 2018;
- Summary of data used from the Flow Monitoring and Hydraulic Modeling of the Sewer System report (Dillon & Aquafor, 2016);
- Process and methodology for expanding the existing City-wide sewer model including calibration; and
- Identification of existing baseline sewer and overland drainage conditions within the City including characterization of rain-derived inflow and infiltration (RDII).

Technical Report Volume III, which includes:

- For the preferred solutions, a summary of the preliminary functional design and recommendations for the proposed storm and sanitary sewer improvements;
- For the preferred coastal flooding solutions a summary of the functional design and recommendations;
- A summary of the assumptions and methodology in developing unit prices and cost estimates for the preferred solutions; and
- The development and process for the flooding solutions implementation plan. The plan was established considering multiple metrics, identified in the report, including discussions with City

staff, prioritization of projects with external funding, consideration for both past flooding records and the potential for flooding based on modelled findings, cost-benefit of solutions, and an emphasis on source control measures.

The EA Master Plan Report includes a comprehensive but general catalogue of works completed in support of this project. Unlike the Technical Reports scientific and engineering details identified in the EA Master Plan Report are limited. Acronyms, Abbreviations, and Definitions for technical terms referenced in this report are included in the EA Master Plan Report.

1.2 Separation of Service Areas

One signal computational sewer InfoWorks model to include all storm, sanitary and combined sewers coupled with a two-dimensional overland flow mesh was developed to represent existing drainage conditions (in-situ 2018 conditions) for the entire City of Windsor. The existing conditions model development details are presented in Appendix D - Technical Report Volume I.

To expedite the development of solution alternatives for the MP, the City of Windsor was separated into three major service areas based primarily on sanitary sewage system drainage boundaries. The intent of the model separation was to better manage the model due to the size and extent of this project scope. The service areas had similar characteristics within their respective boundaries and were able to be modelled independently while developing reasonable representations of flooding conditions and solutions. The separated service areas are identified below:

- Central Windsor – the lands in Windsor currently serviced by the Riverfront Interceptor sewer which is a combined trunk sewer that runs along the north and west boundaries of the combined sewer area and outlets to the Lou Romano Water Reclamation Plan (LRWRP). This area includes Central Downtown Area, West Windsor and Walkerville neighbourhoods. The existing drainage in this service area is primarily combined with several small pockets of separated systems. The stormwater drainage for this area is mostly conveyed to the Detroit River, with the exception of some southern lands which drain to the Grand Marais Drain.
- South Windsor – the lands in Windsor currently serviced to be serviced by the southern sanitary sewer trunk outletting to the LRWRP. This includes Devonshire Heights, Remington Park, South Cameron and South Windsor areas. The stormwater drainage for this area is generally conveyed to the Grand Marais, Cahill and Lennon area storm sewer systems. The existing drainage in this service area is considered to have separated storm and sanitary sewers. However, building foundation drains in older areas may be connected to the sanitary sewer system.
- East Windsor – the lands in Windsor currently serviced by the Little River Pollution Control Plant (LRPCP). This includes Riverside, East Riverside, East Windsor, Forest Glade, Fountainbleu, and the majority of the Sandwich South Secondary Planning Area. The stormwater drainage for this service area is conveyed to the Little River Drain or the Detroit River. The existing drainage in this service area is considered to have mostly separated storm and sanitary sewers, with the major exceptions being south of South National St. west of Jefferson Ave. and East of Pillette Rd.

As per the South Windsor area, the building foundation drains in the older separated areas may be connected to the sanitary sewer system.

Refer to Figure F 1.1 which identifies the three major service areas. Lands in the Town of LaSalle and the Town of Tecumseh are both serviced by the LRWRP. The majority of the lands in the Town of Tecumseh are serviced by the LRPCP.

1.3 Summary of Sewer and Surface Drainage Models

This MP has three distinct sets of sewer and surface drainage models identified in the project reporting. The distinct sets of models were developed as part of the project's objectives to define flooding conditions, and develop and evaluate solution alternatives. The distinct sets of models are summarized below:

- Existing Conditions Model
    - Purpose: Model of current conditions within the City of Windsor. Hydraulic and hydrologic parameters were calibrated to match observed flow and flooding records. This model serves as the starting point before adjustments are made for future conditions and solution models.
    - Notes: This tool is a single City-wide model and is not separated into distinct service areas. Discussion about this model is provided in Appendix D - Technical Report Volume I.
- Baseline Future Conditions Model
    - Purpose: Model of estimated future basement and surface flooding conditions within the City of Windsor. Developed by modifying and expanding inputs as developed in the existing conditions model. This model's outputs define the flooding problems being addressed with long-term solutions.
    - Notes: This tool is composed of three separated models representing the distinct service areas identified above. Discussion about this model is provided in this report Technical Report Volume II.
    - Notes: Modifications to the model accounting for future development were focused on the sanitary system and included adding new sanitary sewers and lands (subcatchments) to account for planned development. It is assumed that stormwater management for new developments will be managed on-site and therefore were not accounted for within the model; however there are exceptions for stormwater as discussed in the report.
- Solution Conditions Model
    - Purpose: Model representing flooding solution conditions within the City of Windsor. Developed by modifying and expanding inputs as developed in the baseline future conditions model. This model's outputs define the solutions proposed to address flooding.
    - Notes: This tool is composed of three separated models representing the distinct service areas identified above. Discussion about this model is provided in this report Appendix D - Technical Report Volume II. The InfoWorks model that is accompanying this report will reflect the implementation of preferred solutions only.

1.3.1 Sewer and Surface Drainage Model Application and Approach

This MP included sewer and surface drainage modelling with the InfoWorks ICM version 8.5 software developed by Innovyze. The InfoWorks ICM software is an advanced modelling tool designed to model complete hydrologic and hydraulic networks. This software utilizes fully integrated and dynamic one-dimensional (1D) and two-dimensional (2D) simulations of above-ground and below-ground drainage systems with numerous options for hydraulic and hydrology modelling. The EPA SWMM engine is integrated into the software for storm, sewer, and flood applications.

For this project wet weather flow (WWF) responses were calculated using EPA SWMM type hydrology, one-dimensional in-conduit flows were calculated with the Saint-Venant equations and two dimensional flows are estimated with the shallow water equations (depth-average Navier-Stokes equations). The existing conditions model approximates a representation of the City-wide drainage systems including:

- Minor system 1D sewer pipes including:
  - Over 645 km of sanitary sewers;
  - Approximately 200 km of combined sewers; and
  - Approximately 700 km of storm sewers;
- Major system 2D overland flow mesh grid of approximately 11,500 ha, represented with by over 2.5 million triangular elements with an average area of 46 m^2;
- Over 19,300 model nodes representing the connection between the major and minor system, as identified in the Figure 1.1 below and including:
  - Sanitary sewer maintenance hole lid accounting for direct surface water inflow; and
  - Storm and combined sewer catch basins;
- Fixed boundary water level conditions at outfalls to watercourses and open drains;
- Representation of sanitary sewage inflows of both wet and dry conditions from external municipalities, both the Town of Tecumseh and Town of LaSalle;
- Representation of backflow preventers; and
- Representation of ponds, storage systems, overflows, and pump stations.

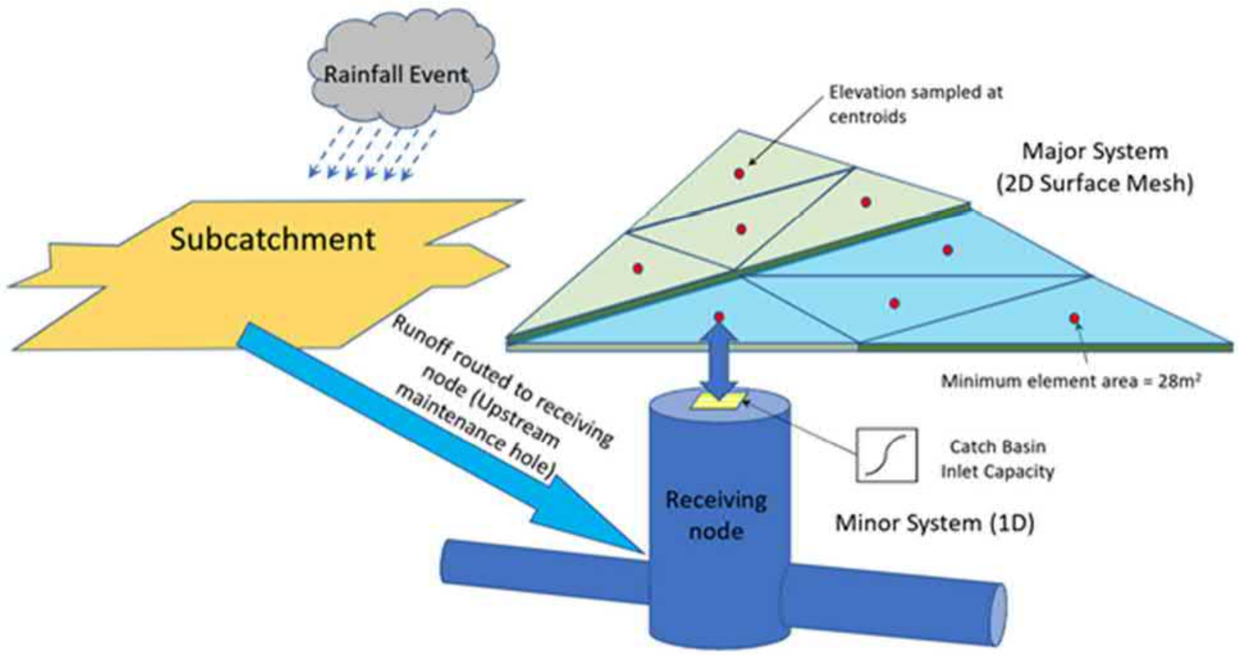

Figure 1.1: 1D-2D Model Linkage Schematic

1.4 Limitations of the Sewer and Surface Drainage Models

The computer model software aided in the creation of a representation of existing flooding conditions and was further used to derive and evaluate flood risk mitigation measures. However, the use of modelling software in this project, like any other application has limitations. The InfoWorks ICM version 8.5 software used in this Master Plan is a hydrologic and hydraulic modelling tool and given appropriate inputs only provides an approximation of real-world conditions.

If input data is missing or incorrect, this can have a meaningful impact on the way the model replicates real world situations. The complexity of the infrastructure systems being assessed is such that having a full and complete set of highly accurate physical attribute data for the entire network is not necessarily realistic; however for this project, a Master Plan City-wide study, the input information is appropriate. However, the level of accuracy of the input data used in this project's modelling assessment would not be appropriate for detailed design type applications.

Known limitations of the model include but are not limited to the following:

- Sewer overflow details in the model may not be an absolute match with real world conditions. Although a significant effort was put into mapping and characterising the overflows both from previous project works and using overflow data provided by the City as a check for this project. The hydraulic systems are sensitive to these inputs where minor data gaps may lead to incorrect results.

- Sewer pipe GIS data provided by the City was used in the modelling. The models reflected three conditions as outlined in Section 1.3. In general the sewer system is based on GIS data and records available on or before August 2019. The exception being additional sewers and maintenance holes included in the model for representation of future development, added to the model where known and as required for the study.
- The two-dimensional surface mesh used to estimate surface drainage conditions was based on a LiDAR aerial survey of the ground completed in the spring of 2017, but more recent changes in topography were not accounted for in the modelling assessment.
- Rainfall data used in calibration is collected at specific points in space and in the model is applied using the Thiessen Polygon approach to vary precipitation spatially; refer to Appendix D - Technical Report Volume I for more details. Although this is an accepted and appropriate hydrologic modelling approach to interpolate point observations, the interpolated data may deviate from the actual spatial variation in rainfall.
- The model does not have representation of basements which can provide storage of flood waters. When sewer pipes are surcharged above the elevation of basements that have no backwater protection, those basements may act as storage for flood waters.
- Further, in the model there is no representation of overland flow which can drain into buildings and basement, ultimately conveying the same flood waters into the sanitary sewer via floor drain connections.
- Known basement flooding reports were used for model calibration however, this data is limited to properties that reported to the City. Buildings that did not report flooding would not be considered in the calibration process.
- Connection between the 1D and 2D drainage systems is a simplification of real world processes. A few of the key examples include:
  - In the model, flow from subcatchments is first sent to the storm sewer nodes; whereas in real-world conditions flows are conveyed overland to inlet catch basins then through catch basin lead pipes which drain to the main storm sewer.
  - A similar simplification is made for the sanitary sewer system where flows are added directly to the sewer nodes (maintenance holes).
- Extrapolating beyond observed conditions can lead to incorrect estimates in the hydraulic or hydrologic response from the model that would not mimic real-world conditions. Calibration was completed with observed rainfall and flow monitoring data, although there were significant storm events recorded (for example above a 1:100 year occurrence design storm) extrapolation may lead to incorrect estimates.

1.4.1 Level of Accuracy

This MP was undertaken to review and develop solutions for broad-scale flooding risks; therefore the model used to assess flooding conditions, develop flood risk reduction alternatives, and assist with evaluation of alternative solutions was developed for such a purpose. The focus of the model calibration was predominantly based on the most severe storm events' impact on trunk sewer systems, which as identified in Technical Report Volume I, exhibited a good model fit with the observed in-sewer flow records.

The model has 10's of thousands of sub-catchment and hydraulic user imputed elements each with many variables that need to be defined. Much of the input was digitized from the Phase 1 of the Sewer Master Plan or from database information provided from the City. Automated and GIS-supported approaches were used wherever possible to fill in model input data. Visual and automated checks of input data were completed as part of the model verification process. Based on the model calibration and validation results the level of model accuracy is in-line with the MP's objectives.

1.4.2 Engineering Design Application

Appropriate development of simple or complex models require experienced modeller and engineering judgement. The model for this project was purposefully expanded from an earlier and less complex version developed, as part of Phase 1 of the Sewer Master Plan; refer to Technical Report Volume I for additional details. The model was developed as a specific application tool to estimate City-wide flooding conditions under extreme or severe rainfall events. Preference was given to representing trunk infrastructure response, whereas not every local street level response would be wholly reflected in the model outputs.

Based on calibration results the modelling tool is appropriate for the project needs. However, if the model is to be used in the future for alternative design or assessment purposes, adjustments for those specific project needs may be required at that time. Some examples of uses of the model beyond its initial intended purpose are provided below, but the list should not be considered comprehensive:

- A detailed design sewer rehabilitation project should confirm and update model inputs including but not limited to sewer sizes and inverts, catch basin representation, and confirm local contributing drainage areas; and
- The model was not developed for water balance type assessments with continuous simulations. Additional adjustment of catchment parameters may be required to convert the model for this purpose. This type of study could include design for water balance features, a more focused daily review of dry weather and mild wet weather sanitary sewage demands, or running an average year simulation per MECP F-5-5 criteria.

2.0 Basement Flooding – Level of Service

2.1 Introduction

Basement flood risk reduction, level of service criteria were developed to provide improvements at a broader scale given the City-wide scope of the MP project. Solutions reducing flood risk were not to address local or street level risk and were focused on addressing more regional, system-wide problems. The criteria considered input from consultation with multiple individuals and referenced numerous sources, as summarized below:

- The Master Plan Technical Advisory Committee (TAC) that was established at the beginning of the project to provide key input into the project's direction. The TAC is composed of City of Windsor staff, representation from the Essex Region Conservation Authority (ERCA), Aquafor and Dillon. The role of the TAC was to develop evaluation criteria, provide input on the alternative and preferred solutions and provide feedback on the implementation plan and cost estimates.
- A review of the Windsor and Essex Regional current design manuals and guidelines, which are primarily contained in the engineering documents below:
  - City of Windsor Development Manual (November, 2015) - This manual includes criteria for sanitary sewer servicing, storm sewer servicing and roadway design.
  - Windsor/Essex Region Stormwater Management Standards Manual (December, 2018) - This manual provides recommendations for stormwater management and storm sewer design.
- A review of guidelines, Master Plans, and studies developed by external sources including other municipalities, government agencies, and industries. The review focused on municipalities in Ontario, but the assessment included out of Province and American sources for documentation.
- Input from the Stakeholder Advisory Committee (SAC) members, representing a cross-section of community interests including general public, business/community groups, emergency service providers, environmental associations, and insurance companies/associations.
- Discussion and meetings with the Ontario Ministry of Environment, Conservation and Parks (MECP).
- Input from emergency services providers including Windsor Police, Windsor Fire & Rescue Services, and Essex Windsor Emergency Medical Services regarding identification of transportation routes and key sites.
- Feedback from the general public as received during and following the project public information centres (PIC) and other written commentary.
- Consultation with multiple City of Windsor departments including Operations, Office of the City Engineer, Pollution Control, and others.

The cumulative input from the sources above resulted in the establishment of an adaptive approach in solutions that provides a flexible level of service suited to the relative risks and impacts of the conditions and issues that have been identified. The traditional engineering solution approach is compared to this adaptive approach in Figure 2.1.

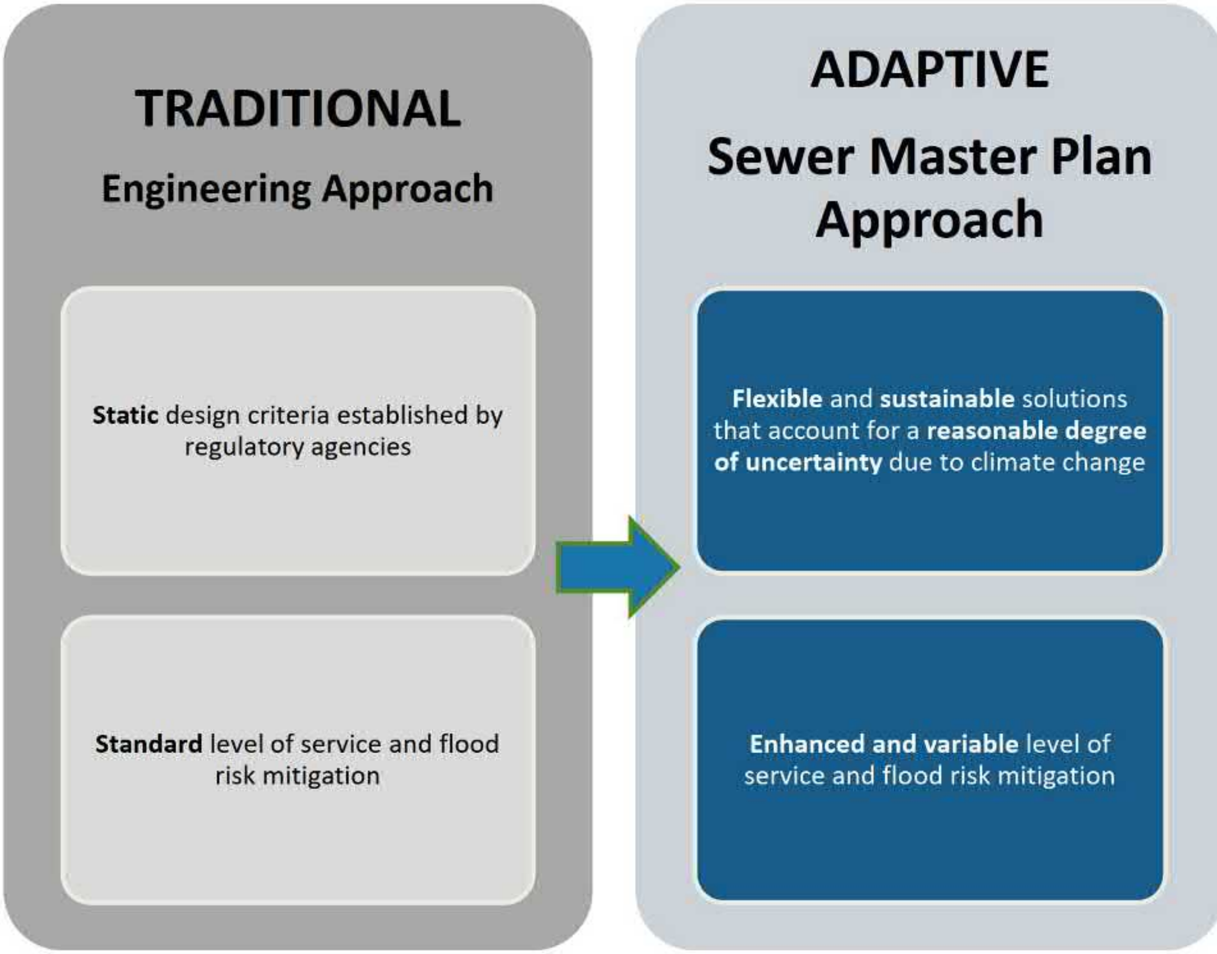

Figure 2.1: Adaptive Approach - Considered in Solution Design

The adaptive approach is applied to both basement and surface flooding risk reduction measures. Surface flooding risk reduction level of service criteria and solution alternatives are presented in Sections 4 and 5, respectively.

The development process for the level of service criteria was iterative and included significant literature and document review, coupled with key technical meetings, review of observed flooding conditions in the City and outputs from the InfoWorks ICM flooding model. The tasks completed as part of this work are further detailed below:

- A benchmarking review of other municipal, government, and regulatory authority design guidelines and criteria including climate change adaptation approaches, drainage system level of service (LOS), low impact development (LID) applications, water balance criteria, combined sewer strategies, and other flood management measures;

- Detailed WWF pipe hydraulic and surface drainage modelling was completed for the existing storm, sanitary and combined sewer systems using the updated and calibrated InfoWorks ICM model; and
- Assessment of current minor system capacity under multiple design storms to approximate level of service (LOS) under existing conditions for the storm, sanitary and combined sewer networks including the major overland flow conveyance system drainage patterns. Further, the hydraulic influence from PS outlets and conditions at storm gravity outfalls, including high water levels at the outlet with the potential to cause adverse tail water conditions, were included.

2.2 Level of Service - City Input and Discussions

Development of level of service criteria was completed in consultation with City staff. This consultation expanded well beyond the project's technical advisory committee and included many other City Departments. The input helped to refine recommendations developed through public consultation and existing study review. City Departments that provided feedback included:

- Engineering – Infrastructure & Geomatics
- Operations – Contracts, Field Services & Maintenance
- Operations – Technical Support
- Operations – IMS
- Office of the City Engineer
- Pollution Control
- Building Services
- Environmental Sustainability and Climate Change

2.2.1 Other Municipalities

A review of other municipalities' level of service standards for the wastewater collection system related to basement flood protection was completed and is summarized in Table 2.1, below.

Table 2.1: Comparison of Various Basement Flooding LOS Criteria

Municipality	Maximum HGL	Return Period / Design Storm
Windsor Current	Dry Weather Flow: • Goal: Ensure dry weather flow conveyance capacity is provided. • Follow City's Development Manual to confirm available outlet capacity and establish sewer sizes and slopes.	Not Applicable.
Toronto	Dry Weather Flow: • Similar dry weather formula as Windsor. Wet Weather Flow: • 1.8 m below Ground Elevation for May 12, 2000 event.	• May 12, 2000 storm event (Return Period - 1:25 to 1:50 year; duration - 24 hours; Peak Intensity - [5 min] 160 mm/hr)

Municipality	Maximum HGL	Return Period / Design Storm
Kingston	Dry Weather Flow: ● Similar dry weather formula as Windsor ● Flow < 85 % of pipe capacity. Wet Weather Flow: ● HGL < 0.3 m above pipe obvert and ● HGL > 2 m below finished ground	● Up to and including the 1:100 year event; ● Sensitivity to various storm events for the 1:10 year event (considered a gap) and 1:25 year event (consideration for sewer review).
Hamilton	Dry Weather Flow: ● Similar dry weather formula as Windsor Sewer Sizes up to 450 mm dia.: 75% of full design capacity. ● Sewer sizes 525 mm dia. or greater: 60% of full design capacity. Wet Weather Flow: ● No criteria	● Not Applicable.
Ottawa	Dry Weather Flow: ● Similar dry weather formula as Windsor. Wet Weather Flow: ● Sewers designed to operate under free flow conditions, unless downstream conditions cause surcharge. Maximum HGL 0.30 m below footings.	● 1:100 year event volume disturbed based on a historical event.

Notes:

Data from other municipalities is based on research and data available in 2018.

In addition to the above, all municipalities in Ontario are governed by the MECP F-5-5 criteria, identifying rules for treating municipal and private combined and partially separated sewage systems. The goals of the MECP F-5-5 procedure are summarized below:

- Eliminate the occurrence of dry weather overflows;
- Minimize the potential for impacts on human health and aquatic life resulting from CSOs;
- During a seven-month period commencing within 15 days of April 1, capture and treat, for an average year, all the DWF plus 90% of the volume resulting from WWF that is above the DWF; and,
- Achieve as a minimum, compliance with body contact recreational water quality objectives (Provincial Water Quality Objectives (PWQO) for Escherichia coli (E. coli)) at beaches impacted by CSOs for at least 95% of the four-month period (June 1 to September 30) for an average year.

It should be noted that the work completed for this MP was focused on flood risk reduction measures and that other studies completed for the City address the current CSO management strategies. Discussion on how recommendations from this MP may impact (and reduce) CSOs are provided in subsequent sections of this report.

Input from various MECP Departments provided for this project are summarized in the following section.

2.2.2 MECP Input & Recommendations

Consultation and coordination meetings were held with the Ontario Ministry of Environment, Conservation and Parks (MECP) to review existing basement and surface flooding challenges and potential solutions to reduce these flooding risks.

Flow through primary sewage treatment systems were identified early in the project as a cost-effective component of a multi-element strategy to reduce the potential of basement flooding risk and treat sewage discharge entering receiving waters. In particular, the use of retention treatment basin (RTB) type systems were considered. An RTB was installed along the Detroit River waterfront between 2009 and 2011. This existing system services approximately half of the upstream (eastern half) combined sewer system in the LRWRP service area (East of Caron Ave.) The City has retained Stantec Consulting Limited to complete a Schedule C Environmental Assessment (Combined Sewer Overflow (CSO) in the Riverfront Area West of Caron Ave. Environmental Assessment) which has recommended the implementation of an additional RTB for the downstream (West of Caron Ave.) of the service area. This study is anticipated to be completed in 2020. Refer to Figure F.2.1 that identifies the existing treatment plants, existing RTB and proposed second LRWRP RTB system.

Preliminary concepts for surface and basement flooding risk reduction measures were presented to multiple MECP branches and staff members where initial support for the majority of the measures proposed were identified. However, the notable exception was the use of primary treatment flow through systems to manage extreme wet weather RDII, this included RTB systems. Since the use of these systems was relatively innovative discussion often focused on this element.

A summary of the key meetings and discussions held with the MECP are summarized below, supporting documents can be found in the Master Plan consultation appendices:

- June 6th, 2019 - MECP London Office Surface Water Unit and Environmental Planning and MECP Local Office (Sarina/Windsor District)
    - Meeting objectives included the following:
        - Provide project background information and present preliminary findings of problem areas defining surface flooding and basement flooding risks;
        - Review the City's CSO strategy and RTB systems, including the MECP F-5-5 guideline requirements; and
        - Review and obtain feedback on the range of alternative solutions developed to reduce flooding risks.
    - Meeting feedback and outcome included the following:
        - To receive additional input it was recommended potential solutions be further reviewed with the MECP ECA, water standards, and permissions branches this included the use of RTB systems for management of wet weather sewage; and

        - The MECP noted preference to focus on water balance and water quality in solutions. Low impact development (LID) measures are recommended to address those concerns.
- July 11th, 2019 - Project Team sent a letter to MECP Environmental Assessment and Permissions Division which outlined the proposed basement flood risk reduction strategy.
- July through October, 2019 (Multiple Meetings) - MECP Environmental Assessment and Permissions Division
    - Meeting objectives included the following:
        - Provide background information and present preliminary findings of problem areas defining surface flooding and basement flooding risks; and
        - Identification of measures to reduce basement flooding risk including;
            - Source controls to reduce RDII in the sanitary collection system including: sealing of sanitary manhole covers; repairs to leaky sanitary sewer pipes and MHs; removal of improper connections; downspout disconnection and mandatory disconnection of foundation drains, expected in homes built before 1980.
            - Sewer pipe improvements including: increased sanitary sewer conveyance capacity; and large diameter temporary surcharge storage sewers.
            - Outlet capacity improvements including: increased outlet discharge capacity at the wastewater treatment plant facilities, combined with: temporary storage; and/or supplementary treatment of extraneous flows using a separate flow-through treatment facility.
    - The feedback and outcomes included the following:
        - The MECP recommended ultimate condition solutions still consider a high amount of infiltration and asked that the project team focus on improving sewer conditions to reduce RDII.
            - The project recommends significant and Province leading-RDII source control measures including mandatory foundation drain disconnection. Even with the source control measures, it is estimated there will still be an appreciable volume of RDII which must be managed to reduce basement flooding risk.
        - The MECP clarified that the definition of a combined and/or partially combined system is one that was originally designed as a combined sewer. These systems are governed by the F-5-5 guidelines. Separated systems that behave similarly to a combined sewer or have similar effluent characteristics to the combined flows are not.
        - The majority of the East Windsor (LRPCP) service area was designed as a fully separated system and therefore, it is governed under the F-5-1 guidelines.
            - The MP team identified that the provisions under Section 3.5 of F-5-1 permit the construction of excess primary treatment capacity, by-passing secondary/tertiary treatment works for treatment of peak WWFs and this appeared applicable to a potential RTB system for the LRPCP.
        - The MECP riterated RTB type flow through treatment systems would only be considered and approved for the combined sewer systems per the definitions above.

- This would include the combined sewer service area draining to the LRWRP and the relatively small combined sewer system in the LRPCP service area. Refer to Figure F.2.1. However, the majority of the LRPCP service area would not be permitted to discharge through an RTB system.

The feedback from the MECP helped form the final recommended solutions including the balance and type of measures related to source control, sewer storage and conveyance, and outlet capacity. Additional details are provided in Sections 3 and 5.

2.3 Existing Treatment Plants - Wet Weather Operations

There are two wastewater treatment facilities serving the western and eastern portions of the City of Windsor, as illustrated in the Figure F.2.1 and as outlined below:

- The LRWRP serves the westerly portion of the City, which includes a separated sanitary sewer system to the south, as well as the combined sewer system to the north. In addition, the Town of LaSalle and a small area in the Town of Tecumseh are served by this facility.
- The LRPCP serves the easterly portion of the City, which is primarily a separated sanitary sewer system with a smaller combined sewer service area. In addition, a sizable urban area in the Town of Tecumseh is served by this facility.

Observations have shown that during significant storm events, the sanitary collection and treatment systems become overwhelmed with the increase in peak flow rate and volume from rainfall derived inflow and infiltration (RDII). The surcharged conditions in the collection systems has resulted in widespread basement flooding throughout nearly the entire City; refer to Technical Report Volume I for more details.

2.3.1 Little River Pollution Control Plant (LRPCP)

As noted above, the existing sanitary sewers outletting to the LRPCP experience an increase in extraneous inflow and infiltration during significant rainfall events. The calibrated InfoWork ICM model of the City's sewer system was utilized to estimate the RDII contribution rates under a 1:100 year design storm. The results of this modeling analysis in relation to existing plant capacity are summarized below:

Table 2.2: LRPCP Inlet Flow Conditions

Flow Condition	Flow (m^3/day)
Current ECA approved capacity (annual average day flow)	72,800
Current inlet pumping station (PS) capacity (peak wet weather)	225,000
Modelled unrestricted total inlet flow rate under 1:100 year design storm, unrestricted by plant's PS	460,000
Total stormwater volume reaching the LRPCP under a 1:100 year design storm, with existing restrictions	205,400

The current rated average day (dry weather) capacity of the LRPCP treatment process is 0.84 m^3/s (72,800 m^3/d) which is about 35% of the peak capacity of the inlet PS. The "average day" capacity of the LRPCP is substantially less than the peak design flow resulting from the level of service storm event (1:100 year storm). Under wet weather conditions, the plant can treat approximately 1.06 m^3/s (92,000 m^3/d) per the 2018 operating report. Flows in excess of the plant's wet weather treatment capacity, up to the capacity of the inlet PS, receives screening, grit removal and disinfection only prior to discharge. Peak flows that cannot be accommodated by the LRPCP inlet PS require the Pontiac PS to bypass the treatment plant. Below provides a description of the LRPCP Bypass and Overflows:

LRPCP Bypass:

The LRPCP peak wet weather overflow occurs upstream of the inlet PS, through an overflow to the Pontiac PS. Flows bypassing the LRPCP directly to the Pontiac PS do not receive any treatment prior to discharge to the Little River Drain.

LRPCP Overflow:

Sewage flow entering the plant, through the LRPCP inlet PS, that are beyond the secondary treatment capacity of the plant are considered overflow. The LRPCP overflow occurs downstream of the inlet PS and upstream of the biological treatment components of the LRPCP. Overflow passes through grit removal and is disinfected before discharge to the Little River Drain. Due to the nature of biological wastewater treatment processes, full secondary treatment cannot be provided when flow rapidly increases above normal base-flow.

Figure 2.1.1 below provides a simplified schematic of the existing wastewater treatment plant's bypass and overflow processes.

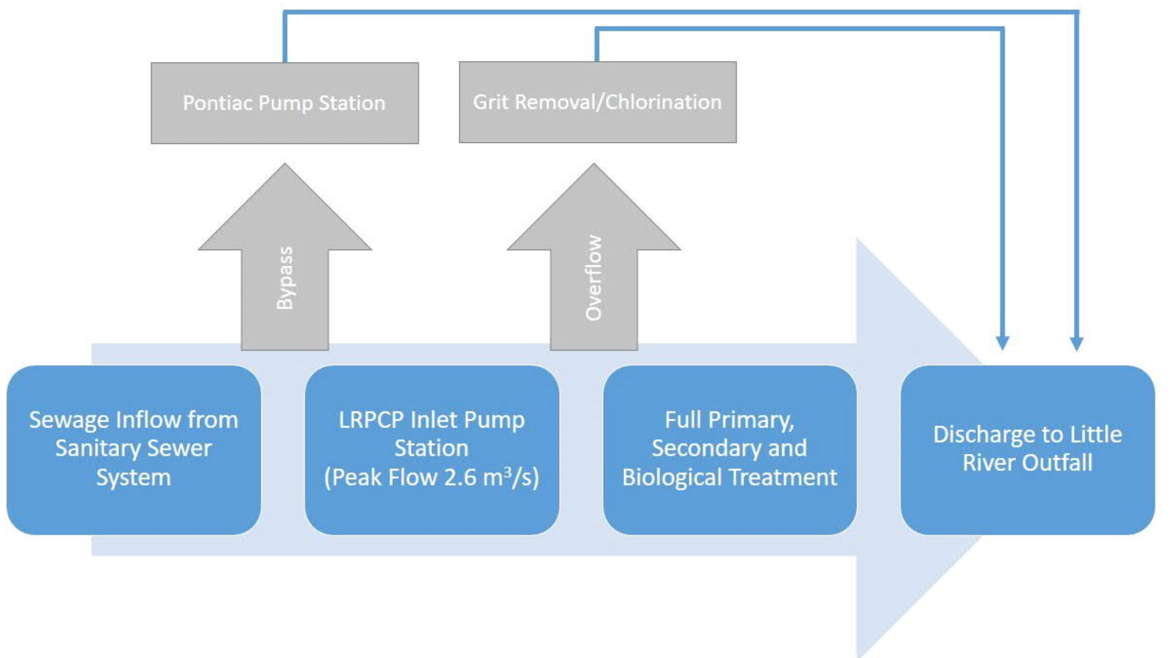

Figure 2.1.1: Little River Pollution Control Plant Configuration

The inlet PS capacity of the LRPCP is 2.6 m^3/s, which corresponds to the amount of peak flow that is able to enter the treatment plant at the inlet PS. Under normal conditions the treatment plant system frequently operates at substantially less than its design "average day" capacity of 0.84 m^3/s, Average day capacity is typically determined by the population within the service area based on sustained sewage loads treatment outside of wet weather events.

The maximum design peak treatment capacity for sewage inflow is 1.2 m^3/s. The plant can receive peak flows up to 2.2 times the average annual flow to the plant over the preceding 3 years, above which overflow of the biological treatment process occurs. This threshold for overflow is typically less than 1.2m^3/s. The peak flow capacity of LRPCP process is less than some other comparable facilities, which may accommodate peak flows of up to 2 times rated "average day" design flow through the biological treatment process and up to 5 times the "average day" design flow through a combination of biological treatment and primary clarification only, without the need to overflows following preliminary treatment. Future enhancements to improve the ability of the LRPCP to manage peak flows below the level of service storm with reduced bypass frequency may be considered as part of an overall WWF management strategy.

Operational data obtained from LRPCP staff suggests that peak WWFs entering the plant are primarily composed of stormwater, which result in considerably diluted sanitary wastewater characteristics. The table below summarizes influent quality from the August 2017 peak flow event (greater than 100 year storm) and overall 2017 influent quality.

Table 2.3: LRPCP influent quality

Influent Quality Parameter	2017 Average Condition (mg/L)	Peak Wet Weather Condition (mg/L) (August 29, 2017)
BOD	103	12
TSS	131	20
TP	2.82	0.4
TKN	20.78	4.5
NH3-N	12.57	1.8
NO3-N	0.28	0.4

More information on operation of this treatment plant is described in Section 3.4.

2.3.2 Lou Romano Water Reclamation Plant (LRWRP)

The LRWRP services the west portion of the City of Windsor, which comprises two separate systems, the northern combined and southern separated sewer systems, refer to Figure F.2.1. During extreme weather events, large amounts of rain water entering the system requires that the plant inflow is throttled via a gate just upstream of the PS, allowing for treatment of as much inflow as possible while preventing damage to the treatment plant. This treatment plant does not have an additional bypass upstream to provide relief during major events and therefore the gate can, under extreme events, contribute to backup within the existing sewer systems.

In the LRWRP service area, the City of Windsor has implemented a flow-through treatment facility for the management of combined sewer overflows in the downtown area to meet MECP F-5-5 guideline requirements. Additionally, the City has recently finalized a Class Environmental Assessment for the implementation of a similar facility adjacent to the LRWRP.

To address this issue, a separate Environmental Assessment and Function Design Study has been recently completed. Through the study "Combined Sewer Overflow Control in the Riverfront Area West of Caron Ave., Class EA", a preferred solution was developed that includes the implementation of a Retention Treatment Basin (RTB) to provide additional surcharge storage and water quality during major rain events for the combined system to ensure that the Ministry's F-5-5 criteria is met. This second RTB is proposed to be installed adjacent to and just upstream of the LRWRP. From the InfoWorks ICM modelling of existing and proposed systems, it was found that this proposed second RTB facility provides relief to the South Windsor separated service area, improving conditions for approximately 25% of the total area, under the 1:100 year storm. This 25% of the total South Windsor area was no longer estimated to have a basement flooding risk, as the HGL that previously reflected surcharge conditions and a maximum elevation of less than 1.8 m below ground, was estimated to now be more than 1.8 m below ground, lower than basement elevations.

2.4 Level of Service Objectives for Solutions

This section of the report identifies the level of service targets that would be applied in the MP for both existing and future development (greenfield and infill/intensification) conditions. The recommended LOS criteria to address basement and surface flooding that has been outlined herein was based on feedback received from the multiple stakeholders as identified above.

The basement flooding risk reduction LOS benchmark considered for the project to identify problem areas and considered in the development of solutions are outlined in Table 2.4. The LOS conventions were applied to the existing sewer network with consideration for both sanitary and combined sewer systems.

Table 2.4: Sanitary and Combined Sewer Drainage LOS for Basement Flooding

Consideration	Criteria	Objective
Wet Weather Flow	1:100 year storm event ● Sewer HGL is deeper than 1.8 m below existing ground elevation.	Reduce the risk of basement flooding for storm events up to and including the 1:100 year storm event for 90% or more of the City.

The recommended LOS criteria to manage WWF in the sanitary sewer system are based on the 1:100 year storm event and maintaining a HGL generally below basement floor grades, approximately 1.8 m below ground (6.0 ft.) at the location of the sewer maintenance hole (MH) within the municipal ROW. The "90% or more of the City" consideration was based on the broad scale scope of the project, which focuses on trunk sewers, outlets, and storage systems. It was considered beyond the scope of the project and infeasible to address all local or street level basement flooding risk, where less than 10% of the sewers not meeting the criteria was deemed appropriate.

2.4.1 Level of Service - Design Storms

Precipitation rainfall event depth (i.e., mm), duration, and intensity (i.e., mm/hr) are related to the frequency, or return period, of a storm event. These storm event characteristics have established intensity-duration-frequency (IDF) relationships derived based on historical observations; however the rainfall distribution is not characterized in a similar relationship. Therefore, the selection of a storm distribution must be made carefully and conservatively, as this input affects the subcatchment hydrograph shape and the estimate of peak flow.

The Essex Region Conservation Authority (ERCA) released the Windsor/Essex Region Stormwater Management Standards Manual (December 2018) that recommended the design storm return periods, IDF relationships and storm distributions to be used to assess urban and rural drainage systems. The Chicago 4-hour distribution represents a high intensity thunderstorm event and is recommended as the design storm type to assess conveyance capacity of urban systems. The selection of the design storm time step within this distribution, and consequently the peak rainfall intensity, has a significant impact on modelled peak flows and consequently estimates of peak sewer HGL and surface ponding conditions.

Further, the Stormwater Management Standards Manual (ERCA, 2018) recommends time steps as a function of percent impervious and consequence of flow conveyance capacity being exceeded. The City of Windsor is large and diverse, encompassing significant variability. The calibrated model average contributing percent impervious was 35 % and 45 % for separated and combined sewer subcatchments, respectively. Under medium consequence of exceedance conditions and these average impervious percentages, a 20 and 15 minute step time would be recommended for the storm sewer area and the combined sewer area. Conservatively, to assess the sewer system's resiliency and vulnerability, the design storms for the study use a Chicago Storm distribution, with 4-hour duration and 15 minute time steps. The use of smaller time steps (5 or 10 minute) or larger time steps (20 or 30 minutes) were not considered appropriate.

Additionally, a climate change stress test was applied to assess climate change risk across the study area for surface conveyance (overland flow) and storage infrastructure, and further to help develop a realistic level of service as discussed in the next section. The ERCA Stormwater Management Standards Manual (2018) recommends using an "Urban Stress Test" storm with 24-hour distribution and a peak rainfall intensity similar to the 1:100 year event. However to represent a climate change condition that is more severe, than the current 1:100 year design storm, a design storm that has both a 40% increase to volume and intensity was used. Details of the design storm events used in the assessment are provided in Table 2.5.

Table 2.5: Summary of Design Storm Events

Design Storm Event	Duration (Hours)	Total Volume (mm)	Peak Intensity (mm/hr)
1:5 Year	4	49.5	88.4
1:25 Year	4	67.0	118.4
1:100 Year	4	81.6	144.7
Climate Change Stress Test	4	114.2	202.6

It should be recognized that design storms including the Chicago distribution design storm event are not real storm events, but rather are synthetic design conditions developed using IDF statistics from single location (or point) rain gauges. The IDF statistics are derived from past observations and may or may not be representative of future conditions. Further, when using these design storm events, the statistics derived at a single point are extrapolated over a much larger area. Also, unlike real storms that are spatially varied, design storms are assumed to occur uniformly.

2.5 Future Condition Model Summary

In the existing conditions model the Official Plan (2014) was used as a guiding document to assemble land use areas for modelling of the storm, sanitary and combined systems. The Official Plan Land Use map as well as Zoning By-Law 8600 were provided by the City of Windsor Planning Department to determine initial land uses throughout the City, and are reflected in the DWF and WWF parameters in the model sub-catchments.

To develop solutions the single City-wide model was divided into three working components, as outlined in Section 1.2. The need to account for the impact of future development was part of the project's scope and was considered for all three regional area models.

The general strategy to account for future development's impact on basement flooding risk is identified below:

- Secondary Planning Areas
  - These areas were added to the future conditions model. Sewage contribution to the sanitary and/or combined sewer systems included both domestic DWF and wet weather RDII extraneous flow.
- Current and Potential Development based on Applications
  - The City provided a list of developments that have submitted development applications with the City. These developments were added to the future conditions model, where sewage contribution for both domestic DWF and wet weather RDII extraneous flow were included.
- Development of Vacant Properties, Infill, and Intensification
  - Future development beyond the above-noted is hard to predict and the City does not have infill or intensification growth projections available. It was agreed that to account for infill and intensification within the developed urban city areas that a test of the proposed solutions' resiliency to accommodate changes to land use, population density, and/or intensification would be completed. Further details are provided in Section 3.5.

Considerations and model allocations were made for both future development in Windsor, the Town of Tecumseh, and the Town of LaSalle. The following were the key secondary planning areas within the City considered for future development:

- East Riverside (North and South Neighborhood Development Areas);
- Sandwich South including East Pelton;
- South Cameron; and
- Spring Garden.

In addition to the planning areas identified above, the City provided a list of developments nearing construction, current and potential development, that were added in the future conditions baseline model at a site level or local scale to account for select infill construction. The planning areas and current and potential development areas are identified in Figure F.2.3.

It should be noted the North and South Neighbourhood area in East Riverside, is approximately 50% developed, however future development considerations were incorporated for the entire developable land.

2.5.1 Future Condition Model Inputs

It has been identified through recent studies, as well as through the flow monitoring completed as part of this project, that observed sanitary sewer rainfall-derived infiltration (RDII) could exceed typical allowances in design guidelines by up to 6 times, even in new developments under extreme rainfall conditions. These excessive RDII flow contributions to the sanitary system increase basement flooding risk.

The secondary planning areas coupled with current and potential development were accounted for in the future condition baseline model using both DWF and WWF RDII type responses using subcatchments in InfoWorks ICM. Multiple sources were considered when determining how to account for RDII from new development in the sewer model assessment. There was consideration for both the large inflow values observed currently in newer development in Windsor and plans to improve and lower RDII flow contributions in future projects potentially with on-site sewer flow monitoring, enhanced construction observation during home construction and formal requirements in development approvals. The primary sources of information that guided the selection of RDII model inputs are identified below:

- The technical reports and presentations including but not limited to:
    - Inflow & Infiltration Reduction Strategy (York Region, not dated);
    - Project to Address Unacceptable Inflow and Infiltration in New Subdivisions (Norton Engineering Inc., September 2017);
    - Inflow and Infiltration in New Construction: A HUGE Issue in Ontario and Across Canada (Norton Engineering Inc., not dated) [Presentation];
    - Reducing the Risk of Inflow and Infiltration in New Sewer Construction (Standards Council of Canada, November 2019); and,
- Based on the project's sanitary sewer flow monitoring records.
- Input and observations from City Administration.

2.5.2 New Development in Windsor WWF Modelling

Ultimately new development WWF subcatchments were set to respond to the 1:100 year 4 hour design storm with the following area normalized response peak flow of 1.0 L/s/ha with a total runoff volume of approximately 2.2 mm. The subcatchments were set to a 3.6 % impervious contributing area which allowed for design storm varying RDII flow contributions in the model.

Norton Engineering Inc. identified highly varying RDII rates from newly constructed subdivisions in Ontario where peak flow rates in many instances exceeded 1.0 L/s/Ha. From an observed storm event, ranging in severity between a 1:5 year and 1:10 year design storm, flow monitor data (maintenance hole 6S3097), recorded RDII peak flow rates around 0.9 L/s/ha and 2.4 mm of wet weather volume.

These values of RDII accounted for in the future conditions sewer model were not intended to be design allowances for future developments. Common and current design practices in Ontario using sanitary sewer design spreadsheet account for between 0.100 L/s/Ha to up to 0.400 L/s/Ha for infiltration, in the City of Windsor's Development Manual (May 2015) this value is 0.156 L/s/Ha. Such design allowances are used in sewer design to reflect typical flow conditions under which no surcharging would be expected. However, during wet weather, even with current design and construction practices that were developed to limit RDII, observations of flow in nearly every new subdivision in Ontario has exceeded these existing design infiltration allowances (Norton Engineering Inc., September 2017). To reasonably represent potential future inflows values, under extreme rainfall conditions, values higher than design allowances were used. This approach is consistent with the recent CSA W204:19 National Standard of Canada Flood resilient design of new residential communities, that indicates "design of sanitary sewers should include I/I WWF rates of at least 0.3 L/s/ha". It is still recommended that stringent monitoring and sewer and home plumbing construction practices be implemented in the future to reduce RDII, additional discussion is provided in Section 3.1.

2.5.3 New Development in Windsor DWF Modelling

To account for the dry weather sewage flow contributions from the secondary planning areas in the future conditions baseline model, existing studies were referenced for population projections and daily per capita sewage demands (L/day/person) wherever possible. Key studies referenced included:

- Background Report: County Road 42 Secondary Plan (MacNaughton Hermsen Britton Clarkson Planning Limited [MHBC], January 2018)
- Sanitary Sewer Servicing Study for Lands Annexed from the Town of Tecumseh and Addendum (Stantec Consulting Ltd, June 2006 and December 2014, respectively)
- Oldcastle Hamlet Sanitary Servicing - 8th Concession Road Trunk Sanitary Sewer Outlet: Preliminary Design Report (Dillon, May 2018)
- South Neighbourhood – Population projections were obtained from the North Neighbourhood Pond Final Design Report (Dillon, April 2002).

In areas where studies or servicing plans did not identify dry weather sewage criteria, the model inputs for population densities and residential sewage flow were referenced from the City of Windsor's Development Manual (May 2015). The residential sewage flow of 0.0042 L/s/capita was converted to 360 L/d/capita. Land uses were taken from the Official Plan Land Use map as well as Zoning By-Law 8600 where population density codes were taken directly from the Development Manual (May 2015). In addition to the population density and residential sewage flow, the InfoWorks ICM model requires diurnal flow patterns to account for time-varying DWF contributions. A common diurnal residential curve developed in Phase 1 of the Master Plan was used for future development, and is presented in Figure 2.2, below.

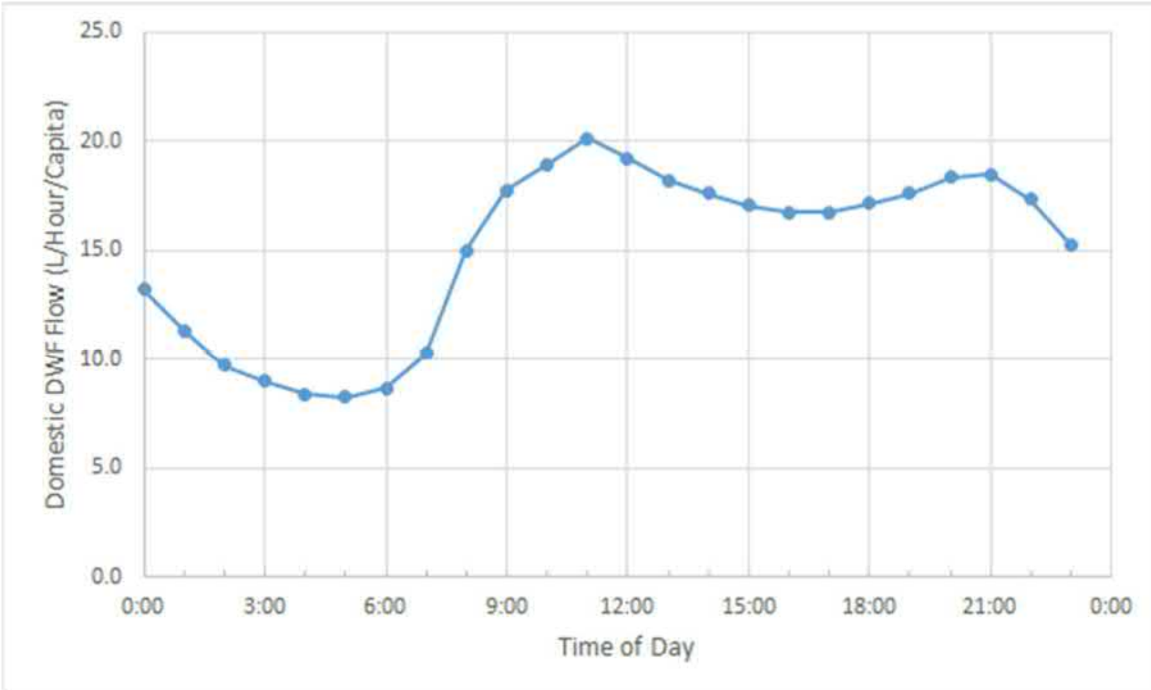

Figure 2.2: Diurnal Flow Pattern - Future Conditions

2.5.4 Future Conditions External Municipalities Flow Modelling

External flows from the Town of LaSalle and the Town of Tecumseh contribute sanitary sewage flows to the LRWRP and LRPCP. Refer to Figure F.2.1 that identifies the external contributions of sanitary sewage flow to the LRPCP and LRWRP.

2.5.4.1 Town of LaSalle

In 1974, the Town of LaSalle entered into an agreement with the City of Windsor for the processing and disposal of the sewage from the Town of LaSalle's sanitary sewage system.

The Town of LaSalle has a single connection to the LRWRP where an 800 mm diameter sanitary forcemain enters the City limits at the intersection of Ojibway Pkwy. and Morton Dr. This sanitary sewer forcemain starts at the LaSalle Sewage PS No. 1 on Milford Ave. in the Town of LaSalle. As identified in the PS's Environmental Compliance Approval (ECA), the works include 2 variable speed pumps (one duty, one standby, and with provision of a third pump), each rated at 252 to 592 L/s at a total dynamic head (THD) of 6.7 to 14.9 m. Under future conditions the model was adjusted to have the provisional pump contribute sewage to the LRWRP, which is effectively a doubling of flows from this source to the City. There is one additional inflow point the end of Southwinds Dr., just south of Cabana Rd. W.

2.5.4.2 Town of Tecumseh

In accordance with the 2004 Wastewater Agreement between the City of Windsor and the Town of Tecumseh, the Town has been allocated 19.9 ML/D capacity in the Little River PCP. Provisions were included within the 2004 Agreement to allow Tecumseh to increase their capacity allocation by paying the Town's share for future plant expansions, up to a maximum of 38.0 ML/D. The Town of Tecumseh has multiple inlets contributing sanitary sewage flows to both of the City of Windsor's treatment plant systems as summarized below:

- North Talbot Sanitary Sewer Outlet - LRWRP
    - This outlet contributes flow to the LRWRP and connects to a 600 mm diameter gravity sewer on North Talbot Rd. at the border of Windsor and Tecumseh.
    - Per the agreement with the two municipalities the maximum allowable flow through this outlet is 85 L/s.
- 8th Concession Sanitary Sewer Outlet - LRPCP
    - This outlet contributes flow to the LRPCP and connects to a 900 mm diameter gravity sewer on 8th Concession Rd. at the border of Windsor and Tecumseh.
    - Per the agreement with the two municipalities the maximum allowable flow through this outlet is 325 L/s.
- Northeast Windsor Trunk Sanitary Sewer Outlet - LRPCP
    - This outlet contributes flow to the LRPCP and connection to a 1200 mm diameter gravity sewer in the south east corner of the intersection of Banwell and E. C. Row near the border of Windsor and Tecumseh.
    - Per the agreement with the two municipalities the maximum allowable flow through this outlet is 983 L/s.
- Cedarwood Sanitary PS Outlet - LRPCP
    - This outlet contributes flow to the LRPCP and connects to a 900 mm diameter gravity sewer at the border of Windsor and Tecumseh, approximately 100 m south of Little River Rd.
    - Per the agreement with the two municipalities the maximum allowable flow through this outlet is 935 L/s.

The sanitary sewer system for the proposed InfoWorks model has been expanded with a cumulative maximum allowable flow of 2.243 m^3/s from the Town of Tecumseh. Three different hydrographs (flow vs time) were added into the model at three different nodes representing peak flows at Cedarwood Dr. and Gauthier Dr., Banwell Road and Country Rd. 22 and Oldcastle Road and 8th Concession Rd.

The North Service Area of Town of Tecumseh is serviced by two primary trunk sewers. The Lesperance Rd. Trunk Sewer extends from Cedarwood Dr., southerly along Lesperance Rd., Gouin St., St. Anne St. and St. Alphonse St. to County Rd. 42. The Little River Rd. Trunk Sewer extends from the Cedarwood PS on Gauthier St., easterly along Cedarwood Dr., Wood St., Little River Blvd, to the Lakewood PS which serves the St. Clair Beach area. In accordance with Article 11 of the 2004 Wastewater Agreement between the City of Windsor and the Town of Tecumseh, the existing outlet at the Cedarwood PS to LRPCP is limited to a maximum peak flow rate of 0.935 m^3/s. The estimated inflow is depicted in Figure 2.3

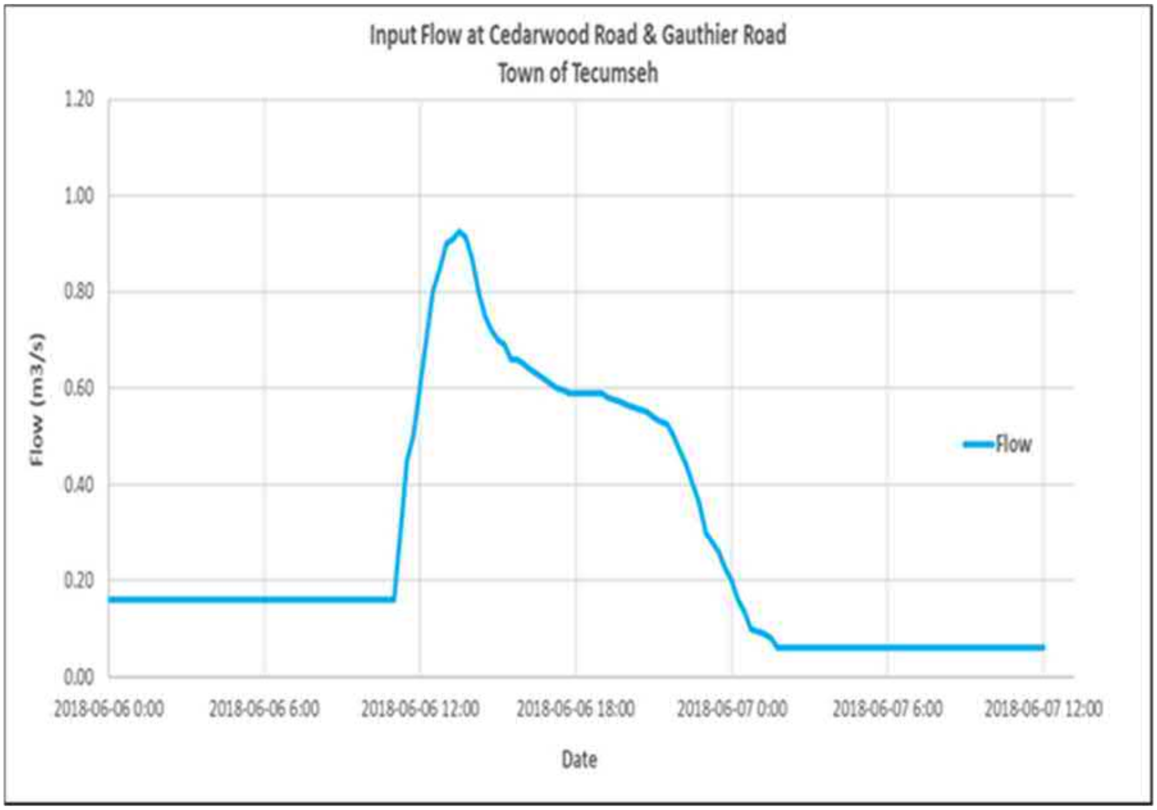

Figure 2.3: Estimated Future Inflow via Cedarwood-Gauthier Pumping Station, Tecumseh

By Agreement with the City of Windsor and the Town of Tecumseh, the North-East Windsor Trunk Sanitary Sewer has been constructed up to the south side of the intersection of Banwell Rd. and County Rd. 22 (EC Row Expressway). This trunk facility provides a newer outlet for the Town of Tecumseh with a discharge to the LRPCP. By Agreement with the City, the outlet at Banwell Rd. is limited to a maximum peak flow rate of 0.983 m^3/s. The estimated inflow is shown in Figure 2.5

The South West service area of the Town has another outlet at 8th Concession Rd. towards the LRPCP. By agreement, this outlet will be limited to 0.325 m^3/s peak flow to LRPCP. The estimated inflow is shown in Figure 2.6.

Figure 2.6 shows three inflow points that contribute to flows at the LRPCP.

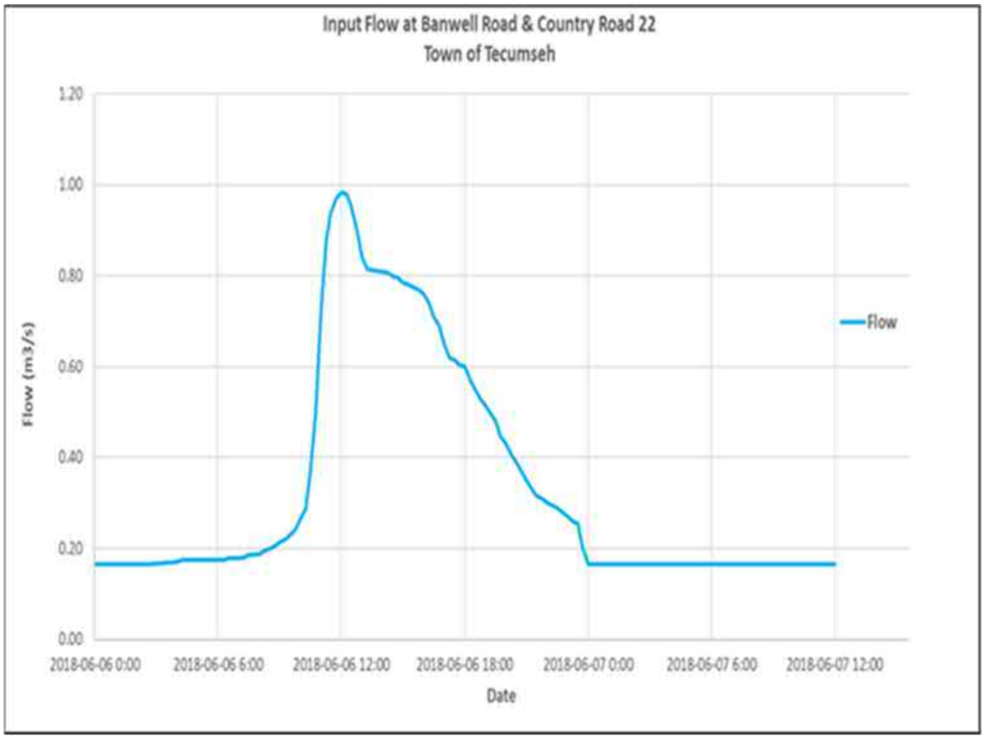

Figure 2.5: Estimated Future Inflow via County Rd. 22 / Banwell Rd., Maidstone

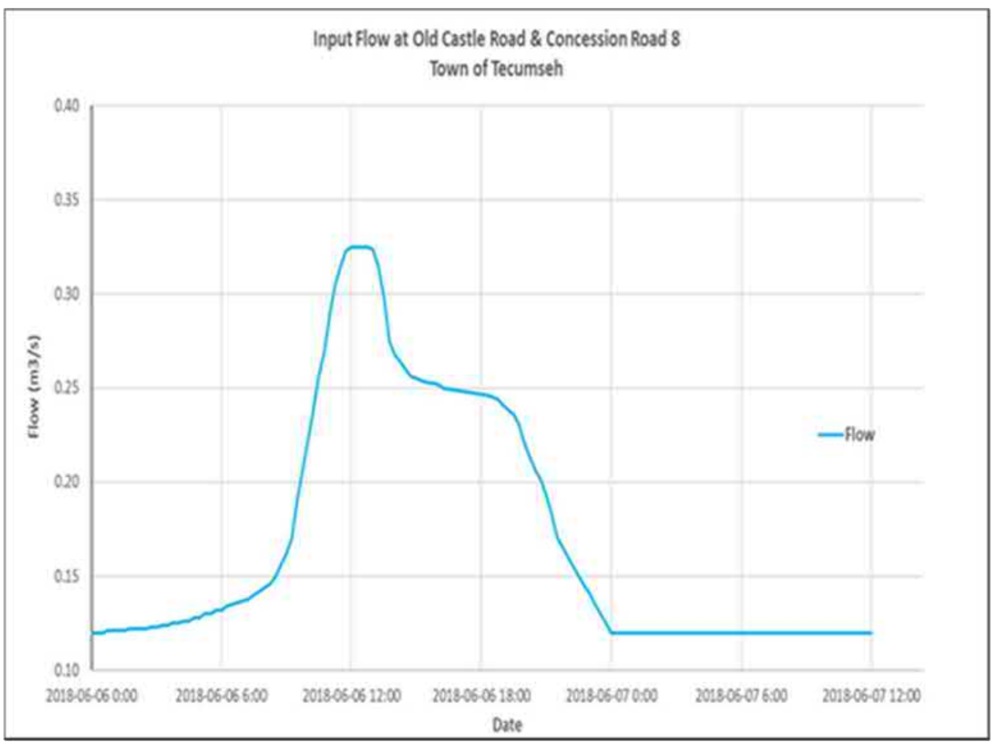

Figure 2.6: Estimated Future Inflow via 8th Concession Rd., Oldcastle

Adjustments made to the InfoWorks ICM existing conditions model for the storm sewer and surface drainage systems to improve representation of future conditions are presented in Section 4.

2.6 Existing and Baseline Future Conditions - Model Results

Prior to the development of solution alternatives, there were two sets of models which represented flooding conditions within the City of Windsor. First, the existing conditions model which was calibrated primarily using observed rainfall, flow monitoring, surface flooding photos/records, reports of basement flooding, and input from City of Windsor Administration. The second was baseline future conditions which is composed of models modified from the existing conditions model. The modifications were generally focused on the sanitary system to account for planned development. In general, impacts of new development on the stormwater system were considered to be managed on-site and were not accounted for within the model; however there are exceptions.

A summary of the existing conditions sewer system performance for the city-wide system, under various design storm events, is presented in Table 2.6.

Table 2.6: Existing Conditions – City-wide Percent of Nodes above Basement Flooding Criteria

System Type	Design Storm			
	1:5 Year	1:25 Year	1:100 Year	Climate Change Stress Test
Sanitary	16.3%	49.6%	75.0%	92.6%
Combined	56.5%	70.3%	84.8%	90.7%

The system performance is worse with increasingly more severe and less common events. The sanitary sewer system performance was found to be the most sensitive to increases in design storm rainfall intensities and volumes. The model results identified between the 1:5 year and climate change stress test design storms between 16% and 93% of the sanitary sewer system exceeding the basement flooding criteria.

The combined sewer system was found to have a comparatively poorer performance than the sanitary system relative to the basement flooding criteria under both the 1:5, 1:25 and 1:100 year design storm events. The model results identified under the 1:5 year to climate change stress test storms between 57% and 91% of the combined sewer system exceeds the HGL performance criterion. These results are likely a function of overflow elevations and PSs restricting flow in the combined sewer system.

2.6.1 Level of Service Existing Conditions by Service Area

The existing conditions performance from the three models is provided in the following sections. Figure F.2.4 identifies the city-wide existing conditions basement flooding risk. This figure includes a density map of areas under potential basement flooding risk under four design storm event conditions. The metric for basement flooding risk considered any combined and sanitary sewer model node where the estimated maximum HGL is less than 1.80 m below the ground surface.

2.6.1.1 Central Windsor

The model results indicate that the Central Windsor area had the most severe basement flooding risk of the three service areas for storm events, less than or equal to the 1:100 year design storm event. A summary of the area-wide basement flooding risk for the Central Windsor area is provided in Table 2.7. The percentages represent the number of model nodes where the estimated HGL is less than 1.80 m below the ground surface divided by the total number of nodes in the service area.

Table 2.7: Central Windsor Existing Conditions – Percent of Nodes above Basement Elevation

System Type	Design Storm			
	1:5 Year	1:25 Year	1:100 Year	Climate Change Test
Sanitary	28.2%	58.1%	86.2%	91.6%
Combined	55.1%	68.6%	84.0%	90.3%

When considering the three service areas (Central, South and East), model outputs for Central Windsor found this area to have the highest basement flooding potential. While this high risk may appear inconsistent with the number of flood reports during the severe September 2016 and August 2017 events, it should be noted that the Central Windsor area was not in the path of those storm events. Furthermore, as this is the oldest developed area in the City where basements may flood more routinely, there may be less motivation for residents to report to the City when floods do occur. Also in this area basements may be less susceptible to flooding or basements may not be full depth, and/or are not finished.

2.6.1.2 South Windsor

The model results indicate that the South Windsor area, in general, had the least severe basement flooding risk of the three service areas for storm events less than or equal to the 1:100 year design storm event. A summary of the area-wide basement flooding risk for the South Windsor area is provided in Table 2.8. The percentages represent the number of model nodes where the estimated HGL is less than 1.80 m below the ground surface divided by the total number of nodes in the service area.

Table 2.8: South Windsor Existing Conditions – Percent of Nodes above Basement Elevation

System Type	Design Storm			
	1:5 Year	1:25 Year	1:100 Year	Climate Change Test
Sanitary	4.6%	33.5%	63.2%	92.5%

2.6.1.3 East Windsor

The model results indicate that the East Windsor area has more severe basement flooding risk than South Windsor but less than Central Windsor for storm events less than or equal to the 1:100 year design storm event. A summary of the area-wide basement flooding risk for the East Windsor area is provided in Table 2.9. The percentages represent the number of model nodes where the estimated HGL is less than 1.80 m below the ground surface divided by the total number of nodes in the service area.

Table 2.9: East Windsor Existing Conditions – Percent of Nodes above Basement Elevation

System Type	Design Storm			
	1:5 Year	1:25 Year	1:100 Year	Climate Change Test
Sanitary	24.3%	63.8%	81.5%	93.3%
Combined	17.6%	97.9%	99.0%	100.0%

3.0 Basement Flooding - Development of Solution Alternatives

Feedback from residents, agencies, the SAC, the TAC and City administration guided the development of basement flooding solutions. Solutions were developed following a balanced approach with consideration for both short-term measures, which could be implemented quickly to reduce flooding risk, coupled with long-term measures, that requires upgrades to the City's existing municipal infrastructure, to meet the ultimate recommended level of service criteria. Further, both the short-term and long-term measures were developed with a multi-element flood risk reduction strategy to provide robust and comprehensive solution measures.

Sections 3.1 includes details on the development of solution alternatives developed to reduce surface flooding risks. Each set of alternatives were evaluated using a number of criteria and a preferred solution was determined for each area. These tables were included for reference only. The MP report will provide the final evaluations including detailed description of those evaluations and evaluation criteria. Detailed tables of those evaluations can be found in Appendix G - Evaluation Matrices.

3.1 Short-Term Solutions and Source Control Measures

The short-term solutions address multiple objectives of the Sewer Master Plan and were developed using a holistic objectives-based approach which includes a multi-disciplinary process integrating environmental, social, economic and technical perspectives in decision making. The objectives were generated through a combination of public and technical input. A report entitled Short-Term Solutions: Summary of Recommendations included in this Master Plan project and details how short-term flood risk reduction objectives were determined, includes a review of other municipalities' short-term measures, feedback from residents and City Administration, and presents a long-list of short-term measures with first-steps for implementation identified. This report is included in Appendix C.

3.1.1 Overview of Short-Term Solutions and Source Control Measures

The recommended short-term solution strategies are based on providing proactive measures that reduce the risk and associated impacts of undesired flooding to the residents of Windsor. The implementation strategies are subdivided into three categories:

- Municipal Policies
- Subsidy Programs
- Collaborative Improvements

A summary of the recommended short-term solutions related are provided below. Measures identified below are for both basement and surface flood risk reduction.

Municipal Policies:

- Mandatory Use of Sewage Ejector Pumps for New Residential Development - It is recommended that the installation of sewage ejector pumps be mandated for all new residential developments with below grade living spaces or basements. This recommendation was developed to give new homes a more reliable level of protection, requiring less maintenance than backflow preventers while still providing protection from high water levels surcharging sewage into basements.
- Mandatory Downspout Disconnection for New Development - New development is currently mandated to provide disconnected downspouts through existing City policies (however, exceptions are common. To assist with the implementation of this mandatory policy, the City staff have identified that new standard downspout disconnection details including pop-up heads that by-pass paved surfaces are being developed internally.
- Stormwater Financing Study - The City is undertaking a Stormwater Financing Study that will form the basis of a future policy. Input from the public, the project's Stakeholder Advisory Committee, and City Administration is being collected. The outcome of this study could result in new or improved funding sources for flood risk reduction projects.
- Sanitary Rain Catchers and Maintenance Hole Sealing - It is recommended that select sanitary sewer maintenance hole covers within the City be sealed to reduce undesired inflow. This includes installation of rain catcher devices between the maintenance hole cover and frame. It is also recommended that some maintenance holes be sealed with waterproof lockable covers, specifically, low elevation covers where risks for sanitary backup spilling onto the road or boulevard has higher potential.
- Infrastructure Maintenance and Assessment - The City completes extensive infrastructure and asset condition assessment programs for sewer and related infrastructure to guide decision making of sewer replacement and upgrade projects.
- It is recommended that the City implement enhancing the maintenance practices to consider areas of higher flood vulnerability including high traffic roadways and sensitive land uses. This includes:
    - Increasing street cleaning frequency in areas with sewer and/or catch basin clogging;
    - Additional maintenance of new LIDs, such as permeable pavements, exfiltration trenches, bioswales, etc.;
    - Include maintenance hole with rain catchers in recurring inspections; and
    - Regular maintenance of stormwater management ponds, municipal drainage systems and other open ditches to remove overgrowth of vegetation.
- Design Standards - City of Windsor is currently updating their Development Manual to incorporate updated sewer and stormwater management design standards. Both the ERCA Regional Stormwater Guidelines (2018) and the MECP Low Impact Development Stormwater Management Guidance Manual (Draft 2020) are available to provide the framework to update the City's design standards.

- Sewer Network Backflow Prevention Devices - It is recommended backflow prevention devices be installed with the sewer system to protect the drainage infrastructure from undesired surcharge conditions sending water upstream into the sewer network. The two primary applications are:
  - Placement of devices at the outlets of the storm system to protect storm sewer system outlets from high water level conditions in Detroit River or Lake St. Clair; and
  - Placement of devices at interconnections between the sanitary and storm systems to protect sanitary sewer systems from surcharge of stormwater flows.

Subsidy Programs:

- Basement Flooding Protection Subsidy - Consideration should be given to expanding the City's existing Basement Flooding Protection (BFP) subsidy program for additional measures.
- Mandatory Downspout Disconnection - It is recommended that the City implement a City-wide mandatory Downspout Disconnection Policy. A City-wide program will require public cooperation which could include additional marketing targeted at residents. Recommendations for pilot projects are provided in Section 6.
- Mandatory Foundation Drain Disconnection - It is recommended that a City-wide mandatory foundation drain disconnection subsidy program be implemented. Foundation drains connected to the sanitary sewer system represent a major contributor of RDII. This program, although ambitious, was estimated to significantly reduce RDII flow and basement flooding risks. Recommendations for pilot projects are provided in Section 6.

Collaborative Improvements:

- Green Infrastructure/Low Impact Development (LID) Measures - The recommendations for green infrastructure and LIDs are focused on public education, as well as in-kind and planning support from the City. Recommendations for construction and monitoring of pilot projects, on City owned lands, are provided in Section 6.
- Lot Grading - Improper lot grading may be a cause of homeowner's flooding. It is recommended that lot grading be completed in conjunction with the foundation drain disconnection subsidy program. Further, public education focused on lot grading would provide benefits to residents.
- Other Household Management Strategies - Homeowners have an interest in being actively involved in the implementation of mitigation measures to protect their home. Measures that property owners can implement to protect their property from flooding including actions to take before, during, and after a flooding event are summarized in Short-Term Solutions: Summary of Recommendations (Dillon, 2020), included in Appendix C.

3.1.2 Modelled Short-Term Solutions and Source Control Measures

Many of the recommended short-term solutions were included in the model assessment for basement or surface flooding solutions. However, not all measures were included, Table 3.1, and summarizes which measures were included in the model assessment. Additional details about how the short-term measures were inputted and/or accounted for in the Solution Condition Models are provided in the subsequent text.

Table 3.1: Summary of Modelled Short-term Solution Measures

Short-term Solution Measure	Solution Condition Model Input
Mandatory Use of Sewage Ejector Pumps for New Residential Development	Not included.
Mandatory Downspout Disconnection for New Development	Not included.
Stormwater Surcharges and Green Infrastructure Credits	Not included.
Sanitary Rain Catchers and Maintenance Hole Sealing	All sanitary sewer maintenance holes lids were represented with an 80% reduced inflow compared to baseline conditions.
Infrastructure Maintenance and Assessment	All sanitary RDII subcatchments were represented with a 5% reduced inflow compared to baseline conditions.
Design Standards	Not included.
Sewer Network Backflow Prevention Devices	Select backflow prevention devices were added at outfall locations where high water level conditions would surcharge the existing sewer network.
Basement Flooding Protection Subsidy	Not included.
Mandatory Downspout Disconnection	Select stormwater subcatchment within the City had alterations to overland flow parameters to represent downspout disconnection.
Mandatory Foundation Drain Disconnection	All sanitary RDII subcatchments with lots older than 1980 had a 56% reduction of contributing area compared to baseline conditions.
Green Infrastructure/Low Impact Development (LID) Measures	In East Windsor these measures were applied to all stormwater drainage systems. In South and Central Windsor these measures were applied where needed as part of solutions to solve flooding.
Lot Grading	Not included.
Other Household Management Strategies	Not included.

It is recommended that the efficacy and benefit of downspout disconnection, foundation drain disconnection and low impact development (LID) measures be assessed in greater detail with pilot project monitoring programs. Additional details are provided in Section 6.

3.1.3 Modelling of Source Control Measures

Several future condition source control improvements were considered in the modelling assessment of basement flooding solutions (description for modelling of surface flood mitigation source controls are detailed in Section 5.1.2. The source control measures were represented in the InfoWorks ICM model prior to applying the use of more traditional "hard infrastructure" (i.e., larger pipes, increased PS capacity, etc.) in the development of basement flooding solutions. The source control measures are a fundamental component of the balanced approach to solution development used in this project.

These source control measures related to basement flood risk reduction and conditions in sanitary sewer system include disconnecting foundation drains from the sanitary system, removal of extraneous RDII through sealing of maintenance hole covers, continued and improved sewer system maintenance (i.e., repairing “leaky” sewers and MHs exhibiting high infiltration), and installation of backflow prevention devices stopping clean storm water from entering the sanitary system when the storm sewer water levels surcharge at storm-sanitary sewer overflow connection points.

The source control measures related to basement and surface flood risk reduction in combined sewer systems (Central Windsor and a portion of East Windsor) include complete separation of storm and sanitary sewer flows, disconnection of directly connected downspouts from the sewer to be discharged to ground surface, installation of low impact development (LID) measures to reduce total inflow to the sewer, and installation of backflow prevention devices stopping clean storm water from entering the sanitary system when the storm sewer water levels surcharge at storm-sanitary sewer overflow connection points.

The source control measures related to surface flooding in separated sewer areas include installation of low impact development (LID) measures to reduce total inflow, disconnection of directly connected downspouts and installation of backflow prevention devices stopping high water level in outlet system (Detroit River, Little River Watercourse, etc.) from surcharging back into the storm sewer system.

Model input details considered in the solution development and assessment process related to source control measures that reduce basement flooding risk are provided below. Details of source control measures that reduce surface flooding risk are presented in Section 5.

3.1.3.1 Sanitary Rain Catchers and Maintenance Hole Sealing

All sewer systems are modelled with nodes which generally represent maintenance holes, conduits are used to represent sewer pipes, and the flow on the ground surface is represented with triangular mesh elements. Excess stormwater runoff that surcharges from the storm or combined sewer system to the surface may in the model (and in real-life) enter the sanitary sewer system via the maintenance holes pick hole openings. Refer to Figure 1.1 in Section 1.3.1 for a schematic of the surface and underground drainage system connection.

The rate of which water can enter the sanitary sewer system from MH pick hole openings is defined within a head-discharge rating curve; where, flow into or out of the node is defined by the net hydraulic head acting on the same node. The project recommendations include system-wide lid sealing with rain-catcher devices to reduce this source of RDII. In the model, this was accounted for with a universal 80% reduction to the flow ordinates of the head-discharge curve. The 80% reduction factor was applied to account for imperfect installations, minor inflow at proper installations, and broken or missing units. A comparison of the existing conditions and solution conditions head-discharge curve for the sanitary sewer system MH pick hole openings is provided in Figure 3.1 below.

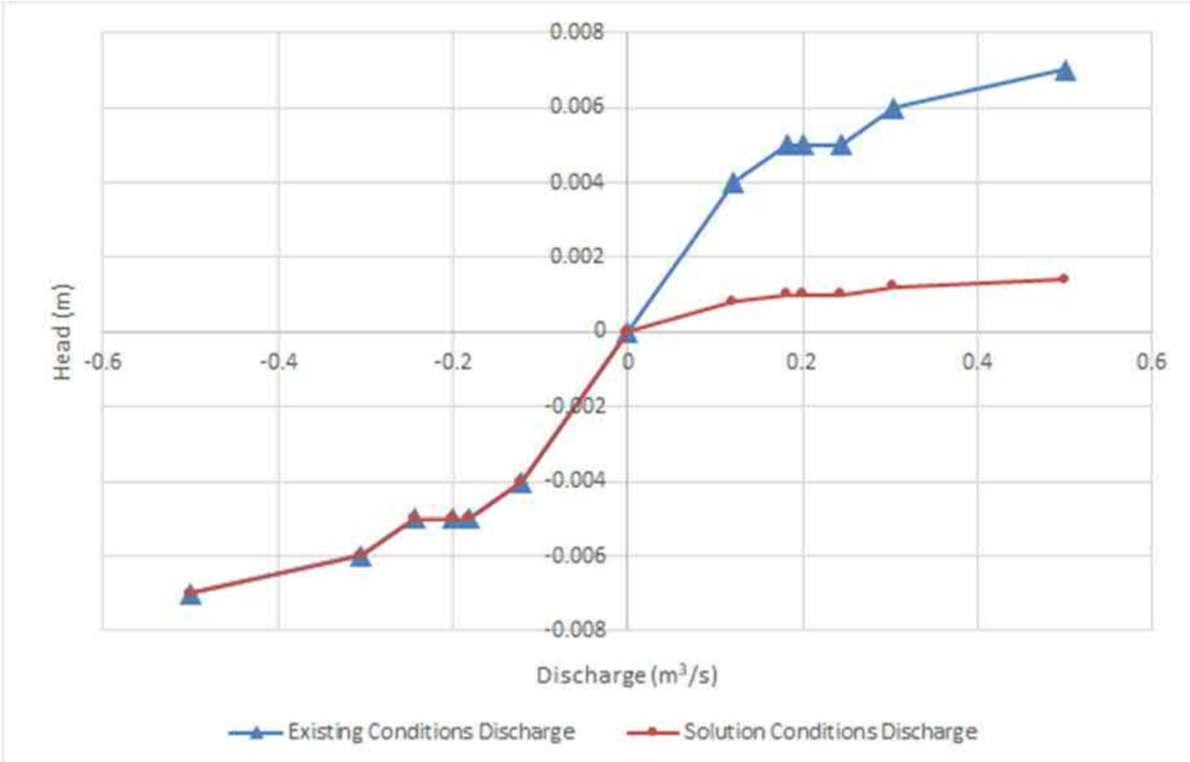

Figure 3.1: Comparison of Sanitary Sewer Lid Hole Opening Head-Discharge Curves

In Figure 3.1, positive and negative head values represent conditions where the net hydraulic head acting on a node is above ground and below ground, respectively. In the solution conditions model inflows from the surface to the sanitary sewer system were reduced by 80%; however the outflow from the node to surface was maintained using the curve as existing conditions. This portion of the curve was maintained as a partial relief of the sanitary system as many others were not included in the model (service connection pipes, basements, etc.); this ultimately allowed for a better comparison between existing and solution conditions.

The reduction of MH lid inflow was only applied to sanitary sewer nodes and not combined sewer system nodes. The highest yield for flood risk reduction return in implementing sanitary sewer MH lid sealing would be in low lying locations of completely separated or mostly separated sewer systems.

A first round of MH to be retrofitted with rain catchers to mitigate the inflow is included in Appendix C. Short Term Recommendations Report.

3.1.3.2 Mandatory Foundation Drain Disconnection

It is recommended that a City-wide mandatory foundation drain disconnection program or policy be implemented. The Central Windsor service area, which is primarily serviced by a combined sewer system, was not recommended for mandatory foundation drain disconnection. In this area, the recommendation was to disconnect where feasible with a lower priority in systems currently designed for conveyance of combined sewer. Figure F.3.1 shows the areas where this mandatory program is recommended for implementation.

A City-wide program of this nature, especially one that requires significant improvements to plumbing infrastructure on private properties, will require significant public partnership. The City will need to develop a program to educate the public, facilitate the construction and enforce this mandatory program.

The estimated reduction of RDII in the sanitary sewer system from the proposed foundation drain disconnection is a significant component of the basement flood risk reduction strategy. Based on other sanitary sewer and basement flooding studies it was identified in older residential neighbourhoods that up to 80% of the total RDII volume and peak flow were generated from foundation drains connected to the sanitary sewer, refer to the RDII case studies presented in Technical Report Volume I.

To model the reduction of inflow to the sanitary sewer system, under conditions where foundation drain discharge was removed from the sanitary sewer system, a 56% reduction factor was applied to all WWF response subcatchment that spatially intersected residential buildings older than 1980. A 56% reduction factor was determined in consultation with City Administration and following review of preliminary solution model outputs, ultimately arriving with the following:

- 80% (uptake factor) x 70% (foundation drain contribution factor) = 56% reduction factor

The recommendation for this source control measures is to be applied at all residential buildings constructed on or before 1980, however the 80% (uptake factor) was implemented with a built-in factor of safety, as the program is recommended for all buildings. The 70% (foundation drain contribution factor) was implemented as a representative contribution of the total flow in a sanitary sewer system that foundation drains add during wet weather events, as identified in the case studies presented in Technical Report Volume I.

The existing conditions model was developed with two types of WWF sources in the sanitary sewer system; a fast and slow response. Both types of responses were reduced by 56%.

3.1.3.3 Infrastructure Maintenance and Assessment

The City currently performs comprehensive infrastructure and asset condition assessment programs for sewers and related infrastructure. These programs guide decision making of sewer replacement, repair, and upgrade projects. Multiple practices are recommended in the upgraded maintenance program, many of the recommendations are related to the storm sewer systems or surface flooding risk reduction. The associated practices related to reducing basement flooding risk and improving the sanitary sewer system are continued inspection, cleaning, and repair of leaky sanitary sewer infrastructure coupled with an inspection and replacement program for the proposed MH lid rain catchers.

To model the flow reduction from the proactive infrastructure maintenance measures a 5.0% reduction was applied to all sanitary WWF subcatchments. This factor was determined in consultation with City Administration, findings from other studies, and following review of preliminary solution model outputs, ultimately arriving with the following:

- 20% (improvement factor) x 25% (ROW factor - proportion of total RDII contribution) = 5.0% reduction factor

The relative contribution of private property RDII sources compared to the total RDII in the sanitary sewer is understood from other studies to be in the range of 65%- 85% of the total contribution. The average proportional contribution from the municipal ROW for both lands with and without connected foundation drains was therefore estimated to be 25% of total RDII. This value is based on findings from other studies and the consideration that approximately only one-fourth of the total underground sanitary sewer pipes are within the ROW.

The “20%” improvement was selected with an understanding the City is currently pro-actively monitoring and repairing, leaking or damaged pipe; therefore the change in subcatchment model parameters represents only a limited proportional improvement. Further, in selecting this improvement factor, consideration was given to the fact that infrastructure is in a constant state of decay and that a safety factor should be applied.

Both the “25% (ROW factor - proportion of total RDII contribution)” and the “70% (foundation drain contribution factor)” should not be considered exact values. Nor, should the remaining 5% be considered as the contribution of private properties if foundation drains were disconnected. The “70%” factor for foundation drains is applied spatially based on age of residential buildings. Both factors are estimates of relative proportions of RDII and it should be noted the model was calibrated with spatial variability in the estimated WWF responses from the numerous modelled subcatchments.

3.1.3.4 Sewer Network Backflow Prevention Devices

A few select backflow prevention devices were added at locations in the model where the storm sewer may surcharge back to the sanitary sewer network. A list of locations will be provided to the City separate from this study. The backflow prevention devices were modelled as flap valves in the InfoWorks ICM software. In general, the City has been proactive with installing such devices as these locations, it is recommended this is continued.

3.1.3.5 Surface Flooding and Storm Sewer Source Controls

Details of how surface flooding and storm sewer source control measures were included in the model assessment of solutions are presented in Section 5.1.2. These source control measures primarily include green infrastructure/low impact development measures and a mandatory downspout disconnection policy. The use of backflow prevention devices are also applicable to reduce surface flooding risks, as recommended to protect storm sewers from high water level conditions in receiving systems.

3.2 Central Windsor - Basement Flooding Alternatives

3.2.1 Background

The Central Windsor region contains a substantial portion of the City's oldest development and has unique drainage servicing, where the majority is provided by combined sewer and dual maintenance hole (MH) sewer systems. Less than 20% of the lands in the Central Windsor service area are serviced by fully separated storm and sanitary sewer systems.

The combined sewer systems convey stormwater runoff, sanitary sewage, and industrial wastewater in a single pipe. Under dry weather conditions, all flows are conveyed to a treatment plant. Under wet weather conditions, stormwater runoff sometimes exceeds the combined sewer's capacity, resulting in overflow to the Detroit River. The dual MH sewer system has two pipes in parallel, where one pipe is used for the conveyance of stormwater and a second lower pipe is designed for conveyance of sanitary sewage, for details refer to Figure 3.2. Under wet weather conditions flows between the two pipes in the dual MH sewer system can mix.

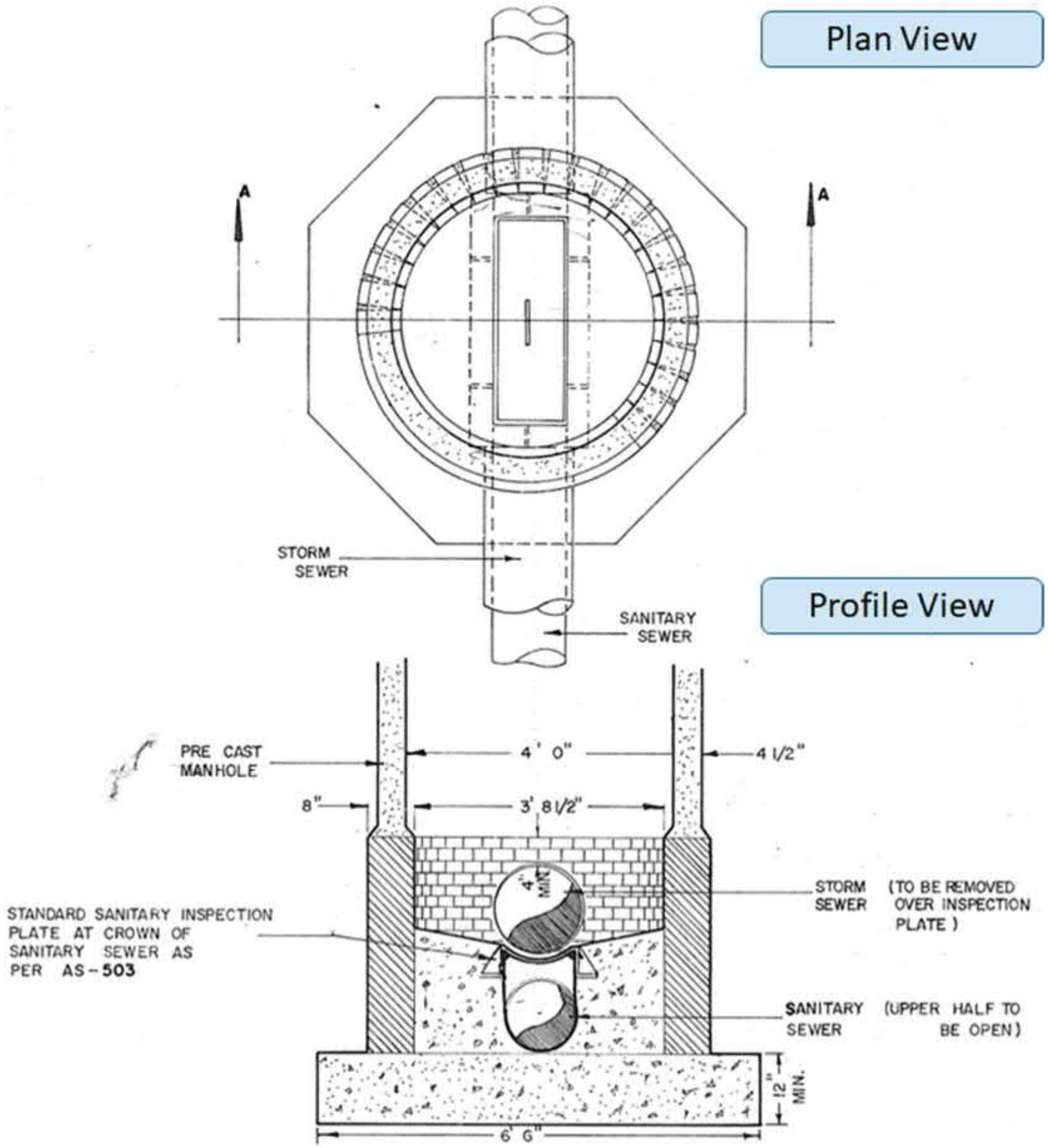

Figure 3.2: City of Windsor Standard Drawing AS-501: Manhole for Dual Sewers (Jan, 1976

Both the combined sewer and dual manhole sewer systems are designed to convey stormwater but under heavy rainfall conditions, there is potential for the water levels in the sewers to surcharge. This increases the risk of basement flooding in properties without backflow preventers or similar protection measures.

As previously identified, CSO discharge to receiving systems are regulated by the MECP F-5-5 guidelines. The City of Windsor currently implements a CSO management strategy to meet the criteria of the same guidelines which includes limiting overflows to the Detroit River and providing water quality treatment for overflows with Retention Treatment Basins (RTB) to promote settling of solids prior to discharge to the River. Currently, the City implements this strategy with the existing Riverfront RTB, approximately located north of Riverside Dr. between Glengarry Ave. and Almer Ave., which services the portion of the Central Windsor service area generally east of Caron Ave. A plan for a second RTB facility, near the LRWRP is proposed to manage and treat the remainder of the service area's CSOs (Windsor Riverfront West CSO Control "Schedule C" Class EA, Environmental Servicing Report. Stantec – July 2019).

The City's first RTB was recently constructed under a riverfront parking lot to assist with CSO treatment for the contributing area of the City. The retention treatment basin provides a storage volume of 8,000 m^3 as outlined within the final design brief for the Riverfront RTB dated October 5, 2009 and was considered within the baseline model calibration. The existing RTB system's peak flow rate is approximately 7.8 m^3/s, as controlled by the influent PS.

To support the City's current strategy for management of CSO, a second RTB unit is planned to be constructed adjacent to the LRWRP. It is estimated this new treatment unit will have a flow through capacity up to 9.1 m^3/s, providing treatment for combined sewage before discharge to the Detroit River. The RTB was not considered in the existing conditions model, but was incorporated in the ultimate conditions model.

3.2.2 Central Area Basement Flooding Alternatives

Two alternatives were considered for the Central Windsor service area, as identified below.

- SAN-C-1 - Complete Enhanced Sewer Separation of the Combined Sewer and Dual MH systems.
- SAN-C-2 - Maintain the current strategy of soft separation and achieving CSO F-5-5 measures with the use of the existing and proposed second RTB units.

Refer to Figure F.3.2 which presents details of alternative SAN-C-1. No figure is provided for the alternative SAN-C-2, as this alternative continues with the City's existing strategy for management of surface and basement flooding.

<u>Alternative SAN-C-1</u>

This alternative includes complete separation of combined sewer and dual MH sewer systems where ultimately stormwater runoff is conveyed in an independent separate pipe from the sewer pipe containing domestic sewage. In the combined sewer system area this would include:

- Removal of all surface and roof (downspout) drainage from the sewer.
- Where feasible removal of building foundation drainage from combined sewer.

In the dual MH system this alternative would include replacement of all dual MH sewers with separated storm and sanitary sewers in conjunction with disconnection of building foundation drainage from the sanitary system.

The complete separation of the combined sewer was found to be required to meet the project basement flood risk reduction objective, where the surcharge conditions (HGL is deeper than 1.8 m below grade) in the sanitary and combined sewer is approximately 10% or less under the 1:100 year storm event area-wide. Several partial separation scenarios were reviewed, however those scenarios did not meet this objective, even if coupled with significant surcharge storage.

Partial separation scenarios were considered and were found to not meet the flood risk reduction objectives. These scenarios include:

i) Complete removal of all front yard and ROW drainage from the combined/sanitary system; and

ii) Complete removal of all front yard, rear yard and ROW drainage from the combined/sanitary sewer system.

It was confirmed that all surface and roof drainage needed to be conveyed in a separate sewer system in order to provide sufficient relieve to the combined sewage system.

This alternative is a long-term strategy, where all roadway, rooftop, and other surface drainage would be gradually removed from the combined (or sanitary) sewer and added to an existing or new separate storm sewer system. Existing and new combined/sanitary sewers could continue to convey domestic sewage and existing foundation drain flow contributions. It is envisioned as the gradual separation of drainage occurs, that existing sanitary and combined sewers will be replaced with like-for-like sewers with the approximate same size and inverts as existing.

In the dual MH area; this separation would include all of the recommendations for the combined sewer area and further it would also include the disconnection of foundation drains from the sanitary/combined sewer, where flows would be discharged to the ground surface, ultimately being drained into the storm sewer system.

These would likely be implemented in conjunction with sewer and road rehabilitation projects, and should be coordinated following the proposed storm sewer drainage area mosaic and new storm sewers as identified in Section 5.3.2.1. The drainage area mosaic identifies the recommended drainage boundaries for the proposed separated system. Refer to Figure F.3.3 which presents summary details of system-wide storm sewer improvements proposed as part of alternative SAN-C-1.

This alternative includes area-wide full compliance with downspout disconnection allocations for residential rear yard alley connections to a separate storm sewer. Existing larger buildings (commercial, industrial, apartments, etc.) may have internal roof drainage directed to a combined sewer. In these cases "redevelopment" and related approvals under the Planning Act (or other regulations) may be an opportunity and mechanism to mandate future developments to redirect their site drainage to a separate storm sewer.

This strategy was established as a long term approach to reducing basement flooding risk, and was not designed as a CSO management approach. Therefore, in combination with this strategy, the existing approach to CSO management will need to be sustained. This would include continued operation of the existing RTB and implementation of the second proposed facility to manage CSOs (CSO Study, Stantec 2019).

It is expected that as complete separation of the sewer system is undertaken a gradual reduction in CSO would occur. After a significant separation of the sewer system has been completed it may warrant a review of the function of the RTB; however it is envisioned that this review would not be required until a substantial amount of sewer separation is completed.

This alternative, which includes separation of a combined sewer system under approximately 400 km of roads, differs from the East and South Windsor service areas. The East and South Windsor surface and basement flooding solutions are generally independent; however in the Central Windsor service area solutions are dependent. Basement flooding risks are reduced by removing WWF from combined/sanitary systems, but was then these flows have been added to and accounted for in the storm sewer system. The stormwater previously conveyed by the existing combined system will be managed with a combination of new and existing separated storm sewers. The proposed servicing for the Central Windsor separate storm sewers are presented in Section 5.

Alternative SAN-C-2

This alternative includes continuing the current soft separation practice where a partial removal of stormwater flows from the combined sewer is achieved. This is generally accomplished by directing roadway runoff to a new storm sewer. With this approach, there is still the potential for private properties (downspout and rear yard) runoff to enter the combined sewer.

Further, this alternative, continues the existing strategy for CSO management developed for the Central Windsor area, in coordination with the MECP. However, this alternative does not meet the basement flood risk reduction objective.

An evaluation of the two alternatives is presented in Table 3.2.

Table 3.2: Comparison of Central Windsor Basement Flooding Alternatives

Evaluation Criteria	Alternative SAN-C-1	Alternative SAN-C-2 (Do Nothing)
Description	Complete Enhanced Sewer Separation of Combined Sewer and Dual Manhole Systems	Continued Soft Separation and CSO Management
Meets Flood Mitigation Objectives	✓	Does not Meet Flood Mitigation Objectives
Resiliency to Climate Change	✓	
Ease of Construction		
Impact to Environment		

Evaluation Criteria	Alternative SAN-C-1	Alternative SAN-C-2 (Do Nothing)
Impact to Heritage and Archaeological Resources		
Disruption to Residents		
Impact to Recreational Space		
Time to Implement		
Cost	✓	

Alternative SAN-C-2 was not found to meet the basement flood risk mitigation objective and therefore, alternative SAN-C-1 is considered preferred.

3.2.3 Results of the Preferred Alternative

Understanding the basement flooding model results:

The basement flooding assessment is completed by reviewing the one dimensional sewer elements, in specific the nodes representing the sanitary and combined sewer networks. The assessment compares the depth of the maximum sewer HGL to the ground surface. The depth of residential basement floors are assumed to be up to 1.8 m below ground surface. The basement elevation, estimated relative to the ground surface, was established as the metric to compare the modelled HGL in the sanitary/combined sewers and to estimate the potential for basement flooding risk. For the purposes of this study, the depth of the HGL, is as it compares to estimated basement depths is a good indicator of basement flood risk. It should be noted that the use of sewage ejector pumps is recommended for installation in new homes to mitigate risks of backup from conventional gravity sanitary private drain connections. Retrofit of existing homes with sewage ejector pump is also encouraged however there may be limitations due to internal plumbing configurations and the need for internal and external construction (i.e. floor, wall, and pavement restoration).

Depth of the HGL below ground was assessed at each node in the model under the various design storm events. Nodes where the HGL was less than 1.80 m below the ground surface were considered surcharged to basement elevations, representing a flooding risk.

A model node generally represents a single MH structure, however, there are exceptions including nodes that represent ponds or underground storage, and further MH structures with overflow controls (weirs, etc.) may be represented with more than one node in the model.

Model Results of Preferred Basement Flooding Solution, SAN-C-1:

The Central Windsor model results for the sanitary and combined sewer under the 1:5 year, 1:25 year, 1:100 year, and climate change design storms are presented in Figures F.3.4 to F.3.7. Summary statistics for the existing condition and preferred solution condition sewer performance estimates are provided in Table 3.3.

The table identifies for each sewer system type the total number of nodes included in the model and the percent of nodes that exceed the HGL criteria under the various design storm events. The negative system-wide average depth for the sanitary sewer system under existing conditions and the climate change design storm indicates that under the peak or maximum conditions the majority of sanitary sewer nodes within the model have a HGL above ground, with an average of 0.70 m above ground.

Table 3.3: Summary of Central Windsor Basement Flooding Sewer Performance

Sewer System Type and Model Scenario	Total Number of Model Nodes	Percent of Nodes with HGL above Basement Elevation	System-wide Average Depth of HGL below Ground
1:5 Year Design Storm			
Existing Condition Sanitary	1764	28.2%	2.24m
Preferred Condition Sanitary	1792	5.4%	3.38 m
Existing Condition Combined	2714	55.1%	1.59m
Preferred Condition Combined	2611	7.5%	3.27 m
1:25 Year Design Storm			
Existing Condition Sanitary	1764	58.1%	1.33m
Preferred Condition Sanitary	1792	7.1%	3.22 m
Existing Condition Combined	2714	68.6%	1.14m
Preferred Condition Combined	2611	7.9%	3.20 m
1:100 Year Design Storm			
Existing Condition Sanitary	1764	86.2%	0.32m
Preferred Condition Sanitary	1792	16.6%	2.78 m
Existing Condition Combined	2714	84.0%	0.57m
Preferred Condition Combined	2611	11.8%	3.03 m
Climate Change Design Storm			
Existing Condition Sanitary	1764	91.6%	(-)0.70m
Preferred Condition Sanitary	1792	67.5%	1.24 m
Existing Condition Combined	2714	90.3%	0.10m
Preferred Condition Combined	2611	35.6%	2.24 m

There was a reduction in the total number of combined sewer nodes between existing and proposed conditions. This is a result of the “separation” of the storm sewer system in the model where select nodes were removed to create a separated sewer model of the Central Windsor service area. Further there was an increase in the total number of sanitary sewer nodes between existing and proposed conditions. This is a result of the increased separation and allocations for future development.

3.3 South Windsor - Basement Flooding Alternatives

3.3.1 Background

The South Windsor service area has fully separated storm and sanitary sewer systems. However, under extreme wet weather conditions a significant amount of RDII enters the sanitary sewers creating the potential for the system to surcharge and for basement flooding. The alternatives were developed to reduce basement flooding potential to meet the risk reduction criteria. As previously identified, the flood risk reduction objective is to reduce the water levels in the City's sanitary sewer system, such that 10% or less of the sewers surcharge to levels that could result in basement flooding, under the 1:100 year design storm conditions.

3.3.2 South Windsor Basement Flooding Alternatives

Two alternatives were considered for the South Windsor service area, as identified below. Refer to Figure F.3.8 which presents details of alternative SAN-S-1 and SAN-S-2.

- Alternative SAN-S-1 - Targeted Sub-trunk Storage.
- Alternative SAN-S-2 - Decentralized Upstream Storage.

Further, both alternatives also include the following sanitary sewer system improvements:

- Increased sewage treatment capacity at the LRWRP, with construction of a new retention treatment basin (RTB). This proposed RTB unit adds an additional 9.1 m^3/s of outlet capacity to the Central and South Windsor systems, which is proposed to be constructed just west of the LRWRP. This RTB was evaluated through a separate MCEA project. (Stantec 2019)
- Disconnection of all existing residential foundation drainage from the sanitary system.
- Reduced inflow into the sanitary system following sealing of manhole lids and continued repair and sealing of existing leaky sewer pipes and manhole structures.
- No changes to the sanitary flow allowances from the Town of LaSalle inflow points.

<u>Alternative SAN-S-1</u>

This alternative includes construction of updated new sanitary sewer sub-trunks to provide increased conveyance and additional storage for excess RDII in the sewer network. These sub-trunk sanitary sewer improvements are for upgraded sewer pipes ranging in size between 750 mm and 900 mm diameter for approximately 8 km on Dominion Blvd, Woodland Ave, Howard Ave, Parkway Ave, Conservation Dr., Grand Marais Rd. E., and Tourangeau Rd.

Further, as alternatives were developed following a balanced approach both source control measures and outlet capacity improvements play an integral part. Therefore, the conveyance capacity and storage sub-trunk improvements are coupled with source control measures reducing the total RDII entering the sewer and increased outlet capacity at the LRWRP.

Alternative SAN-S-2

This alternative includes construction of updated new sanitary sewer, de-centralized upstream improvements to provide increased conveyance and additional storage for excess RDII in the sewer network. These sanitary sewer improvements are for upgraded sewer pipes ranging in size between 600 mm and 750 mm in diameter for approximately 26 km of various roadways in the service area, refer to Figure F.3.8 for a location plan of the sewer improvements. This also included source control measures to reduce the total RDII entering the sewer and increased outlet capacity at the LRWRP.

An evaluation of the two alternatives is presented in Table 3.4. Both alternatives were found to meet the basement flood risk reduction objective and have similar flood resiliency for severe climate change conditions, however alternative SAN-S-1 was found to be less expensive and require less construction; therefore SAN-S-1 was found to be the preferred alternative.

Table 3.4: Comparison of South Windsor Basement Flooding Alternatives

Evaluation Criteria	Alternative SAN-S-1	Alternative SAN-S-2
Description	Targeted Sub-trunk Storage	Decentralized Upstream Storage
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	
Disruption to Residents	✓	
Impact to Recreational Space	✓	✓
Time to Implement	✓	
Cost	✓	

3.3.3 Results of the Preferred Alternative

The South Windsor service area model results for the sanitary sewer under the 1:5 year, 1:25 year, 1:100 year, and climate change design storms are presented in Figures F.3.9 to F.3.12. Summary statistics for the existing condition and preferred solution condition sewer performance estimates are provided in Table 3.5.

The table identifies the total number of nodes included in the model and the percent of nodes that exceed the HGL criteria under the various design storm events. The negative system-wide average depth for the sanitary sewer system indicates under peak or maximum conditions the majority of sanitary sewer nodes within the mode have a HGL above ground, with an average of 0.64 m above ground. For additional details related to interpreting the basement flooding model results refer to Section 3.2.3.

Table 3.5: Summary of South Windsor Basement Flooding Sewer Performance

Sewer System Type and Model Scenario	Total Number of Model Nodes	Percent of Nodes with HGL above Basement Elevation	System-wide Average Depth of HGL below Ground
1:5 Year Design Storm			
Existing Condition Sanitary	3188	4.6%	4.07m
Preferred Condition Sanitary	3211	1.4%	4.50 m
1:25 Year Design Storm			
Existing Condition Sanitary	3188	33.5%	2.32m
Preferred Condition Sanitary	3211	2.6%	4.27 m
1:100 Year Design Storm			
Existing Condition Sanitary	3188	63.2%	0.95m
Preferred Condition Sanitary	3211	6.5%	3.66 m
Climate Change Design Storm			
Existing Condition Sanitary	3188	92.5%	(-)0.64m
Preferred Condition Sanitary	3211	63.4%	1.28 m

3.4 East Windsor - Basement Flooding Alternatives

This section summarizes existing infrastructure, description of alternatives and of the proposed solution for basement flooding issues within the East Windsor service area.

3.4.1 Background

The East Windsor service area consists of combined, partially separated and fully separated sewers. After discussion with the City, it was agreed that in order to reduce flows to the LRPCP, it would be necessary to fully separate the combined sewer systems in this service area.

There is one major area, within the East Windsor system, that contains combined sewers. This area as shown in Figure F.3.13, is generally located east of Pillette Rd., west of Jefferson Blvd. and south of South National St. The peak flow from this area, for the 1:100 year event is approximately 2.2 m^3/s. This flow exceeds the treatment capacity of the LRPCP (1.15 m^3/s) and is almost as large as the LRPCP's inlet PS capacity, nominally 2.6 m^3/s. Due to the impact this area has on the downstream sanitary system, sewer separation will be an integral part of all basement flood mitigation alternatives. Sewer separation, for the purpose of this assessment, would remove all stormwater flows (including ROW, front yard, rear yard, and roof drainage) from the existing combined sewer system.

Under existing conditions, during major rain events, there are sewage flow conveyance and outlet restrictions caused by the significant volume of extraneous flow entering the sanitary system. The sanitary sewer system, which was not designed to convey rain derived storm flows, becomes overwhelmed which causes back up in the system and subsequently into unprotected basements. Also, at the downstream end of the sanitary system, the LRPCP cannot accept the peak flow volumes resulting from the significant volume of flows from each sanitary sewer inlet. Excess flows which cannot be treated are directed to an overflow that provides preliminary screening and disinfection only. The overflow then is directed to the Little River Drain. Any additional flows reaching the LRPCP beyond the capacity of the inlet PS have the potential to cause a backup in the sanitary sewer network, resulting in an increased risk of basement flooding. Further the Pontiac PS may only provide bypass capacity when the storm sewer water levels have receded, normally well after the peak of severe storm events.

In 2018, Dillon undertook a study of the Pontiac, St. Paul, and St. Rose Drainage Area Study (St. Paul/Pontiac Study 2018) and this bypass and the findings are summarized as follows. The sanitary trunk sewer directly upstream of the LRPCP is hydraulically connected by a bypass to the Pontiac PS at an overflow weir elevation of 170.38 m. The bypass is triggered by a sluice gate which is closed under dry weather and minor storm conditions, but opens when the water level in the LRPCP wet well reaches 170.69 m asl (meters above sea level). Under current operating conditions, the water levels in the Pontiac PS inlet chamber are occasionally too high during larger storm events, where the bypass is required to provide significant release from the existing sanitary sewer system. Based on the operation of the existing screw pumps, it is estimated that when the water level is at the top of PS's overflow weir level (170.38 m), the capacity of the large pumps is approximately 70% of the design capacity. Due to this decreased capacity, the pumps are unable to lower the water level in the inlet chamber to the sanitary sewer system bypass elevation to facilitate a controlled bypass. Without sufficient capacity in the Pontiac PS, events exceed both the LRPCP inlet PS capacity and the ability of the Pontiac PS to accept bypass results system backups.

3.4.2 East Windsor Basement Flooding Alternatives

Two basement flood risk reduction alternatives were developed for the East Windsor service area summarized below. Refer to Figure F.3.13 for schematics showing the extent of each alternative.

- Alternative SAN-E-1 – Maintain the capacity of the current inlet PS at the LRPCP (2.6 m^3/s), construct an underground storage facility under McHugh Park and construct 45.6 km of improved sanitary sewer.
- Alternative SAN-E-2 - Increase the capacity of the current LRPCP inlet PS (5.2.m^3/s) coupled with 45.6 km of improved sanitary sewer. In the interim, in advance of the future LRPCP treatment plant expansion, the need for improving the existing bypass at the treatment plant is required to meet the basement flood mitigation objectives.

Further, both alternatives also include the following sanitary sewer system improvements:

- Disconnection of all existing residential foundation drainage from the sanitary system; and

- Reduced inflow into the sanitary system following sealing of manhole lids and continued repair and sealing of existing leaky sewer pipes and manhole structures.

The basement flooding mitigation solutions also assume full build-out of the East Windsor vacant developable land areas, and allowance of peak wastewater allowance from the Town of Tecumseh based on the current servicing agreement and includes a conservative allowance for wet weather RDII that exceeds recommended maximum allowances, as discussed in detail in Section 2.5.

WWF Management – Improvement to the existing LRPCP By-Pass
(Interim Conditions - No upgrades to the LRPCP)

The 2018 St. Paul/Pontiac study determined that the LRPCP Bypass is not available during major rain events, due to the active hydraulic grade elevations in the City's storm system, as described above. It was recommended that the following improvements be implemented:

- Re-direct the existing bypass sewer that connects the sanitary sewer system to the Pontiac PS, to a new wet well structure proposed to be located south of the existing Pontiac PS;
- Construct a new wet well structure to house three 1.2 m^3/s pumps; and,
- Construct an outlet from new wet well structure to the Little River Drain adjacent to the existing Pontiac PS outlet.

At this time, the current population treatment demand does not justify the expansion of this treatment plant. Timing related to population growth from the build out of vacant lands is variable and unknown. To meet the basement flood mitigation objectives of this study, immediate relief is required to address concerns over safety and considerable property damage that could be expected if no improvements are completed at the downstream end of the East Windsor sewage system, therefore the existing bypass capacity of the treatment plant is recommended.

In addition to improvements to the pumped bypass to following is also recommended:

- Including an upstream "gate controlled" connection between the existing Pontiac PS and the new by-pass. This would allow for more regular running of the new pumps for maintenance purposes;
- The new by-pass PS should have equipment for flow monitoring to help with by-pass recording and reporting;
- Consider sharing the existing discharge apron from the Pontiac PS with the new by-pass PS;
- Consider having back-up pumps for the new by-pass; this differs from the Pontiac/St. Paul Report (2018).

As described earlier in this report and as recommended by the MECP, the comprehensive solution developed to mitigate basement flood risk is relying on improvements along all levels of the sewage system (source control, conveyance system improvements and downstream improvement). As much as possible, source control measures where used to mitigate the need to implement costly infrastructure improvements and to reduce volume of sewage being directed to the LRPCP. The following table provides a summary of the sewage system WWF response under various scenarios.

Table 3.5.1: LRPCP – Summary of Wet Weather Sewage Inflow Scenarios

Scenario	Assumptions	Variable	1:100 Year Storm Level of Service
1) Ultimate Build Out Conditions	Excludes source control measures, conveyance system measures and treatment plant improvements	Peak Flow to Plant (m^3/s)	4.9
		24 Hour Total Volume at Plant (m^3)	288,736
		% of Sewer System at Surcharge Risk	95%
2) Ultimate Build Out Conditions, with Source Controls Only	Excludes conveyance system measures and treatment plant improvements. Includes source control for reduction from MH sealing, sanitary sewer sealing, private property foundation drain disconnection and separation of 200 ha of existing combined sewer area.	Peak Flow to Plant (m^3/s)	4.7
		24 Hour Total Volume at Plant (m^3)	244,270
		% of Sewer System at Surcharge Risk	74%
3) Ultimate Build Out Conditions, with Source Controls and Conveyance System Improvements	Excludes treatment plant improvements. Includes source control flow reduction from MH sealing, sanitary sewer sealing, private property foundation drain disconnection and separation of 200 ha of existing combined sewer area.	Peak Flow to Plant (m^3/s)	5.1
		36 Hour Total Volume at Plant (m^3)	311,755
		% of Sewer System at Surcharge Risk	10%

WWF Management – Ultimate Conditions (LRPCP Plant Expansion)

As noted in Section 2.3.1, the existing treatment plant operational capacity is established based on the average daily sewage inflow rates reflective of the existing population. Some municipal wastewater treatment facilities incorporate peak WWF management approaches into their design, typically through the addition of chemical enhancements to the clarification process, or modification of the flow routing through the facility under WWF conditions. In these cases, typically a portion of the incoming wastewater flow is treated through the biological process, while the remainder receives enhanced clarification. In some instances the combination of biological treatment and enhanced clarification can provide an increased peak plant capacity of approximately five times "average day" rated capacity.

A potential wet weather enhancement of the LRPCP could allow management of the full projected WWF under the future flow scenarios through the treatment process with the need for less flow to fully bypass the facility.

Alternative SAN-E-1

This alternative maintains the current LRPCP inlet PS capacity (2.6 m^3/s) by limiting inflow from each of the five (5) inlets to the LRPCP to approximately 0.5 m^3/s. This alternative consists of improving conveyance and storage capacity by constructing approximately 37.0 km of new sanitary sewers (450 mm to 2,700 mm diameter) and 8.6 km of box culverts (up to 2,700 mm x 4,200 mm), and a new off-line underground storage at McHugh Park (approximately 100,000 m3) as presented in Figure F.3.13. This facility would have access chambers but due to the depth the park could still operate as it does currently. Summary details of this alternative's conveyance and storage improvements are provided in Table 3.6.

Table 3.6: Proposed Infrastructure SAN-E-1

Infrastructure	Shape	Improved Size (mm)	Length (km)
Improved Sanitary Sewer	Circular	ranging from 450 up to 2700	37.0
New Box Culverts	Rectangular	from 1200 x 1325 up to 2700x4200	8.6
Infrastructure	Volume (m^3)		
New Underground Storage	100,000		

Alternative SAN-E-2

Following discussions with City Administration and MECP staff, it was agreed that considerations should be given to expanding the LRPCP inlet PS capacity. As noted above increasing the inlet PS capacity will be done upon expansion of the LRPCP. In the interim, the need to improve the Pontiac PS bypass will be required. The proposed upgrade to the Pontiac PS would provide dedicated capacity to the sanitary system with a peak flow rate of approximately 2.5 m^3/s.

To improve the bypass, a separate wet well structure is proposed to house two duty pumps. Each pump would have a capacity of 1.25 m^3/s; the total dynamic head is estimated at about 9.0 m. Based on the depth of the overflow pipe from the LRPCP, the depth of the PS is estimated at about 8.0 m below grade. Increased outlet flows from the Pontiac PS to the Little River Drain will need to be reviewed as it relates to the capacity of the existing drain. The recommendation of this study has been shared with the Little River Floodplain Report team to incorporate into their study and assess the impacts or mitigation measures required to accommodate the improved bypass. If the Little River Drain cannot accommodate the additional flow, the City may consider an alternative bypass sewer within the City's existing ROW be implemented to allow flows to discharge directly to the Detroit River,. The LRPCP bypass PS project is required to meet the Schedule C requirements of the MCEA process.

This alternative requires construction of approximately 37.0 km of new sanitary sewers (450 mm to 2,700 mm diameter) and 8.6 km of box culverts (up to 2,700 mm x 4,200 mm) to improve conveyance and storage capacity throughout the system. Summary details of this alternative's conveyance and storage improvements are provided in Table 3.7.

Table 3.7: Proposed Infrastructure (SAN-E2)

Infrastructure	Shape	Improved Size (mm)	Length (km)
Improved Sanitary Sewer	Circular	ranging from 450 up to 2700	37.0
New Box Culverts	Rectangular	from 1200x1325 up to 2700x4200	8.6
Infrastructure	Capacity (m^3/s)		
Upgraded Little River Pollution Control Plant	5.2		

This alternative is similar to that shown in SAN-E-1, with the exception that the release rate from the largest sewershed area that inlets into the LRPCP via Aspenshore St. is increased from approximately 0.5 m^3/s to approximately 3.1 m^3/s. Furthermore, this alternative does not require a storage facility at McHugh Park. Figure F.3.13 presents this alternative's proposed infrastructure upgrades.

An evaluation of the two alternatives is presented in Table 3.8. Both alternatives were found to meet the basement flood risk reduction objective and have similar flood resiliency for severe climate change conditions. However, alternative SAN-E-2 was found to be less expensive, requires less construction, provides more resilient basement flood protection, can be implemented more readily, and construction in McHugh Park is not required therefore would not impact McHugh park. Therefore SAN-E-2 was found to be the preferred alternative.

Table 3.8: Comparison of East Windsor Basement Flooding Alternatives

Evaluation Criteria	Alternative SAN-E-1	Alternative SAN-E-2
Description	Maintain current Little River PCP capacity coupled with underground storage at McHugh Park and improved sanitary sewer.	Increase current Little River PCP capacity coupled with improved sanitary sewer.
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change		✓
Ease of Construction	✓	✓

Evaluation Criteria	Alternative SAN-E-1	Alternative SAN-E-2
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents		✓
Impact to Recreational Space		✓
Time to Implement	✓	✓
Cost		✓

3.4.3 Results of the Preferred Alternative

The East Windsor service area model results for the sanitary sewer under preferred solution condition, for the 1:5 year, 1:25 year, 1:100 year, and climate change design storms are presented in Figures F.3.14 to F.3.17. Summary statistics for the existing condition and preferred solution condition sewer performance estimates are provided in Table 3.9.

The table identifies the total number of nodes included in the model and the percent of nodes that exceed the HGL criteria under the various design storm events. The negative system-wide average depth for the sanitary sewer system indicates under peak or maximum conditions the majority of sanitary sewer nodes within the model have a HGL above ground, with an average of 1.03 m above ground. For additional details related to interpreting the basement flooding model results refer to Section 3.2.3.

Table 3.9: Summary of East Windsor Basement Flooding Sewer Performance

Model Scenario Results for Sanitary and Combined Sewer Nodes	Total Number of Model Nodes	Percent of Nodes with HGL above Basement Elevation	System-wide Average Depth of HGL below Ground
1:5 Year Design Storm			
Existing Condition	2907	28.0%	2.73
Preferred Condition	2907	5.0%	3.90
1:25 Year Design Storm			
Existing Condition	2907	66.1%	1.31
Preferred Condition	2907	6.3%	3.69
1:100 Year Design Storm			
Existing Condition	2907	82.7%	0.31
Preferred Condition	2907	10.5%	3.32
Climate Change Design Storm			
Existing Condition	2907	93.7%	(-)1.03
Preferred Condition	2907	59.6%	1.48

The model simulation completed for the 1:100 year design storm events indicate that approximately 10.5% of the sanitary sewer system would be surcharged. Surcharge conditions of the sanitary sewers under the alternatives are confined to upstream sections of the system where local sewers are either undersized or have flat grades that would need to be resolved during design.

3.5 Considerations for Infill Development

The proposed solution measures identified above were designed to mitigate basement flooding risk under the 1:100 year design storm event, where considerations were made to represent "full build out" future conditions in the InfoWorks ICM software program. However, beyond the known future development planning areas, and known high potential future development considered directly in the modelling work, consideration should be given to further infill development and land use intensification.

To review the potential impact of further future infill development, a sensitivity analysis was undertaken. The sensitivity analysis varied the sanitary sewage dry weather and WWF subcatchment parameters where the total area, contributing area and population parameters were increased by varying percentages. For example a "2% intensification" would mean that a subcatchment with a 100 person population would now have a 102 person population and a runoff surface area of 1.00 ha would be 1.02 ha. A summary of the sensitivity analysis is provided in Table 3.10.

Table 3.10: Infill Development Intensification Sensitivity Analysis

Model Scenario	Percent of Nodes with HGL above Basement Flood Risk Criteria		
	Central Windsor Service Area	South Windsor Service Area	East Windsor Service Area
Preferred Solution Baseline	13.7%	6.5%	10.5%
2% Intensification	13.9%	7.0%	10.9%
4% Intensification	14.2%	7.9%	11.3%
8% Intensification	15.1%	10.0%	12.3%
16% Intensification	17.2%	15.1%	14.5%
32% Intensification	19.8%	28.7%	20.5%

The sensitivity analysis was conservative with the simplification that future infill would increase both the DWF and WWF subcatchment parameters proportionally; however it would be unlikely that an percentage increase in population would be proportional to drainage area contributing to the sanitary/combined sewer as the area contributing would likely increase at a significantly lower rate. For example, infill development often has a higher population density than the previous land use, additionally, where lands are redeveloped there may be potential to reduce total RDII from a site. Also, these increase factors were applied evenly over the enter sewershed area, and in reality infill development will only occur in a portion of these areas. The above table was developed as a worse case review for how infill development in Windsor would impact basement flooding potential under full solution and population build out conditions. It is recommended as future development plans are put forward that a more comprehensive and site specific review be completed assessing the impact to basement flooding risk.

A 0 to 8% intensification generally had a nominal impact on the flood risk; however the percentage of nodes at basement flooding risk did gradually increase within this range. The model results identified that in the East and Central Windsor service areas a less than 2% increase in nodes with a flooding risk was estimated under an 8% intensification scenario. In the South Windsor service area, under the 8% intensification scenario a 3.5% increase to system-wide basement flooding risk was estimated; however this was still within the project objective of 10% or less of basements having a flooding risk.

Under the 32% intensification scenario all three service areas had significant basement flooding risk. However, the East and Central Windsor service areas had more resiliency to intensification than South Windsor; where East and Central had approximately a 20% system-wide basement flooding risk and south had nearly a 30% system-wide risk.

3.6 Recommended Basement Flooding Solutions

Table 3.11 provides a summary of the recommended longer-term solutions (Preferred Alternatives) resulting from the comparative evaluation of the previous sub-sections, for the Central, South, and East SewerSheds respectively. It should be noted that in 2020, an update to the Municipal Class Environmental Assessment is scheduled which may alter the Schedule designation of these projects and therefore the City shall confirm schedules when information is made available.

Table 3.11: Summary of Preferred Basement Flood Reduction Alternatives

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Central	SAN-C	Central Windsor Sanitary Sewer System Solutions	Enhanced separation of the existing combined sewer system requiring the construction of a separated storm system to capture storm flows from the Municipal ROW, Private Property (Downspouts, Front and Rear Yards) and Rear Alleyways.	A+
South	SAN-S	South Windsor Basement Flood Risk Reduction Sanitary Sewer Improvements	Installation of upgraded sewer pipes ranging in size between 750 mm and 900 mm diameter for approximately 8 km on Dominion Blvd., Woodland Ave., Howard Ave., Parkway Ave., Conservation Dr., Grand Marais Rd. E., and Tourangeau Rd.	A+

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
East	SAN-E	East Windsor Basement Flood Risk Reduction Sanitary Sewer Improvements and LRPCP Improved Bypass	Improve conveyance and storage capacity of the East Windsor sanitary system by constructing approximately 47 km of new sanitary sewers (450 mm to 2,700 mm diameter) and box culverts (2.4 m by 4.2 m). Area-wide source control measures such as foundation drain disconnection are also required for this solution. Construction of a pump station adjacent to the existing Pontiac Pump Station to improve the wet weather bypass at the Little River Pollution Control Plant.	C

4.0 Surface Flooding - Level of Service

4.1 Introduction

The surface flood risk reduction, level of service criteria were established to improve conditions in three general categories as identified below:

- Regional areas where surface flooding was identified as a concern based on observations and records of historic events;
- Major roadways within the City including Arterial and Class II Collector Roads with highest priority given to flooding on major arterial roadways that provide critical north/south connections within the City's road network; and
- To provide vehicular access on City roadways of all types to sensitive land use and infrastructure (i.e. emergency services, institutional lands, etc.).

The level of service criteria for surface flood risk reduction were drafted based on input and consultation with various stakeholders and referenced numerous sources including the Master Plan Technical Advisory Committee, Windsor and Essex Regional design manuals and guidelines, existing Master Plans and studies developed by external sources, input from the Stakeholder Advisory Committee, discussion with the MECP, input from emergency services providers, feedback from the general public, and consultation with multiple City of Windsor departments. Refer to Section 2.1 for additional information on the consultation and referenced sources considered in the development for both basement and surface flood risk reduction objectives including the use of the adaptive approach.

The development process for the level of service criteria was iterative and included significant literature and document review, coupled with key technical meetings, review of observed flooding conditions in the City and outputs from the InfoWorks ICM flooding model. The tasks completed for all systems are detailed in Section 2.1. Specific to the storm sewer system, conditions at storm gravity outfalls, including high water levels at the outlet with the potential to cause adverse tailwater conditions, were included in the assessment in addition to the tasks shown in Section 2.1 for establishing the recommended Level of Service.

4.2 Level of Service - City Input and Discussion

Discussions were held with the City of Windsor staff early on in the project. The City of Windsor and ERCA storm sewer design criteria were reviewed and compared with storm design criteria from other municipalities.

Development of level of service criteria was completed in consultation with City staff. This consultation expanded well beyond the project's technical advisory committee and included many other City Departments. The input helped to refine recommendations developed through public consultation and existing study review. City Departments that provided feedback included:

- Engineering – Infrastructure & Geomatics
- Operations – Contracts, Field Services & Maintenance
- Operations – IMS
- Office of the City Engineer
- Pollution Control
- Corporate Projects
- Building Services
- Environmental Sustainability and Climate Change

4.2.1 Other Municipalities

A review of other municipalities' level of service standards for the stormwater drainage systems and surface flood criteria was completed and is summarized in Table 4.1, below.

Table 4.1: Comparison of Storm Drainage and Surface Flooding LOS Criteria

Municipality	Maximum HGL and Surface Flooding	Return Period
Windsor & ERCA Guidelines	Minor System HGL Design: • HGL at least 0.30 m below ground elevation with considerations for backwater and minor losses. Maximum Surface Ponding (Flooding): • Maximum 0.30 m depth of surface ponding on roads and parking lots. High traffic roadways may warrant lower depths. • Minimum lowest opening at least 0.30 m above 1:100 year water level or regulatory flood level.	Storm Sewer (Minor System) • 1:5 year design storm Overland Flow (Major System) • Minimum standard is 1:100 year design storm • “Climate Change StressTest” storm to assess resiliency and vulnerability Recommended design storm attributes for both major and minor systems are a function of site conditions.
Toronto	Minor System HGL Design: • For local storm sewer HGL below sewer obvert. Maximum Ponding (Flooding): • Local Roads: 150 mm above road crown or water level up to ROW limit • Collector and Industrial Roads: 100 mm above road crown or water level up to ROW limit, whichever less • Arterial Roads: Up to crown of road • Streets with reverse sloped driveways: 150 mm above gutter.	Storm Sewer (Minor System) • 1:2 year design storm Overland Flow (Major System) • 1:100 year design storm (Duration - 12 hr; 10 min increments; Peak Intensity - [10 min] 250 mm/hr)
Hamilton	Minor System HGL Design: • For local storm sewer HGL below sewer obvert. Maximum Ponding (Flooding): • Local/Rural Arterial or Collector Streets: 150 mm above road crown • Urban Arterial or Emergency Streets: 0 mm above road crown	Storm Sewer (Minor System) • 1:5 year design storm Overland Flow (Major System) • 1:100 year design storm

Municipality	Maximum HGL and Surface Flooding	Return Period
London	Minor System HGL Design: ● Maximum HGL below ground. Maximum Ponding (Flooding): ● For events larger than 1:2 year - Ponding on major overland flow routes: up to 300 mm on roads and parking lots; 450 mm on rear-yard CBs ● Building abutting overland flow routes - ground and window openings should be higher than 1:250 year water levels	Storm Sewer (Minor System) ● 1:2 year design storm Overland Flow (Major System) ● Flows up to 1:100 year design storm contained within ROW or dedicated easements; ● Flows up to 1:250 year design storm safely conveyed

The above criteria apply to new development as well as drainage system undergoing retrofits or upgrades as part of Master Plan or Municipal Class Environment Assessment studies.

In addition to the above, most Ontario Municipalities require provisions for water quality treatment or control of stormwater runoff. The water quality objectives for new development are often defined by the MECP Stormwater Management Planning and Design Manual (2003), however local guidelines may supplement this Provincial Manual. In the City of Windsor, the Windsor/Essex Region Stormwater Management Standards Manual (ERCA, 2018) further supplements the 2003 MECP manual with additional recommendations for water quality control measures for new development. The recommendations for quality control for new development would not necessarily be applicable to maintenance or upgrades of existing ROW drainage and associated infrastructure.

Input from various MECP Departments and from ERCA provided for this project are summarized in the following section.

4.2.2 ERCA and MECP Input & Recommendations

The Essex Region Conservation Authority (ERCA) is part of the project's Technical Advisory Committee. Input from ERCA was fundamental in developing both surface and coastal flooding risk reduction strategies which included recommendations for control of discharge to open waterways, confirmation of high water level conditions at sewer outfalls, and feedback on the use of low impact development (LID) measures. ERCA's input into the coastal flooding strategies is discussed further in Section 6.

A summary of the key meetings and discussions held with the ERCA are summarized below.

- April 4th, 2018 - ERCA input during Technical Advisory Committee meeting:
  - Discussion about releasing additional flow to the open waterways and if allowed, what additional assessments would be required. It was confirmed that relative-change type assessments could be completed to assess impacts in change of release rates to the waterways using hydraulic models of drains. The following was included in the discussion:
    - Releasing a higher peak flow rate directly to the Detroit River would be acceptable.

        - In regards to the other major waterways in the City, including but not limited to Grand Marais Drain, Little River, Turkey Creek, Lennon Drain and Cahill Drain, concerns for increasing peak flow discharge were noted.
        - In regards to Little River, it was noted a Flood Hazard Assessment Study would likely be required to assess any change in flow regime in the waterway.
- June through September, 2019 (Multiple Meetings) - Landmark Engineers Inc., ERCA and the City - High Water Level Impacts on Sewer Infrastructure
    - Estimates of current 1:100 year and potential future climate change 1:100 year water level conditions in the Detroit River and Lake St. Clair systems were reviewed. Given the record breaking high water levels (experienced in June 2019) it was agreed that the high water level conditions would be accounted for by fixed outfall boundaries in the model for the assessment of flooding risk and solution development.
    - From the East Riverside Flood Risk Assessment (2019), the following instantaneous high water level values were confirmed and used in the sewer model assessment for the East Windsor service area:
        - Current 1:100 year high water level of 176.45 m; and
        - Future 2050 climate change 1:100 year water level of 176.80 m.
    - It was agreed that the water protection level along Detroit River be set on a gradient that mimics the grade of the slope of the observed water level. Therefore, in the Central Windsor service area, a current conditions 1:100 year high water level of 176.10 m was used.
- July 25, 2019 - Technical Advisory Committee meeting:
    - It was identified that the Stress Test (climate change) storm per the Windsor/Essex Regional Stormwater Management Standards Manual is 40% greater than the 1:100 year design storm in volume but the intensity is actually lower. To account for a more severe climate change rainfall, a design storm distribution with a 40% volume and intensity factor was used. Dillon has informed ERCA of this finding and they are in agreement with this more conservative design approach.
- October 17, 2019 - ERCA input during Technical Advisory Committee meeting:
    - Concerns were identified with LIDs and included:
        - That exfiltration of stormwater would not occur, given unknown and potentially high groundwater conditions; and
        - That the additional storage would fill once and would remain full with the storage capacity unavailable during following storms.
    - Further the following was identified in regards to how the MP considered and appraised LID:
        - That the LIDs measures were modelled as Etobicoke exfiltration trenches; however the type of LIDs would be confirmed later in subsequent designs.
        - That the acceptability of LIDs within each area will need to be confirmed during detailed design based on in situ soil conditions for each site; and

- The systems will have underdrains and even under high groundwater a stone trench could be drained.
- LIDs were implemented along Matthew Brady Blvd. and data loggers will be installed soon to monitor the benefit of the new system.

Consultation and coordination meetings were held with the Ontario Ministry of Environment, Conservation and Parks (MECP) to review existing basement and surface flooding challenges and potential solutions to reduce these flooding risks.

Between June and October of 2019, preliminary concepts for surface and basement flooding risk reduction measures were presented to multiple MECP branches and staff members where in support for the majority of the measures proposed. The majority of the discussions were focused on the balance and type of basement flood risk reductions measures including the use of rapid treatment systems to help manage wet weather extraneous flow, refer to Section 2.2 for additional details.

4.3 Existing Drains, Watercourses, and Great Lakes System

Existing Municipal Drains, Watercourses and the Great Lakes System all influence surface flooding risk via the backwater effects on the storm sewer conveyance infrastructure. Figure F.4.1 illustrates the main receiving watercourses and water bodies that provide an outlet for the City's storm sewers and overland flow routes. The following are a list of the major Municipal Drains, Watercourses, and open water features that influence surface flooding risk and the range of potential flood risk reduction measures:

- Little River
- Grand Marais Drain
- Lennon Drain
- Cahill Drain/Wolfe Drain
- Detroit River and Lake St. Clair (Great Lakes System)

The Little River extends 12 km, draining approximately 6500 ha of land area and encompasses the Pontiac and St. Paul PS drainage areas as well as the upper Little River sub-watershed area. A 2018 St. Paul/Pontiac Study (Dillon) identified necessary storm sewer solutions within the drainage areas upstream of those PSs, to increase the sewer level of service and reduce the risk of flooding. These solutions were further validated during the model development for this MP. The Upper Little River Master Plan - Environmental Assessment (Stantec, ongoing) has recommended the provision of stormwater management facilities for all future development to limit stormwater outflow to existing levels and/or a rate equal to the Municipal Agricultural Drain design coefficient approach. Dillon's discussions with ERCA confirmed that future flooding solutions must be developed to include this requirement.

The Grand Marais Drain, which is part of the Turkey Creek Drainage Area, is a major watercourse located within the City of Windsor. The drain originates near Pillette Rd. and flows westerly, along Grand Marais Rd. E. towards the Town of LaSalle where the drain discharges into Turkey Creek. Turkey Creek continues to flow westerly through the Town of LaSalle and ultimately discharges into the Detroit River. The Drain had channel improvements in 2012 following completion of a MCEA by Landmark Engineering Inc. (Landmark). Landmark (Grand Marais Drain Hydrologic and Hydraulic Models (2019)) subsequently completed technical and supporting studies for this waterway. The results of this study shows differences in flow and HGL conditions within the Turkey Creek Drain (including the upper reaches of the Grand Marais Drain) between the 2019 conditions and the previously competed flood plain analyses completed in the 1990's (Floodway Analysis – Stormwater Management Guidelines (MacLaren, 1991). Addressing any historical changes that have occurred in the Grand Marais Drain and Turkey Creek watershed are beyond the scope of the City's Sewer Master Plan, the focus of which is on mitigating the risks of flooding relative to the current outlet conditions. The more detailed evaluation and identification of recommended solutions related to any negative impacts that have occurred to the outlet watercourses, including the differences in the conditions, are expected to be addressed through the Turkey Creek Watershed study that is now being initiated. Based on the findings and recommendations of that study, there will be opportunities to reconfirm the functionality of the flood mitigation solutions identified in this MP, based on any differences in the boundary conditions, including reconfirmation that there continue to be no negative downstream impacts.

The Lennon Drain, originating east of Dougall Ave., flows west and south through southern Windsor including the Roseland Golf Club and St. Clair College sites, ending at the Lennon Drain siphon, constructed as part of the Herb Gray Pkwy. (HGP), with flow continuing into the Cahill Drain. The Lennon Drain has been studied, and improvements made following AECOM reports dated 2012 and 2017, as well as a 2017 drainage report by Rood Engineering. Recommended improvements included the construction of new or expansion of existing stormwater management quantity control facilities, and regular cleaning of the Lennon Drain to provide improved conveyance capacity. The identification of both existing flooding issues in the Turkey Creek Drainage Area and Municipal Drain flow conveyance capacity limits, restricted the alternatives available to improve flooding conditions; the MP does not recommended and solutions within this drain's drainage area.

The Cahill Drain, originates at Howard Ave. and Cousineau Rd. in the City of Windsor. It drains west along Cousineau Rd. and the HGP, entering the Town of LaSalle as it crosses the HGP. This drain extends, westerly along Villa Maria Blvd., through vacant lands, crossing Malden Rd., just south of Normandy St. and drains to Turkey Creek. The Cahill drain receives flow from the Lennon Drain and smaller branch drains. A spill over exists that directs flow southerly to the West Branch of the Cahill drain, to River Canard.

The Detroit River is the receiving body from all of the above mentioned surface drainage systems. The river flows approximately 45 km, forming part of the border between Canada and the U.S. It is considered narrow, being 0.8 to 4.0 km wide; and is 16 m deep in the deepest section of the river. A study by Landmark (discussed in Section 7) assessed the potential impacts of climate change on the high water levels of the Detroit River that would impact the backwater condition of the sewer system as well as low-lying areas of the City vulnerable to coastal flooding. As a result of this study and the recent record breaking high water levels (2019 and 2020), alternatives to mitigate surface flooding along the Detroit River include representation of high water level conditions.

4.3.1 Influence on Flooding Risk and Mitigation Measures

To appropriately model the storm sewer system including surface drainage, boundary conditions had to be defined to account for tailwater conditions within the minor system to provide a representation of the conveyance constraints at the sewers outlets to the various watercourse and waterways. The high water level discharge constraints at the receiving waterways and watercourses often helped define the need for backwater protection via a back water valve and/or PS. A map of the modelled high water level outlet condition is provided in Figure F.4.2.

Further, as identified by ERCA alterations to discharge to open watercourses or waterways shall not negatively impact these systems from a flooding or erosion potential perspective. A notable exception being that increased flow rate or volume to the Detroit River or Lake St. Clair systems would be considered acceptable as this would not cause a negative impact. In service areas where flood risk reduction measures were identified as required and that outlet to watercourses or waterways where there was the potential for negative impact the type of solution measures were limited to storage and/or infiltration systems.

4.3.2 Outlet Capacity Impact Assessment

ERCA was consulted as part of the technical working group for this project and it was identified that flood risk reduction solutions should not negatively impact watercourses receiving flow from these altered sewer and overland flow systems. This criteria and requirement was also requested by the Town of LaSalle as it relates to the Turkey Creek Watershed.

To meet the above criteria and address the Town of LaSalle's request the following approach was taken:

- Solutions to reduce surface flooding risk on major roadways and within regional flooding problem areas would be based on a combination of source control and storage measures with no increase in peak flows, as required to avoid impacts to downstream watercourses (other than for areas served by the Detroit River).
- To measure and confirm the potential hydrologic and hydraulic impact of the solutions an outlet capacity assessment would be completed for the receiving watercourses accepting modified flow regimes from the City's sewer systems.

Little River

A separate study for the Little River watercourse (Little River Floodplain, ongoing) is being completed to review the existing and potential future floodplain. It is recommended the future outlet capacity assessment for Little River be completed using the hydrologic and hydraulic models that are developed as part of that study.

Grand Marais Drain (GMD)
A recent study of the GMD was completed by Landmark Engineers Inc. (Landmark) in 2019, entitled Grand Marais Drain Hydrologic and Hydraulic Models (GMD H&H 2019). This analysis was used as the basis for the outlet capacity impact assessment, see Section 4.3.3 below.

It should be noted other tributaries on Turkey Creek, besides the GMD (i.e. Lennon Drain, Cahill Drain, etc.), are not proposed to have improvements that would modify flow regime. Therefore, no assessment was needed for those watercourses.

Measures to address improvements to existing flow regimes in the open watercourses within the City of Windsor and neighboring municipalities was beyond the scope of the City's SMP project. The scope of this project is limited to addressing the risk of basement and surface flooding associated with the storm, sanitary and combined sewer systems, as well as protections from coastal flooding related to high water levels in the Detroit River.

The Town of LaSalle has expressed concerns related to the use of this newer assessment of the GMD H&H study and the existing conditions withtih the Turkey Creek Watershed. Details related to coordination and engagement with the Town of LaSalle is detailed in Appendix B – Consultation Summary Report.

4.3.3 Grand Marais Drain Outlet Capacity Impact Assessment

The primary objective of the analysis is to assess hydrological and hydraulic impact of the proposed MP sewer improvements on the GMD's potential for flooding and in-stream erosion. The metrics considered in the assessment include maintaining water surface elevations and peak flows. This assessment found in all instances the peak HGL and peak flow rate under proposed conditions were lower than those estimated under existing conditions. The decrease in peak HGL ranged from 0.01 m to 0.32 m. This decrease in peak flow ranged from 1 % to 24 %, with the largest decrease occurring at the upstream end of the GMD.

The impact assessment is conservative as LID measures are recommended City-wide as part of the comprehensive measures, but not accounted for in the model. The LID measures would reduce proposed total runoff volumes to levels less than existing conditions, providing additional reductions in peak HGL and flow rates before and after the peak.

Since the proposed solutions lower the peak HGL and peak flow rates in the GMD, there is no negative impact as a result of the proposed improvements. Further, under the proposed solutions which include upstream storage and LID measures to increase infiltration, it was found that the potential for flooding inundation and in-stream erosion would be lower than under existing conditions.

It should be noted that these findings are generally expected, as the proposed solutions were to provide additional storage and infiltration, while maintaining the existing outlet pipes and pumping schemes to the GMD. Unlike stormwater management reports, which commonly address change (or increase) in imperviousness land coverage; the proposed solutions from the MP manage the same volume of runoff but with additional storage, attenuating local flows which consequently reduces flow rate discharged into the GMD watercourse.

The outlet capacity assessment is discussed further in Appendix E-1.

4.4 Level of Service Objectives for Solutions

This section of the report identifies the level of service targets that would be applied in the SMP. The recommended LOS criteria to address surface flooding that has been outlined herein was based on feedback received from the multiple stakeholders as identified above. Refer to Section 2.4.1 for details and information on design storm events.

The following objectives were established to meet the level of service criteria:

- Establish and confirm regional surface flooding problem areas, as modelled under existing conditions, across the City and mitigate surface flooding, where feasible. Regional areas represents areas where the LoS is not met on a neighbourhood basis, including major and minor roadways in that area;
- Identify areas of vulnerable roadways or land use areas including major roadways and emergency access routes for vulnerable land uses. An enhanced level of surface flood protection has been applied to these areas as part of the adaptive approach to surface flooding mitigation; and
- Provide sewer separation of the areas currently serviced by combined sewers. Completing sewer separation provides the City the opportunity to upsize the new minor storm system to accommodate flows from both public and private area completing. Minor system improvements will in turn relieve the major overland major system.

The surface flooding risk reduction LOS benchmark considered for the project to identify flooding problems and in the development of solutions are detailed in Table 4.2. The LOS conventions were applied to the existing sewer network with consideration for both the storm and combined sewer systems.

For the major overland drainage system, the 1:100 year event is used as the baseline level of service for the storm sewer HGL which requires that surface flooding be less than 0.30 m deep within the City's municipal ROW. As noted above, areas of the City were identified for an enhanced level of protection (i.e. vulnerable infrastructure and emergency routes as defined in Section 4.4.2) in order to provide resiliency to the impacts of climate change. For these areas, an additional 40% factor to both the intensity and volume parameters is added to the 1:100 year design storm event.

For the minor (underground sewer) system, municipal infrastructure should convey the 1:5 year event with no surface flooding and maintain the sewer HGL within the City's ROW.

The MECP recommends the use of water balance and quality measures (May 2020 Low Impact Development (LID) Stormwater Management Guidance Manual) to attenuate / infiltrate a certain stormwater volume through source or conveyance controls prior to conveyance. These measures are a best management practice and not a requirement. During detailed design, the City should consider meeting the MECP water balance criterion; however, based on site conditions, infiltration characteristics and suitable LID measures, the size and feasibility of meeting this criteria should be evaluated.

The recommended level of service criteria are summarized in Table 4.2.

Table 4.2: Storm Sewer Drainage LOS for Surface Flooding

Consideration	Criteria - Storm Drainage	Objective
Major System	1:100 Year Event ● Less than 0.30 m of surface flooding in the ROW for 1:100-year storm event for a major overland drainage system.	Standard criteria for access and risks of property damage.
	1:100 Year plus 40% Climate Change Factor. "Climate Change Storm" ● For 1:100-year storm event + 40% climate change factor for both volume[1] and intensity,[2] have less than 0.30 m of surface flooding in the ROW for arterial and collector roads; and ● Surface flooding below lowest building opening elevations, (modelled as flow-spread not impacting building footprint) where feasible, but in particular for any higher risk uses.	Provide enhanced/variable level of service where there is a higher consequence of surface flooding.
Minor System	1:5 Year Event ● HGL is at least 0.3m below ground based on available outlet receiving capacity; and ● No increase to the HGL downstream	No surface flooding under the minor storm
Water Quantity and Resilience	Retention / Infiltration of the first 32 mm of runoff within the ROW	Additional resiliency and water quality improvements are recommended but not a requirement.

[1] The "Urban Stress Test" storm defined in the Regional Stormwater Management Standards Manual (2018) would test the resiliency of the storm drainage system under higher volume storm conditions.
[2] It is proposed that a 1:100 year, 4-hour storm with rainfall intensity increased by a factor of 40% would be considered sufficient to test the resiliency of the storm drainage systems under higher intensity storm conditions

Surface flooding problem areas were established based on the model estimates of surface flooding with existing infrastructure under both the 1:100 year and the climate change design storm events and where surface flooding levels equal to or greater than 0.30 m above ground level. For the 1:100 year event, areas with surface flooding above 0.30 m were organized into cluster or 'regional problem' areas while the climate change event was used to determine where enhanced measures are required to mitigate surface flooding around major roadways, sensitive infrastructure and emergency access routes.

4.4.1 Regional Problem Areas

Regional problem areas are defined as areas with clusters of surface flooding, under existing conditions, exceeding 0.30 m above the surface under the 1:100 year event. These clusters were resolved into defined regional problem areas throughout the City and are summarized in Figure F.4.3. Input from City Administration helped to delineate the regional problem areas, including confirmation of observed past flooding.

4.4.2 Major Roads, Sensitive Land Use and Climate Change

Through discussions and meetings with the City of Windsor's Emergency Services, ERCA, and members of the project's Technical Advisory Committee the consolidated input was used to develop a map of major roads and sensitive infrastructure. This map identifies where emergency access routes and major roadways that require an enhanced level of flood protection from more severe extreme storm events (i.e., the climate change stress test storm) per the project adaptive approach level of service criteria. The adaptive approach provides additional resiliency for drainage improvements where the more severe climate change storm is used to both identify if an area is at risk of surface flooding and used to design surface flooding solutions.

A summary of the more sensitive and/or vulnerable infrastructure is provided below:

- Hospitals;
- Emergency services (Emergency Shelters, 911 Call centres, Windsor Police Facilities, Fire Dept. Facilities);
- City Maintenance Facilities:;
- Schools;
- Day-cares;
- Long-term care facilities; and,
- Major roads and transportation facilities (i.e. collector, arterial, and freeways).

4.4.2.1 Overview of the Roadway System

The pertinent roadway network classifications within the City of Windsor as documented in the City of Windsor Official Plan under Chapter 7 includes:

- Class I & II Arterial Roads
- Class I & II Collector Roads

Cycling facilities may be permitted on Class II Arterial Roads and Class I & II Collector Road categories.

Class I Arterial Roads are controlled access highways designed to carry high volumes of passenger and commercial traffic for intra-city travel at moderate speeds. They have a minimum ROW width of 46 metres, with no direct property access or on-street parking. Class II Arterial Roads are designed to carry high volumes of passenger and commercial traffic for intra-city travel at moderate speeds. ROWs are to be no more than 42 metres. Direct property access is discouraged but on-street parking is permitted. Riverside Dr. is considered a scenic road; however for the purposes of the surface flood risk assessment and solution development; this roadway was considered the same as an arterial.

Class I Collector Roads are designed to carry moderate volumes of traffic with ROW no more than 28 metres wide. Direct property access is permitted with some controls. Class II Collector Roads: Class II Collector Roads are designed for moderate volumes of traffic. ROWs are to be no more than 26 m, with direct property access permitted with some controls.

The remaining streets are scenic or local roads, designed to carry low to moderate volumes of traffic. Figure F.4.4 summarizes the road classification schedule for the City of Windsor and Figure F.4.5 shows the major roads overlay with sensitive land use areas as defined above requiring access for emergency services.

4.4.3 Surface Flooding Decision Diagram

The adaptive approach was incorporated into the surface flooding decision diagram, refer to Figure 4.1, which outlines the process for how surface flooding problems are identified and if a flood risk reduction solution would be developed as part of the Master Plan. The surface flooding decision diagram consolidates and intersects considerations for potential impacts of climate change, model estimates of surface flooding, areas of concern including major roadways, areas of sensitive land use, and regional flooding areas. The design storm event for sensitive land use areas, arterial roads and collector roads is the climate change storm event; whereas the 1:00 year design storm is used for assessment and solution development in the regional problem areas.

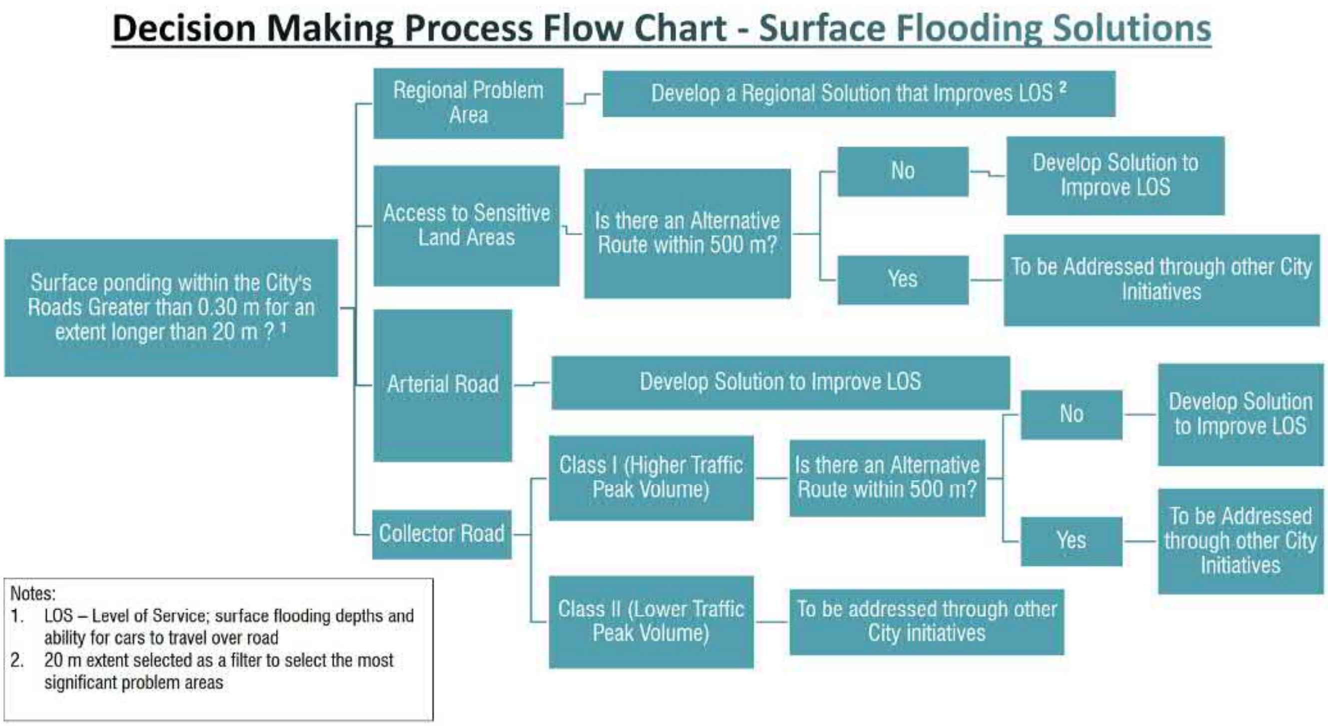

Figure 4.1: Surface Flooding Solutions Decision Process

4.4.4 Proposed Separation of Combined Sewers

Throughout the study, one of the problems identified was extraneous stormwater inflows overwhelming both the sewer conveyance and sewage treatment plant capacity resulting in a backwater effect in the conveyance system, plant overflows to the Detroit River (LRWRP) or plant overflows/bypasses to Little River (LRPCP). The objective of sewer separation is to reduce wet weather inflows to the sewage treatment plant by redirecting this flow from the combined sewer system into the storm sewer system, relieving the stormwater surge from the sewage treatment plants. This redirection of flow in the sanitary and combined sewers is accomplished by providing a new route for the stormwater runoff in a separate storm sewer. In both cases, ultimately flows would discharge into the same receiving watercourses; however with separation the flow is conveyed to a storm sewer outfall (without the opportunity to mix with sanitary sewage) and is not bypassed or overflowed from a treatment plant.

The extent of the combined sewer drainage areas is identified in Figure F.4.6. The combined sewer system covers the majority of Central Windsor (2000 ha) termed as the "Combined Core" and a south west portion of East Windsor (360 ha) termed as "Combined-Little River". Currently, the combined systems are a mix of fully combined drainage and partially separated areas as summarized below:

- The combined sewer with areas of only combined drainage currently accepts all domestic dry weather and wet weather (foundation drain, roof downspouts and road catch basin) flows that are conveyed directly to the LRWCP and LRPCP.
- Within the combined drainage area are streets with partial or "soft" separation of sewers where the combined sewer receives dry weather domestic flow as well as drainage from foundation

drains and directly-connected roof downspouts, while the storm sewer receives WWF from catch basin inlets (drainage from roads and driveways) and disconnected downspouts.

A strategy to provide CSO management and meet the MECP F-5-5 criteria for the combined sewer system in the Central Windsor service area was developed as part of other projects, additional information is provided in Section 2.2.

The criteria for the existing development in the combined sewer area are shown in Table 4.3 below.

Table 4.3: Combined Sewer Drainage Criteria

Consideration	Criteria - Storm Drainage	Objective
Primary Storm Drainage Component	1:100 Year Event ● Less than 0.30 m of surface flooding in the ROW (ROW), where feasible for 1:100-year storm event for a major overland drainage system.	Standard criteria for access and risks of property damage.
	1:100 Year plus 40% Climate Change ● Surface flooding below lowest building opening elevations, (modelled as flow-spread not impacting building footprint) where feasible, but in particular for any higher risk uses; for 1:100-year storm event + 40% climate change factor for both volume[1] and intensity.[2] And ● Less than 0.30 m of surface flooding in the ROW for arterial and collector roads.	Provide enhanced/variable level of service where there is a higher consequence of surface flooding.
Sanitary Drainage Component	1:100-year event ● Sewer HGL more than 1.8 m below existing grades	Reduce risk of basement flooding

Figure F.4.6 also shows the approach to sewer separation used for the Central and East areas. In modelling the alternatives for the ultimate conditions, all areas are proposed to undergo a form of sewer separation as described below:

- Status Quo - "Soft" Separation - WWFs conveyed to the road ROW are collected via catch basin inlets and are directed to the storm sewer system; where the combined sewer receives domestic DWF plus wet weather inflows generated by directly-connected foundation drains, connected roof downspouts, and private connections (including rear lot drainage) to the combined sewer.
- Recommended Approach - "Complete" or "Hard" Separation - WWFs from all ground surfaces in both private property areas and within the City's right-of way. Storm flows are to be directed to the storm trunk system, such that the combined sewer receives only domestic DWF from sanitary private drain connections.

- o Downspout Disconnection (DD): Current disconnection policy indicates that DD is mandatory in certain neighbourhoods (see Section 5.1.3.2) and that DD is recommended for all residential homes.
- o Foundation Drain Disconnection (FDD): It is recommended that the City achieve full foundation drain disconnection within the City's Central area, however it is understood that due to the more urban nature of this area, there may be challenges due to internal plumbing constraints or lack of exterior naturalized surface area for discharge of sump pump flows. Regarding disconnection of foundation drains from the combined sewer system, is still recommended where feasible, but is not considered a mandatory element in the Central Windsor service area. However, in the East and South Windsor service area foundation drain disconnection from the combined sewers is recommended to be mandatory.

4.4.5 Climate Change - Design Storm

Section 6.4 of the Sewer and Coastal Flood Master Plan Technical Report Volume I discusses the potential impacts of climate change on precipitation. In this report, Section 2.4.1, provides an overview of all the design storm events used in the project to assess flooding risk and develop solution measures. Additional information related to how the potential impact of climate change was considered is provided below.

In Windsor, Environment and Climate Change Canada's trend analysis on annual maximum rainfall up to 2016 shows no significant change in rainfall intensities and volume, consistent with other long-term gauges in southern Ontario. Nonetheless, intense localized storms have been observed resulting in widespread flooding. The August, 2017 storm represents such an intense storm that generated widespread flooding. Though climate change shifts may not be well-defined, the Sewer Master Plan recommends methods to make the City's drainage infrastructure more resilient to potential changes in more frequent and significant storms.

The 'Stress Test' storm identified in the Windsor-Essex Region Stormwater Management Standards Manual (ERCA, 2018) represents a 40% increase in volume, but reflects a lower peak intensity of rainfall (mm/hr) is as a 1:100 year Chicago Design storm. This stress test storm was assessed using the InfoWorks City-wide sewer model per Technical Volume 1 and it was found results related to peak flooding conditions were approximately the same or sometimes less severe when compared with the 1:100 year (15 minute intensity interval) Chicago Design storm. Therefore, to represent a condition more severe than the current 1:100 year design storm and following discussion with the technical committee it was agreed for this project to represent the potential impact of climate change with a design storm that has both a 40% increase to volume and intensity. The 1:100 year 4 hour Chicago distribution design storm with 15 minute intensity intervals was adjusted by multiplying the ordinates by 1.40, with the following characteristics:

- Peak 15 minute intensity = 203 mm/hr; and
- Total 4 hour storm volume = 114 mm.

This design storm, referred to as the climate change storm for the project, was used to assess conditions in the InfoWorks model.

4.5 Surface Flooding Problem Areas

This section summarizes the surface flooding problem areas and modelling assumptions used to develop the alternatives considered for the reduction of surface flooding risk. The following Table 4.4 provides the relationship of the identified problem areas to the service area.

Table 4.4: Summary of Surface Flooding Regional Problem Areas

Service Area	Sub-Drainage Area	Area Number	Problem Area
Central	Detroit River	Central Windsor –Combined Sewer Area	Regional surface flooding was addressed through sewer separation. Remaining areas where identified as major roadway or vulnerable area surface flooding.
South	Grand Marais Drain	Area 7	Central, Pillette and the Central Pond Drainage Area
	Lennon Drain	Area 8	Southwood Lakes Drainage Area (Lake Grande, Lake Como and Lake Laguna)
East	Detroit River/Riverside	Area 1&3	Riverside Area, Ford Blvd. to just east of Lauzon Rd.
	Little River	Area 3&4	Fontainebleau & Lauzon Pkwy.
	Blue Heron/Lakeview PS	Area 5	Blue Heron Pond Drainage Area
	Pontiac PS	Area 6	East Riverside, between Lauzon Rd. and Banwell Rd.

4.5.1 Modelling Assumptions

In addition to meeting the established storm drainage criteria level of service defined in Section 4.4, the following modelling assumptions were used in the development of surface flooding solution alternatives:

- A full build-out of all current developable lands and secondary planning areas, as applicable to the existing sewer network;
- Inclusion of projected impervious area parameters to reflect post-development condition;
- Water quality treatment may be provided by low impact development (LID) measures such as exfiltration trenches. The approach and requirement for water quality control will be confirmed later in the design phase; and
- Solutions would not be permitted to discharge additional flows to existing water courses for the exception of the Detroit River.
- In general further new development’s impact on the stormwater system were considered to be managed on-site and were not accounted for within the model.

In addition to the above general considerations for modelling of the surface flood risk reduction alternatives, modelling assumptions unique to each service area and each problem area solutions were considered and are summarized in the following sections.

4.5.2 Central Windsor

As identified previously, to meet the basement flood risk reduction objectives in the Central Windsor service area, nearly all stormwater runoff needs to be removed from the combined sewer system. To accomplish this complete separation of the sewer system is required. The Central Windsor service area is unique in that fact that many of the surface flooding problem areas are addressed by completing sewer separation. Using the sewer model, complete sewer separation was applied to the entire Central area and the resulting surface flood risk areas were assessed. Using Figure 4.1, remaining surface flooding areas that were to be addressed were identified, and they are as follows:

- Tecumseh Rd. W. around Wellington Ave. and Crawford Ave;
- College Ave. between Cameron Ave. and California Ave.;
- McDougall around Giles Blvd. E and Erie St. S.; and
- Ypres Ave. around Woodlawn Ave.

Flood risk reduction objectives for the Central Windsor service area are unique and are presented below:

- Under a 1:100 year design storm event, the HGL in storm trunk sewer, where feasible, should be less than 0.30 m above ground, this translates to having no more than 0.3 m of stormwater ponding within the ROW.
- Under the climate change design storm event, where feasible, surface flooding is reduced on major roadways and sensitive land uses to depths less than 0.30 m.

To meet the first objective above a series of new, updated or twin stormwater trunk sewers were proposed to reduce flood risk. Further information is provided in Section 5.

4.5.3 South Windsor

Flood risk reduction objectives for the South Windsor service area are provided below:

- Under the 1:100 year design storm event, where feasible, surface flooding has been reduced in regional areas to depths less than 0.30 m, this translates to having no more than 0.3 m of stormwater ponding within the ROW.
- Under the climate change design storm event, where feasible, surface flooding has been reduced on major roadways (Arterial and Collector Class) and roadways that provide exclusive access to sensitive land uses to depths less than 0.30 m.

The following sections identify the at risk surface flooding locations where solution alternatives were reviewed and developed. These surface drainage systems in the South Windsor service area are outlets to Municipal Drains including Grand Marais Drain, Cahill Drain, Lennon Drain and Wolfe Drain. It was confirmed in coordination with ERCA that changes to stormwater infrastructure should not negatively impact these receiving systems; this influences the type of solution measures available to mitigate flooding risks.

4.5.3.1 Central Ave., Pillette Rd. and Regional Area 7 (STM-S7)

Surface flooding is observed in the areas that is contributing to the existing Central Ave. stormwater management pond this areas is called Regional Area 7, and generally falls between Tecumseh Rd. E., Central Ave., Grand Marais Rd. E., and Pillette Ave. Flooding is also observed along the major roadways in this area including Pillette Ave. (Class 1 Collector) and Central Ave. (Class 2 Arterial). The flood risk reduction objectives for Pillette Rd. and Central Ave. are based on risk under the climate change design storm; whereas the flood risk reduction objectives for the local streets in Regional Area 7 are based on risk under the 1:100 year design storm event. This system is part of the Grand Marais Drain drainage area.

4.5.3.2 Regional Area 8- Southwood Lakes (STM-S8)

The Southwood Lakes residential development has been identified as Regional Area 8, generally between Howard Ave, Highway 401, south of Dougall Pkwy. The roadways within this Regional Area are all local roads. Flooding is observed along the local roadways and is also supported by reports received by residents. The flood risk reduction objective is based on risk under the 1:100 year design storm event. This system drains to three ponds, Lake Grande, Lake Laguna and Lake Como which ultimate discharges to a pump station with outlets to the upper reaches of the Cahill Drain drainage area.

4.5.3.3 Dougall Ave. (ROAD-S1)

Surface flooding is observed both in situ and through the sewer model along Dougall Ave. (Class 2 Arterial), between the intersection of Ouellette Ave. and the rail underpass, along Ouellette Ave. (Class 2 Arterial), between the intersections of Dougall Ave. and Eugenie St. E., and along Eugenie St. E (Class 1 Collector), between Dougall Ave. and Dufferin Pl. The flood risk reduction objectives for these major roadways are based on risk under the climate change design storm. This system is part of the Grand Marais Drain drainage area.

4.5.3.4 Howard Ave. (ROAD-S2)

The surface flooding was identified along Howard Ave. (Class 2 Arterial), between Edinborough St. and Grand Marais Rd. E. The flood risk reduction objectives for this area is based on risk under the climate change design storm. This system is part of the Grand Marais Drain drainage area.

4.5.3.5 Chrysler Centre (ROAD-S3)

The problem area was identified along Chrysler Centre (Class 1 Collector) and Grand Marais Rd. E. (Class 1 Collector), west of Chrysler Centre, between Tecumseh Rd. E. and Grand Marais Rd. E. The flood risk reduction objectives for this problem area is based on risk under the climate change design storm. This system is part of Grand Marais Drain drainage area.

4.5.4 East Windsor

Flood risk reduction objectives for the East Windsor service area are provided below:

- Under the 1:100 year design storm event, where feasible surface flooding is reduced in regional areas to depths less than 0.30 m.
- Under the climate change design storm event, where feasible, surface flooding is reduced on major roadways and sensitive land uses to depths less than 0.30 m.

The following sections identify the at risk surface flooding locations where solution alternatives were reviewed and developed. The primary receiving watercourses include the Detroit River and Little River. It was confirmed in coordination with ERCA that changes to stormwater infrastructure should not negatively impact the Little River receiving system (no net increase in flows to the Little River system from existing conditions); this influences the type of solution measures available to mitigate flooding risks. ERCA also requires that stormwater management be designed such that surface flooding to be limited to allow a minimum of one lane access on major roads. The model used to develop is based on a course 2D model and therefore this criteria could not be confirmed. Upon detailed design of stormwater infrastructure a more refined model analysis shall be undertaken to confirm this criteria is met and demonstrated to ERCA. Additionally, the design of the solution infrastructure incorporated potential future high water level conditions in the Detroit River, with level of 176.45 m AD.

The following sections identify the at risk surface flooding locations where solution alternatives were reviewed and developed.

4.5.4.1 Regional Areas 1 & 2 and Riverside Dr. E. (STM-E1)

Two (2) adjacent problem areas were identified in the City's Riverside area, these areas include the St. Paul, St. Rose, Ford Blvd. drainage areas, roughly bounded by Riverside Dr. E. from the north, Tecumseh Rd. E. to the south, Lauzon Rd. to the east and Buckingham Dr. to the west. Part of the East Windsor combined sewer area is between South National St. and Tecumseh Rd E. is captured within the boundaries of the Ford Blvd. drainage area.

Regional Area 1 includes the segment of Riverside Dr. E., between Ford Blvd. and St. Rose Ave. that is scheduled to be reconstructed (Riverside Vista Phase 2A) by 2025. Regional Area 2 is generally within the St. Paul PS drainage area. The flood risk reduction objectives for these Regional Areas is based on a 1:100 year design storm event for all roadways and a Climate Change design storm event for Riverside Dr. E.

Proposed works from the St. Paul/ Pontiac Study (2018) were used as a basis for the development of solutions for these areas and, where applicable, those solutions were refined to meet the newer level of service. In addition, additional storm trunk sewers, box culverts and the recommended landform barriers were incorporated into the model.

4.5.4.2 **Regional Area 3 & 4 (STM-E3)**

Two (2) adjacent problem areas (Regional Problem Areas 3 and 4) were identified in the City's Fontainebleau and Lauzon Pkwy. residential area.

Area 3 includes the combined sewer area, between South National St. and North Service Rd. (north to south) and between Pillette Rd. to Jefferson Blvd. (west to east). This area has been identified due to the presence of the combined sewer system. To complete sewer separation of this area, additional storm sewer infrastructure is required to capture surface drainage area. This area is currently serviced partially via a trunk storm sewer on Ford Blvd. that directs stormwater to the Detroit River and the balance of the areas is directed to the Little River Drain. As part of the Regional Area 1 solution, the area directed to the storm sewer on Ford Blvd. is being increased to provide outlet for additional drainage areas directed to that outlet.

Area 4 includes the area between Jefferson Blvd. to Lauzon Pkwy. which is observed to have surface flooding under the 1:100 year storm event. This area includes the Roseville School, residential roadways Roseville Garden Dr. and Jefferson Ave., north of Roseville Ave.

Flood risk reduction objectives are based on the 1:100 year design storm event for local streets within Regional Areas 3 and 4 and the climate change design event for Jefferson Blvd. (Arterial), South National St. (Collector) and Roseville Garden Dr. (collector).

4.5.4.3 **Regional Area 5 – Blue Heron Pond Drainage Area (STM-E5)**

The flood risk reduction objective is based on the 1:100-year design storm event where feasible for local streets. This area drains to the Detroit River primarily via the Blue Heron Stormwater Management Facility. The development of the alternatives also includes allowances for full future development build-out and impact on stormwater runoff. Findings related to the Wyandotte St. E. Environmental Assessments (Ongoing) were not incorporated into the modelling of this drainage area.

4.5.4.4 **Regional Area 6 – East Riverside Area (STM-E6)**

The flood risk reduction objective is based on the 1:100-year design storm event where feasible for local streets. A portion of this areas drains to the Pontiac PS and the remaining portion of this area drains to the East Marsh PS with outlets directly to Lake St. Clair. The development of the alternatives also includes allowances for full development of vacant lands and impact on stormwater runoff.

Proposed works from the St. Paul/ Pontiac Study for the Pontiac and East Marsh drainage area sewers are incorporated into the model including upgraded sewers and sewers associated with residential developments in the North and South neighbourhoods. Additionally, recommended reductions in the East Marsh drainage area are included per the City's direction (complete disconnection of drainage to East Marsh PS from west of Florence Ave.). Also recent works within the North and South neighbourhoods are incorporated in the model

4.5.4.5 Jefferson Blvd. and Raymond Ave. (ROAD-E2)

A problem area was identified on Jefferson Blvd. (Arterial) between Raymond Ave. and Ontario St. and Raymond Ave. (Collector) fronting the David Suzuki Public School (vulnerable population). The flood risk reduction objective is based on the climate change design event for major roads and sensitive infrastructure. The developed alternatives assume that improvements for the St. Rose drainage system including new PS and trunk sewers are implemented. It is assumed that where the modelled extent of surface flooding between 0.3 m and 0.37m remains, that the alternative can be modified at detailed design to mitigate remaining surface flooding issues.

4.5.4.6 Roseville Garden Dr. (ROAD-E11)

Problem areas were identified on Roseville Garden Dr. (Collector), Hawthorne Dr. (Collector) and Kew Dr. (Collector). The flood risk reduction objective is based on the climate change event for major roads and vulnerable lands parcels (Roseville School).

4.5.4.7 Lauzon Rd. (ROAD-E5)

Problem areas were identified on Lauzon Rd. (Arterial) at the intersection with Clairview Ave. and between Wyandotte St. E. and Tranby Ave. The flood risk reduction objective is based on the climate change design event for major roads. Lauzon Rd. has split drainage to two outfalls - one to the Detroit River and the other to Little River.

4.5.4.8 Wyandotte St. E. at Watson Ave. (ROAD-E9)

A problem area was identified at the intersection of Wyandotte St. E. (Class 2 Collector) and Watson Ave. The flood risk reduction objective is based on the climate change design event for major roads.

The alternative assumes that proposed works from the St. Paul/Pontiac Study for the Pontiac and East Marsh drainage area sewers are incorporated into the model that includes upgraded sewers along Cedarview Ave. and underground storage in Brumpton Park.

4.5.4.9 Banwell Rd., McHugh St., and McNorton St. (ROAD-E10, ROAD-E7, and ROAD-E8)

Problem areas were identified along McHugh St, McNorton St, and Banwell Rd., all Class 2 Arterial, where the flood risk reduction objectives are based on risk under the climate change design storm. This system is part of Blue Heron pond drainage area which has PS controlled discharge to the Detroit River.

4.5.4.10 Lauzon Pkwy. (ROAD-E4)

A problem area was identified along Lauzon Pkwy. (Class 2 Arterial), between Tecumseh Rd. E and Cantelon Dr., where the flood risk reduction objectives are based on risk under the climate change design storm. A key constraint that is assumed for the alternative is that there shall be no increase in stormwater peak flow entering the Little River Watercourse.

4.5.4.11 McHugh St. at Darfield Rd. (ROAD-E6)

A problem area was identified along McHugh St. (Class 2 Arterial) where the flood risk reduction objectives are based on risk under the climate change design storm. A key constraint that is assumed for the alternative is that there shall be no increase in stormwater peak flow entering the Little River Watercourse.

4.5.5 Existing Conditions - Summary

Prior to the development of solution alternatives, there were two sets of models which represented flooding conditions within the City of Windsor, one being the existing conditions model which was calibrated primarily using observed rainfall, flow monitoring, surface flooding photos/records, reports of basement flooding, and input from City of Windsor Administration. The other was baseline future conditions which is composed of models modified from the existing conditions model. The outputs of the existing conditions model are summarized in further detail in Technical Report Volume I.

For the development of the alternatives, the baseline existing conditions model was run under the 1:100 year event to identify surface flood risk areas on a regional scale. The climate change design storm event was also assessed to identify critical areas, along major roadways or in the vicinity of vulnerable lands uses) to focus the recommendations to localized storm sewer improvements required to meet the flood risk reduction objectives. It is assumed that new developments will be required to meet minimum flood mitigation criteria, which would include adherence to boundary conditions parameters that would prohibit site runoff form exceeding pre-development conditions. The resulting spread of surface flooding under existing conditions above a depth of 0.30 m was modelled and is presented in Figures F.4.7 and F.4.8 respectively for the 1:100 year and the climate change design storm events. It should be noted, that areas highlighted in red represents those areas that observe flooding higher than 0.30 m deep. The extent of these areas has been exaggerated in the figure to help highlight those areas that do not meet the established level of service.

5.0 Surface Flooding – Development of Solution Alternatives

Similar to basement flooding solutions, feedback from residents and City Administration guided the development of surface flooding solutions. Both short-term measures and long-term measures are recommended to meet the established level of service criteria. The Short-Term Solutions: Summary of Recommendations (Dillon, 2020) Appendix C for the MP report details the short-term flood risk reduction objectives and recommendations that are considered in the comprehensive plan to mitigate surface flooding. Sections 5.1.1. and 5.1.2 describes how these short term solutions were considered the development of long term solutions.

Sections 5.3, 5.4 and 5.5 includes details on the development of solution alternatives developed to reduce surface flooding risks. Each set of alternatives were evaluated using a number of criteria and a preferred solution was determined for each area. These evaluations tables were included in this report for reference only. The MP report will provide the final evaluations including detailed description of those evaluations and evaluation criteria. Detailed tables of those evaluations can be found in Appendix G - Evaluation Matrices.

5.1.1 Modelled Short-term Solutions and Source Control Measures

Many of the recommended short-term solutions were included in the model assessment for basement or surface flooding solutions. Table 5.1, below, summarizes which surface flood risk reduction measures were included in the model assessment. Additional details about how the short-term measures were inputted and/or accounted for in the solution condition models are provided in the subsequent text.

Table 5.1: Summary of Modelled Short-term Surface Flood Risk Reduction Measures

Short-term Solution Measure	Solution Condition Model Inputs
Sewer Network Backflow Prevention Devices	Select backflow prevention devices were added at outfall locations where high water level conditions would surcharge the existing sewer network.
Mandatory Downspout Disconnection	Select stormwater subcatchment within the City had alterations to overland flow parameters to represent downspout disconnection.
Green Infrastructure/Low Impact Development (LID) Measures	In East Windsor these measures were applied to all stormwater drainage systems. In South and Central Windsor these measures were applied where needed as part of solutions to solve flooding.

5.1.2 Modelling of Source Control Measures

Several future condition source control improvements were considered in the modelling assessment of surface flooding solutions. The source control measures were represented in the InfoWorks ICM model prior to applying the use of more traditional "hard infrastructure" (i.e., larger pipes, increased PS capacity, etc.) in the development of surface flooding solutions. The source control measures are a fundamental component of the balanced approach to solution development used in this project.

The source control measures related to basement and surface flood risk reduction in combined sewer systems (Central and portion of East Windsor) include complete separation of storm and sanitary sewer flows, disconnection of directly connected downspouts from the sewer to be discharged to ground surface, installation of low impact development (LID) measures to reduce total inflow to the sewer, and installation of backflow prevention devices stopping clean storm water from entering the sanitary system when the storm sewer water levels surcharge at storm-sanitary sewer overflow connection points.

The source control measures related to surface flooding in separated sewer areas include installation of low impact development (LID) measures to reduce total inflow, disconnection of directly connected downspouts and installation of backflow prevention devices stopping high water level in outlet system (Detroit River, Little River Watercourse, etc.) from surcharging back into the storm sewer system. Downspout disconnection is recommended to be enforced City-wide (Figure F.3.1). In some areas, the disconnection of downspouts re a fundamental component of the developed solutions and are required to achieve this studies objectives. Specific model input criteria used in the development of solutions and assessment process, related to source control measures and downspout disconnection, are provided below under each individual solution heading.

It is recommended no new storm drainage systems are connected to existing combined sewers except as an interim measure where sewer separation is to be ultimately implemented or where circumstances allow no other alternative.

5.1.2.1 Sewer Network Backflow Prevention Devices

Backflow prevention devices were added at a few select locations in the model where high water levels in the Detroit River or Lake St. Clair could backup into the storm sewer. The backflow prevention devices were modelled as flap valves in the InfoWorks ICM software. In general, the City has been proactive with installing such devices as these locations, it is recommended this is continued. This valves should be inspected regularly and during low water level conditions, there may be risk of freezing conditions which would compromise the use of these devices.

Backflow prevention devices would also prove useful in localized pockets of separated sewers where the storm sewer should be connected to the combined sewer.

5.1.2.2 Mandatory Downspout Disconnection

Currently, under By-Law 26-2008, parts of the City may require mandatory disconnection. Non-compliance with a disconnection order may be subject to a fine under the By-Law.

Disconnection is mandatory for residential homes within the area bounded by the following:

- South of Tecumseh Rd. East
- North of the Canadian Pacific Railway
- East of Howard Ave.
- West of Walker Rd

The City currently offers a Downspout Disconnection Service free of charge targeting residential homes only.

It is recommended that the City implement a City-wide mandatory Downspout Disconnection Policy. A City-wide program of this nature will require significant public partnership. The City will need to develop a program to educate the public, facilitate the completion of this work and enforce this mandatory program. The rationale for these recommendations are based on improving sewer performance by reducing inflows, thereby, reducing the risk of basement and surface flooding resulting from sewer surcharging. Many municipalities have found that proper downspout discharge coupled with improved lot grading is an effective way to reduce private property inflow contribution.

Existing downspouts connected to separate sanitary sewer systems are not currently permitted. The mandatory downspout disconnection policy recommended as part of the Master Plan refers to disconnection of downspouts from the storm sewer system, where in all feasible locations (use of pop-up heads, etc.) downspouts would be directed from roofs to the ground surface and not have a direct connection to the storm sewer system.

To model the potential benefit of downspout disconnection stormwater subcatchment had alterations to overland flow parameters. In specific a portion of the "roof" runoff surface area would be conveyed to the pervious area prior to entering the model sewer nodes. This provided a slower time travel time to the sewer and for additional water to be infiltrated into the ground surface. This was only applied and modelled at select locations as providing slight reductions in runoff volume and flow rate.

5.1.2.3 Low Impact Development (LID) Measures

Per the draft MECP (May 2020) LID Stormwater Management Guidance Manual, Low impact development (LID) measures:

> …are an innovative state-of-the-art approach to managing stormwater by controlling and treating precipitation where it falls, as a resource to be managed and protected rather than a wasted. (The measures are intended to help maintain the natural hydrologic cycle through the use of source (lot level) and conveyance measures in combination with end-of-pipe controls using what is referred to as a "treatment train" approach to stormwater management.

As LID measures are considered an innovative and new technology for stormwater management, it is recommended pilot project(s) be completed to confirm the benefit of installed LIDs. The same recommendation is given to foundation drain disconnection downspout disconnection. The pilot projects will monitor the conditions within the measures including potential benefits of flood risk reduction where the observed measures will be evaluated on a cost benefit basis, prior to future projects. Additional details of the proposed pilot projects are provided in Section 6.

To help mitigate the risk of improperly assessing and relying too much on the potential benefit of LID measures in the flood risk reduction solutions, LID measures are just one part of the multi-element solution approach; which also includes conveyance, storage and outlet improvements. The use of LIDs generally improves stormwater runoff water quality and reduces volume of combined sewer overflows (CSOs). However, the potential flood risk reduction benefits of these measures are only accounted for in select locations in the model, which are identified in Figure F.5.1. Even though the recommendations are City-wide in the model LIDs were only included in select locations. This included the entire East Windsor service area and as needed in the South and Central Windsor service areas to compliment other improvements to the stormwater infrastructure. The MECP's LID guidelines note that the use of these measures are voluntary and that municipalities should assess the local effectiveness in the application of these measures. As part of this study it is recommended that should the results of local pilot projects show favourable and that the City is able to commit to a regular inspection and maintenance of these measure that the use LIDs be implemented wherever practical.

There are multiple methods to model LIDs with software programs like InfoWorks ICM including but not limited to providing additional conduits, additional storage nodes, adding infiltration parameters to conduits/storage nodes, and modifying subcatchment parameters. For this City-wide flood risk reduction study it was agreed with the project team that a conservative approach be implemented in the development of flood risk reduction solutions. In specific, LIDs were modelled by increasing the initial abstraction value of subcatchment by 15 mm, this would apply uniformly to all wet-weather stormwater subcatchments' land uses. This approximately translates to 18% volume reduction and 10% peak flow reduction for a 1:100 year event. Under a Climate Change event, this results in 10% volume reduction with no reduction in peak flow rates. The selection of this parameter is done in the absence of a local study to set infiltration parameters and therefore the actual abstraction factor will be confirmed based on pilot programs and site by site soil characteristic analysis.

The modelling approach for LIDs has a factor of safety. For the Windsor-Essex Region, the draft MECP (May 2020) LID Stormwater Management Guidance Manual and the ERCA Reginal Stormwater Guidelines recommends the use of a runoff volume control target of 32 mm (reduction using Retention, LIDs and detention). To represent the use of LIDs in the model, a 15 mm initial abstraction, was used. The lower volume was used to account for variability related to site specific conditions such as space constraints, groundwater elevation and soil characteristics. The sewer infrastructure (storm sewers, ponds, pump stations etc.) were sized such that only the volume associated with the 15 mm reduction was achieved. The City is encouraged to implement LIDs city-wide and to strive to achieve meet 32 mm control target.

From the January 20th, 2020 Technical Advisory Committee meeting it was agreed that there is not a preferred LID type (exfiltration trench, bioswale, etc.) and that to not limit future designs, the study does not include recommendations for a specific type of LID measure. The Ministry of Environment, Conservation and Parks (MECP) recommends the implementation of LIDs as part of the comprehensive stormwater management solutions, which is an integral part of the balanced solution recommendations developed as part of this project. It should be noted that use of LIDs should be confirmed based on site specific factors and additional site study is required to confirm suitability.

LID alternatives area discussed in more detail in Technical Volume 3.

5.2 High Water Levels in the Detroit River & Lake St. Clair

Figure F.5.2 and Figures 5.1 and 5.2 below shows an analysis from the East Riverside Flood Risk Assessment (Landmark Engineers Inc., 2019) on the influence of high water levels in the East Windsor area in order to design the proposed landform barrier along Riverside Dr. from St. Rose to the East City Limits. These figures shows a large portion of this area falls under the current instantaneous 1:100 year water level (176.5 m) and well under the predicted 2050 1:100 year instantaneous high water level (176.8 m).

The East Riverside Flood Risk Assessment (Landmark Engineers Inc., 2019) served as the support to developing the coastal flood risk reduction strategy for East Riverside as part of this Master Plan. Further details are provided in Sections 7 & 8. To account for the potential impact of high water levels in the Detroit River and Lake St. Clair at each outfall, a fixed high water level of 176.45 m was used during simulations with the 1:100 year and climate change storms.

Figure 5.1: East Riverside Flood Level Mapping (Current) (Landmark 2019)

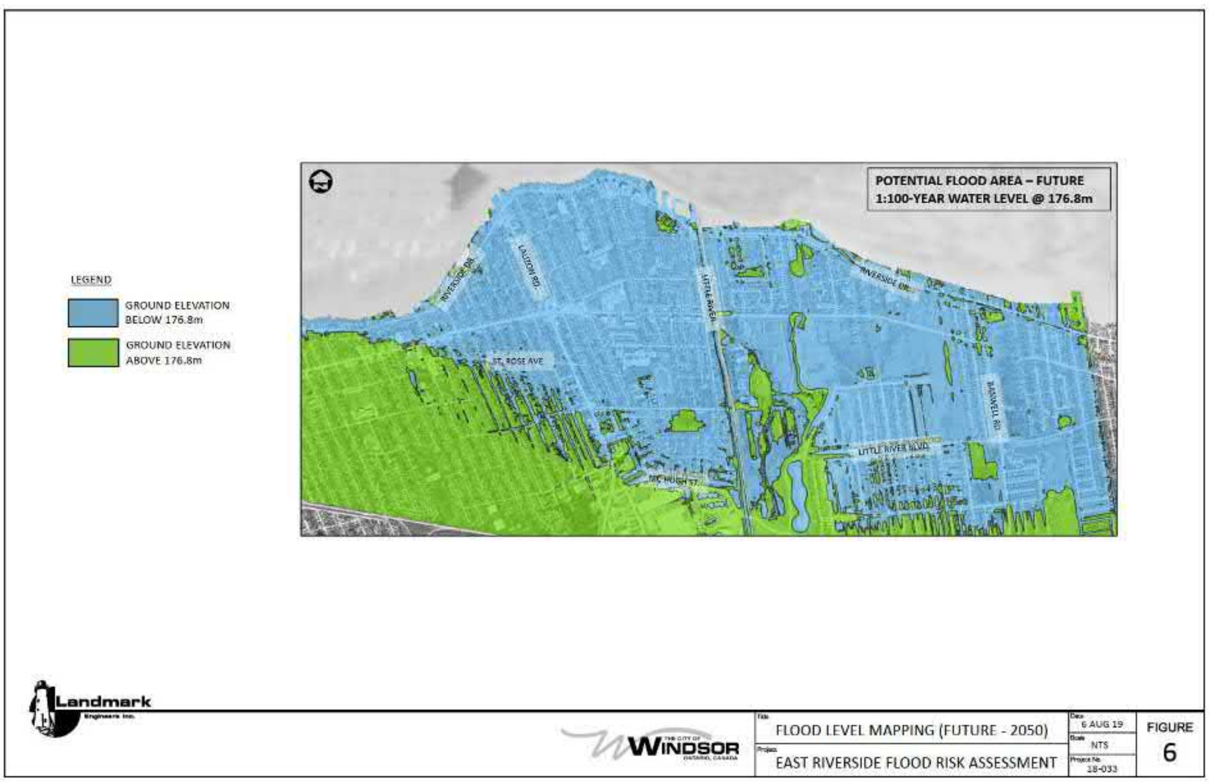

Figure 5.2: East Riverside Flood Level Mapping (Future Projected 2050) (Landmark 2019)

5.3 Central Windsor - Surface Flooding Alternatives

5.3.1 Background

The Central Windsor service area contains a substantial portion of the City's oldest development and has unique drainage servicing, where the majority is provided by combined sewer and dual maintenance hole (MH) sewer systems. Less than 20% of the lands in the Central Windsor service area are serviced by fully separated storm and sanitary sewer systems.

The combined sewer systems convey stormwater runoff, sanitary sewage, and industrial wastewater in a single pipe. Under dry weather conditions, all flows are conveyed to a treatment plant. Under wet weather conditions, stormwater runoff sometimes exceeds the combined sewer's capacity, resulting in overflow to the Detroit River. The dual MH sewer system has two pipes in parallel where one pipe is used for the conveyance of stormwater and a second lower pipe is designed for conveyance of sanitary sewage.

Both the combined sewer system and dual manhole sewer system are designed to convey stormwater but under heavy rainfall conditions, there is potential for the water levels in the sewers to surcharge. This increases the risk of basement flooding in properties without backflow preventers or similar protection measures.

As previously, identified CSO discharge to receiving systems are regulated by the MECP F-5-5 guidelines. The City of Windsor has a CSO management strategy to meet the criteria of the same guidelines. This includes limiting overflows to the Detroit River and providing water quality treatment using the existing Retention Treatment Basin (RTB); to promote settling of solids prior to discharge, for further details refer to Section 2.3.2.

The City's first RTB was recently constructed under a riverfront parking lot, north of Aylmer Ave. and Glengarry Ave, to assist with CSO treatment for the eastern portion of the Central Windsor service area. This RTB was represented in the baseline model including calibration. This unit has a peak flow rate of approximately 7.8 m^3/s. A second RTB unit is planned to be constructed adjacent to the LRWRP. It is estimated this new treatment unit will have a flow through capacity up to 9.1 m^3/s, providing treatment for combined sewage before discharge to the Detroit River. Both RTB units are accounted for in the ultimate conditions model with associated PSs controlling flow.

5.3.2 Basement Flood risk reduction Alternatives

The basement flood risk reduction alternatives for the Central Windsor service area significantly influence the surface flood risk reduction measures in the same service area. The two basement flood risk reduction alternatives considered for the Central Windsor service area are summarized below, where further details are provided earlier in the report in Section 3.2.

- SAN-C-1 - Complete Enhanced Sewer Separation of the Combined Sewer and Dual MH systems.

- SAN-C-2 - Maintain the current strategy of soft separation and achieving CSO F-5-5 measures with the use of the existing and proposed second RTB units.

Alternative SAN-C-2 was not found to meet the basement flood risk mitigation objective and therefore, alternative SAN-C-1 is considered preferred. The following sections discuss the storm sewer trunk servicing proposed to work in combination with the recommendations from SAN-C-1. An overall map of the separated stormwater trunk sewer servicing, including a drainage area mosaic is provided in Figure F.5.3.

5.3.2.1 Trunk Storm Sewer Improvements and Sewer Separation

To service the proposed fully separated sewer system in the Central Windsor service area, new trunk storm sewer infrastructure is required in conjunction with new or upgraded local roadway storm sewers to address surface flooding on major roadway and provide access to sensitive land uses. The Central Windsor area may have existing drainage constraints and challenges with the current combined sewer system, but the service area also has several unique opportunities compared to East and South Windsor.

The unique drainage opportunities for improvements in the Central Windsor service area include the ability to increase peak flow rate of existing outlets to the Detroit River. Further, with the coastal lands in Central Windsor being higher than East Riverside, the effect of backwater from the River is significantly less, allowing for efficient gravity based drainage, where PSs are generally not required. The service area is primarily not at coastal flooding risk based on the existing topography, with a few exceptions west of the Ambassador Bridge, north of Sandwich St.

The opportunities in Central Windsor allow for sewer system conveyance capacity improvements which can be constructed within the existing ROW, where the more land intensive storage based mitigation measures are not required to control peak flow. Further, PS systems are often not required due to the higher ground elevations. Under the Municipal Class Environmental Assessment process, these projects generally fall under the A/A+ classification however there may be instances where additional easements along ROWs are required to accommodate new sewers or relocation of utilities, these are classified as Schedule B projects. Outlets for newly proposed trunk sewers or upgrades to existing sewers fall under a Class B or C classification, which will be detailed in the SMP Master Plan cover report.

These single alternative improvement projects are identified in Figures F.5.4 to F.5.14 and are summarized below. Solutions that have been recommended to mitigate surface flooding risk related to emergency access have been designed to reduce surface flooding for a Climate Change Storm (added 40% climate change factor).

- Prince Rd. Trunk Storm Sewer, improvements are proposed within the Prince Rd. trunk storm sewer system and include:
  - Alternative STM-C1 -To complete this trunk storm sewer construction of approximately 200 m of new 2700 mm diameter storm sewers, west of the intersection of Chappell Ave.

and Sandwich St. to the sewer's outfall at McKee Creek, which ultimately drains to the Detroit River.
    - Alternative STM-C9 - To mitigate surface flooding risks, under the climate change design storm, on College Ave., north of Prince Rd. to South St. It is recommended that approximately 400 m of new 750 mm to 900 mm diameter storm sewers, coupled with low impact development (LID) measures be constructed.
- Felix Ave. Trunk Storm Sewer and Brock Drainage Area Separation(STM-C10), improvements are proposed within the Brock St. trunk storm sewer system and include:
    - Trunk storm sewer construction of approximately 1600 m of new storm sewers ranging in size from 1200 mm diameter to 1800 mm x 1800 mm box culverts. Construction works starting just south of the intersection of Huron Church Rd. and Dorchester Rd, heading westerly along Dorchester Rd. and Felix Ave, connecting to the existing trunk sewer at College Ave.
- Detroit St. Trunk Storm Sewer (STM-C2), improvements are proposed within the Detroit St. trunk storm sewer system and include:
    - Trunk storm sewer construction of approximately 300 m of new 1200 mm diameter storm sewers between the intersection of Detroit St. and Sandwich St. to an outfall into the Detroit River.
- Huron Church Rd. Trunk Storm Sewer Drainage Area, improvements are proposed within the Huron Church Rd. trunk storm sewer system include:
    - Partington Ave. Storm Sewer Alternative STM-C11 - Trunk storm sewer construction of 1300 m of new storm sewers, ranging in size from 900 mm to 1650 mm in diameter, starting just south of the intersection of Tecumseh Rd. W and Campbell Ave. heading westerly along Tecumseh Rd. W, then northerly along Partington Ave., connecting to the existing storm sewer at College Ave.
    - Patricia Rd. Storm Sewer Alternative STM-C12 - To mitigate surface flooding risks, under the climate change design storm, construct storm sewer along Patricia Rd. and Wyandotte St. W construction of approximately 650 m of 1200 mm diameter storm sewer connecting to the existing storm sewer at the intersection of Huron Church Rd. and Wyandotte St. E.
    - Huron Church R. Storm Sewer Alternative STM-C13- To mitigate surface flooding risks, under the climate change design storm, construct storm sewer along the east side of Huron Church Rd. north of the intersection of Huron Church Rd. and Tecumseh Rd. W, construction of approximately 70 m of 3000 mm diameter storage pipes coupled with low impact development measures.
- Separation of the Askin Rd. drainage area (STM-C20).
- Cameron St. Trunk Sewer (STM-C3), improvements are proposed for the new Cameron St. trunk storm sewer system and include:
    - A new trunk sewer system and outlet to the Detroit River. This includes construction of approximately 2700 m of new storm sewers ranging in size from 750 mm to a 3300 x 2400 mm box culvert along Tecumseh Rd. E, Curry Ave, McKay Ave. and Cameron Ave. to a new outfall at Detroit River.

- This new trunk sewer provides relief for the adjacent Huron Church and Wellington trunk storm sewer systems, lessening the improvements needed in both.
  - In the Huron Church trunk system it eliminated the need for storm sewer improvements along and under Huron Church Rd.
  - In the Wellington trunk system it eliminated the need for trunk sewer improvements north of Tecumseh Rd. W.
  - Further this sewer will reduce the risk of surface flooding along College Ave. between McKay Ave. and California Ave.
- Wellington Ave. Trunk Storm Sewer System, improvements are proposed within the trunk storm sewer system and include:
  - Alternative STM-C14 - To mitigate surface flooding risks, under the climate change design storm, on Tecumseh Rd. W between Wellington Ave. and Crawford Ave, it is recommended that 600 m of new storm sewers, ranging in size from 1350 mm to 1500 mm, coupled with low impact development measures be constructed. This item includes storm sewers required for the separation of the drainage area.
- Church-McDougall-Langlois Trunk Storm Sewer System (Bruce Ave. and Parent Ave. Outlets), improvements are proposed within this trunk storm sewer system and include:
  - It is recommended that the drainage areas for these three trunk sewer systems be upgraded with new interconnections and improved outfalls. This includes the following:
    - Alternative STM-C4 -Construction of 2000 m of new storm sewers, ranging in size from 2700 mm to 3600 mm in diameter, along Bruce Ave. to a proposed outlet to Detroit River. This item Includes storm sewers required for the separation of the drainage area.
    - Alternative STM-C5 - Construction of approximately 800 m of new storm sewers along Parent Ave. from Wyandotte St. E to Chatham St. E, then along Chatham St. E to Marentette Ave. to a proposed outfall at the Detroit River. This sewer ranges in size from 1500 mm to 1800 mm in diameter. This item Includes storm sewers required for the separation of the drainage area.
    - Alternative STM-C15 -Construction of 1500 m of new storm sewers along Giles Blvd, Erie St. and McDougall St, ranging in size from 600 mm diameter to 2400 x 1200 mm box culverts. These sewers are designed to “interconnect” the existing storm sewers to better equalize flows in the system.
    - Alternative STM-C16 - To mitigate surface flooding risks, under the climate change design storm, on Parent Ave. construction of 450 m of new storm sewers, ranging in size from 750 mm to 1200 mm in diameter, along Parent Ave. north of Giles.
    - Separation of the McDougall Ave. Area drainage area (STM-C22).

- Lincoln Rd. Trunk Storm Sewer System, improvements are proposed within this trunk storm sewer system and include:
  - Separation of the Lincoln Rd. drainage area (STM-C23);

- To mitigate surface flooding risks, under the climate change design storm on Walker Rd, the following is recommended:
  - Lincoln Rd. Alternative STM-C17 - Construction of 300 m of new 3600 mm diameter storm sewers along Lincoln Rd. between Niagara St. and Cataraqui St.
  - Ontario St. Alternative STM-C18 - Construction of 440 m of new storm sewers along Ontario St. between Walker Rd. and Kildare Rd, ranging in size from 1800 mm to 1950 mm in diameter.
  - Walker Rd. Alternative STM-C19 - Construction of 640 m of new 1350 mm diameter storm sewers along Walker Rd. between Tecumseh Rd. E and Mohawk St. and along Mohawk St. between Walker Rd. and Kildare Rd.
- Albert Rd. Trunk Storm Sewer System (STM-C7), improvements are proposed within this trunk storm sewer system and include:
  - To upgrade and complete the trunk sewer construction of 350 m of new 1650 mm diameter storm sewers starting just south of the railway tracks, north of St. Luke Rd, northerly towards Albert Rd. until reaching the sewer's outfall at the Detroit River. This item Includes storm sewers required for the separation of the drainage area.
  - Wyandotte St. E. - To mitigate surface flooding risks, under the climate change design storm on Wyandotte St. E, the following is recommended
    - Construction of 200 m of new storm sewers, ranging in size from 450 mm to 750 mm along Wyandotte St. E between Walker Rd. and St. Luke St.
- Dual MH Area, East of Albert (STM-C21), improvements are proposed within this trunk storm sewer system and include:
  - No recommended changes to the trunk stormwater infrastructure. However, like all combined sewer areas in the Central Windsor service area it is recommended that complete separation of dual MH system storm and sanitary sewer flows are completed.

5.3.2.2 Ypres Ave. (STM-C6)

A flooding problem area was identified on Ypres Ave. near Woodlawn Ave, where under the Climate Change Storm surface flooding was greater than 0.30 m. This problem area is at the far upstream end of the drainage area where the outlet is several kilometers from the problem area, therefore it was determined that a storage type alternative would be most appropriate. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- Alternative STM-C6-1 - Underground storage at Optimist Memorial Park, parking lot. This alternative includes providing approximately 70 m of 750 mm diameter storm sewer connected to a new underground storage facility with approximately 2,900 m^3 of storage.
- Alternative STM-C6-2 - Surface surcharge storage using the Optimist Memorial Park wood lot area. This alternative includes providing approximately 70 m of 750 mm diameter storm sewer connected to the surface at the Park's woodlot surface flooding is estimated to be less than 0.30 m deep in the Park.

Figure F.5.15 provides a schematic of the Ypres Ave. flood risk reduction solution and Table 5. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Alternative STM-C-1-1 is more expensive and requires more construction with the installation of a stormwater storage system underneath the Optimist Memorial Park's parking lot. Alternative STM-C-1-2 would direct additional stormwater runoff to the Park's wood lot which would reduce usability and would negatively affect the vegetation. Alternative STM-C6-1 was found to be preferred with less potential for negative environmental impact to the existing woodlot.

Table 5.2: Comparison of Ypres Ave. Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-C6	Alternative STM-C6
Description	Underground storage at Optimist Park	Surface surcharge storage using the Optimist Park wood lot area.
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	✓
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents	✓	
Impact to Recreational Space	✓	
Time to Implement		✓
Cost		✓

5.3.2.3 Drouillard Rd. PS (STM-C8)

A flooding problem area was identified at the underpass at the intersection of Drouillard Rd. and Wyandotte St. E., where under the climate change storm surface flooding was greater than 0.30 m. This problem area is near the system outlet to the Detroit River, but the road is well below grade being an underpass for the at grade rail system; therefore any solution would require the use of a PS. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- Alternative STM-C8-1 - New PS and upgraded sewers. This alternative includes upgrading the underpass' PS to a capacity of approximately 1,200 L/s coupled with upgraded 330 m of storm sewers, 825 mm in diameter connecting to an existing 900 mm diameter sewer that outlets to the Detroit River.
- Alternative STM-C8-2 - Maintain existing PS with new underground storage (40 m of 3000 mm x 1800 mm box culvert and 127 m of twin 3300 mm x 2400 mm box culvert. This alternative includes maintaining the existing PS but providing additional 2,200 m^3 of upstream underground storage beneath the underpass.

Figure F.5.16 provides a schematic of the two Drouillard Rd. PS flood risk reduction alternatives and Table 5.3 provides a comparison of the two. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Alternative STM-C8-1 is less expensive and requires less construction within the underpass, but more construction along Drouillard Rd., north of the underpass. Alternative STM-C8-1 would impact the existing Cadillac St. Park. Alternative STM-C8-1 was found to be preferred with less cost and less underground construction works required.

Table 5.3: Comparison of Drouillard Rd. PS Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-C8-1	Alternative STM-C8-2
Description	New PS and upgraded sewers.	Maintain existing PS with new underground storage.
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources		✓
Disruption to Residents		✓
Impact to Recreational Space		✓
Time to Implement	✓	
Cost	✓	

5.4 South Windsor - Surface Flooding Alternatives

5.4.1 Background

The South Windsor service area has fully separated storm and sanitary sewer systems. In general this service area has new development than Central and East Windsor. The surface and stormwater drainage in this service area are conveyed to open drains and waterways. The major Municipal Drains that service the storm sewers in the service area include the Grand Marais Drain, the Lennon Drain, the Cahill Drain, and the Wolfe Drain. All of these Municipal Drains collect drainage in the City of Windsor and convey flow through the downstream Town of LaSalle prior to discharge into the Detroit River.

ERCA had identified that solutions shall not negatively impact the reviewing watercourses. Therefore in the South Windsor service area solution measures to reduce surface flooding risk on major roadways and in regional areas of concern outletting to receiving watercourses, were designed with a combination of source control and storage measures. These measures often result in additional costs and more land than an approach based on increased sewer conveyance pipe and outlet capacity; however to achieve no negative impact to the receiving watercourses, these more expensive solution measures have been recommended.

5.4.2 Alternatives

5.4.2.1 Regional Area 7 (STM-S7)

Two types of problem areas were identified, one being the Regional Area 7, generally between Tecumseh Rd. E, Central Ave, Grand Marais Rd. E, and Pillette Ave, and the other being flooding on major roads. The roadways include Pillette Ave. and Central Ave. The flood risk reduction objectives for Pillette Ave. and Central Ave. are based on risk under the climate change design storm; whereas the flood risk reduction objectives for the local streets in Regional Area 7 are based on risk under the 1:100 year design storm event. This system is part of the Grand Marais Drain drainage area. Three flood risk reduction alternatives were developed for this problem area as outlined below:

- STM-S7-1 - New storm sewers coupled with LIDs and underground stormwater management surcharge storage at McDonald Park. This alternative includes approximately 3,800 m of upgraded storm sewers ranging in size from 600 mm to 1650 mm diameter and 23,000 m^3 of surcharge storage.
- STM-S7-2 - New storm sewers coupled with LIDs and underground or surface stormwater management surcharge storage at vacant lands north of YMCA. This alternative includes approximately 4,700 m of upgraded storm sewers ranging in size from 600 mm to 2100 mm diameter and 23,000 m^3 of surcharge storage.
- STM-S7-3 - New storm sewers and expansion of the existing Central Ave. stormwater management pond. This upgrade to the storm system would create split drainage where the lands that currently drain via storm sewers under Grand Marais Rd. E would maintain that outfall and have drainage being conveyed to the expanded Central Ave. pond. This alternative includes approximately 4,600 m of upgraded storm sewers ranging in size from 525 mm to 1800 mm diameter and an expanded pond total volume of approximately 106,000 m^3 at elevation 185.70 m and 82,000 m^3 at elevation 185.10 m.

Figure F.5.17 provides a schematic of the three Regional Area 7 flood risk reduction alternatives and Table 5.4 provides a comparison. All alternatives meet surface flooding risk reduction objectives. Alternative STM-S7-1 is the most expensive with new underground storage at McDonald Park. Costs for Alternatives STM-S7-2 and STM-S7-3 are similar. However, Alternative STM-S7-3 is the preferred alternative and requires the least amount of new infrastructure to maintain.

Table 5.4: Comparison of Regional Area 7 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-S7-1	Alternative STM-S7-2	Alternative STM-S7-3
Description	New storm sewers coupled with LIDs and underground storage at McDonald Park	New storm sewers coupled with LIDs and storage at vacant lands north of YMCA	New storm sewers and expansion of the existing Central Ave. stormwater management pond
Meets Flood Mitigation Objectives	✓	✓	✓

Evaluation Criteria	Alternative STM-S7-1	Alternative STM-S7-2	Alternative STM-S7-3
Resiliency to Climate Change	✓	✓	✓
Ease of Construction			✓
Impact to Environment	✓	✓	
Impact to Heritage and Archaeological Resources	✓	✓	✓
Disruption to Residents			✓
Impact to Recreational Space		✓	✓
Time to Implement		✓	✓
Cost		✓	✓

5.4.2.2 Regional Area 8 (STM-S8)

Regional Area 8 is generally between Howard Ave, Dougall Pkwy, and Highway 401. The roadways within this Regional Area are all local roads. The flood risk reduction objective is based on risk under the 1:100 year design storm event. This system is part of the Cahill Drain drainage area. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- STM-S8-1 - LIDs and downspout disconnection. This alternative includes approximately 13,000 m of new LIDs coupled with all existing storm sewer and complete downspout disconnection of all properties within the drainage area.
- STM-S8-2 - Lower pond normal water level and downspout disconnection. This alternative includes lowering the normal water levels in Lake Laguna, Lake Grande, and Lake Como coupled with complete downspout disconnection of all properties within the drainage area. In specific it is proposed the normal water levels for Lake Laguna, Grande and Como be reduced to 185.90 m, 185.80 m, and 185.70 m, retrospectively. The existing normal water levels are 186.40 m, 186.30 m, and 185.80 m, retrospectively.

Figure F.5.18 provides a schematic of the two Regional Area 8 flood risk reduction alternatives and Table 5.5 provides a comparison of the two. Both alternatives meet surface flooding risk reduction objectives and rely on area-wide private property downspout disconnection. LID measures are required to meet surface flood mitigation objectives for Alternative STM-S8-1. Alternative STM-S8-2 was found to be preferred as it provides a quicker and less expensive flood risk reduction alternative.

Table 5.5: Comparison of Regional Area 8 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-S8-1	Alternative STM-S8-2
Description	LIDs and downspout disconnection	Lower pond normal water level and downspout disconnection
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction		✓
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents		✓
Impact to Recreational Space	✓	
Time to Implement		✓
Cost		✓

5.4.2.3 Dougall Ave. (ROAD-S1)

Problem areas were identified along Dougall Ave, between the intersection of Ouellette Ave. and the rail underpass just north of the E. C. Row on/off ramps, along Ouellette Ave, between the intersections of Dougall Ave. and Eugenie St. E, and along Eugenie St. E, between Dougall Ave. and Dufferin Pl. The flood risk reduction objectives for these problem areas are based on risk under the climate change design storm. This system is part of the Grand Marais Drain drainage area. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- ROAD-S1-1 - Surface surcharge storage pond - vacant land. This alternative includes providing approximately 1,400 m of 825 mm to 1800 mm diameter storm sewer connected to a new surcharge surface storage facility with approximately 14,000 m^3 of storage volume.
- ROAD-S1-2 - Surface surcharge storage ponds - E. C. Row on/off ramps. This alternative includes providing approximately 2,000 m of 825 mm to 1800 mm diameter storm sewer connected to new twin surcharge surface storage facilities each with approximately 6,500 m^3 of storage volume.

Figure F.5.19 provides a schematic of the two Dougall Ave. flood risk reduction alternatives and Table 5.6 provides a comparison of the two. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Alternative ROAD-S1-1 is less expensive, requires less construction, and would not impact the EC Row on/off-ramps including existing tree plantings in these green spaces. Therefore, alternative ROAD-S1-1 is preferred.

Table 5.6: Comparison of Dougall Ave. Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-S1-1	Alternative ROAD-S1-2
Description	Surface surcharge storage pond - vacant land	Surface surcharge storage ponds - E. C. Row on/off ramps
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents	✓	
Impact to Recreational Space	✓	✓
Time to Implement	✓	✓
Cost	✓	

5.4.2.4 Howard Ave. (ROAD-S2)

The problem area was identified along Howard Ave, between Edinborough St. and Grand Marais Rd. E. The flood risk reduction objectives for this problem area is based on risk under the climate change design storm. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- ROAD-S2-1 - Surface surcharge storage pond - residential lands. This alternative includes providing approximately 1,100 m of 825 mm to 1350 mm diameter storm sewer connected to a new surcharge surface storage facility with approximately 3,500 m^3 of storage volume.
- ROAD-S2-2 - Surface surcharge storage pond - commercial property. This alternative includes providing approximately 1,200 m of 900 mm to 1350 mm diameter storm sewer connected to a new surcharge surface storage facility each with approximately 3,500 m^3 of storage volume.

Figure F.5.20 provides a schematic of the two Howard Ave. flood risk reduction alternatives and Table 5.7 provides a comparison. Both alternatives meet surface flooding risk reduction objectives and both also require construction of new sewers on Howard Ave. However, alternative ROAD-S2-1 has less new infrastructure on Howard Ave. Alternative ROAD-S2-2 is less expensive and the stormwater management pond would require acquisition of a single commercial lot, unlike alternative ROAD-S2-1 which requires acquisition of seven residential lots. Therefore, alternative ROAD-S2-2 is preferred.

Table 5.7: Comparison of Howard Ave. Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-S2-1	Alternative ROAD-S2-2
Description	Surface surcharge storage pond - residential lands	Surface surcharge storage pond - commercial property
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents		✓
Impact to Recreational Space	✓	✓
Time to Implement	✓	✓
Cost		✓

5.4.2.5 Chrysler Centre (ROAD-S3)

The problem area was identified along Chrysler Centre, between Tecumseh Rd. E and Grand Marais Rd. E. The flood risk reduction objectives for this problem area is based on risk under the climate change design storm. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- ROAD-S3-1 - Two underground storage facilities. This alternative includes providing approximately 1,200 m of 600 mm to 1500 mm diameter storm sewer connected to a pair of new surcharge surface storage facilities under the Chrysler parking lot with a total storage volume of approximately 11,000 m^3.
- ROAD-S3-2 - Single underground storage facilities. This alternative includes providing approximately 1,200 m of 600 mm to 1500 mm diameter storm sewer connected to a single new surcharge surface storage facility under the Chrysler parking lot with a total storage volume of approximately 11,000 m^3.

Figure F.5.21 provides a schematic of the two Chrysler Centre flood risk reduction alternatives and Table 5.8 provides a comparison. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Alternative ROAD-S3-2 with a single underground storage unit is less expensive, easier to construct and simpler to maintain. Therefore, alternative ROAD-S3-2 is preferred.

The underground storage facilities refer to modular stormwater storage and infiltration systems, such as StormTech Cambers as an example. During detailed design, the most suitable product and configuration for these facilities will need to be determined.

Table 5.8: Comparison of Chrysler Centre Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-S3-1	Alternative ROAD-S3-2
Description	Two underground storage facilities	Single underground storage facilities
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction		✓
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents	✓	✓
Impact to Recreational Space	✓	✓
Time to Implement		✓
Cost		✓

5.5 East Windsor - Surface Flooding Alternatives

5.5.1 Background

The existing East Windsor service area consists of partially separated and fully separated sewers. There is one major area within the East Windsor system that contains combined sewers. This area is generally located west of Jefferson Blvd. and south of South National St.. The peak flow from this area for the 1:100 year event is approximately 2.2 m^3/s, which is almost as large as the capacity of the Little River PCP PS capacity, nominally 2.6 m^3/s. Separation of this drainage area is recommended as it would have significant reduction of wet weather flows going to the sanitary sewer system and it would provide opportunity for the new storms sewers system to be sized to drainage both public and private property drainage area would. Sewer separation, for the purpose of this assessment, would remove all stormwater flows (i.e., front and rear lot and roof drainage) from the existing combined sewer system.

For the future development scenario in relationship to the storm sewer system, the following assumptions were applied:

- Future development areas are assumed to be built out.
- For surface flood risk assessment and development of solutions, the high water level for the Detroit River and Lake St. Clair was set at 176.45 m for model scenarios with the 1:100 year storm event and the climate change storm event.
- Sewer separation of the combined and partially separated areas located west of Jefferson Blvd. and south of South National St.

Consideration in development of surface flood risk reduction measures are identified below:

- LIDs were applied universally throughout the East Windsor service area, unlike South and Central Windsor. These source control measures provided a slight improvement in the surface flooding risk.
- Use of storage in upstream areas, especially for sewers draining to the Little River Watercourse.
- Reducing the drainage area to Little River Watercourse where feasible such that the relocated drainage area(s) would be conveyed directly to the Detroit River.
- Increased pumping capacity or new PSs where feasible.
- Modelled representation of the proposed improved Riverside Dr. landform barrier at elevation 176.50 m via modifications of the 2D boundary data.

5.5.2 Alternatives

5.5.2.1 Regional Areas 1 and 2 (STM-E1)

Regional Problem Areas 1 and 2 falls within the Riverside neighbourhood which includes Riverside Dr. E. and the residential areas between Ford Blvd. and Lauzon Rd.. This area is defined by the drainage areas boundaries for the Ford Blvd. PS, St. Rose Ave. outfall and St. Paul Ave. PS. These three systems convey stormwater flows directly to the Detroit River. The flood risk reduction objectives for Riverside Dr. E. are based on risk under the climate change design storm; whereas the flood risk reduction objectives for the local streets in Regional Areas 1 and 2 are based on risk under the 1:100 year design storm event. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- STM-E1-1 - Improve St. Rose, St. Paul, and Ford outlets, while maintaining the existing Ford drainage area. This alternative carries over the general recommendations from the St. Paul/Pontiac Study (Dillon 2018) that includes conveyance improvements and in-line storage along Riverside Dr. E., conveyance improvement and inline storage from Esdras Ave. to St. Rose Ave., a trunk sewer and box culvert along Belleperche Ave., and the St. Rose Ave. trunk sewer and box culvert. Further this alternative includes a new 6.5 m^3/s PS at St. Rose Beach, an upgraded PS at St. Paul Ave. with a peak capacity of 18 m^3/s.
- STM-E1-2 - Improve St. Rose, St. Paul, and Ford outlets, while modifying the Ford drainage area. This alternative includes conveyance improvements along Riverside Dr. E. and expanding the St. Rose drainage area, as well as a net reduction of the drainage area to the Ford Blvd. PS. This reduction includes relocating drainage areas north of South National St. to the St. Rose Ave. outfall and collecting more drainage area south of South National St. (i.e., part of the existing combined sewershed area). A new PS is proposed at St. Rose outfall (peak capacity of 13.5 m^3/s) and upgrades are proposed at St. Paul PS (peak capacity of 18.2 m^3/s) and at the Ford PS (0.5 m^3/s).

In both alternatives, the proposed upgrades to the Ford Blvd. PS is to increase the capacity of the existing PS from 0.20 m^3/s to 0.5 m^3/s. In STM-E1-2, the PS drainage area is being reduced and therefore this upgrades provides a higher level of service then STM-E1-1. Through the development of solution for this area the option to upgrade the Ford. Blvd. PS with a new PS that would have full capacity to provide 1:100 year level of service was reviewed. After further consideration, this option did not provide measurable additional benefit to the system and therefore is not a cost effective solution. The Ford drainage areas generally is higher than the St. Rose and St. Paul systems to the east and therefore it is less susceptible to high lake levels. In addition to upgrading the Ford PS capacity, it is recommended that the City implement controls and monitoring equipment to facilitate the observation of the operation and draw down time of the Ford Blvd. system. Another critical component of this solutions is the removal of the interconnection, between the Riverside Dr. storm sewer system and the Ford Blvd. storm sewer system (at the Ford Blvd/Riverside Dr. E. intersection) to avoid the backwater of the higher Ford system into the St. Rose system.

Table 5.9: STM-E1-1 Proposed Infrastructure Summary

Infrastructure	Shape	Improved Size (mm)	Length (m)
Improved Sewer	Circular	Ranging from 750mm up to 1800mm	2600m
New Box Culverts	Rectangular	1800 X 900 to 3000 m X 1800 mm	1900 m
Pumping Stations	N/A	Ford Blvd. – Upgrade to 0.5 m^3/s St. Rose Ave. – New PS at 6.5 m^3/s St. Paul Ave. – Expansion to 18 m^3/s	N/A

Table 5.10: STM-E1-2 Proposed Infrastructure Summary

Infrastructure	Shape	Improved Size (mm)	Length (m)
Improved Storm Sewer	Circular	ranging from 900mm up to 2700mm	3700
New Box Culverts	Rectangular	1800mm X 900mm to 3050mmX1830mm	1900
Pumping Stations	N/A	Ford Blvd. – Upgrade to 0.5 m^3/s St. Rose Ave. – New PS at 13.5 m^3/s St. Paul Ave. – Expansion to 18.2 m^3/s	N/A

Both the alternatives meet the 1:100 year event flood risk reduction objectives for the majority of the area. Alternative STM-E1-2 provides a higher level of service under the climate change storm, in comparison to alternative STM-E1-1 which still has surface flooding above 0.30 m at Patrice Dr. and Isabella St. with a length just under 40 m. Further, alternative STM-E1-2 allows for the reallocation of part of the proposed combined separation drainage area, from the Little River Watercourse to the Detroit River via the Ford outfall. This reduces the total drainage area being conveyed to the Little River Watercourse.

The main difference between STM-E1-2 and STM-E1-1, is that under the STM-E1-2 scenario, the improved storm sewer on Riverside Dr. extends to Ford Blvd. which allows for the following additional benefits:

- Larger sewers on Riverside Dr. E., east of Jefferson Blvd., will provide relief to the Esdras/Reedmeer area, where it is known that significant overland flows are directed to Riverside Dr. due to low lying natural topography of the residential area. Under current conditions, significant surface flooding is observed along Riverside Dr. during major rain events.
- Sewer improvements will be coupled with the construction of the Riverside landform barrier which is required to protect inland areas and municipal infrastructure from coastal flooding risk associated with high water levels in Lake St. Clair/Detroit River. This barrier will also provide protection to the residents, north of Riverside Dr. E., that are impacted from ponding on Riverside Dr. E.
- The City has scheduled the construction of the Riverside Vista Phase 2A projects that includes the road reconstruction of Riverside Dr. E., between Ford Blvd. and St. Rose Ave. this provides the opportunity to complete these works in the short-term (2021-2025). This project and the storm sewer improvements have already received partial federal funding support through the Disaster Mitigation and Adaptation Fund (DMAF). An application for the balance of the work has been submitted and the City is waiting for response.
  - Vista 2A improvements include the construction of a new road with a curb/gutter and catchbasin system which will improve conveyance of surface drainage to the storm sewer.

Alternative STM-E1-2 was selected as the preferred alternative, as it meets all the surface flood risk reduction criteria for Riverside Dr. E. as well as the area's upstream lands. Figure F.5.22 provides a schematic of the two Regional Area 1 and 2 flood risk reduction alternatives and Table 5.11 provides a comparison.

Table 5.11: Comparison of Regional Area 1 and 2 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-E1-1	Alternative STM-E1-2
Description	PS Upgrades 4.5 km of New Storm Sewers:	PS Upgrades 5.6 km of New Storm Sewers:
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change		✓
Ease of Construction	✓	
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources		✓
Disruption to Residents		✓
Impact to Recreational Space		✓
Time to Implement	✓	✓
Cost		✓

Several modelling assessments scenarios were conducted with lower pumping capacities that were found not to meet the project's flood risk reduction objectives. To meet the established rainfall derived surface and coastal flooding risk mitigation objectives for Riverside Dr. and the Riverside Vista PH. 2A Area, alternative STM-E1-2 represents a comprehensive solution for the St. Paul, St. Rose and Ford Storm drainage areas.

5.5.2.2 St. Paul PS (PS-E1-PAUL)

The St. Paul PS improvements, per alternative STM-E1-2, are recommended to improve the level of service within the existing drainage area (shown in Figure F.5.22 and Figure F.5.27) by improving the existing outlet and storm trunk sewer conveyance capacity. This requires the expansion of the existing St. Paul PS located north of Riverside Dr. E. and west of the Lauzon Rd. intersection.

In conjunction with this PS, a new storm trunk sewer is proposed along Belleperche Place, between Tranby Ave. and Clairview Ave., along Clairview Ave. between Belleperche Pl. and Kiwanis Park, and through the existing Kiwanis Park, discharging directly to the St. Paul PS.

Alternative PS-E1-PAUL was selected as the preferred alternative, as it meets the surface flood risk reduction criteria for this drainage area. Refer to Appendix F- Technical Volume 3 report for a functional design of the St. Paul PS expansion. F.5.22 shows the location of the St. Paul PS and the proposed alignment of the upstream Belleperche Pl. trunk storm sewer and Table 5.12 below provides a comparison.

Table 5.12: Regional Areas 1 & 2 – St. Paul PS - Surface Flooding Risk Reduction (PS-E1-PAUL / PS-E1 & PS-E2) Alternatives

Evaluation Criteria	Alternative 1 Expand St. Paul PS and Belleperche Storm Sewer	Do Nothing Alternative
Meets Flood Mitigation Objectives	✓	
Flexibility to Adjust to Climate Change	✓	
Complexity of Installation & Operation		Does not meet flood mitigation measures.
Anticipated Extent of Maintenance Required	✓	
Length of Time Required for Implementation		
Disruption during Construction	✓	
Permanent Changes to the Urban Community	✓	
Impacts to Archaeological, Built Heritage, & Cultural Heritage		
Impacts to the Natural Environment	✓	

Evaluation Criteria	Alternative 1 Expand St. Paul PS and Belleperche Storm Sewer	Do Nothing Alternative
Relative Capital Cost	✓	
	PREFERRED	

The 'Do Nothing' alternative does not improve the surface flooding issue, and over time, climate changes will increase the negative effects i.e. impacts, disruption and increased costs to the community. Alternative 1 meets the objectives and is therefore preferred. Regional Areas 1 & 2 – St. Paul PS Surface Flooding Risk Reduction is anticipated to be a Schedule 'B' level for the proposed expansion project.

5.5.2.3 St. Rose PS (PS-E1-ROSE)

The St. Rose PS improvements per alternative STM-E1-2 are recommended based on multiple considerations. The technical considerations are summarized below:

- Expanding the storm drainage area serviced by the existing St. Rose gravity sewer to include lands from the current Ford Blvd. storm sewer drainage area. This relocation of drainage areas:
  - Accommodates additional flows from the proposed separation of the combined sewers, south of South National to the existing Ford Trunk Sewer.
  - The change in drainage area allows the Ford sewer system lands, generally higher, to be "disconnected" from the lower lying lands on Riverside Dr.
  - The St. Rose drainage area requires a pumped outlet, due to the topography relative to the River levels which, based on other studies, is expected to rise in the future.
- With the proposed landform barrier intercepting runoff and existing surface water flooding concerns on Riverside Dr., the proposed solution provides an outlet to capture and convey flow on Riverside Dr., ultimately discharging via the proposed PS to the Detroit River. St. Rose is a natural low spot along Riverside Dr. E.

The proposed St. Rose PS location along St. Rose Ave. was selected based on consideration of the following:

- St. Rose Park is the location of the existing storm sewer outlet.
- The two main trunk systems that serve this area converge at this location and outlet to the Detroit River.
- Providing additional upstream storage, in lieu of improving the existing outlet and adding capacity, was considered. Providing upstream storage using underground tanks is considerably more costly and is less resilient than a PS outlet.

From the numerous options explored in the pre-design phase, the four (4) viable PS location alternatives were evaluated as described below:

- **PS-E-ROSE-1** – Construct the St. Rose Avenue PS in the St. Rose Avenue Park greenspace on the north side of Riverside Drive East, within the existing sheet pile/break wall area of the park. This alternative is the closest to the existing outfall and does not require displacement of any existing residences.

- **PS-E-ROSE-2** – Construct the St. Rose Avenue PS to the south of Riverside Drive and east of St. Rose Avenue. This alternative requires permanent displacement of two residential buildings.
- **PS-E-ROSE-3** - Construct the St. Rose Avenue PS to the south of Riverside Drive and west of St. Rose Avenue. This alternative requires permanent displacement of three residential buildings.
- **PS-E-ROSE-4** - Construct the St. Rose Avenue PS, at the northwest corner of the St. Rose Avenue/Wyandotte Street East intersection. This alternative requires permanent displacement of one commercial building, one residential building, and will require property from the adjacent property (acquire a portion of the existing parking area).

Each site is located in the vicinity of the existing St. Rose Avenue storm box culvert that provides the primary drainage outlet for the entire St. Rose Avenue drainage area (195 Ha). Alternatives were chosen based on their proximity to the outlet and the receiving water course. Alternative locations refer to more general areas where the PS could be located. The City may be able to fine tune the location of the PS based on further discussion and negotiation with property owners. For instance, there may be property owners along St. Rose Avenue or Riverside Drive, east of St. Rose Avenue that may be more open to selling and the homes may be less costly for the City to acquire.

For the purpose of this comparative evaluation, the four alternative PS locations are as listed above and shown in **Figure F.5.22.1.** Exact property limits and impacted properties are subject to refinement based on detailed design of the proposed PS. This figure shows the footprint required to construct the proposed PS based on the functional design of the 13.5 m^3/s PS. The functional design includes provisions for maintenance access, an electrical/control building and an on-site emergency power generator.

Common features and considerations of all three of these alternatives include:

- New PS wet well structure to house 3 large sized pumps and 2 smaller duty pumps to provide a storm sewer outlet for the St. Rose Avenue drainage area. The firm capacity of the PS (all pumps running) will be 13.5 m^3/s. The dimensions of the wet well are a function of the depth of the inlet sewers, on-site soil conditions, and the size and operation of the pumps;
- Building structure to house the electrical systems and controls is required;
- A back-up power generator is recommended to provide standby power. Size and location of the generator shall be confirmed prior to detailed design to determine an appropriate power rating and size that would adequately mitigate risk associated with power outages. The generator will be placed and constructed to mitigate impacts of noise from surrounding properties as required by applicable regulations;
- To provide power, an on-site power transformer will be required. Power source will need to be reviewed with EnWin prior to detailed design;
- Vehicular access points from the City's right-of-way to provide access for periodic maintenance of the site and pumps; and

- Landscaping amenities to improve the esthetic of the facility but also to provide site features that will add value to the property and be beneficial to the community. Local residents will be involved in the design process to assist in the development in a design that will fit the neighbourhood.

Table 5.13 below provides a high level comparison of the St. Rose Avenue PS Location Alternatives and is followed by additional commentary on the section of the preferred alternative. All four alternatives meets the surface flooding risk reduction objectives of this MP. Alternative PS-E-ROSE-1 is preferred based on a number of other criteria. A separate alternative solution evaluation was completed and is included in Appendix E-2.

Table 5.13: St. Rose PS Expansion/Upgrade Surface Flooding Risk Reduction (PS-E1-ROSE) Alternatives

Evaluation Criteria		PS-E-ROSE-1 St. Rose Avenue Park	PS-E-ROSE-2 SE Corner of St. Rose Ave./Riverside DR. E.	PS-E-ROSE-3 SW Corner of St. Rose Ave./Riverside DR. E.	PS-E-ROSE-4 NE Corner of St. Rose Ave./Riverside DR. E.
Meets Flood Mitigation Objectives		✓	✓	✓	✓
Flexibility to Adjust to Climate Change		✓	✓	✓	✓
Coastal Flood Risk					✓
Water Quality		✓	✓	✓	✓
Complexity of Installation & Operation		✓			
Anticipated Extent of Maintenance Required		✓			
Length of Time Required for Implementation		✓			
Disruption during Construction		✓			
Permanent Changes to the Urban Community	Noise/Vibration Impacts				✓
	Displacement of Existing Residents/Businesses	✓			
	Disruption to Greenspaces/Parks		✓	✓	✓
	Disruption to Waterfront/Views		✓	✓	✓
Impacts to Archaeological, Built Heritage, & Cultural Heritage					✓
Impacts to the Natural Environment		✓	✓	✓	✓
Relative Capital Cost		✓			
Preferred:		PREFERRED			

5.5.2.4 **Ford Blvd. PS (PS-E1-FORD)**

The Ford Blvd. PS improvements, per alternative STM-E1-2, are recommended to improve the level of service within the existing drainage area (shown in Figure F.5.22) by improving the drawdown time of the existing storm system by replacing the pumps within the existing PS structure. It is recommended that this PS also be equipped with back-up power and control and monitoring equipment.

5.5.2.5 Regional Area 3 and 4 – East Windsor Combined Sewer Area (STM-E3)

Regional Areas 3 and 4 are generally between Jefferson Blvd, South National St, Pillette Rd, and E.C ROW. The roadways within these Regional Areas are primarily local roads. The local road flood risk reduction objective is based on risk under the 1:100 year design storm event. This existing combined and partially separated sewer system drains both northerly to the Detroit River and easterly towards the Little River watercourse. The primary improvement is complete sewer separation and transferring WWF to the proposed storm sewers. Recommendations also includes the construction of two large culvert along Tecumseh Rd. E. and South National Ave. to address roadway flooding using a Climate Change storm level of service. Two flood risk reduction alternatives were developed as outlined below:

- STM-E3-1 - Continued soft separation and maintaining current drainage areas. This alternative does not meet the flood risk reduction objectives.
- STM-E3-2 - Complete sewer separation of the combined sewer systems and new stormwater drainage areas. This alternative includes removing stormwater from the Little River PCP via a new storm sewer system to the Detroit River and the Little River Watercourse. The proposed new or upgraded storm sewer system reduces surface flooding risk in Regional Area 3.

The key elements for alternative STM-E3-2 include infrastructure to convey flows while satisfying the 1:100 year event, providing infrastructure on Jefferson Blvd. and South National St. and diverting outflow of approximately 92 ha of area from Little River to the Detroit River via the Ford Blvd. trunk sewer. The proposed infrastructure is summarized in Table 5.14.

Table 5.14: STM-E3-2 Proposed Infrastructure

Infrastructure	Shape	Improved Size (mm)	Length (m)
Improved Storm sewer	Circular	Ranging from 375 up to 1500	7,914
New Box Culverts	Rectangular	1200mmX1325mm to 3800mmX1500mm box culvert	1,576

Under the 1:100 year storm event, there is a nominal change in flow to the Hawkins Drain from the improved Coronation St. storm sewer outlet. The Little River Floodplain Study (Dillon, ongoing) will assess this solution and all other solutions upstream of Little River watershed area to confirm drain conditions.

Figure F.5.23 provides a schematic of the two Regional Areas 3 and 4 flood risk reduction alternatives and Table 5.15 provides a comparison of the two. Only alternative STM-E3-2 meets the surface flooding risk reduction objectives. Alternative STM-E3-2 is preferred.

Table 5.15: Comparison of Regional Areas 3 and 4 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-E3-1	Alternative STM-E3-2
Description	Continued soft separation and maintaining current drainage areas	Complete sewer separation of the combined sewer systems and new stormwater drainage areas
Meets Flood Mitigation Objectives	Does not Meet Flood Risk Reduction Objectives	✓
Resiliency to Climate Change		✓
Ease of Construction		
Impact to Environment		✓
Impact to Heritage and Archaeological Resources		✓
Disruption to Residents		✓
Impact to Recreational Space		✓
Time to Implement		✓
Cost		✓

5.5.2.6 Regional Areas 5- Blue Heron Pond Drainage Area (STM-E5)

Regional Area 5 includes the new development associated with the Lakeview drainage area. The area has a mix of relatively new developments (last 25 years), areas that are currently being constructed and areas that have been planned for future development. Regional Area 5's drainage is conveyed to the Blue Heron pond, ultimately discharging into the Detroit River via the Lakeview PS.

Modelling results for this area show significant surface flooding under existing conditions however it is known that during the Sept. 2016 flood event that the pond experienced significant overflow that posed damage and flood risk to adjacent property owners. This condition occurred due to the timing of back to back rain events that did not allow the pond to drain to accommodate additional stormwater management needs. To improve the resiliency of this pond is recommended that the Lakeview PS and outlet to the Detroit River be improved to reduce the time required to draw down the water level within the pond. Under existing conditions, the Lakeview PS, has 2 submersible pumps (0.2 m^3/s each) and is currently operating at a capacity of 0.3 m^3/s based on the modelling and on/off levels supplied by the City. Under current conditions, the Lakeview PS conveys flows from the Blue Heron stormwater management pond to the Detroit River via a 900 m, 600 mm diameter storm sewer. Under the 1:100 year design storm event, there is a 2.20 m freeboard at the maximum level. The drawdown time for the Blue Heron facility is 80 hours.

Prior to Implementation, the City shall confirm these recommendations including the potential need to upsize the sewer between the pond and the PS. There is an ongoing EA being completed for Wyandotte St. E. to Jarvis Ave., this study is currently recommending revisions to the Blue Heron Pond drainage area along with stormwater improvements on Jarvis Ave. These recommendations have not be incorporated into the City's sewer model or assessed through this MP study.

Two alternatives were developed for this problem area as outlined below:

- STM-E5-1 - Improve the Lakeview PS capacity and upgrade the existing outlet to Lake St. Clair. This alternative includes upsizing the PS outlet sewer from a 350 mm diameter to 600 mm diameter and replacing the existing PS with a larger PS with a capacity of 0.7 m^3/s (three 0.25 m^3/s pumps) to improve the drawdown time of the existing Blue Heron stormwater management pond. It is also recommended that road surface flooding be improved to meet the established level of service, in this Blue Heron Pond drainage areas by improving storm sewers located Morningstar Ave., Venetian Ave. and Katella Ave.
- STM-E5-2 - Maintain current PS. Does not meet flood risk reduction objectives.

Table 5.16: STM-E-5-1 Proposed Infrastructure Summary

Infrastructure	Shape	Description	Length (m)/ Capacity (m^3)
Improved Storm Sewers	Circular	375 mm to 900 mm	2,242m
Improved Force Main	Circular	600 mm and upgraded outfall	190m
Lakeview PS		New PS Improvements	0.7m^3/s

Under Alternative STM-E5-1, the sewer improvements on Little River Blvd., Morningstar Ave., Venetian Ave. and Katella Ave. and proposed storm sewer south of Little River Rd. reduces surface flooding risk within a flat, low lying area under the 1:100-year design storm.

Only alternative STM-E5-1 meets the surface flooding risk reduction objectives. Alternative STM-E5-1 is preferred. Figure F.5.24 provides a schematic of the preferred flood risk reduction alternative and Table 5.17 provides a comparison of the two alternatives.

Table 5.17: Comparison of Regional Area 5 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-E5-1	Alternative STM-E5-2
Description	Sewer, forcemain and PS improvements	Maintain current PS
Meets Flood Mitigation Objectives	✓	Does not Meet Flood Risk Reduction Objectives
Resiliency to Climate Change	✓	
Ease of Construction		
Impact to Environment		
Impact to Heritage and Archaeological Resources		

Evaluation Criteria	Alternative STM-E5-1	Alternative STM-E5-2
Disruption to Residents		
Impact to Recreational Space		
Time to Implement		
Cost		

5.5.2.7 Regional Areas 6 – Pontiac and East Marsh PS Drainage Areas

Regional Area 6 includes the new developments associated with the North and South Neighbourhoods, East Marsh drainage area, and Pontiac drainage area. The North and South neighbourhoods have a mix of relatively new developments (last 10 years), areas that are currently being constructed and areas that have been planned for future development. North (Pontiac PS) and South Neighbourhoods both drain to the Little River Watercourse. The East Mast PS drains to the Detroit River.

Many of the recommended sewer sizes, grades, and invert elevations in Regional Area 6 were developed in the Pontiac, St. Paul, and St. Rose Drainage Area Study (2019) and were modified based on changes to the drainage areas. Regional Area 6's drainage is conveyed to North and South Neighbourhood ponds, ultimately discharging into the Little River Watercourse. Further a portion of Regional Area 6's drainage is conveyed northerly to the East Marsh PS, discharging into the Detroit River. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- STM-E6-1 - Maintain Current Drainage Areas. This alternative does not meet the flood risk reduction objectives.
- STM-E6-2 - New Stormwater Drainage Areas, LIDs and Brumpton Park Storage. This alternative redirection of a majority of the East Marsh PS drainage area to the Pontiac PS drainage area; results in a reduction of inland coastal flooding risk as inland drainage is provided within the protection of the Ganatchio Trail berm where coastal flood waters cannot enter the storm sewer system. Further this alternative includes sewer upgrades along Cedarview Ave., Riverside Dr., Neighbourhood and South Neighbourhood and providing off-line storage underground storage in Brumpton Park.

The infrastructure capacity upgrades for alternative STM-E6-2 are summarized below.

Table 5.18: Regional Area 6 Proposed Infrastructure Summary

Infrastructure	Shape	Description	Length (m)/ Capacity (m^3)
Improved Storm sewer	Circular	450 mm to 1050 mm	11,900 m
Brumpton Park Storage		Underground surcharge storage	4,750 m^3

Figure F.5.25 provides a schematic of the two Regional Area 6 flood risk reduction alternatives and Table 5.19 provides a comparison of the two. Only alternative STM-E6-2 meets the surface flooding risk reduction objectives. Alternative STM-E6-2 is preferred.

Table 5.19: Comparison of Regional Area 6 Surface Flooding Alternatives

Evaluation Criteria	Alternative STM-E6-1	Alternative STM-E6-2
Description	Maintain Current Drainage Areas	New Stormwater Drainage Areas, LIDs and Brumpton Park Storage
Meets Flood Mitigation Objectives	Does not Meet Flood Risk Reduction Objectives	✓
Resiliency to Climate Change		✓
Ease of Construction		
Impact to Environment		✓
Impact to Heritage and Archaeological Resources		
Disruption to Residents		
Impact to Recreational Space		
Time to Implement		
Cost		

5.5.2.8 Jefferson Blvd, Raymond Ave. and David Suzuki Public School

Problem areas were identified on Raymond Ave. fronting the David Suzuki Public School and Jefferson Blvd. between Raymond Ave. and Ontario St. The flood risk reduction objectives for these problem areas are based on risk under the climate change design storm. This system is part of the St. Rose PS drainage area, and ultimately outlet to the Detroit River. Two flood risk reduction alternatives were developed for this problem area as outlined below:

- ROAD-E2-1 - New Storm Sewers & Underground Storage At David Suzuki School. The alternative includes sewer upgrades and a surcharge storage facility within the school property, refer to Table 5.18 for details.
- ROAD-E2-2 - New Storm Sewers & Box Culverts. This alternative includes sewer upgrades, box culvert / inline storage on Jefferson Ave. and redirection of flows conveyed via Garden Court Dr. to the west to join with the proposed St. Rose trunk sewer, refer to Table 5.20 for details.

Table 5.20: ROAD E2-1 Proposed Infrastructure Summary

Infrastructure	Description	Length (m)/ Capacity (m^3)
Improved Storm sewer	450 mm to 1800 mm	344 m
Box Culverts	4.2m X 1.8 m	321 m

Infrastructure	Description	Length (m)/ Capacity (m^3)
Underground Surcharge Storage	Underground Surcharge Storage within David Suzuki School Property	14,000 m^3

Table 5.21: ROAD-E2-2 Proposed Infrastructure Summary

Infrastructure	Description	Length (m)/ Capacity (m^3)
Improved Storm sewer	450 mm to 1200 mm	321 m
Box Culverts	1.8m X 0.9m to 4.2m X 1.8 m	701 m

Alternative ROAD-E2-2 was selected as the preferred alternative to avoid impacts to the school property and to utilize spare conveyance capacity available in the St. Rose trunk sewer. Surface flooding under climate change conditions is maintained below 0.3 m for most of the area, however on Jefferson Blvd., surface flooding reaches a peak depth of under 0.36 m in an area 40 m in length. Adjustments can be made at the functional and detailed design stages to meet the criteria.

Figure F.5.26 provides a schematic of the two flood risk reduction alternatives and Table 5.22 provides a comparison of the two. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Both alternatives require construction of new sewers on Jefferson Blvd. and improved sewers through the Dr. David Suzuki School. Alternative ROAD-E2-1 requires underground storage at the school whereas Alternative ROAD-E2-2 does not. Alternative ROAD-E2-2 is less expensive and would have less impact on the Dr. David Suzuki School. Alternative ROAD-E2-2 is preferred.

Table 5.22: Comparison of Jefferson Blvd, Raymond Ave. and David Suzuki Public School Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-E2-1	Alternative ROAD-E2-2
Description	New Storm Sewers & Underground Storage At David Suzuki School	New Storm Sewers & Box Culverts
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction		✓
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents		✓
Impact to Recreational Space		✓

Evaluation Criteria	Alternative ROAD-E2-1	Alternative ROAD-E2-2
Time to Implement	✓	✓
Cost		✓

5.5.2.9 Lauzon Rd. (ROAD-E5)

A problem area was identified on Lauzon Rd, between St. Rose Ave. and Tranby Ave. The flood risk reduction objectives for these problem areas are based on risk under the climate change design storm. This system is part of the St. Paul PS drainage area that includes the proposed Belleperche Pl. sewer upgrade (part of Regional Area 2 Alternative STM-E1-2) and ultimately outlets to the Detroit River. One alternative was considered for this problem area. This alternative, ROAD-E5, includes upgrading the storm sewer along Lauzon Rd. including:

- Conveyance upgrades on 2.5 km of Lauzon Rd. from McHugh St. (Lauzon Line) to Cecile St. to mitigate surface flooding above 0.30 m.
- Sewer sizes range from 1200 mm to 2700 mm.

Figure F.5.27 provides a schematic of the flood risk reduction alternative.

The performance of the storm sewer on Lauzon Rd. is tied to adequate pumping of flows to the Detroit River at the St. Paul PS. Under STM-E1, the St. Paul PS preferred capacity is 18.2 m^3/s. Modelling shows the sewer sizes used on Lauzon Rd. in conjunction with the 18.2 m^3/s PS at St. Paul Ave. reduces surface flooding below 0.30 m leaving at least one lane passable under climate change conditions.

5.5.2.10 Wyandotte St. E. (ROAD-E9)

A problem area was identified on Wyandotte St. E. at Watson Ave. Flood risk reduction objectives for these problem areas are based on risk under the climate change design storm.

One alternative was considered for this area that included:

- Off-line underground storage of approximately 13,000 m3 volume of flows to be located in two facilities per Figure F5.28, and
- Approximately 150 m of additional storm sewer.

Evaluation of this solution as it relates to the “Do Nothing” option is included in the Master Plan Report.

The storage facilities will store excess flows such that the maximum depth of 0.3m along Wyandotte St. will be met. The capacity upgrades proposed are summarized below:

With this alternative under climate change conditions, the offline surcharge storage is fully utilized at Watson Ave. and 80% utilized on Wyandotte St. Surface flooding on Wyandotte St. is mitigated to below 0.3 m with the intersection at Watson Ave. having 2 passable lanes at peak flood conditions.

5.5.2.11 McHugh St, McNorton Ave. and Banwell Rd (ROAD-E7, ROAD-E8 and ROAD-E10)

Problem areas were identified at three locations within the Lakeview Drainage Area:

- Banwell Rd. from Wyandotte St. E to Little River Rd.
- McHugh St. from Katella Ave. to Chateau Ave.; and
- McNorton Rd. between Maitland Ave. to Timbercrest Ave.

Flood risk reduction objectives for these problem areas are based on risk under the climate change design storm. Only one alternative for each problem area was considered for these locations as the options were limited by existing development and local topography.

The key conveyance elements for these alternatives are as follows and summarized on Figure F.5.29 and listed below:

- ROAD-E10 - Banwell Rd. – 1800 mm diameter. Sewer (700 m)
- ROAD-E7 - McHugh St.
  - 1200 mm diameter sewer on Chateau Ave., Leathorne ASt. and Questa Dr. (531 m) and
  - 4.2 m X 1.8 m box culvert inline storage (533 m)
- ROAD-E8- McNorton Ave.
  - 1050 mm diameter sewer on McNorton Ave. (584 m) and..
  - 1050 mm to 2400 mm diameter sewer on Blue Heron Dr. (581 m).

Surface flooding over 0.30 m is mitigated under climate change for all of Banwell Rd. and McNorton Ave. In-line storage on McHugh St. mitigates surface flooding allowing 2 lanes passable at the peak conditions, therefore the criteria are met.

5.5.2.12 Lauzon Pkwy (ROAD-E4)

Problems areas were identified on Lauzon Pkwy. between Hawthorne Dr. and Cantalon Dr. that flood above 0.3 m rapidly under the 1:100-Year plus climate change scenario. Two alternatives were considered to mitigate surface flooding:

- ROAD E4-1: New underground in-line storage tank under Lauzon Pkwy. with 10,000 m3 underground storage facility in Meadowbrook Park along with 20,000m3 SWM facility in the Little River Golf Course Lands. Details are summarized in Table 5.21
- ROAD E4-2: New underground in-line storage tank under Lauzon Pkwy., with 5,000 m^3 underground storage facility in Meadowbrook Park along with 20,00m^3 SWM facility in the Little River Golf Course Lands (LRGC). The stormwater facility will require the decommissioning of the existing golf course as the pond will take up the entire golf course area. The functional design of the LRGC pond considers the area required for the Little Rive Drain 1:100 year flood line level. This alternative also incorporates raising the roadway up to 300 m in some areas on Lauzon Pkwy. and the implementation of swales along 500 m of open private property along the west side of Lauzon Pkwy. from Cantelon Dr. to Hawthorne Dr. Details are summarized in Table 5.23

The alternatives are shown in Figure F.5.30.

Table 5.23: ROAD-E4-1 Proposed Infrastructure

Infrastructure	Description	Length (m)/ Capacity (m^3)
Underground Surcharge Storage	Underground surcharge storage in Meadowbrook Park	10,000 m3
SWM Facility	SWM Facility in LRGC	20,000 m3
Box Culvert / Inline Storage	3.6mX1.8m to 4.2m X 1.8m	845 m

Table 5.24: ROAD-E4-2 Proposed Infrastructure

Infrastructure	Description	Length (m)/ Capacity (m^3)
Underground Surcharge Storage	Underground surcharge storage in Meadowbrook Park	5,000 m3
SWM Facility	SWM Facility in LRGC	20,000 m3
Box Culvert / Inline Storage	Culverts between 3.6mX1.8m and 4.2m X 1.8m.	845 m
Surface Storage Swales	Surface storage swales along west side of Lauzon Pkwy. requiring property acquisition	500 m
Road	Regrade Lauzon Pkwy. between Cantelon and Hawthorne	250 m

It is important to note that both alternatives include surface stormwater management facility (i.e. SWM pond) with an approximate footprint that covers the majority of the existing LRGC. The storage in the proposed facility will generally need to be above the 1:100 year flooding line for Little River of 178.30 m.

Alternative ROAD- E4-2 was selected to reduce the sizing of the proposed underground storage facility in Meadowbrook Park and keep linear infrastructure sizing to a reasonable size that avoids potential conflicts with the proposed sanitary sewer infrastructure along Lauzon Pkwy. The alternative as modelled indicated mitigation of surface flooding above 0.3 m under climate change such that 2 lanes are passable on Lauzon Pkwy. Road regrading was not modelled, however approximate storage depths were calculated to model the proposed swales on private property.

Figure F.5.30 provides a schematic of the two flood risk reduction alternatives and Table 5.25 provides a comparison of the two. Both alternatives meet surface flooding risk reduction objectives including during more severe climate change storms. Both alternatives require construction under Lauzon Pkwy., Meadowbrooke Park and the golf course. Without regrading of Lauzon Pkwy. and surface storage swales along the west side of the parkway, a larger underground facility at Meadowbrooke Park is required, hence ROAD-E4-2 was selected.

Table 5.25: Comparison of Lauzon Pkwy. Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-E4-1	Alternative ROAD-E4-2
Description	New box culverts, offline storage in Meadowbrooke Park and new SWM facility in the Lauzon Golf Course lands	New box culverts, offline storage in Meadowbrooke Park, road regrading of Lauzon Pkwy. with and LID implementation and new SWM facility in the Lauzon Golf Course lands
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction		
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources		
Disruption to Residents		
Impact to Recreational Space		
Time to Implement		
Cost		

5.5.2.13 McHugh St. (West of Little River)

A problem are was identified under the 1:100 year plus climate change level of service on McHugh St. at a large low point just west of Darfieild Dr. Two alternatives were explored to mitigate surface flooding and are summarized below:

- ROAD E6-2: This alternative is shown on the left side of Figure F.5.31 and includes:
    - Re-grading of approx. 300m of McHugh St.;
    - Upgrading the storm sewer, west of Darfield Dr. to a 4.2x1.8m box culvert; and
    - Upgrading the storm sewer, east of Darfield Dr. to a 3.6x1.8m box culvert.
- ROAD E6-3: This alternative is shown on the right side of Figure F.5.31 and includes:
    - Re-grading of approx. 300m of McHugh St.,
    - Re-grade 300 m of McHugh Street, from west of Darfield Dr. to just east of the McHugh/Darfield intersection to eliminate a large low point where the model indicated a high surface flood risk impacting this collector route.
    - East of Darfield Dr. to a 3.6x1.8m box culvert; and
    - A 4,000 m3 offline storage pond on developable lands to the south of McHugh St.

Details are summarized in Table 5.25 below:

Table 5.26: ROAD-E6-2 Proposed Infrastructure

Infrastructure	Shape	Description	Length (m)/ Capacity (m^3)
Box Culvert / Inline Storage	RECT	3.6mX1.8m to 4.2m X 1.8m	371 m
Road		Regrade McHugh St. between Lauzon Line and Darfield Dr.	300 m

Table 5.27: ROAD-E6-3 Proposed Infrastructure

Infrastructure	Shape	Description	Length (m)/ Capacity (m^3)
Surcharge Storage		Offline storage on developable lands to the south of McHugh St.	4,000 m3
Box Culvert / Inline Storage	RECT	3.6mX1.8m	274 m
Road		Regrade McHugh St. between Lauzon Line and Darfield Dr.	300 m

Alternative ROAD E6-2 was selected as preferred to reduce/eliminate the low point and keep at least 2 lanes passable on McHugh St. with surface ponding below 0.3 m. Alternative ROAD E6-3 was not selected as information received from the developer of the adjacent lands indicated that the development process was underway that mitigated any potential usage as emergency stormwater storage. Table 5.28 provides a comparison of the two alternatives.

Table 5.28: Comparison of McHugh St. Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-E6-2	Alternative ROAD-E6-3
Description	New box culvert (in-line and off-line storage) and road re-grading.	New box culvert and road re-grading with off-line surface storage on developable lands
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change	✓	✓
Ease of Construction	✓	
Impact to Environment	✓	✓
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents	✓	
Impact to Recreational Space	✓	✓
Time to Implement	✓	✓
Cost		

5.5.2.14 Roseville Garden Dr. (ROAD-E-11)

A problem area was identified on Roseville Garden Dr. between Roseville Public School and Tecumseh Road is at high-risk to flooding due to current road grades, upstream flows from Jefferson Blvd. and Rose St. to the west, a large area of impervious surface from the commercial areas near Tecumseh Road and a downstream surcharged storm system along Hawthorne Ave. under both the 1:100 year and 1:100 year plus 40% climate change.

One alternative was considered for this area that included the following key elements:

- Underground offline storage at Roseville Park and Roseville Public school property with a storage capacity of 31,000 m3
- 640 m of box culverts ranging in size from 1.8mX0.9m to 2.4mX1.8m along Roseville Garden Dr.
- 60 m of upgraded sewers from 600 mm to 900 mm diameter.

Figure F.5.32 shows the approximate footprint of the proposed off-line storage facility and the extent of the proposed upgrades.

Alternative ROAD E6-2 was selected as preferred to reduce/eliminate the low point and keep at least 2 lanes passable on McHugh St. with surface ponding below 0.3 m. Alternative ROAD E6-3 was not selected as information received from the developer of the adjacent lands indicated that the development process was underway that mitigated any potential usage as emergency stormwater storage. Table 5.29 provides a comparison of the two alternatives.

Table 5.29: Comparison of Roseville Garden Drive Surface Flooding Alternatives

Evaluation Criteria	Alternative ROAD-E11	Do Nothing
Description	New box culvert (in-line and off-line storage) and road re-grading.	No improvement to the existing storm sewer system.
Meets Flood Mitigation Objectives	✓	
Resiliency to Climate Change	✓	
Ease of Construction	✓	Does not meet flood mitigation objectives.
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	
Disruption to Residents	✓	
Impact to Recreational Space	✓	
Time to Implement	✓	
Cost		

The alternative mitigates flood-risk along Hawthorne Dr. and Kew Dr. to meet the 0.3 m surface flooding LoS criteria for major roads. Upstream sections of Roseville Garden Dr. still see surcharging above 0.3 m to 0.37 m to be addressed at detailed design. It was also identified that further improvement could be realized with LID implementation, particularly within the parking lots dominating the impervious areas draining from north of Vine St.

5.6 Recommended Surface Flooding Solutions

The previous section provided detail on the flood mitigation alternatives based on both a regional perspective to satisfy the 1:100 year event level of service and a flood mitigation measures from an Emergency Services perspective to satisfy a 1:100 year plus 40% climate change level of service. In some cases, solutions will require detailed design refinements (i.e. road grading requirement) in order to meet the level of service.

Figures 5.33 and 5.34 illustrate the modelled extent of surface flooding after implementation of the preferred alternatives. It should be noted that some areas showing surface flooding above 0.3 m include existing ditches, low points in open spaces and lands with no defined major system at the time of development of the DEM.

Tables 5.30 through 5.32 provide a summary of the recommended longer-term solutions (Preferred Alternatives) resulting from the comparative evaluation of the previous sub-sections, for the Central, South, and East SewerSheds respectively. It should be noted that in 2020, an update to the Municipal Class Environmental Assessment is scheduled which may alter the Schedule designation of these projects and therefore the City shall confirm schedules when information is made available.

Table 5.30: Summary of Preferred Alternatives - Central Sewershed Drainage Area

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Prince Road	STM-C1	Prince Trunk Storm Sewer Outfall including Drainage Area Sewer Separation	Installation of approx. 200 m of storm sewers to a new outfall at McKee Creek including a dewatering pump station.	C
Prince Road	STM-C9	College Ave. Storm Sewer	Installation of approx. 400 m of storm sewers and LIDs along College Ave. to connect with existing Prince Rd. trunk sewer on Prince Rd.	A+

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Brock Street	STM-C10	Felix Ave. Storm Sewer including Drainage Area Sewer Separation	Installation of approx. 1,600 m of storm sewers along Felix Ave., connecting to existing main at College Ave.	A+
Detroit Street	STM-C2	Detroit Street Trunk Storm Sewer and Outfall Drainage Area Sewer Separation	Installation of approx. 300 m of storm sewer along Detroit Street, from Sandwich St. to an improved outfall at the Detroit River.	C (outfall)
Huron Church Rd.	STM-C11	Partington Ave. Trunk Storm Sewer including Drainage Area Sewer Separation	Installation of approx. 1,300 m of storm sewer along Tecumseh Rd. W and Partington Ave. to existing main at College Ave. including Drainage Area Sewer Separation.	A+
Huron Church Rd.	STM-C12	Patricia Trunk Storm Sewer	Installation of approx. 650 m of storm sewer along Patricia Rd. and Wyandotte St. W to existing main at Huron Church Rd.	A+
Huron Church Rd.	STM-C13	Huron Church Rd. Trunk Storm Sewer	Installation of approx. 70 m of storm sewer along Huron Church Rd. just north of the intersection with Tecumseh Rd. E.	A+
Askin Rd.	STM-C20	Askin Drainage Area Sewer Separation	Enhanced sewer separation of the entire drainage area.	A+
Wellington Avenue	STM-C14	Wellington Trunk Storm Sewer including Drainage Area Sewer Separation	Installation of approx. 600 m of storm along Tecumseh Blvd. W. at Crawford Ave.	A+
Cameron Avenue	STM-C3	Cameron Trunk Storm Sewer/ Outfall including Drainage Area Sewer Separation.	Installation of approx. 2,700 m of storm sewer along Tecumseh Rd. W., Curry Ave., Rooney St., McKay Ave., Martindale St., and Cameron Ave. to new outfall to the Detroit River, including Drainage Area Sewer Separation.	A+ and C (outfall)

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Church Ave.	STM-C4	Bruce Ave. Trunk Storm Sewer/ Outfall including Drainage Area Sewer Separation	Installation of approx. 2,000 m of storm sewer along Bruce Ave. to connect to new outfall at Detroit River and Drainage Area Sewer Separation.	A+ and C (outfall)
McDougall Ave.	STM-C22	Drainage Area Sewer Separation	Enhanced sewer separation of the entire drainage area.	A+
Langlois Ae.	STM-C5	Parent Ave. Storm Sewer/ Marentette Ave. Outfall including Drainage Area Sewer Separation	Installation of approx. 800 m of storm sewers along Assumption St., Parent Ave., Chatham St., Marentette Ave., to new outfall at Detroit River and Drainage Area Sewer Separation.	A+ and C (outfall)
Church Ave./ McDougall Ave./ Langlois Ave.	STM-C15	Giles Ave. Storm Sewer Interconnection	Installation of approx. 1,500 m of storm sewers along Shepherd St., McDougall St., Giles Blvd. E., and Erie St.	A+
Parent Ave.	STM-C16	Parent Ave. Storm Sewer at Erie St. E.	Installation of 450 m of new storm sewers along Parent Ave. south of Erie St. E.	A+
Lincoln Ave.	STM-C23	Drainage Area Sewer Separation	Enhanced sewer separation of the entire drainage area.	A+
Lincoln Ave.	STM-C17	Lincoln Trunk Storm Sewer	Installation of approx. 300 m of storm sewer along Lincoln Rd.	A+
Lincoln Ave.	STM-C18	Ontario St. Storm Sewer	Installation of approx. 440 m of storm sewer along Ontario St.	A+
Lincoln Ave.	STM-C19	Walker Rd. Storm Sewer	Installation of approx. 640 m of storm sewer along Walker Rd. and a portion of Mohawk St	A+
Ypres Avenue.	STM-C6	Ypres Ave. Stormwater Management Facility	Installation of an underground stormwater storage facility under existing a parking lot within Optimist Park on Ypres Ave.	B

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Albert Road	STM-C7.1	Albert Trunk Storm Sewer/Outfall	Installation of approx. 350 m of storm sewer along Albert Rd. to connect to an improved outfall to the Detroit River and Drainage Area Sewer Separation.	B
Albert Road	STM-C7.2	Wyandotte St. E. Storm Sewer	Installation of approx. 200 m of storm culverts along Wyandotte St. E. to provide stormwater storage capacity.	A+
Drouillard Road	STM-C8	Drouillard PS Improvements	Installation of approx. 270 m of storm sewer along Drouillard Rd. between Riverside Dr. E. and Wyandotte St. E. Construction of a new pump station within Cadillac Park and decommissioning of the existing pump station.	B
Dual Manhole Area	STM-C21	Separation of the Dual Manhole Drainage Area	Replaced the existing dual storm and sanitary system with a new fully separated system.	A+

Table 5.31: Summary of Preferred Alternatives - South Sewershed Drainage Area

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B, C)
Grand Marais Drain	ROAD-S1	Dougall Ave. Stormwater Management Pond and Storm Sewer Improvements	Installation of approx. 1,400 m of storm sewers on Eugenie St. E., between McDougall St. and Dougall Ave., and along Dougall Ave., from Eugenie St. E. to a proposed SWM Pond, south of South Cameron Blvd. providing approx. 14,000 m^3 storage volume within private property.	B
Grand Marais Drain	ROAD-S2	Howard Ave. Stormwater Management Pond and Storm Sewer Improvements	Installation of approx. 1,200 m of storm sewer on Howard Ave. between Edinborough St. and E.C ROW Expressway to a proposed SWM Pond providing approx. 3,500 m3 storage volume within private property.	B

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B, C)
Grand Marais Drain	ROAD-S3	Chrysler Centre Underground Stormwater Management Facility and Storm Sewer Improvements	Installation of approx. 600 m of storm sewer along Chrysler Centre between Tecumseh Rd. E. and Grand Marais Rd. E. to a proposed underground stormwater management facility within private property, providing approx. 11,000 m3.	B
Grand Marais Drain	STM-S7	Regional Area 7 (Central Ave. and Pillette Rd.) Stormwater Management Pond and Storm Sewer Improvements	Installation of approx. 1,200 m of storm sewer along Pillette Rd., Central Ave., Grand Marais Rd. E. Tourangeau Rd., and Bernard Rd., to the existing Central Ave. SWM Pond. This includes the expansion of the Central Ave. pond within private property areas.	B
Cahill Drain	STM-S8	Regional Area 8 Surface Flooding Risk Reduction	Lowering the normal water levels in Lake Laguna, Lake Grande, and Lake Como coupled with complete downspout disconnection of all properties within the drainage area.	A+

Table 5.32: Summary of Preferred Alternatives - East Sewershed Drainage Area

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Detroit River	STM-E1	Regional Areas 1 & 2 (Riverside Area) -St. Paul. Drainage Area Storm Sewer and Pump Station Improvements	Installation of storm trunk sewers on Belleperche Pl., Clairview Ave., and a proposed easement through Kiwanis Park.	B

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Detroit River	STM-E1	Regional Areas 1 & 2 (Riverside Area) - St. Rose Ave. Drainage Area Storm Sewer and Pump Station Improvements	Installation of storm trunk sewers along Riverside Dr. E., St. Rose Ave., Wyandotte St. E., Janisse Dr., Ontario St., and St. Mary's Blvd.	B
Detroit River	PS-E1-PAUL	St. Paul PS Improvements	Expansion eastwards of the existing PS, new outfall at the Detroit River from the expansion, and backup generators.	B
Detroit River	PS-E1-ROSE	St. Rose Ave. PS Improvements	Construction of a new 13.5 m^3/s PS within the St. Rose Park lands including a new outfall and a backup power generator.	C
Detroit River	PS-E1-FORD	Ford Blvd. PS Upgrades	Upgrade capacity of the existing PS within the existing wet well, include controls, monitoring equipment and backup power generator.	A+
Little River/ Detroit River	STM-E3	Regional Areas 3 & 4 (East Windsor/ Fountainbleu Area) - Storm Sewer Improvements	Separation of sewers in the Regional Areas 3 and 4 (between Pillette Rd., and Jefferson Blvd., south of South National St., and north of the E.C.ROW Expressway). This includes the installation of approximately 9,500 m of large trunk storm sewers and culverts.	B
Little River	ROAD-E4	Lauzon Parkway Storm Sewer Improvements Underground	Installation of large storm culverts on Lauzon Pkwy. including the grading improvements within the municipal right-of-way.	B
Little River	ROAD-E4	Lauzon Parkway Surface Storage Swales	Installation of 500 m of surface storage swale located within private property are, west of Lauzon Pkwy., between Cantelon Dr. and Hawthorne Dr.	B

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Little River	ROAD-E4	Meadowbrook Park Underground Stormwater Management Facility	Installation of an underground stormwater management facility within the park lands, west of Meadowbrook Lane.	B
Little River	ROAD-E4	Little River Golf Course Stormwater Management Pond	Installation of stormwater management pond within the Little River Golf Course.	B
Detroit River	ROAD-E5	Lauzon Road Surface Flooding Risk Reduction	Installation of approx. 2,000 m of storm sewers along Lauzon Rd. accompanied by LIDs.	A+
Little River	ROAD-E11	Roseville Garden Underground Stormwater Management Facility and Storm Sewer Improvements	Installation of approx. 700 m of storm sewers and culverts along Roseville Garden Dr., as well as an underground stormwater storage facility under Roseville Park and Roseville Public School's green space.	B
Blue Heron/Lakeview PS	ROAD-E10	Banwell Surface Flooding Risk Reduction	Installation of approx. 1,800 m of storm sewers and 500 m of box culvert along Banwell Rd.	A+
Blue Heron/Lakeview PS	ROAD-E7	McHugh Surface Flooding Risk Reduction	Installation of approx. 530 m of storm sewers and 530 m of box culvert along McHugh St.	A+
Blue Heron/Lakeview PS	ROAD-E8	McNorton Surface Flooding Risk Reduction	Installation of approx. 600 m of storm sewers and 600 m of box culvert along McNorton St.	A+
Little River	ROAD-E6	McHugh St. Storm Sewer at Darfield Dr.	Installation of 500 m of new box culverts and regrading of 350 m of McHugh St.	A+

Sub-Drainage Area	Alternative Code	Alternative Name	Description	Proposed Class EA Schedule Level (A, A+ ,B , C)
Blue Heron/Lakeview PS	STM-E5	Regional Area 5 (Blue Heron Pond Area) PS and Storm Sewer Outlet Improvements	Improve the Lakeview pump station at South Rendezvous Park and upgrade the existing outlet to Lake St. Clair.	B
Pontiac PS	STM-E6	Regional Area 6 Surface Flooding Risk Reduction	Installation of a storm sewer along Cedarview Dr., and new stormwater pond in Brumpton Park.	B
Pontiac PS	STM-E6	Regional Area 6 Surface Flooding Risk Reduction	New storm sewers required to redirect drainage south of Ganatchio Trail Berm from East Marsh PS to Pontiac PS in conjunction with East Marsh PS improvements which include upgraded s (no change in capacity) and installation of backup generators.	B
Pontiac PS	ROAD-E9	Wyandotte at Watson Underground Storage Facility	Construction of two stormwater surcharge features (either pond or underground), requiring property acquisition.	C
Detroit River	ROAD-E2	Jefferson Blvd. and Raymond Ave. Storm Sewer	Installation of approx. 1,100 m of storm sewers along Jefferson Blvd., Raymond Ave. and within David Suzuki Easement.	A+

6.0 Pilot Projects

Multiple recommendations for source control measures were identified as part of the project. The source control programs are integral measures for both the surface and basement flood risk reduction solutions. These measures have significant potential to reduce both the volume and rate of water entering the storm, sanitary, and combined sewer systems. However, these measures may require substantial time or financial investment; and further may require works on private properties. In discussions with the project team it was confirmed that pilot projects should be completed to evaluate the efficacy of the following:

- Foundation drain disconnections (FDD) from the sanitary sewer system;
- Low impact development (LID) measures, in conjunction with the existing storm sewer conveyance system; and,
- Downspout disconnection (DD) from the storm sewer system.

6.1 General Recommendations

As these measures are all source control approaches, there are many common elements between the three. Although each of the source control measures are unique with individual recommendations, the common elements for the pilot programs for the three measures are presented below:

- Use of a Control. For each area the City implements pilot projects, two street segments must be monitored. One street would be the "control street" and the second would be the "improved street". The two streets are a minimum recommendation; more "control streets" and "improved streets" would provide more information to complete the assessment. Ideally, the locations being monitored would have independent upstream drainage areas of similar size and land use. Further, the help isolate areas of interest, it is recommended the sites for monitoring be selected at the top end (or upstream end) of the sewer system.
- Pre-construction monitoring, ideally given the hydrologic uncertainties in rainfall patterns and consequently flow patterns in sewers; programs would collect 2-3 years of rainfall and flow data. The pre-construction monitoring is an important component of the pilot projects creating an understanding of baseline conditions and providing a relative picture of how the two locations respond to rainfall and more importantly how the flows in the sewer respond relative to each location.
- Post-construction monitoring, in post construction monitoring, data would be collected in the same locations on the "control street" as in pre-construction conditions and there would be the same or more flow monitoring devices on the "improved street" post-construction. Also, post construction monitoring collection shall extend for 2-3 years to capture various rainfall flow data scenarios. Additional details for specific source control measures are provided in the text in the following sections.

Adequate and comprehensive records of rainfall and flow data are fundamental for developing a sound assessment of source control measures. The rainfall or precipitation data should be representative of what the subject drainage areas have received. The City maintains a network of rain gauges with continuous recordings of rainfall; it may be required to supplement this data with local precipitation monitoring closer to the flow monitoring sites. This should be confirmed when site monitoring plans are developed.

Flow monitoring data collection is also fundamental for a sound assessment of source control measures. The flow monitoring data would include rates, volumes, and depths with respect to time, further discussion is provided in the following sections. Other key elements required for the flow monitoring programs are confirming drainage areas outletting to the source control measures and the drainage area characteristics of the sewer system(s) upstream and downstream of the 2 streets. The characteristics of interest related to the drainage areas would include, but is not limited to:

- Drainage area size,
- Land uses and impervious coverage,
- Catchment slope(s),
- Soil conditions; and,
- Connectivity of the lands (i.e. directly connected, etc.)

For each of the three source control measures (FDD, DD and LIDs) multiple pilot programs at various locations within the City shall be implemented. Results of those pilot projects should be compared, then, pending City Council approval a strategy to apply the measures for City-wide flood reduction program will need to be developed. Once the flow monitoring data is collected, both pre and post construction, this information can be related with respect to both potential to reduce flooding risks and construction costs to improve the sewer systems. There are no specific RDII reduction targets associated with each pilot program as each location and system is unique and has varying levels of RDII reduction potential. Pilot programs should demonstrate a net reduction of HGL however it should be noted that these source controls are only one component of the flood mitigation strategy and flood risk reduction will need to be the combined implementation of these measures along with infrastructure improvements.

Monitoring will also consider impacts to groundwater levels in the vicinity of LID features to assess potential impacts to adjacent properties.

6.2 Foundation Drain Disconnection Pilot Projects

6.2.1 Background

The foundation drain disconnection program is potentially the most contentious program recommended from the Master Plan. However, basement flooding is effectively a City-wide concern under severe storm events; therefore the implementation of a program to remove a substantial portion of RDII from the sanitary sewer system is reasonable.

In many instances the building foundation drainage systems are connected directly into the municipal sanitary sewer connection. Generally, homes built before 1980, were permitted to drain foundations to the sanitary connection. Standard home building practices have improved since that time; however, it should be noted that there may be instances where homes built after 1980, may have improper connections that were done illegally.

None of the municipalities included in the desktop review have implemented a mandatory foundation drain disconnection program as part of their flooding mitigation measures. It was found that this type of program has had success in other areas. For example, Ann Arbor, Michigan, has implemented a mandatory disconnection program (Sanitary Sewer Wet Weather Evaluation Project) which resulted in the disconnection of 50% to 99% homes in priority areas. During subsequent storm events, their system analysis has shown significant reduction in sanitary sewer flow volumes (77% reduction during a major storm event). In the City of Markham, mandatory downspout disconnection from the sanitary sewer reduced wet weather extraneous flow peaks by half when only 5% of rooftops were disconnected in one flood-prone sewershed.

Through this master plan, the project team completed various different modelling scenarios to determine the benefit of foundation disconnection on the City's sewer system. Each scenario looked at varying degrees of public cooperation relative to disconnecting foundation drains. For example, for the South Windsor sanitary drainage area, foundation drain disconnection was found to have a favourable benefit-cost ratio as it mitigated the need to increase large inline storage sewers.

It is understood that disconnection of foundations drains has the most relative impact to homeowners during implementation and that disconnection will often require restoration both inside and outside the home.

6.2.2 Recommendations

These monitoring programs would be looking for changes in both WWF and DWF conditions in the sanitary sewer system. In addition to the general recommendations provided in Section 6.1 flow monitoring gauges would record the following:

- 2 sanitary sewer flow monitors (depth and flow) on both the "control street" and the "improved street" just downstream of the site and at a second location in the middle of two streets. Second location provides redundancy in data collection and second point of information. The "control street" and the "improved street" should be in close proximity to avoid variation of rain fall distribution.

To confirm efficacy and findings the parallel monitoring programs shall be complete at a minimum two locations in the City, three locations would be preferred. This would include monitoring a minimum of 4 streets; two control sites and two improved streets. The selection of preferred sites should consider older residential subdivisions where it is believed the majority of buildings have foundation drain connections to the sanitary sewer. It should be noted that the efficacy of FDD solutions may vary specially due to time of year, groundwater levels, soil conditions and also home building practices. Pilot projects locations should be chosen to capture the benefit based on variable differences between neighbourhoods such as house lot coverage, size of homes, and age of homes.

The location of these pilot projects should be focused in areas where the City is prepared to implement mandatory foundation drain disconnection. The City shall utilize historical permit and building records and complete preliminary in-situ home inspections to confirm areas that are suitable for pilot programs.

6.2.3 Additional Discussion

Much of the work completed for the sewer master plan has focused on quantifying existing development's sewer flow response to rainfall conditions to reduce basement flooding risks for existing development. However, the project was also scoped to review needs under future development. It has been identified through recent studies, as well as through the flow monitoring completed as part of this project, that observed sanitary sewer rainfall- derived infiltration (RDII) could exceed typical allowances in design guidelines by up to 6 times, even in new developments. These excessive RDII flow contributions to the sanitary system increase basement flooding risk.

Therefore, the detailed design and implementation of sanitary sewers for new developments should consider the impacts of wet weather inflow and infiltration and the HGL elevations throughout the sewer system. There are two general approaches taken by other municipalities to address this issue, as follows:

1. Flow Monitoring and Controls for New Sanitary Sewer Systems. Developers are responsible for ensuring that extraneous flows in new sanitary sewer systems are monitored and controlled, as required to ensure that sources of excess extraneous flows beyond acceptable design standards are repaired.
2. Increase extraneous flow allowances in the design of sanitary sewage collection and treatment systems to accommodate the observed increased flows during both dry and wet weather conditions.

Following discussions with the City it was recommended both strategies for addressing extraneous flows in new development be considered to help manage the impacts of future development within the sewer system.

6.3 Low Impact Development (LID) Pilot Projects

6.3.1 Background

LID measures are considered an innovative and new technology for stormwater management, it is recommended pilot project(s) be completed to confirm the benefit. The pilot projects will monitor the conditions within the measures including potential benefits of flood risk reduction where the observed measures will be evaluated on a cost benefit basis, prior to future projects. Even though the recommendations are City-wide in the model LIDs were only included in select locations. This included the entire East Windsor service area and as needed in the South and Central Windsor service areas to compliment other improvements to the stormwater infrastructure.

6.3.2 Recommendations

These monitoring programs would be looking for how much water is being conveyed in the sewer post construction, how much water is being infiltrated into the ground and are there any noticeable impacts to the sanitary sewer system's flow or to adjacent properties due to exfiltrated water and changes to shallow groundwater that could affect private property. In addition to the general recommendations provided in Section 6.1 flow monitoring gauges would record the following:

- 2 storm sewer flow monitors on both the "control street" and the "improved street" just downstream of the site and at a second location in the middle of streets. Second location provides redundancy in data collection and second point of information. Further it is recommended 1 sanitary flow monitor be installed on both streets to understand potential interaction between LIDs and the sanitary sewer system. It would be ideal if the sanitary sewer drains in the same direction as the sewer storm.
- In addition to the installation of the sewer flow monitors, it is recommended that on the "improved street" 2 flow monitors and depth sensors are installed in the LID(s).

To help confirm efficacy and findings it may be worth completing the parallel monitoring programs at two or multiple locations in the City. This would allow for a better cross-section of subdivision characteristics to quantify the potential benefits.

6.4 Downspout Disconnection

6.4.1 Background

It is recommended that the City implement a City-wide Downspout Disconnection Policy. The rationale for these recommendations are based on improving sewer performance by reducing inflows, thereby, reducing the risk of basement and surface flooding resulting from sewer surcharging. The downspout disconnection policy recommended as part of the Master Plan refers to disconnection of downspouts from the storm sewer system, where in all feasible locations (use of pop-up heads, etc.) downspouts would be directed from roofs to the ground surface and not have a direct connection to the storm sewer system.

6.4.2 Recommendations

These monitoring programs would be looking for how much water is being conveyed in the sewer post construction. In addition to the general recommendations provided in Section 6.1 flow monitoring gauges would record the following:

- 2 storm sewer flow monitors on both the "control street" and the "improved street" just downstream of the site and at a second location in the middle of streets. Second location provides redundancy in data collection and second point of information.

To help confirm efficacy and findings it may be worth completing the parallel monitoring programs at two or multiple locations in the City. This would allow for a better cross-section of subdivision characteristics to quantify the potential benefits.

7.0 Coastal Flood Protection

The north and west boundaries of the City of Windsor are bound by Lake St. Clair and the Detroit River. During periods of High Water Levels additional coastal flooding risk is present, especially for low-lying areas. High water levels also impact the efficiency of the City's sewer system due to submerged sewer outlets.

Two areas of the City have been identified as being at risk of flooding based on the existing topography in relation to the HWL of the Lake/River. These areas include:

- Riverside Dr. East and the East Riverside Area, between Ford Blvd. and the East CIty of Windsor Limits; and,
- Coastal area, west of Russell St., west of the Ambassador Bridge.

The purpose of this master plan is to further refine and evaluate alternatives associated with coastal flood protection solutions for the Riverside Dr. East and the East Riverside Area. Coastal flood risk assessments and solutions for the West Windsor areas will be done through a separate study. Refer to Section X below for a map showing this area in more detail.

Recently the City has undertaken a risk assessment of the East Riverside Area (East Riverside Flood Risk Assessment, 2019 Landmark Engineers Inc.). The purpose of this report is to:

- Document and assess the condition of the existing flood control measures along Riverside Dr. East from St. Rose Beach, easterly to the City boundary with the Town of Tecumseh;
- Quantify the risk to the flood-prone areas along Riverside Dr. East and inland;
- Identify alternative solutions for restoration of the flood protection measures within the study area;
- Prepare a prioritized action plan to address and mitigate the risk of overland flooding; and,
- Provide updated design recommendations and cost estimates for budgeting purposes.

Based on the findings of that report, various landform barrier protection measures alternatives were developed. Alternatives were based on consultation with the City, ERCA, Landmark Engineers Inc. (Landmark) as well as local property owners. A summary of this consultation is detailed in Section 7.X below.

In addition to overland coastal flood protection measures, locations where the sewer system is vulnerable to back up from high lake/water levels have been identified and the ERFRA report provides detailed mapping of where backflow protection measures should be implemented.

The ERFRA report focused on the Riverside Dr. E. Area between St. Rose Beach (at St. Rose Ave.) easterly to the east City limits with the Town of Tecumseh. Due to existing sewer and overland flooding system issues that have been identified in the Regional Area 1&2 area, an opportunity to utilise this barrier to provide additional wet weather flood control was investigated. Therefore, for the purposes of this study, the coastal flood protection scope boundary is between Ford Blvd. and the East City Limits.

7.1 Summary of Coastal Flooding Consultation

A summary of the key meetings and discussions held with ERCA, Landmark Engineers Inc., and the City related to coastal flooding risk and mitigation measures are summarized below in Table. 7.1

Table 7.1: Summary of Coastal Flood Coordination

June 21th, 2019 - Meeting with City of Windsor, Landmark and Dillon ● Project team members met to review the draft findings of the East Windsor Flood Risk Assessment, including review of potential in-land flooding maps and graphics based on estimated extreme Detroit River/Lake St. Clair high water levels (176.50, 176.80).
August 27th, 2019 - Meeting with City, ERCA, Landmark, Dillon and Aqaufor ● ERCA identified that flood protection measures for existing developments must be robust enough to reduce the risks of damage or disruption by landowners. ● All parties need to be involved in maintaining the integrity of the flood protection infrastructure, including property owners, municipal maintenance staff, etc. ● The City is planning to acquire easements to protect the existing and proposed landform barrier. ● ERCA prefers that passive flood protection barriers be used as much as possible and stressed the need for regular maintenance. ● The ERFRA study recommends self-activating sluice gates and walls in some areas due to challenges with existing conditions. ● ERCA stated that based on their current knowledge, they may not be able to consider the gates as passive protection based on the fact that human intervention may be required for on-going maintenance of the mechanical systems. They also stated that it is likely impractical to implement an entirely passive measure of protection throughout the study area and the final solution would likely be a combination of active and passive measures. ● Emergency response will also need to be considered when determining the level of service. ERCA will need to review what the new revised engineering standard would be applied to development areas based on final flood protection design. ● Landmark noted that a water level of 176.40 m was used historically to assess the impact of both static water level and storm surge. This is understood to be approximately 0.25 m higher than the ERCA regulatory value for Detroit River between Riverdale Ave. and Walker Rd.: o ERCA has been enforcing flood proofing elevations of up to 177.00 m in the area immediately along the water's edge (15 m from edge). o ERCA requested that if this consideration was applied, the barrier would need to be designed specifically to accommodate overtopping to avoid washout/damage. ● ERCA noted that access and egress is required to be maintained based on the Gilmore Decision. For new developments, developers need to confirm that access will be maintained and/or EMS has established a site specific plan to reach sites during emergency flooding situations. If these conditions are not satisfied, ERCA may be forced to recommend that the ERCA Board of Directors deny the application. ● Landmark will be able to use their coastal flood assessment model to assess the flood risk at various landform barrier elevations.
September 4th, 2019 - Meeting with City, Landmark and Dillon ● The group agreed that the following alternatives would be used to develop functional landform barrier designs. These alternatives would be the basis for the Environmental Assessment and will be presented at the upcoming Public Information Centres (PICs):

- Existing Conditions;
- 176.45 Water Level Elevation; and
- 176.80 Stress Test Water Level Elevation (Future High Water Level).

- Landmark will use their 2D model to assess the impacts of the various water level elevations and under the following scenarios:
  - No Pump Out;
  - 50% Pump Out Rate (or a moderate outlet rate); and
  - Max Pump Out Rate.
- The group discussed the option to provide flood protection along the north shoreline in the rear of private properties as this option would also provide coastal flood protection to the properties on the northside of Riverside Dr. The elevation of this barrier would need to be higher to account for wave action (177.00). Completing a functional design for this alternative is challenging as existing condition information and access to the shoreline is limited.
- From the East Riverside Flood Risk Assessment (2019), the following instantaneous high water level values were confirmed and used in the sewer model assessment for the East Windsor service area:
  - Current high water level (176.45 m), nominally 176.50 m; and
  - 176.80 Potential Future 2050 Climate Change Water Level Elevation

7.2 Coastal Flooding Level of Service

As part of the East Riverside Flood Risk Assessment (2019) (ERFRA), a review of historical water levels on Lake St. Clair was completed (City of Windsor: East Riverside Flood Risk Assessment- 1:100 Year Instantaneous Water Elevation, RWDI Consulting Engineers & Scientists) to establish an updated 1:100 year instantaneous peak water level of current conditions. The following resulted in this analysis:

Table 7.2: Instantaneous Peak High Water Levels - Lake St. Clair

High Water Level (HWL) Condition	Storm Event	Instantaneous Peak Water Level (m)
Baseline- Existing Conditions	1:100 Year Event	176.5
Projected- Climate Change (2050)	1:100 Year Event	176.8

Based on these elevations, alternative flood protection landform barrier elevations and alignments were evaluated, refer to Section 7.3.

For context, the two figures below provide a map of areas within the Riverside area that are lower than the elevations listed above.

Figure 7.1: Riverside Areas below 176.50 Current 1:100 Year Peak Instantaneous HWL

Figure 7.2: Riverside Areas below 176.80 2050 Projected 1:100 Year Peak Instantaneous HWL

7.2.1 Coastal Flood Protection Measures Assumptions and Considerations

The following assumptions and considerations were used in the alternative development and assessment of landform barrier solutions.

- Passive (landform barrier earth berm) solution would be used to provide coastal flood protection. The use of mechanical gates were not considered at this time.
- In areas where, due to limitations with topography and access is a concern the City will need to provide emergency flood control such as fill or sandbags. Areas where passive flood protection cannot be provided is detailed in the functional design (Technical Report 3).

7.3 Coastal Flooding Alternatives

The Riverside Dr. E. and East Riverside Area have been broken down into three sections, each unique characteristics and extent of existing coastal flood protection measures.

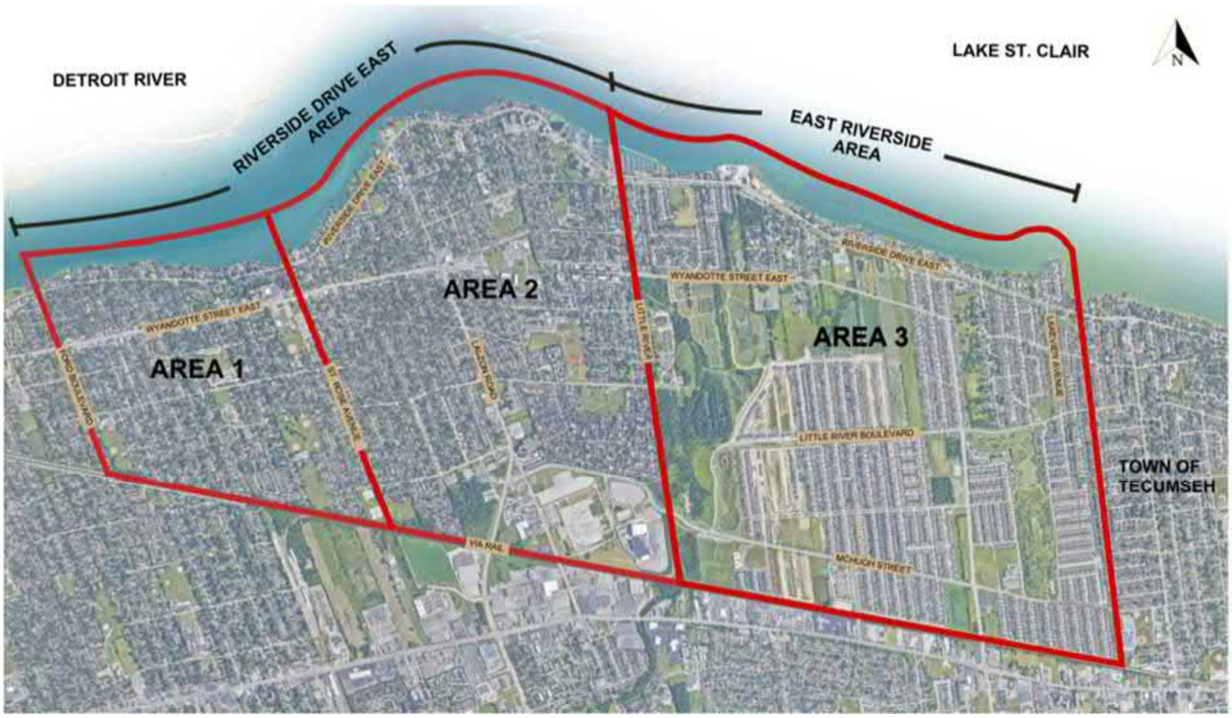

Figure 7.3: Riverside Dr. E. and East Riverside Coastal Flood Protection Area Map

<u>Area 1: Ford Blvd. to St. Rose Ave.</u>
Inland areas, south of the Riverside Dr. ROW are above 176.80 elevations, therefore the risk of flooding due to high water levels in Detroit River is less than the areas to the east. Based on the City sewer model, site observations and flood calls during major wet weather events, there is significant flooding on Riverside due to overland flow from lands south and outlet capacity restrictions. Where homes are lower than the existing roadway grades, road surface flooding inundates these properties causing significant damage and disruption.

Storm sewer system improvements have been identified through the analysis and evaluation of alternatives for the Regional Area 1&2 area (Refer to Section 4.5.4.1) above. This solution recommends the construction of a large trunk storm sewer along Riverside Dr. and stormwater PS at St. Rose Beach to meet an enhanced level of service because this area is more vulnerable to overflooding issues and is used as a main emergency access route for this area. These recommended improvements reduce the storm system HGL to provide a maximum roadway surface flooding depth of 0.3 m (1ft).

Area 2: St. Rose Ave. to Little River Drain (Riverdale Ave.)
Flood protection measures in this area provides protection for the inland areas, south of Riverside Dr. E.

Recently the Riverside Dr. Vista Phase 1 construction took place and included construction of a segment of the landform barrier on the south side of the roadway, between Watson Ave. and 8887 Riverside Dr. The remaining portions of Riverside Dr. and adjacent properties vary in elevation. In some locations, the landform barrier may not be needed as the private properties north of Riverside Dr. exceed the flood protection elevations and act to protect the inland area.

Area 3: Little River Drain (Riverdale Ave.) to the East City Limits
This area is currently protected by an existing landform barrier that was constructed in the 1980's. The berm is used as a recreational trail (Ganatchio Trail) and protects areas to the south between the Little River Drain and the East City Limits. Based on the ERFRA (Landmark, 2019) the existing landform barrier the runs along the City of Windsor and Town of Tecumseh Boundary meets or exists the flood protection elevations.

7.3.1 Area 1: Ford Blvd. to St. Rose Ave. Coastal Flooding Alternatives

Three alternatives were considered a landform barrier to an elevation of 176.50 along the south boulevard of Riverside Dr. E. to mitigate surface flooding:

- BERM-1-1: Construct a landform barrier to an elevation of 176.50 along the south boulevard of Riverside Dr. E.
- BERM-1-2: Construct a landform barrier to an elevation of 176.50 along the north boulevard of Riverside Dr. E.
- BERM-1-3: Construct a landform barrier to an elevation of 176.80 along the north boulevard of Riverside Dr. E.

Figures showing the proposed landform barrier and functional design is included the MP report and Appendix F. Table 7.3 provides a summary of the comparative evaluation.

Alternative BERM-1-1 is the preferred alternative, in addition to the coastal flood protection it provides to properties south of Riverside Dr., it provides the following benefits:

- It helps direct flow to an enhanced catchbasin/curb and gutter system proposed for Riverside Dr. and away from low lying residential properties, north of Riverside Dr. E.; and
- It protects the storm sewer system along Riverside Dr. E. by preventing coastal flooding to enter the storm system reducing the outlet capacity of the system and also causes recirculation of flows at the pumped outlets (St. Rose PS).

The berm elevation of 176.50 does not provide full flood protection for the projected high water levels which is not ideal however in reviewing the conceptual design of the landform barrier, the higher elevation of 176.80 requires an additional +/- 2.0 m of land along yard areas and +/- 6.0 m at driveways which causes significant impact to private properties.

It should be noted that in addition to areas where the coastal flood landform barrier is proposed (areas lower than the flood protection elevation) additional grading will be required to protect residential properties lower than Riverside Dr. These areas have been identified in the functional design drawings for the preferred landform barrier.

Table 7.3: Comparison of Area 1 Coastal Flooding Alternatives

Evaluation Criteria	Alternative BERM-1-1	Alternative BERM-1-2	Alternative BERM-1-3
Description	Flood Protection Berm, South of Riverside Dr. at 176.45	Flood Protection Berm, North of Riverside Dr. at 176.45	Flood Protection Berm, North of Riverside Dr. at 176.80
Meets Flood Mitigation Objectives	✓	✓	✓
Resiliency to Climate Change			✓
Protection to Sewer Drainage System		✓	✓
Protection of homes north of Riverside Dr. from Overland Flow.		✓	✓
Ease of Construction	✓	✓	
Impact to Environment	✓	✓	
Impact to Heritage and Archaeological Resources	✓		
Disruption to Residents	✓	✓	
Impact to Recreational Space	✓	✓	
Impacts for proposed development.		✓	✓
Time to Implement	✓	✓	
Cost	✓		

7.3.2 Area 2: St. Rose Ave. to Little River Drain (Riverdale Ave.) Coastal Flooding Alternatives

Three alternatives were considered a landform barrier to an elevation of 176.50 along the south boulevard of Riverside Dr. E. to mitigate surface flooding:

- BERM-2-2: Construct a landform barrier to an elevation of 176.50 along the north or south boulevard of Riverside Dr. E.
- BERM-2-3: Construct a landform barrier to an elevation of 176.80 along the north or south boulevard of Riverside Dr. E.

Figures showing the proposed landform barrier and functional design is included the MP report and Appendix F. Table 7.4 provides a summary of the comparative evaluation.

Alternative BERM-2-1 is the preferred alternative as it has the least extent of private property impacts. Portions of this area between Frank Ave. and Watson Ave. has limited space for the landform barrier and it would not be feasible to implement the 176.8 landform barrier along that location without impacting several properties.

The landform barrier must cross Riverside Dr. at Frank Ave. under both scenarios. Due to grading constraints in this area Riverside Dr. cannot be raised to meet either of the flood protection elevations therefore during emergency flooding conditions the City will need to implement measures such as placement of fill or sandbags. The City may consider implementing a mechanical gate system at this location in the future. It is recommended that the landform barrier be constructed to minimize the gap that exists between the north and south section, across Riverside Dr. E. This would require the acquisition of 8057 and 8085 Riverside Dr. E. as these properties would no longer be accessible. Due to their proximity to the ROW the driveway access points could not be constructed to provide safety access.

Also within Area 2, there are sections where many private properties exceed, north of Riverside Dr., that exceed flood protection elevations. In this case additional flood protection measure is not required on Riverside Dr.

In Area 2, there are private properties that have elevations that exceed the flood protection elevations. At these locations, additional flood protection along Riverside Dr. E. is not required, however the City will need to implement necessary legal measures to ensure that these private property elevations are maintained, such as putting property elevations on title.

Table 7.4: Comparison of Area 2 Coastal Flooding Alternatives

Evaluation Criteria	Alternative BERM-2-2	Alternative BERM-2-3
Description	Flood Protection Berm, North and South of Riverside Dr. at 176.45	Flood Protection Berm, North and South of Riverside Dr. at 176.80
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change		✓
Ease of Construction	✓	
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	
Disruption to Residents	✓	

Evaluation Criteria	Alternative BERM-2-2	Alternative BERM-2-3
Impact to Recreational Space	✓	
Impacts for proposed development.	✓	✓
Time to Implement	✓	
Cost	✓	

7.3.3 Area 3: Little River Drain (Riverdale Ave.) to the East City Limits Coastal Flooding Alternatives

Two alternatives were considered along the south boulevard of Riverside Dr. E. to mitigate surface flooding:

- BERM-3-1: Build-up the existing landform barrier to an elevation of 176.80 along the south boulevard Riverside Dr. E. (Ganatchio Trail).
- BERM-3-2: Build-up the existing landform barrier to an elevation of 176.80 along the south boulevard Riverside Dr. E. (Ganatchio Trail).

Figures showing the proposed landform barrier and functional design is included the MP report and Appendix F. Table 7.5 provides a summary of the comparative evaluation.

Alternative BERM-3-1 is the preferred alternative as it has the least extent of disruption and lower comparative costs.

Table 7.5: Comparison of Area 3 Coastal Flooding Alternatives

Evaluation Criteria	Alternative BERM-3-2	Alternative BERM-3-3
Description	Flood Protection Berm, North of Riverside Dr. at 176.45	Flood Protection Berm, North of Riverside Dr. at 176.80
Meets Flood Mitigation Objectives	✓	✓
Resiliency to Climate Change		✓
Ease of Construction	✓	
Impact to Environment	✓	
Impact to Heritage and Archaeological Resources	✓	✓
Disruption to Residents	✓	✓

Evaluation Criteria	Alternative BERM-3-2	Alternative BERM-3-3
Impact to Recreational Space	✓	
Impacts for proposed development.	✓	✓
Time to Implement	✓	
Cost	✓	

7.4 Coastal Flood Risk Analysis

Using the existing Coastal flood Risk assessment model, Landmark has completed additional assessments to determine the extent of risk areas under existing and proposed conditions (with or without coastal flood protection and storm sewer system pumped outlets). This assessment has looked at various scenarios related to the extent of inland flooding within the Riverside Area, between St. Rose Ave. and just east of the Little River Drain. Storm sewers system pump outlet capacities were based on preferred alternative recommendation from this report. This report concludes that the implementation of coastal flood protection within the area noted above will reduce the spill water elevation in land during a spill event. This supplement report entitled East Riverside Flood Risk Assessment – Supplementary Report, Lake St. Clair/Detroit River Shoreline - Overland Spill Flood Analysis is dated Nov. 11, 2020 is as included in Appendix E-3.

8.0 Conclusion

The purpose of this Technical Volume 2 study was to complete an existing condition modelling analysis to identify basement and surface flooding problem areas during large storm events and develop flood mitigating solutions to reduce back up of the sanitary system and reduce ponding depths along the roadway during extreme rainfall event. Considerations for Coastal flood protection were also integrated into this MP based on findings of the ERFRA (Landmark, 2019).

In consultation with project stakeholders, a level of service for all three types of flood risk (basement, surface and coastal) were established and used to identify problem areas. For basement flood risk, it was found that all developed areas within the City of Windsor were at risk of basement flooding during major (1:100 year) storm events and that the most at-risk areas are those currently serviced by combined sewers and older areas where private property drainage is often directly connected to the sanitary system. For surface flooding, problem areas were delineated in two ways; "Regional" problem areas that represent areas where surface flooding is observed broadly within a neighbourhood context and Major roadways where surface flooding is observed to impact access along Arterial and/or Collector Class roadways in the City. Seven (8) regional problem areas along with a number of road segments were identified and evaluated as part of this MP.

Two areas were determined to be at risk of Coastal flooding due to high Lake St. Clair or Detroit River levels. These areas include the Riverside Dr. E. and East Riverside area between Ford Blvd. and the east City of Windsor limits; and west Windsor, along the Detroit River shoreline, between the Ambassador Bridge and the south City of Windsor Limits. This study focused on developing coastal flood protection for the Riverside area and the west Windsor area will be reviewed as part of other City of Windsor initiatives.

To mitigate flooding in problem areas comprehensive solution strategies were developed using an adaptive approach that includes improvements and proactive measures that can be implemented along all levels of the City's drainage system. These levels include source control and private property measures, sewer system improvements, outlet improvements and coastal flood protection. To meet the flood solution objectives of this study, solutions rely on intervention at all levels. A partnership between the City and residents is needed to reduce flood risk within both private and public property but also to implement protection measures. Solutions developed will reduce sewer backups and surface ponding under a 1:100 year event and for more vulnerable areas, a Climate Change events (1:100 year plus a 40% Volume and Intensity Factor) have been used to provide added flexibility for the system to adapt to climate change.

A number of source control and private property measures are recommended to be implemented as short-term measures that the City can implement more readily as they do not include significant improvement to municipal infrastructure require significant capital investment. The Short Term solutions report in Appendix C of this MP report has more detail. Foundation drain and downspout disconnection are two measure that are anticipated to have measurable benefit on the City's sanitary and storm system. These measures have been incorporated, where applicable, into the development infrastructure solutions proposed in this study.

Sewer system infrastructure improvements recommended as preferred in this study include:

- Central Windsor- a total of 17 km of large storm trunk sewers and 6 new or improved storm outlets to the Detroit River.
- South Windsor- 8 km of sanitary sewer and 9 km of storm sewer upgrades along with 6 new or improved stormwater management ponds and 1 underground stormwater management facility.
- East Windsor- 47 km of sanitary sewer and 40 km of storm sewer upgrades along with 1 new stormwater management pond and 5 underground stormwater management facilities.
- Implementation of LIDs along with proposed storm sewer improvements, throughout the City, where feasible.

Outlet improvements recommended as preferred in this study include:

- Stormwater Outlets:
    - Central Windsor - 6 new or improved storm sewer outlets to the Detroit River.
    - East Windsor – 6 new or improved stormwater PS (PS) and outlets.
- Wastewater Outlets:
    - Little River Pollution Control Plant:
        - Future plant expansion to provide service for population growth and to provide some wet weather treatment capacity.
        - In the interim, improve the existing bypass outlet at the treatment plant (Pontiac PS improvements).
    - Lou Romano Water Reclamation Plant:
        - Construct a Retention Treatment Basin Facility and Sandwich Street Combined Relief Trunk Sewer. (Combined Sewer Overflow Control in the Riverfront Area, West of Caron Avenue, Class EA).

Coastal flood protection recommended for the Riverside Dr. E. and East Riverside areas includes the construction or build-up of a landform barrier a consistent elevation of 176.50 from Ford Blvd. to the East City limits is required to prevent lake/river water from spilling into low laying areas, to protect inflow for lake/river water into the municipal storm system and to protect low-lying property owners, north of Riverside Drive from the impacts of overland flow along Riverside Dr. The installation of storm sewer backflow devices area also required to reduce backflow of the lake/river waters at existing outlets sewer and catchbasins.

As improvements listed above are implemented incremental flood reduction benefits will be realized. For measures such as foundation drain disconnection, downspout disconnection and LIDs pilot projects will be completed and monitored to confirm the benefit that these measures can have on the system in local context.

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Figures

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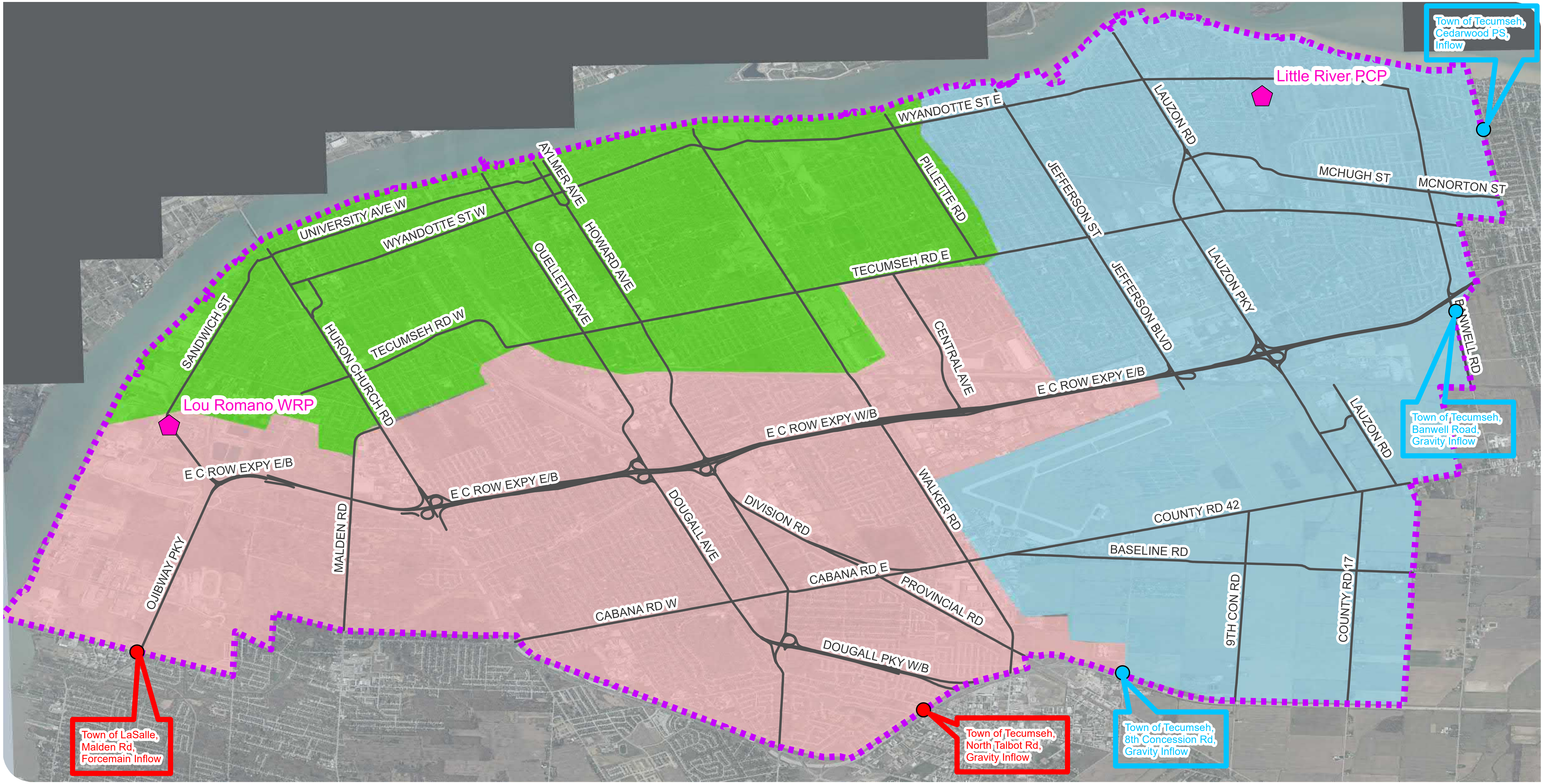

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

MAJOR SANITARY SERVICE AREAS

FIGURE 1.1

THE CITY OF WINDSOR

LOU ROMANO WRP - COMBINED SEWER AREA
LOU ROMANO WRP - SEPARATED SANITARY SEWERS
LITTLE RIVER PCP - SANITARY SEWER AREA
TREATMENT PLANT
EXPRESSWAY OR ATERIAL ROAD
CITY OF WINDSOR BOUNDARY
INFLOW POINTS INTO EAST WINDSOR
INFLOW POINTS INTO SOUTH WINDSOR

DILLON CONSULTING

Aquafor Beech Limited

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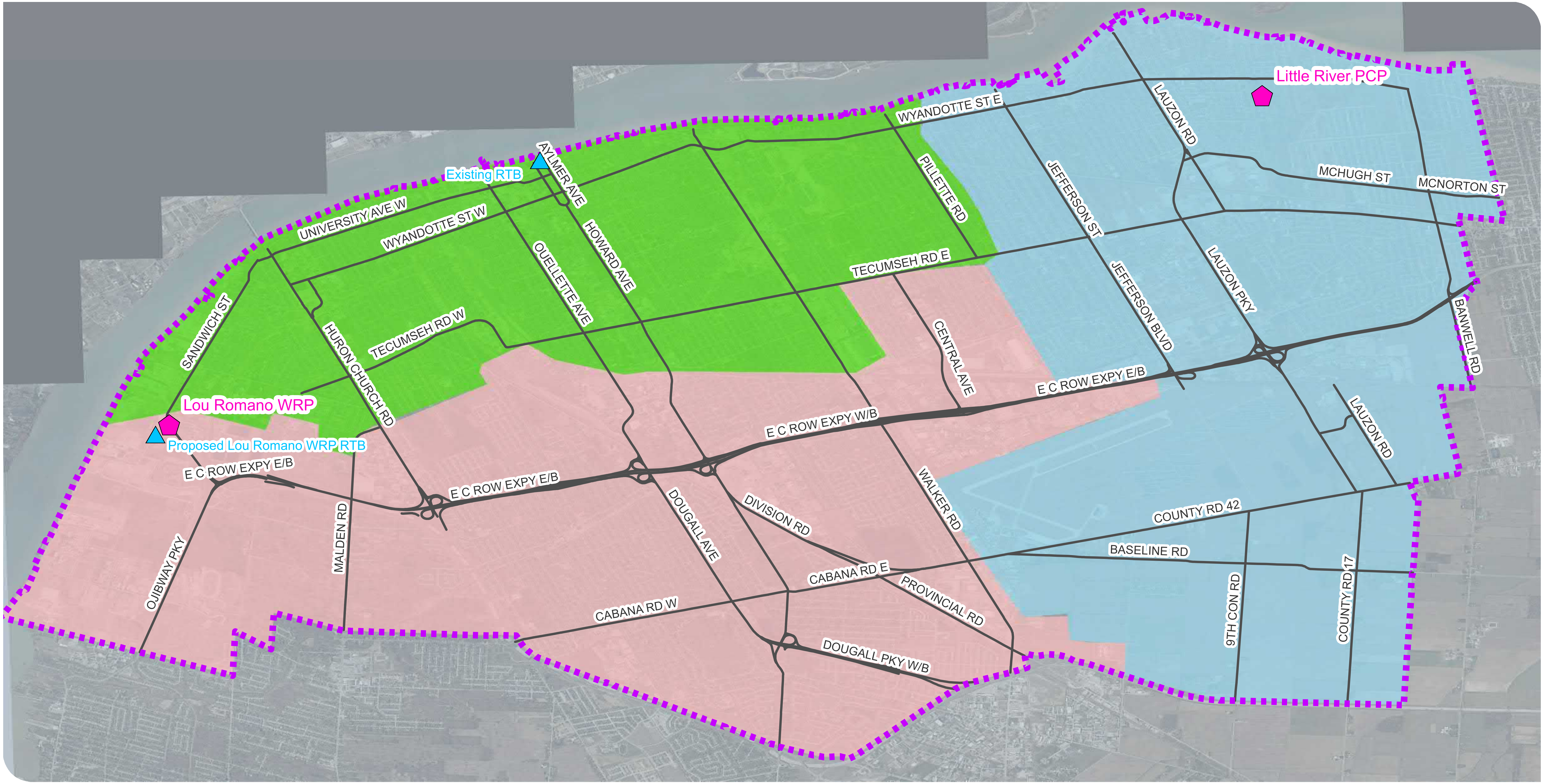
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTIONMASTER PLAN

WASTEWATER TREATMENT PLANTS

FIGURE F.2.1

- LOU ROMANO WRP - COMBINED SEWER AREA
- LOU ROMANO WRP - SEPARATED SANITARY AREA
- LITTLE RIVER PCP - SANITARY SEWER AREA
- TREATMENT PLANT
- EXPRESSWAY OR ATERIAL ROAD
- CITY OF WINDSOR BOUNDARY
- RETENTION TREATMENT BASIN SYSTEM

DILLON CONSULTING

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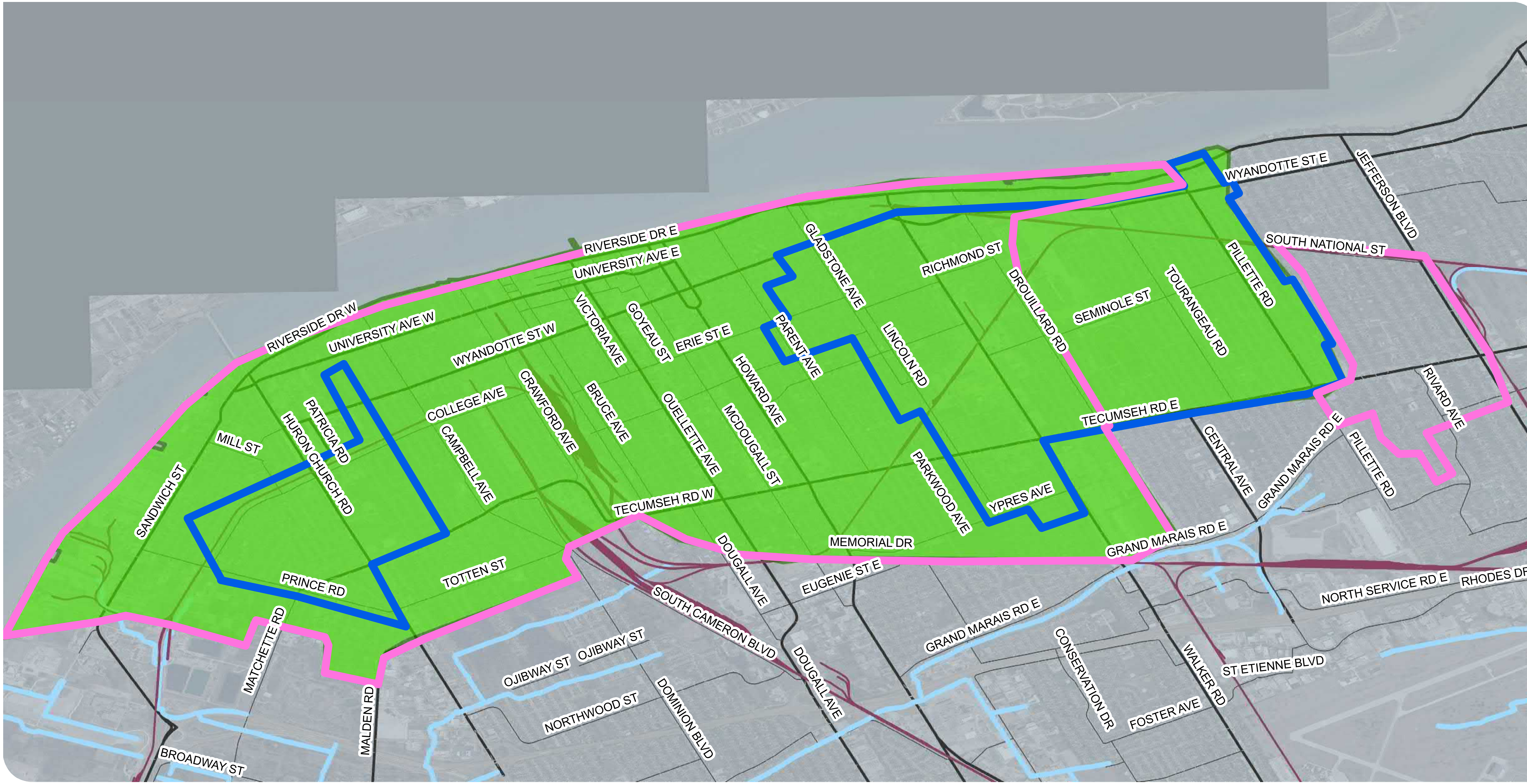

CITY OF WINDSOR
SEWER AND COASTAL FLOOD
PROTECTION MASTER PLAN

COMBINED AND DUAL
MH SERVICE AREAS

FIGURE F.2.2

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
COMBINED SEWER SYSTEM AREA
CENTRAL WINDSOR AREA
DUAL MANHOLE SEWER SYSTEM AREA

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SCALE 1:40,000

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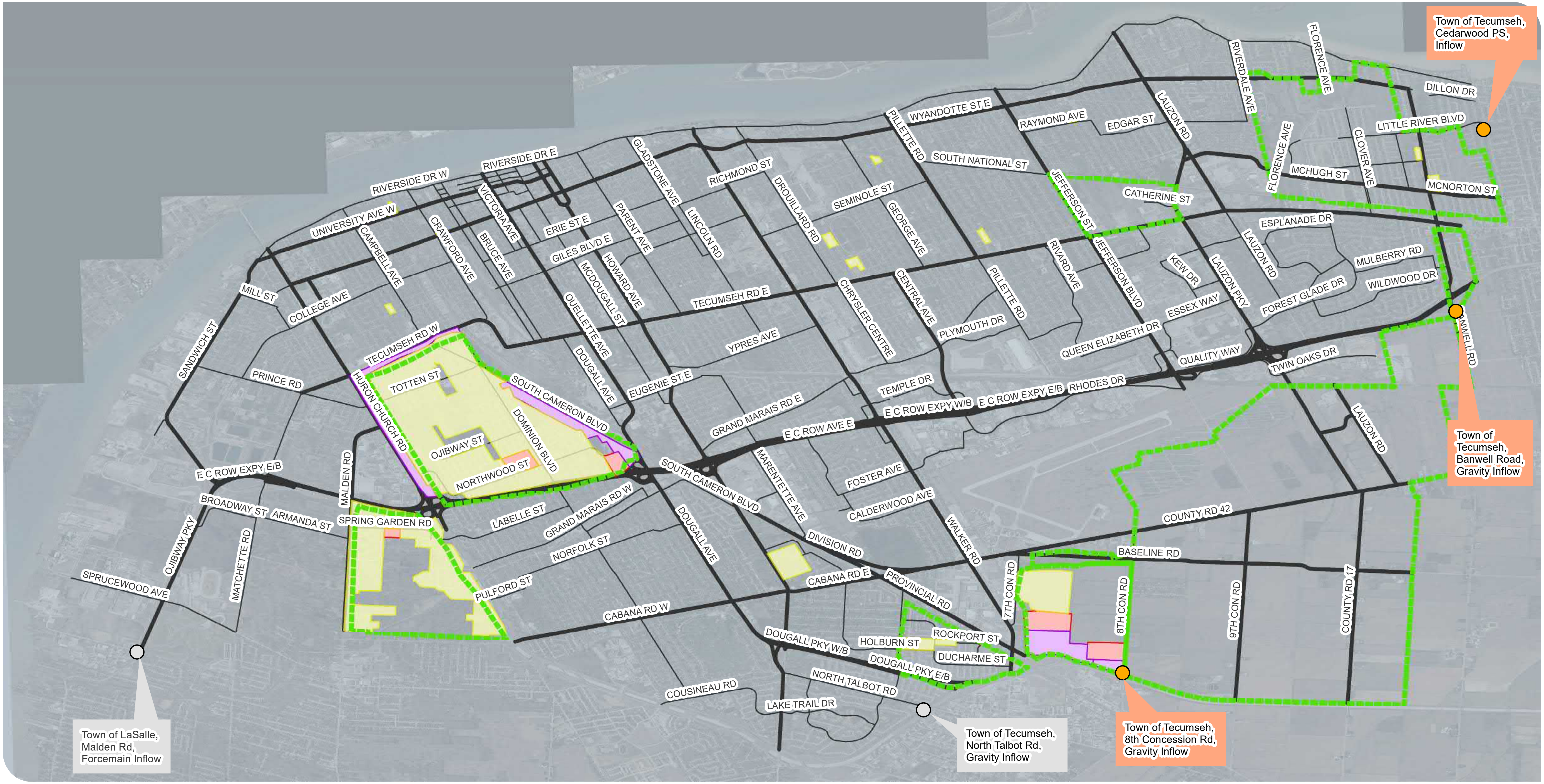

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SECONDARY PLANNING AREAS AND POTENTIAL DEVELOPMENT AREAS

FIGURE F.2.3

THE CITY OF WINDSOR

REISDENTIAL

COMMERICAL/BUSINESS PARK

INSTITUTIONAL

***NOTE: NOT ALL LAND USES SHOWN IN PLANNING AREAS ARE ON THIS MAP

SECONDARY PLANING AREAS AND OTHER LANDS CONSIDERED FOR FUTURE DEVELOPMENT

EXPRESSWAY OR ATERIAL ROAD

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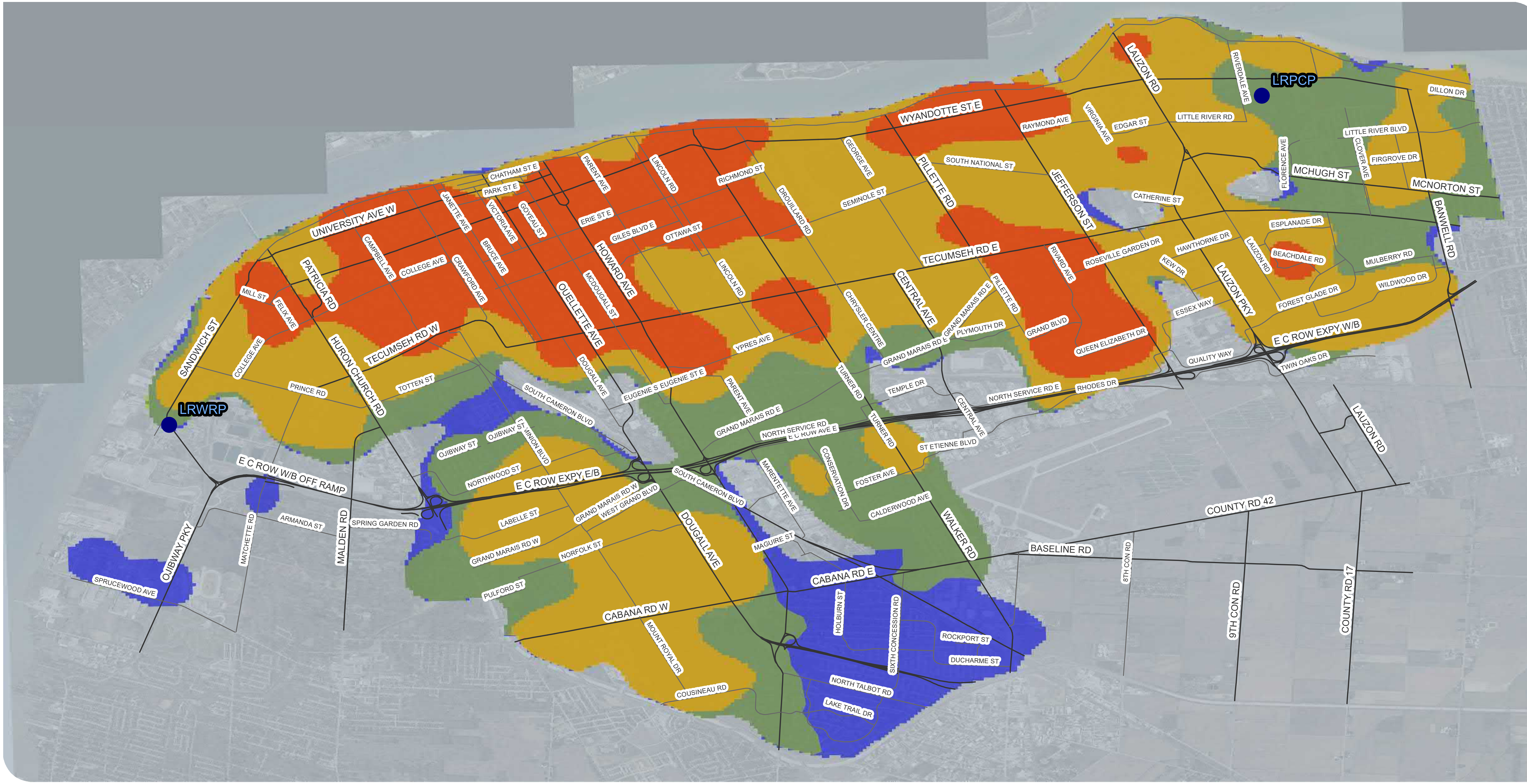

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

BASEMENT FLOODING POTENTIAL - EXISTING CONDITIONS

FIGURE F.2.4

THE CITY OF WINDSOR

- HIGH POTENTIAL RISK OF BASEMENT FLOODING UNDER 1:5 YEAR 4 HOUR 49.5MM STORM
- HIGH POTENTIAL RISK OF BASEMENT FLOODING UNDER 1:25 YEAR 4 HOUR 67.0MM STORM
- HIGH POTENTIAL RISK OF BASEMENT FLOODING UNDER 1:100 YEAR 4 HOUR 81.6MM STORM
- HIGH POTENTIAL RISK OF BASEMENT FLOODING UNDER CLIMATE CHANGE 120MM STORM

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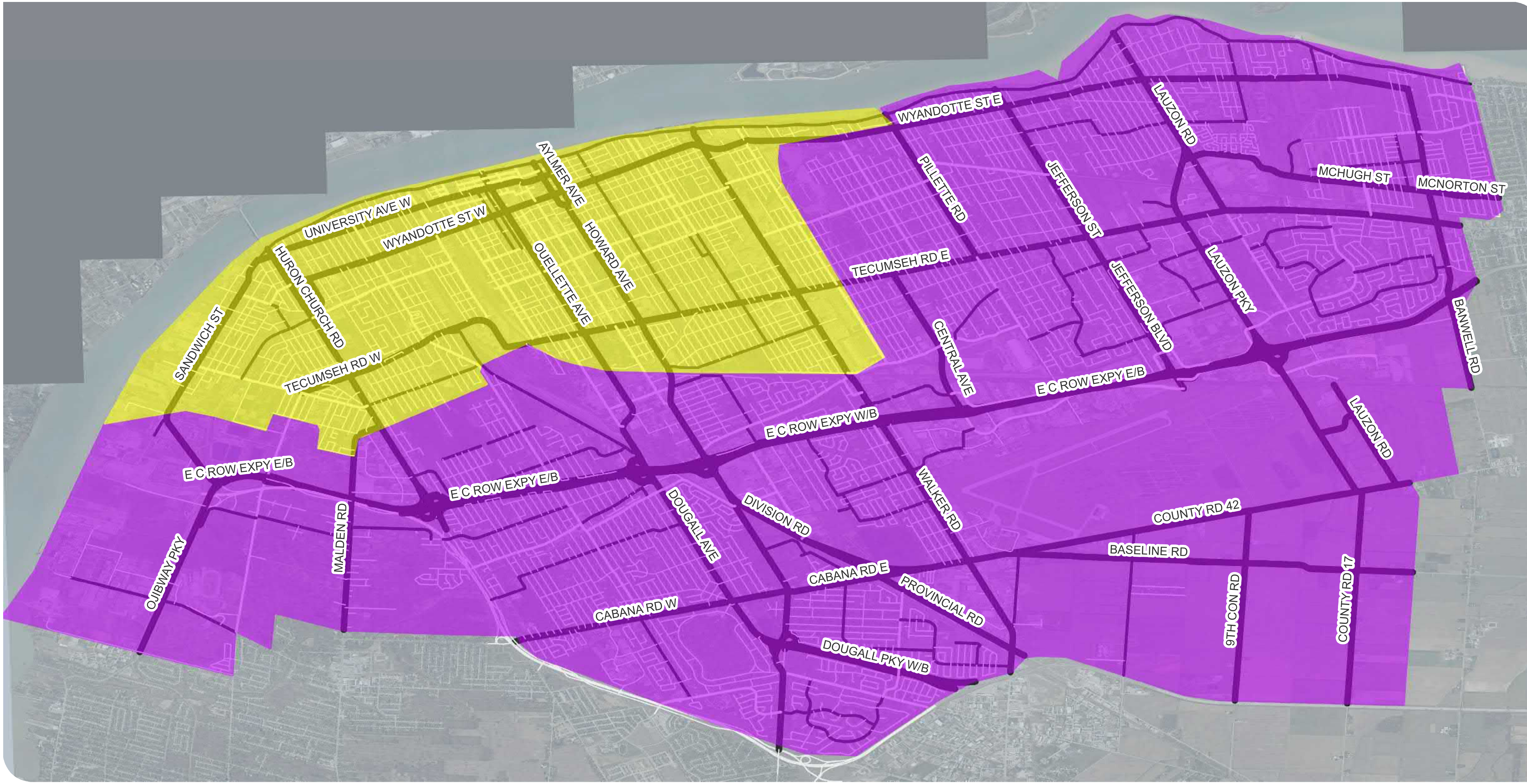

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

RECOMMENDED FOUNDATION DRAIN AND DOWNSPOUT DISCONNECTION

FIGURE F.3.1

RECOMMENDED DOWNSPOUT DISCONNECTION AREA

RECOMMENDED BOTH FOUNDATION DRAIN DISCONNECTION AND DOWNSPOUT DISCONNECTION AREA

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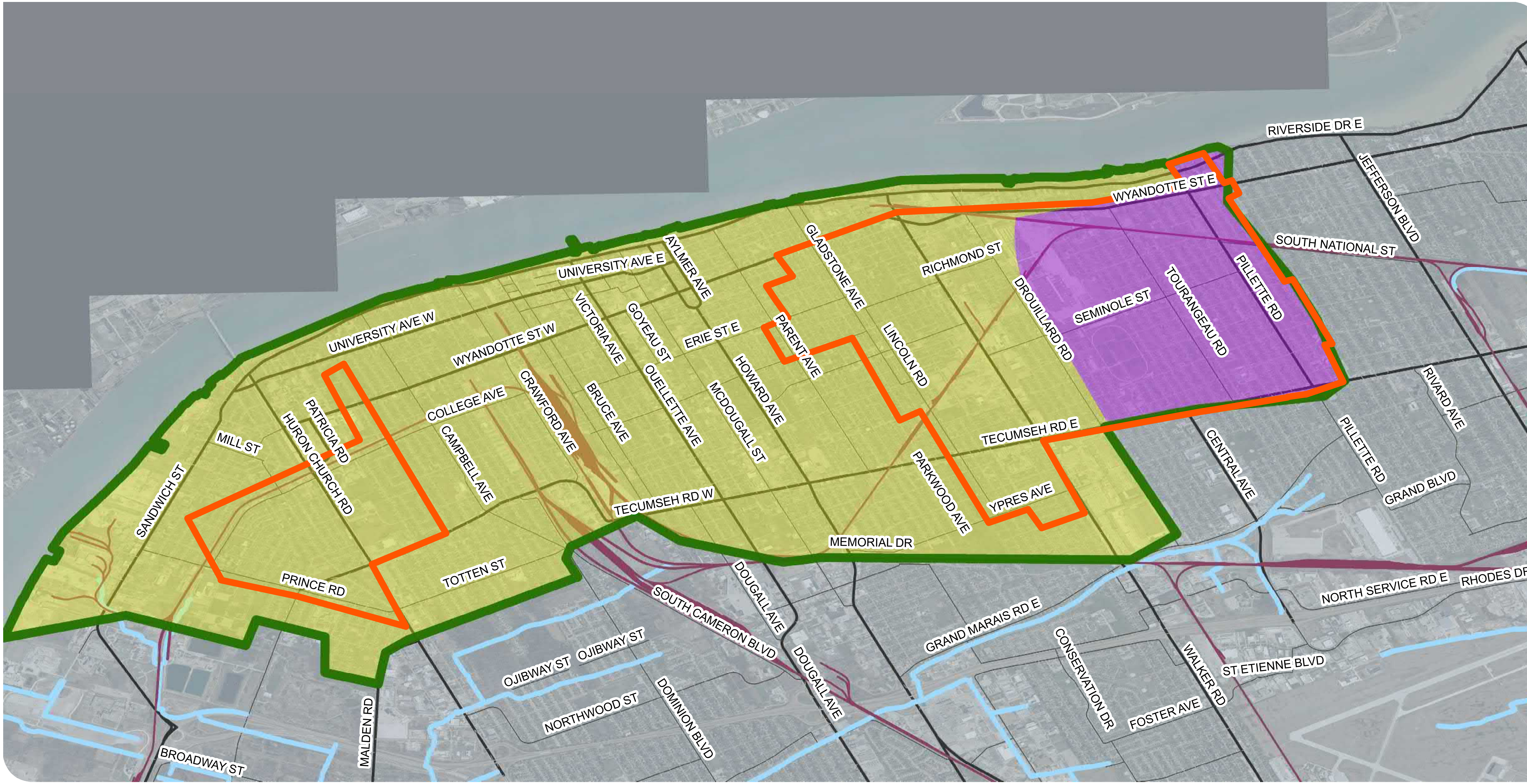

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR BASEMENT FLOODING RECOMMENDATIONS

FIGURE F.3.2

THE CITY OF WINDSOR

- EXPRESSWAY AND ARTERIAL ROADS
- CLASS 1 AND 2 COLLECTOR ROADS
- RAILWAY
- MUNICIPAL DRAINS
- CENTRAL WINDSOR AREA
- DUAL MANHOLE SEWER SYSTEM AREA
- COMPLETE SEPARATION OF COMBINED SEWERS AND DISCONNECT FOUNDATION DRAINS WHERE POSSIBLE
- REPLACE DUAL MANHOLE SEWER SYSTEM WITH SEPARATED SEWERS AND DISCONNECT FOUNDATION DRAINS FROM SANITARY

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CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR BASEMENT FLOODING - PROPOSED STORM SEWERS

FIGURE F.3.3

THE CITY OF WINDSOR

Legend	
DUAL MAINTENANCE HOLE AREA	UNDERGROUND STORMWATER MANAGEMENT FACILITY
COMBINED AREA	PROPOSED STORM SEWER OUTLET
PROPOSED STORM TRUNK SEWER	

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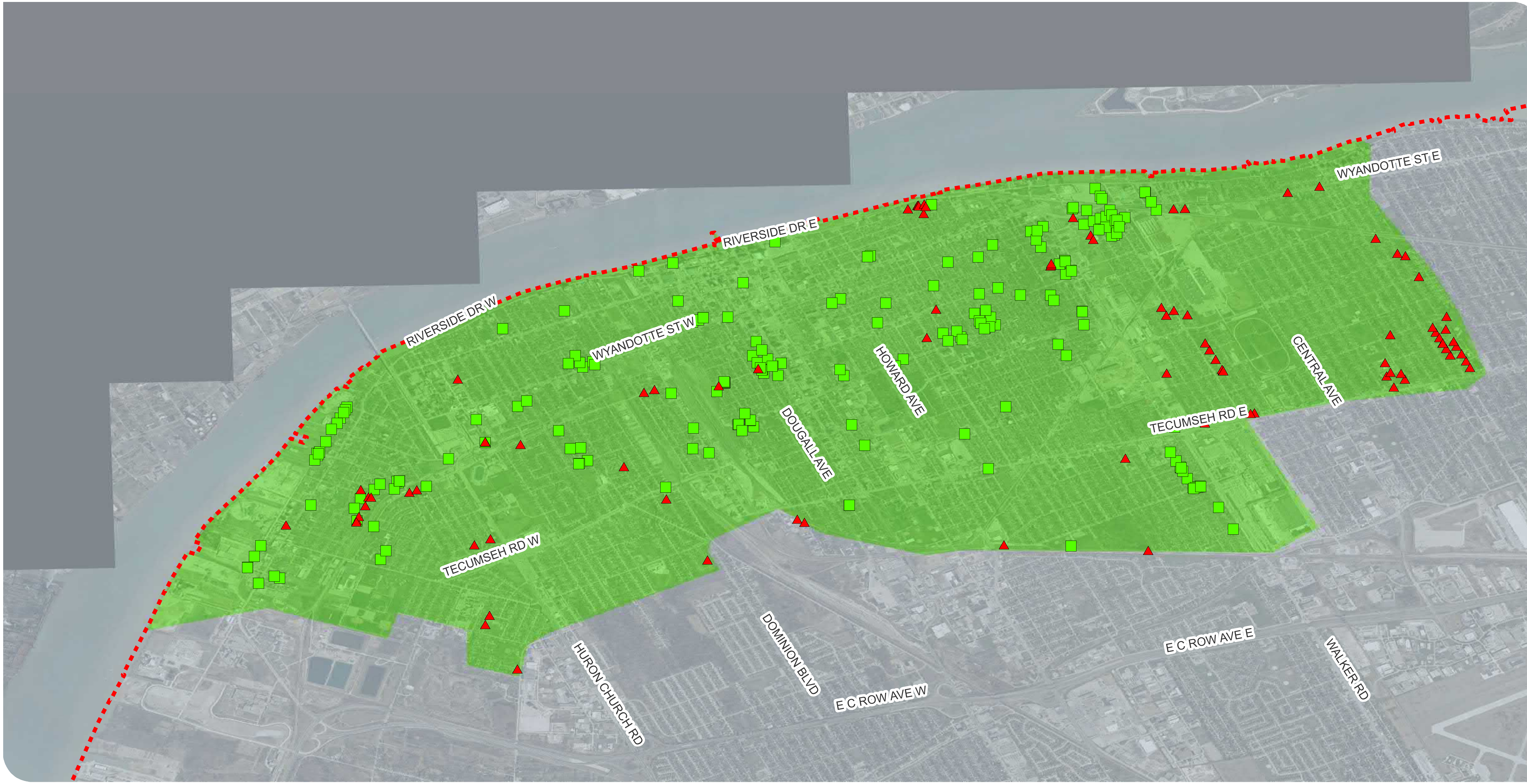

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR 1:5 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.4

THE CITY OF WINDSOR

- SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND
- CENTRAL WINDSOR SERVICE AREA
- COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND
- STUDY AREA

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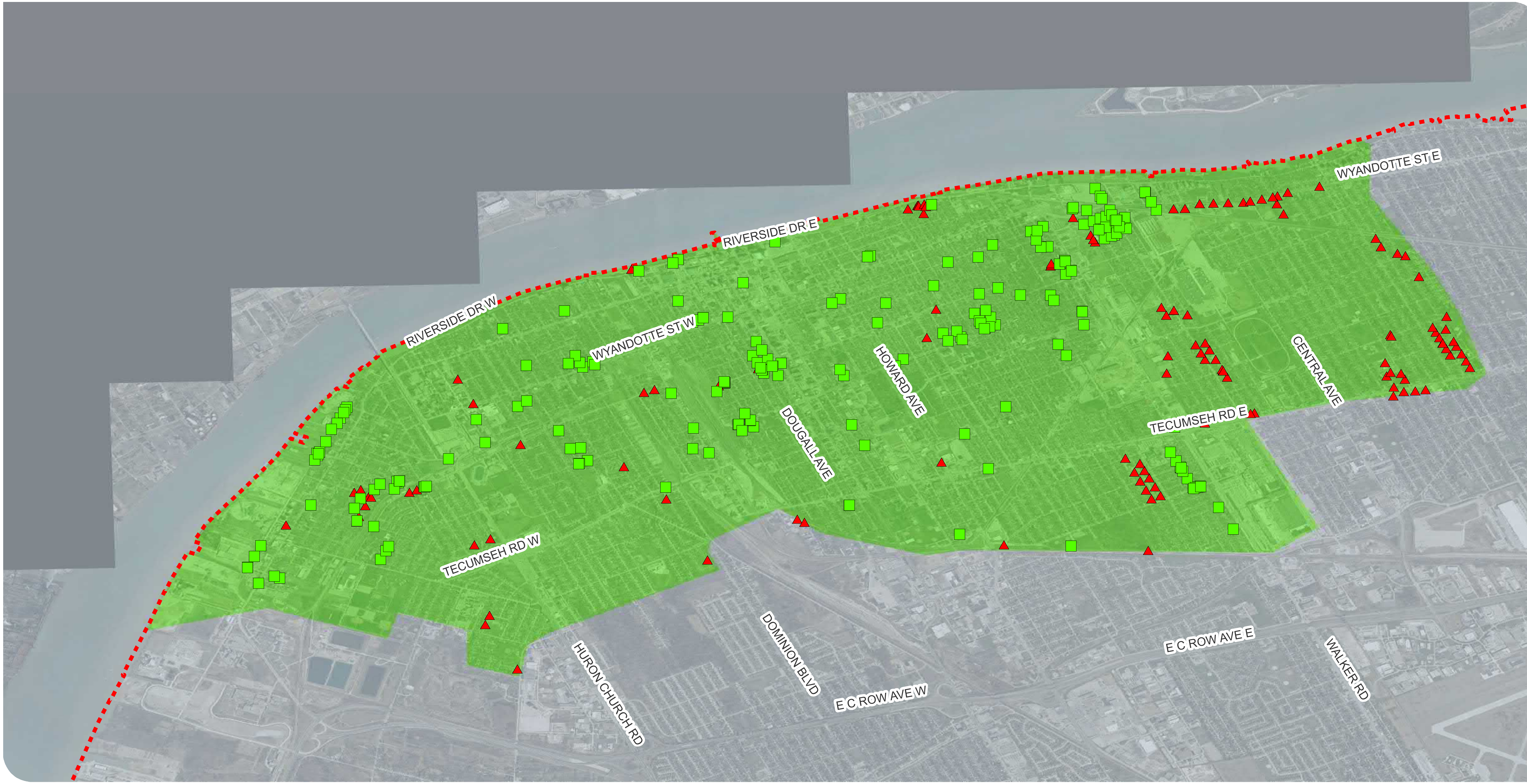


CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR 1:25 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.5

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

CENTRAL WINDSOR SERVICE AREA

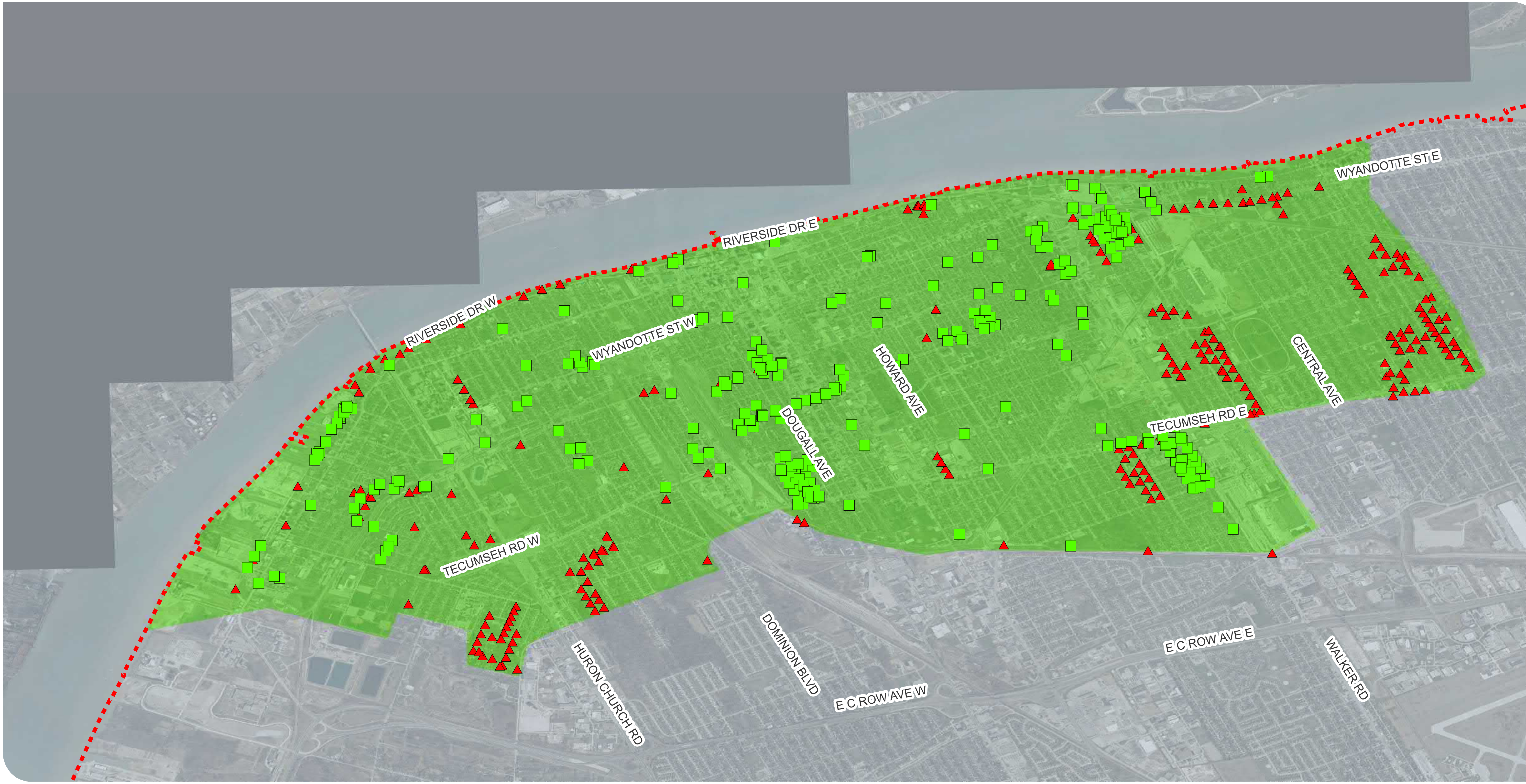
COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:40,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

CENTRAL WINDSOR SERVICE AREA

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR 1:100 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.6

THE CITY OF WINDSOR

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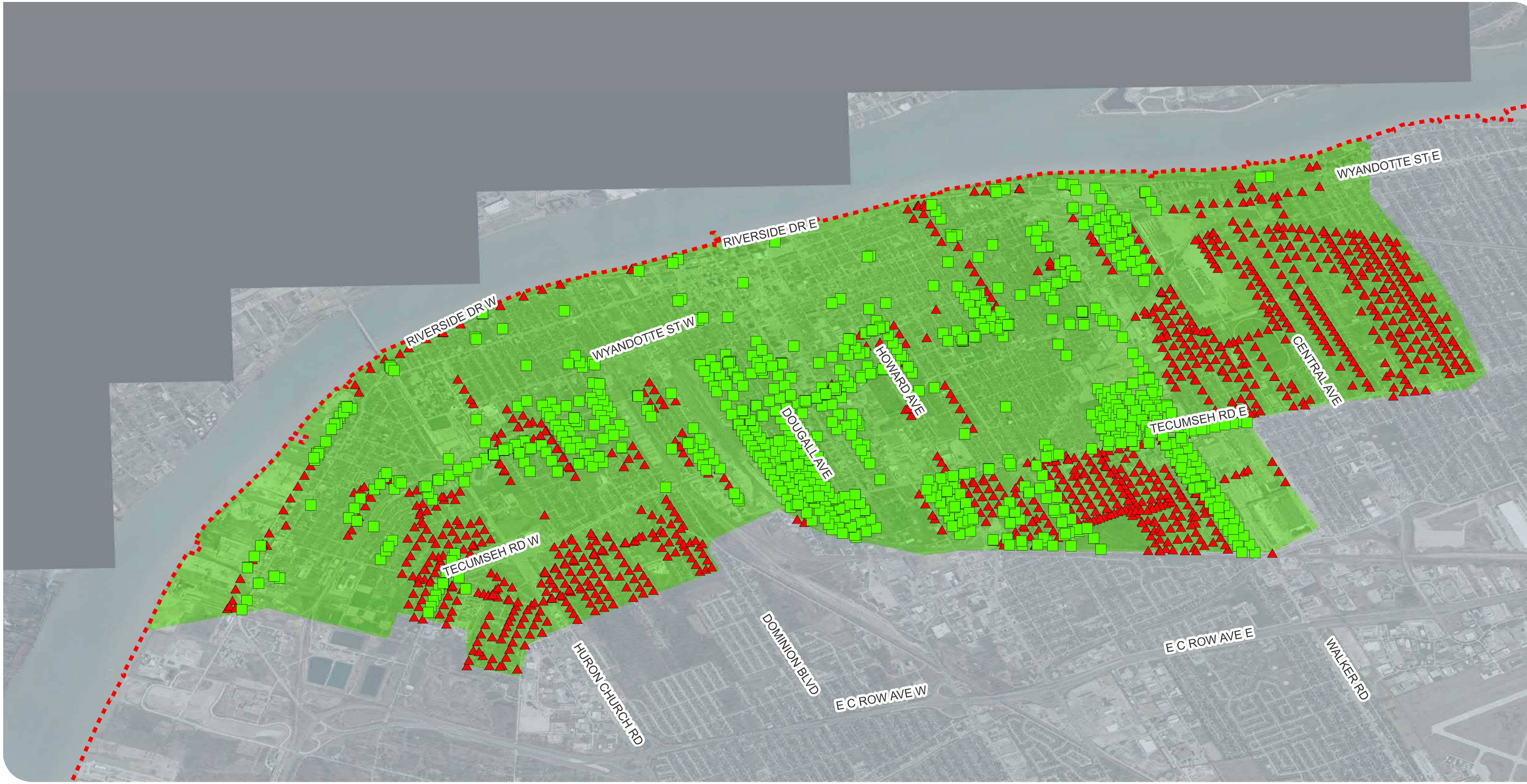
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:40,000

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE:October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR CLIMATE CHANGE STRESS TEST STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.7

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

CENTRAL WINDSOR SERVICE AREA

COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

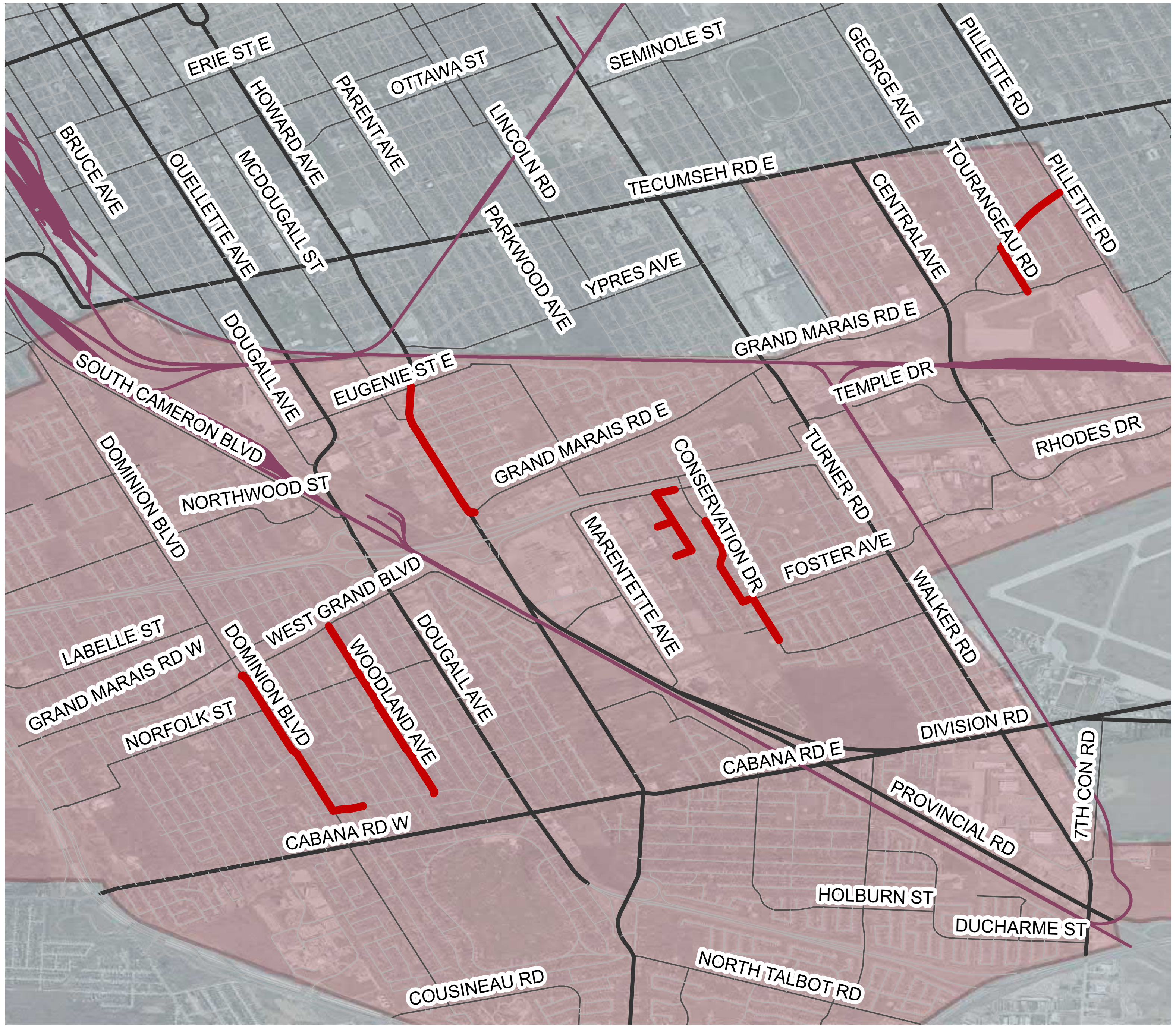
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:40,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

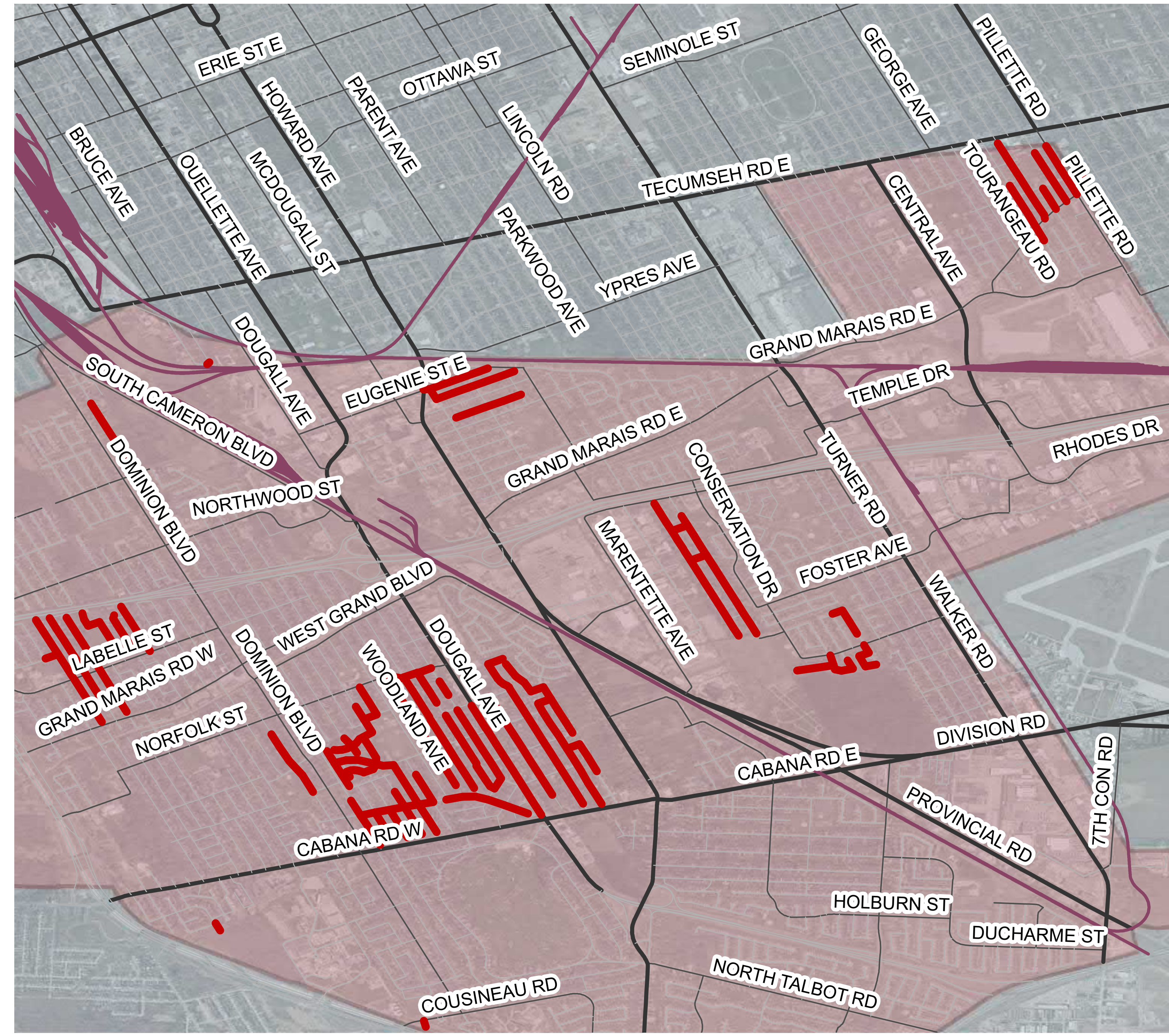
SOUTH WINDSOR BASEMENT FLOODING ALTERNATIVE 1 (PREFERRED)

Targeted Sub-Trunk Storage:
Proposed trunk sanitary sewers (750 to 900 mm diameter) on Dominion Blvd., Woodland Ave., Howard Ave., Parkwood Ave., Conservation Dr., Grand Marias Rd. E, and Tourangeau Rd.
Construction on approximately 8 km of sanitary sewer.



SOUTH WINDSOR BASEMENT FLOODING ALTERNATIVE 2

Decentralized Upstream Storage:
Proposed 26 km of sanitary sewers on multiple streets.
Proposed sewer diameters range from 600 to 750 mm.



CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR BASEMENT FLOODING ALTERNATIVES (SAN-S)
FIGURE F.3.8

- EXPRESSWAY AND ARTERIAL ROADS
- CLASS 1 AND 2 COLLECTOR ROADS
- RAILWAY
- MUNICIPAL DRAINS
- SANITARY SEWER IMPROVEMENTS
- SOUTH WINDSOR SANITARY SEWER DRAINAGE AREA

DILLON CONSULTING
Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:46,000

ROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR 1:5 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.9

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

SOUTH WINDSOR SERVICE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:45,000

PROJECT: 17-6638 | STATUS: FINAL | DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR 1:25 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.10

THE CITY OF WINDSOR

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

SOUTH WINDSOR SERVICE AREA

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:45,000

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W E
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PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR 1:100 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.11

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

SOUTH WINDSOR SERVICE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:45,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR CLIMATE CHANGE STRESS TEST STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.12

SANITARY SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

SOUTH WINDSOR SERVICE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:45,000

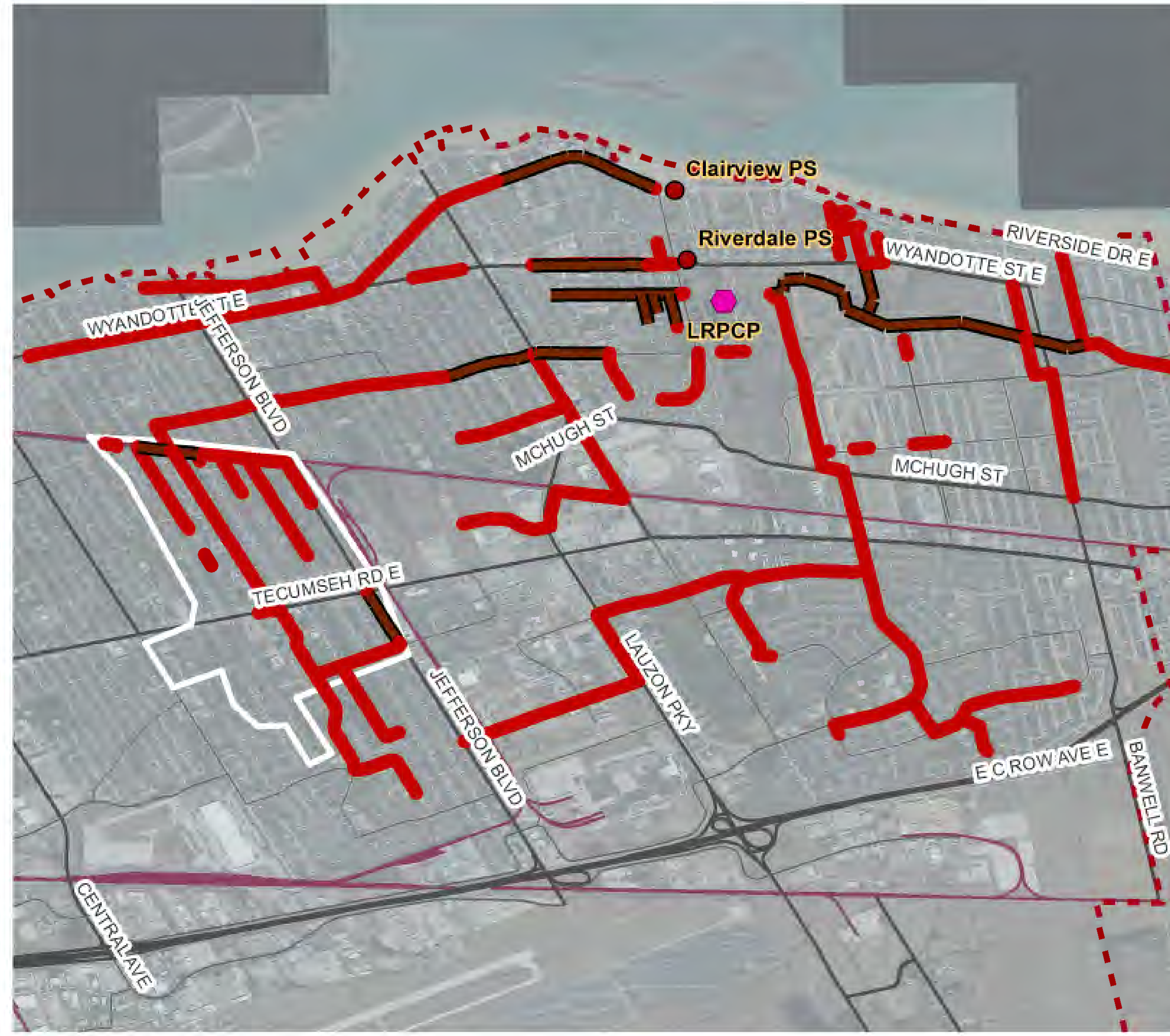
PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

EAST WINDSOR BASEMENT FLOODING ALTERNATIVE 1 (SAN-E1)

McHugh Park Under Ground Storage and Maintaining Existing Treatment Plant Pumping Capacity (2.6 m3/s):
New sanitary sewers (300mm - 2700mm diameter) and in-line storage box culverts (3600mX1800m to 4200mmX 2700mm) to improve conveyance and a new under ground sanitary storage system at McHugh Park.
Construction includes approximately 45,6 km of new sewers.

EAST WINDSOR BASEMENT FLOODING ALTERNATIVE 2 (SAN-E2 PREFERRED)

Expanded Treatment Plant Pumping Capacity (5.2 m3/s):
New sanitary sewers (300mm - 3000mm diameter) and in-line storage (3600mmX1800mm to 4200mmX 2700mm box culverts) to improve sanitary system conveyance and upstream storage.capacity.
Construction includes approximately 45,6 km of new infrastructure.



CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

EAST WINDSOR BASEMENT FLOODING ALTERNATIVES (SAN-E)

FIGURE F.3.13

THE CITY OF WINDSOR

SANITARY PUMP STATION (PS)
WASTEWATER TREATMENT PLANT (WTP)
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
SANITARY SEWER IMPROVEMENTS
SANITARY BOX CULVERTS
UNDERGROUND SANITARY STORAGE
EXISTING COMBINED SEWER AREA TO BE SEPERATED

DILLON CONSULTING

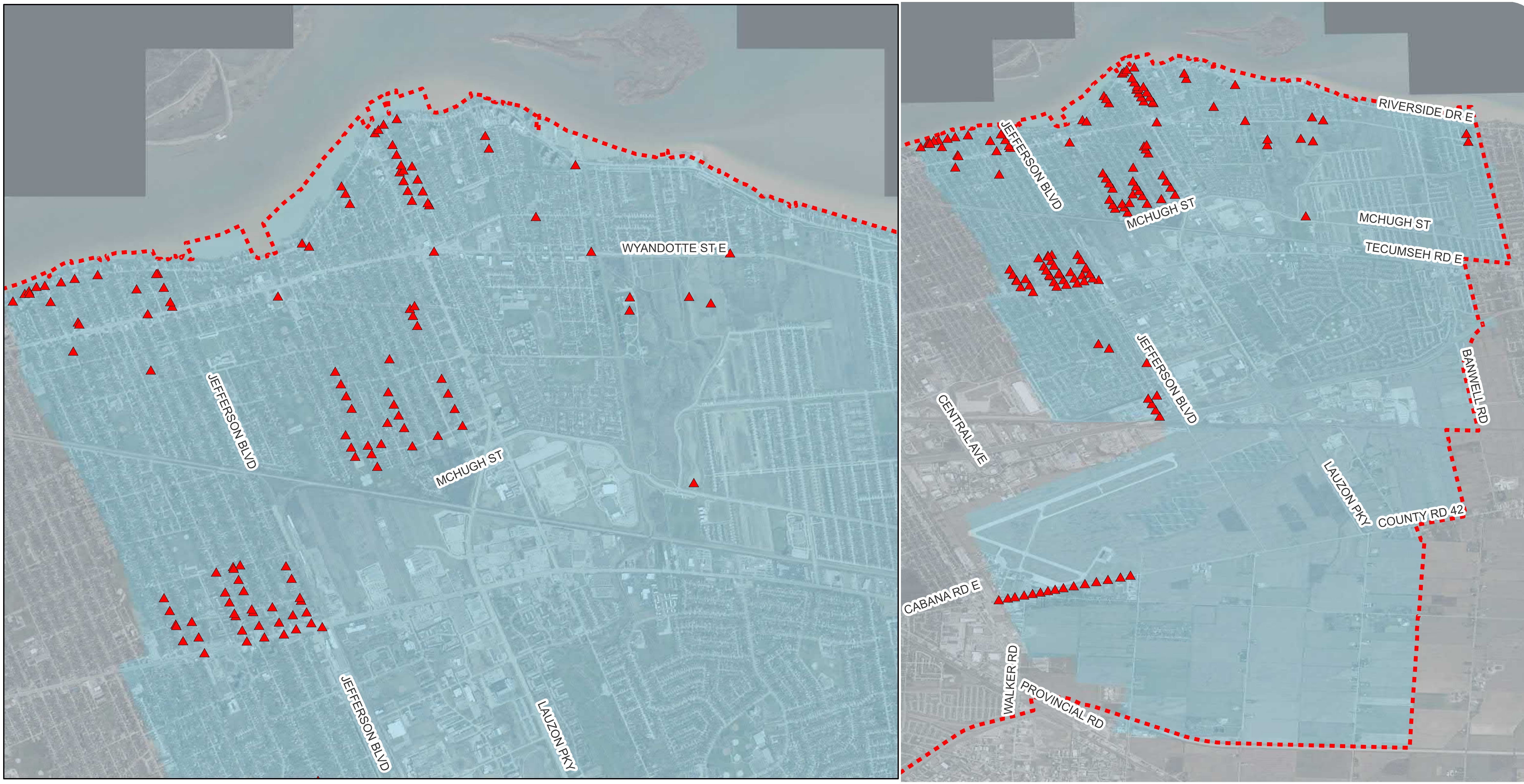
Aquafor Beech Limited

MAP CREATED BY: SD
MAP CHECKED BY: DEM / LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

EAST WINDSOR 1:5 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.14

SANITARY AND COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

EAST WINDSOR SERVICE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:25,000 (LEFT)
1:60,000 (RIGHT)

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

EAST WINDSOR 1:25 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.15

THE CITY OF WINDSOR

SANITARY AND COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

EAST WINDSOR SERVICE AREA

DILLON CONSULTING

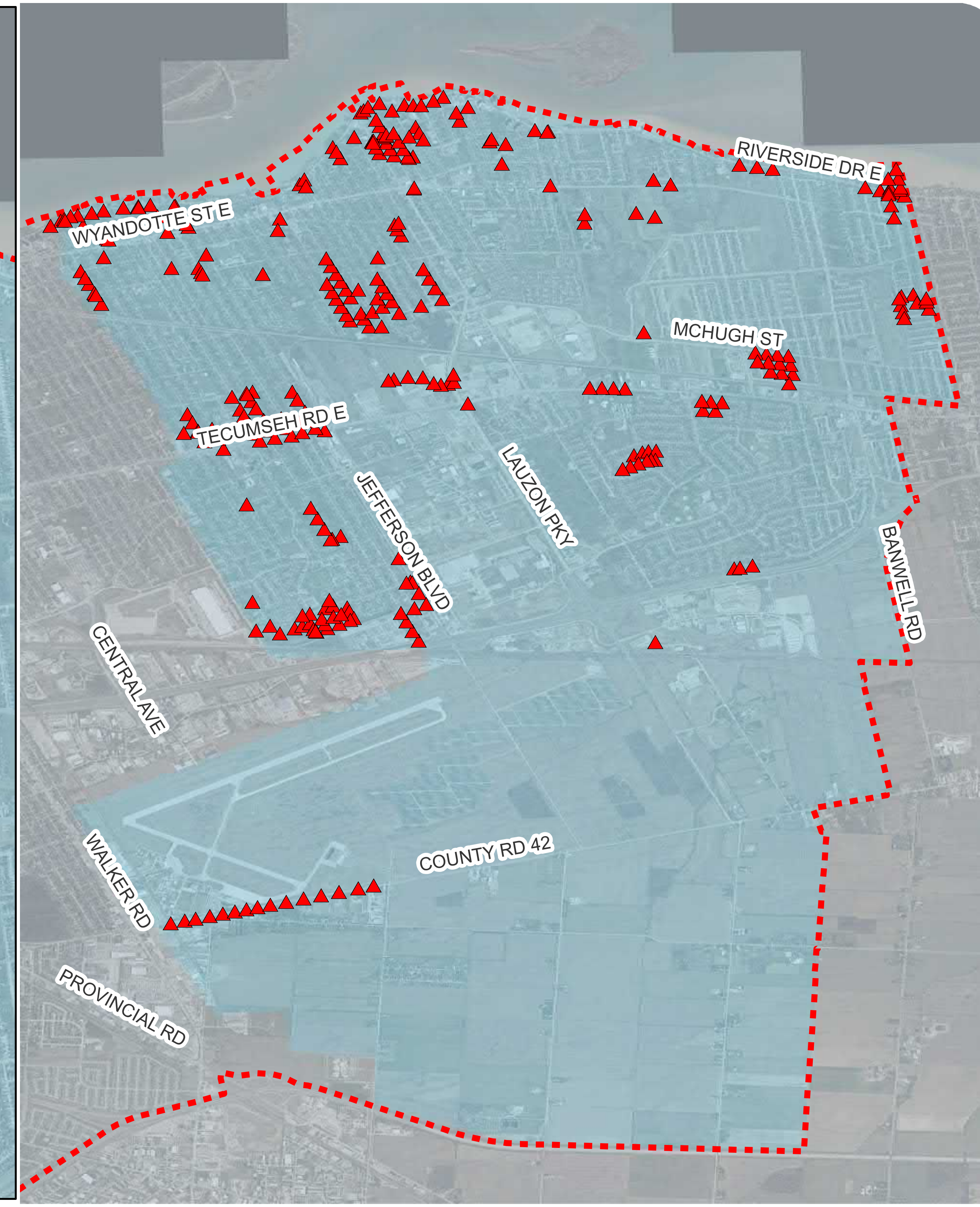
Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:25,000 (LEFT)
1:60,000 (RIGHT)

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

EAST WINDSOR 1:100 YEAR STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.16

SANITARY AND COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

EAST WINDSOR SERVICE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:25,000 (LEFT)
1:60,000 (RIGHT)

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

EAST WINDSOR CLIMATE CHANGE STRESS TEST STORM BASEMENT FLOOD RISK (ULTIMATE CONDITIONS)

FIGURE F.3.17

▲ SANITARY AND COMBINED SEWER HGL LESS THAN 1.80m BELOW GROUND

STUDY AREA

EAST WINDSOR SERVICE AREA

DILLON CONSULTING

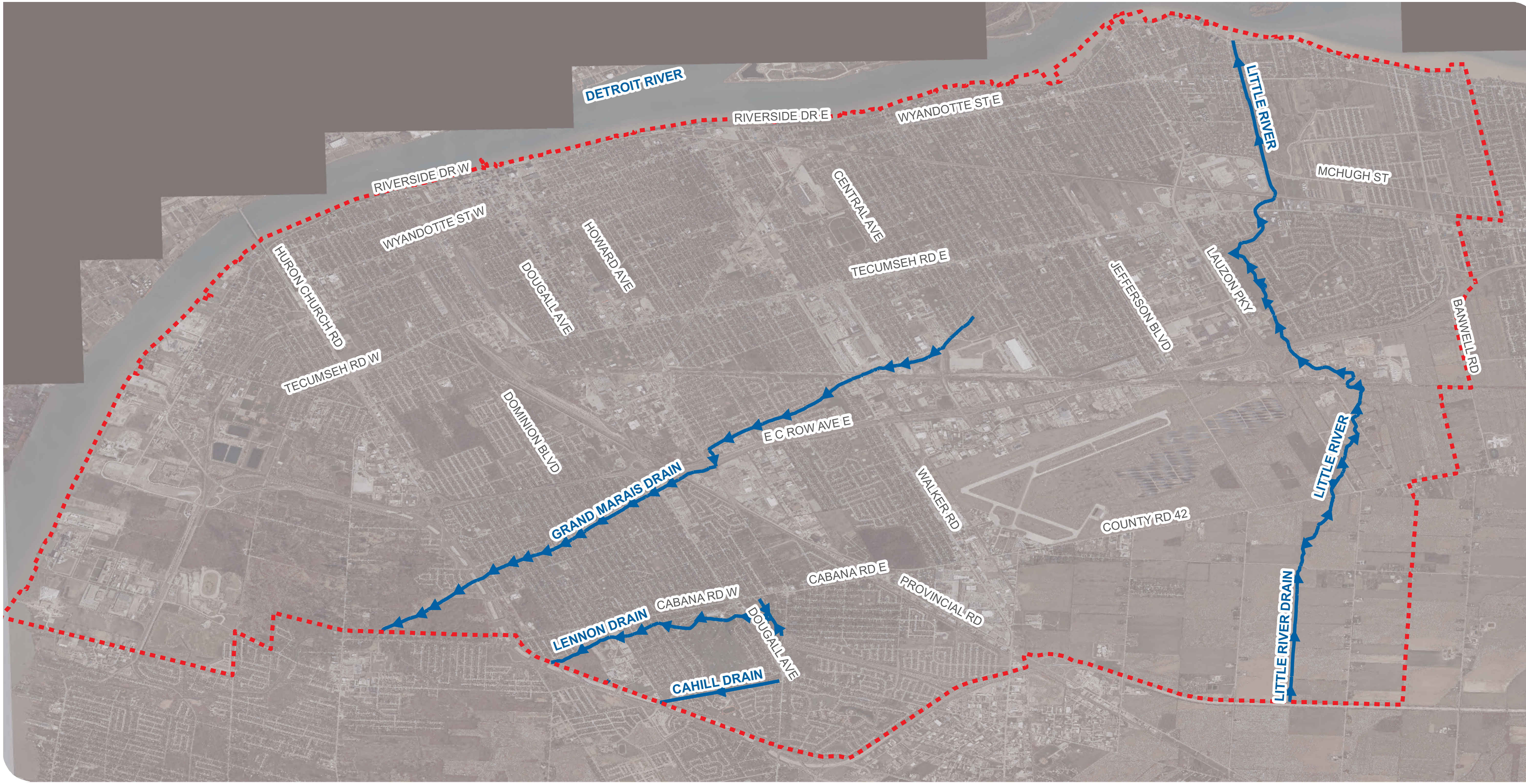
Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:25,000 (LEFT)
1:60,000 (RIGHT)

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

THE CITY OF WINDSOR



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

RECEIVING WATERCOURSES

FIGURE F.4.1

OTHER WATERCOURSES AND DRAINS

MAJOR WATERCOURSE OR DRAIN

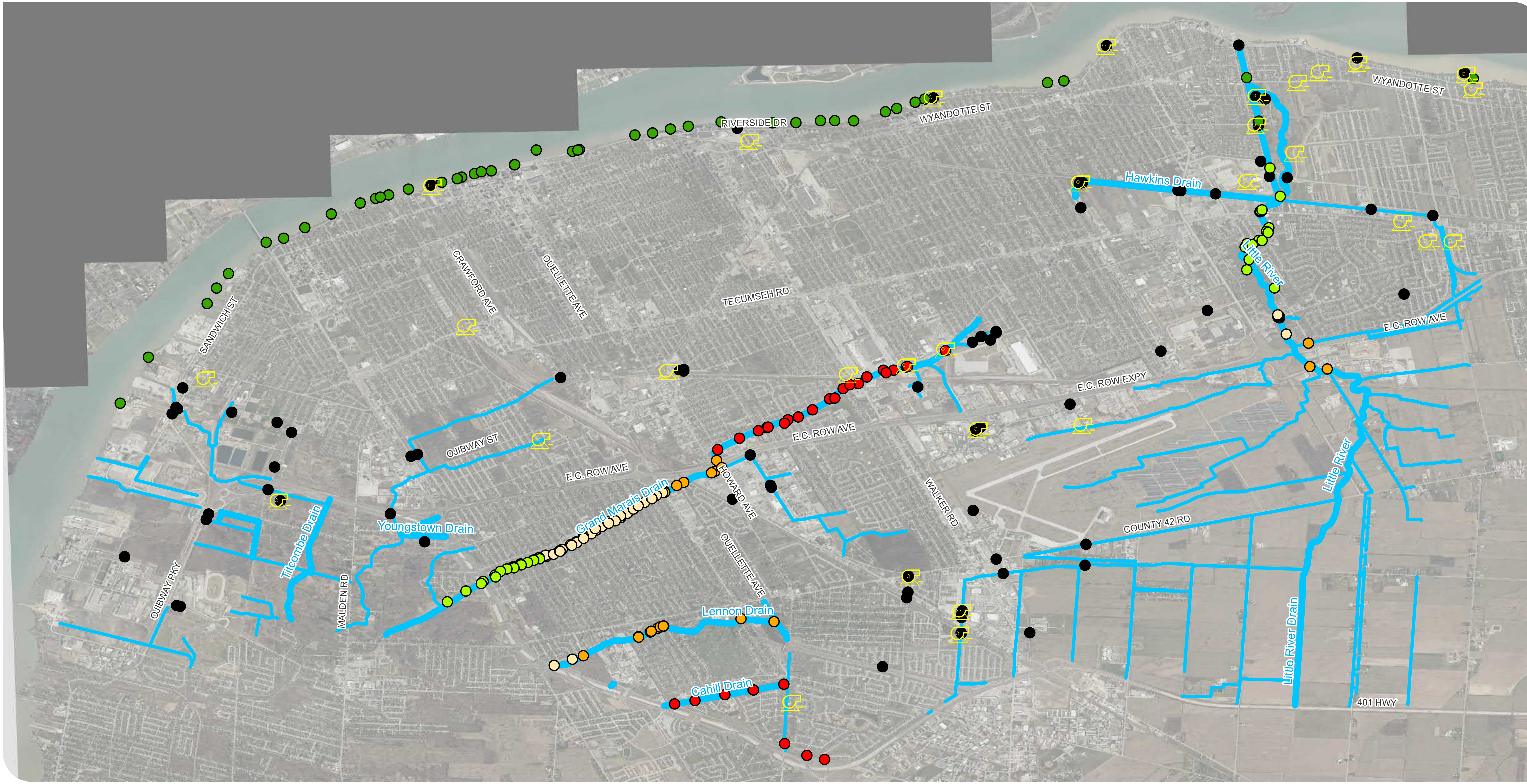
STUDY AREA

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: IDW
MAP CHECKED BY: FF
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

HIGHWATER LEVEL BOUNDARY CONDITIONS

FIGURE F.4.2

- OUTFALL WATER LEVEL ELEVATION - 176.40
- OUTFALL WATER LEVEL ELEVATION - 176.40 TO 178.60
- OUTFALL WATER LEVEL ELEVATION - 178.60 TO 180.90
- OUTFALL WATER LEVEL ELEVATION - 180.90 TO 183.20
- OUTFALL WATER LEVEL ELEVATION - 183.20 TO 184.80
- OUTFALL WATER LEVEL ELEVATION - NOT FIXED
- PUMP

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL SURFACE FLOODING PROBLEM AREAS

FIGURE F.4.3

Legend	
EXPRESSWAY AND ARTERIAL ROADS	STUDY AREA
CLASS 1 AND 2 COLLECTOR ROADS	REGIONAL SURFACE FLOODING AREA

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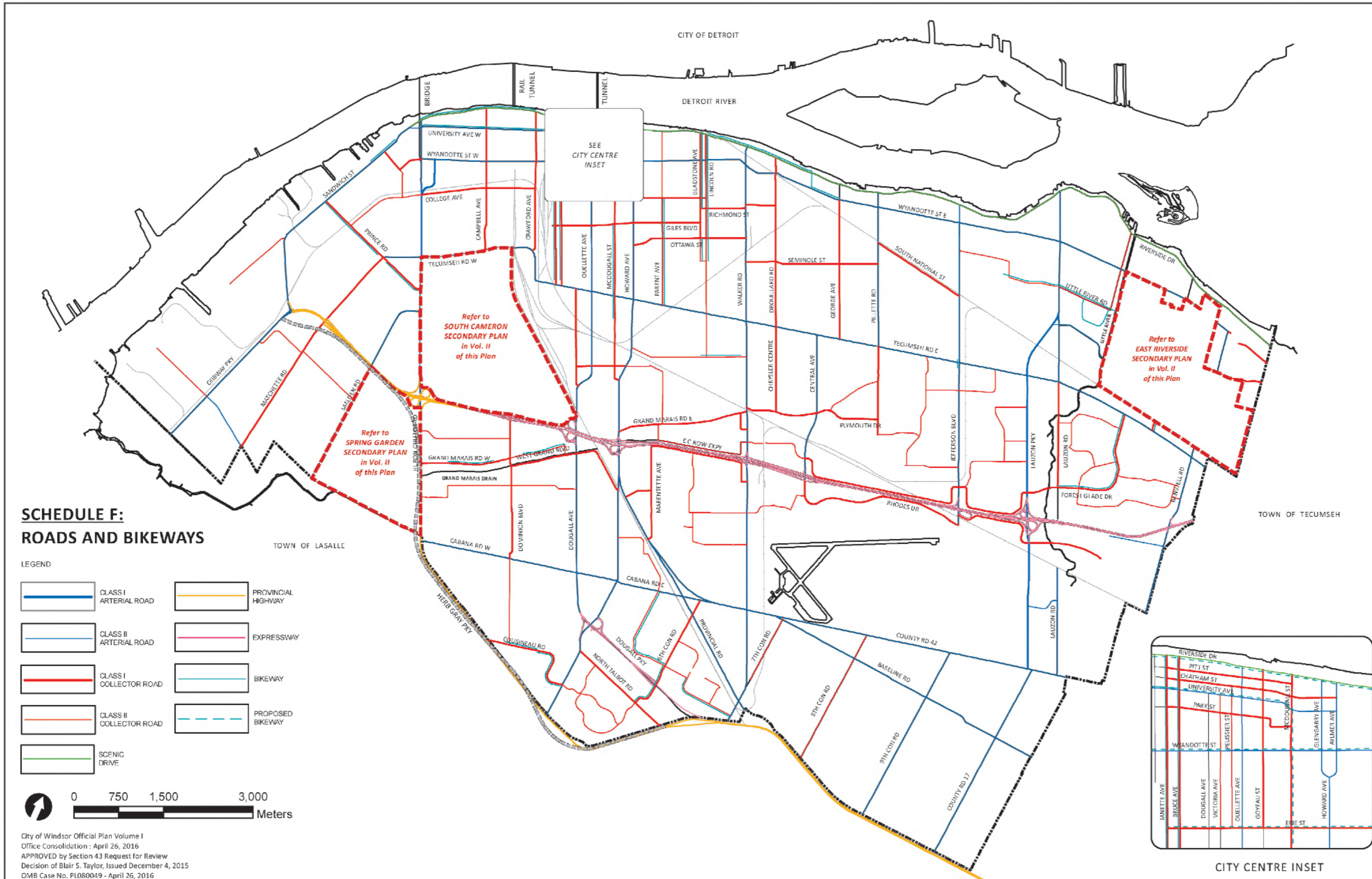
MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: SD
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CITY OF WINDSOR ROAD CLASSIFICATION

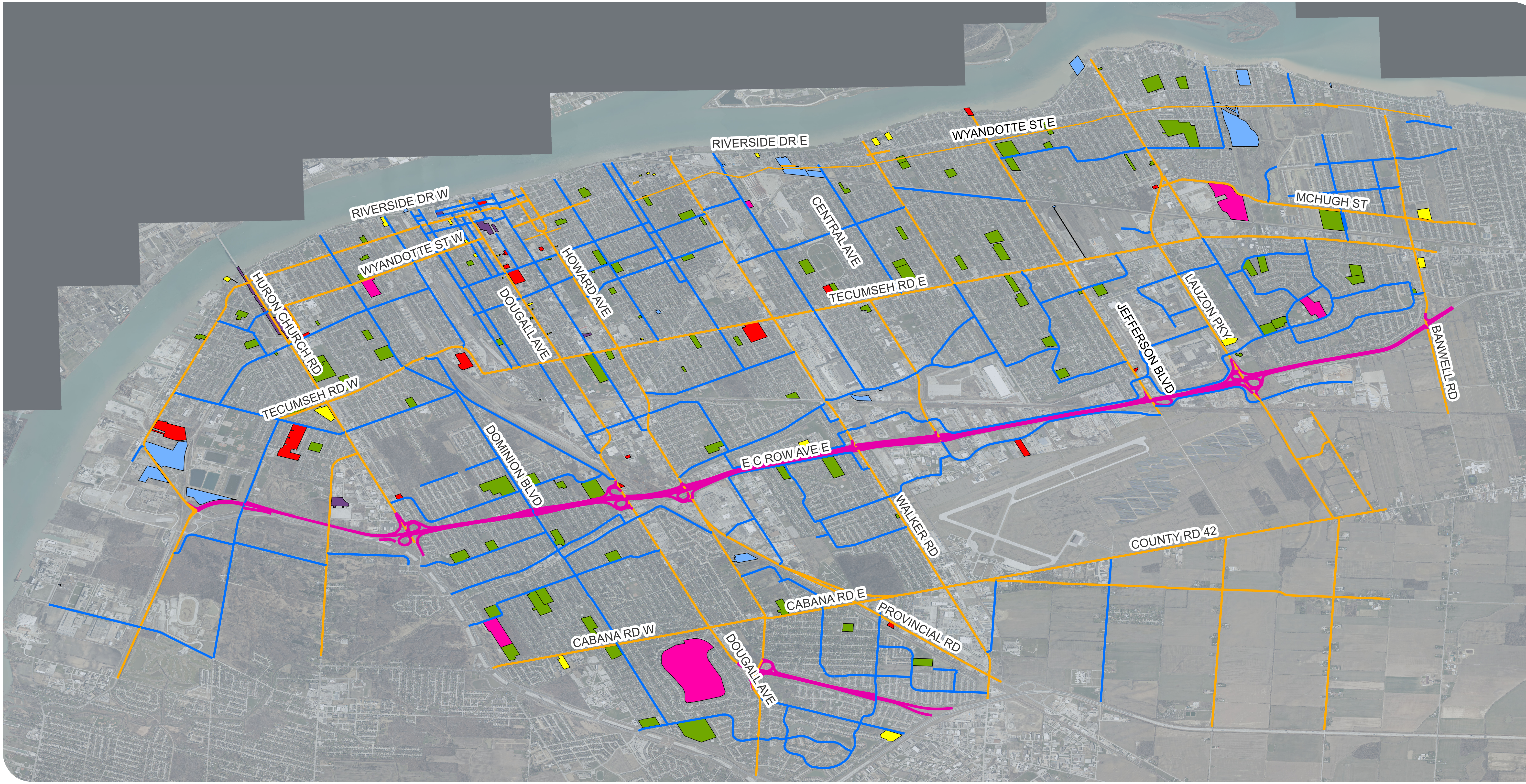
FIGURE F.4.4

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR OFFICIAL PLAN (2006)

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SEE SCALE BAR IN FIGURE

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

MAJOR ROADS & SENSITIVE LAND USE

FIGURE F.4.5

THE CITY OF WINDSOR

VACANT LAND
RESIDENTIAL DEVELOPMENT LAND
EMERGENCY SHELTER CENTRES
TRANSPORTATION
WATER TREATMENT/FILTRATION/WATER TOWERS/PUMP STATIONS
EMERGENCY SHELTER CENTRES
CLASS 1&2 ARTERIALS
CLASS 1&2 COLLECTORS
EXPRESSWAY

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

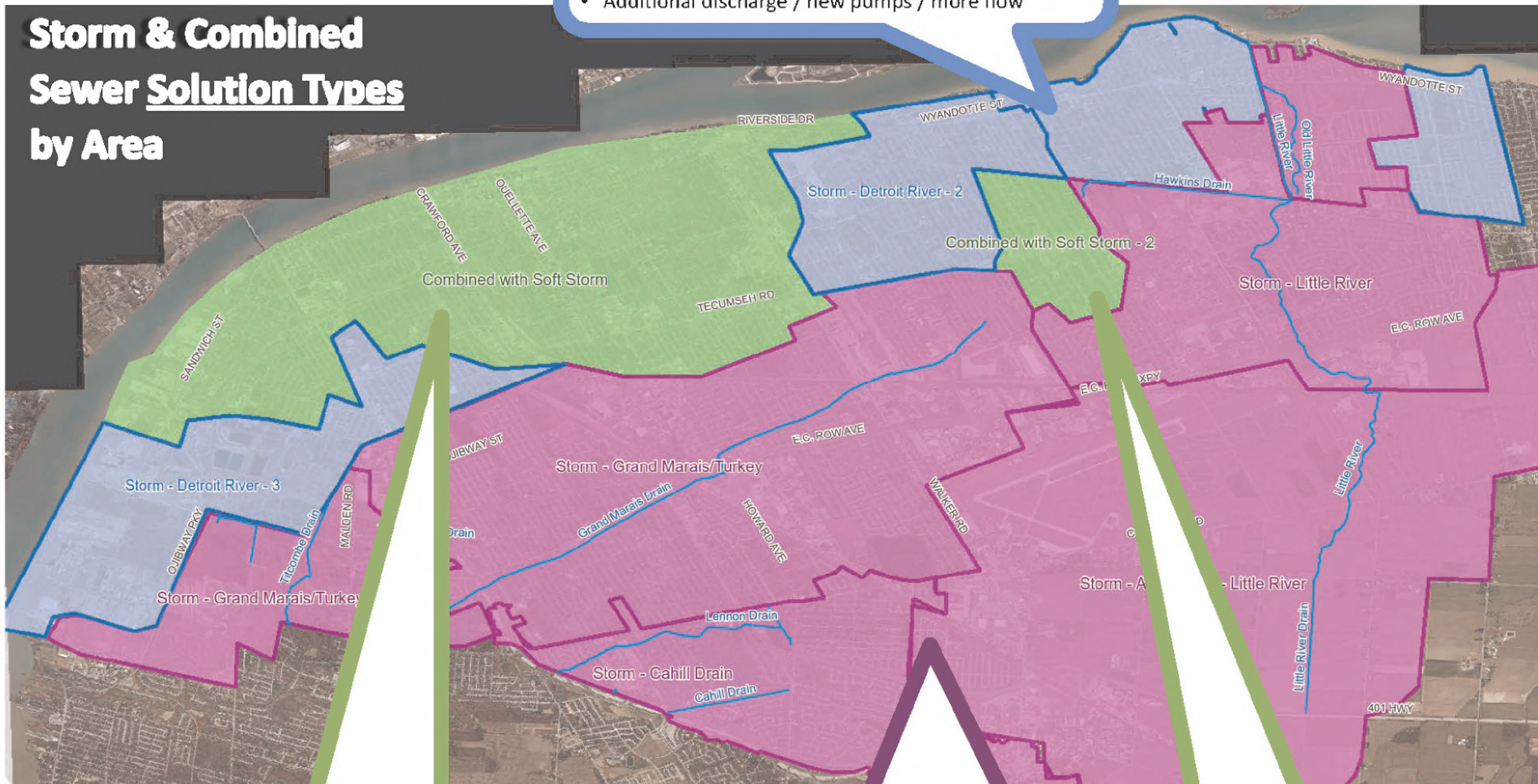
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

GENERAL APPROACH TO FLOOD MITIGATION IN THE EXISTING STORM AND COMBINED DRAINAGE AREAS



Outlets to Detroit River:
- Surface or underground storage
- Source Controls (downspout disconnection, etc.)
- LID's
- Additional discharge / new pumps / more flow

Combined Area – Central:
- "Hard" Separation where roof downspouts and private drains are connected to a storm sewer
- Surface and Underground Storage
- Additional treatment capacity at LRPCP

Outlets to Municipal Drain:
- Surface or underground storage
- Source control (downspout disconnect., etc.)
- LIDs
- Additional discharge is not permitted

Combined Area – Little River:
- "Hard" separation where foundation / private drains are directed to a storm sewer

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

APPROACH TO FLOOD MITIGATION IN EXISTING STORM AND COMBINED DRAINAGE AREAS
FIGURE F.4.6

THE CITY OF WINDSOR

DILLON CONSULTING
Aquafor Beech Limited

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: SD
MAP CHECKED BY: DEM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL STORM SYSTEM PROBLEM AREAS UNDER 1:100 YEAR STORM EVENT

FIGURE F.4.7

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

STUDY AREA

REGIONAL SURFACE FLOODING AREA

SURFACE FLOODING DEPTH LESS THAN 0.30 m (1.0 ft)

SURFACE FLOODING DEPTH MORE THAN 0.30 m (1.0 ft)

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MAP DRAWING INFORMATION:
PROBLEM AREA DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: SD
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 | STATUS: FINAL | DATE: NOVEMBER 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL STORM SYSTEM PROBLEM AREAS UNDER 1:100 YEAR + CLIMATE CHANGE EVENT

FIGURE F.4.8

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

STUDY AREA

REGIONAL SURFACE FLOODING AREA

SURFACE FLOODING DEPTH LESS THAN 0.30 m (1.0 ft)

SURFACE FLOODING DEPTH MORE THAN 0.30 m (1.0 ft)

THE CITY OF WINDSOR

DILLON CONSULTING

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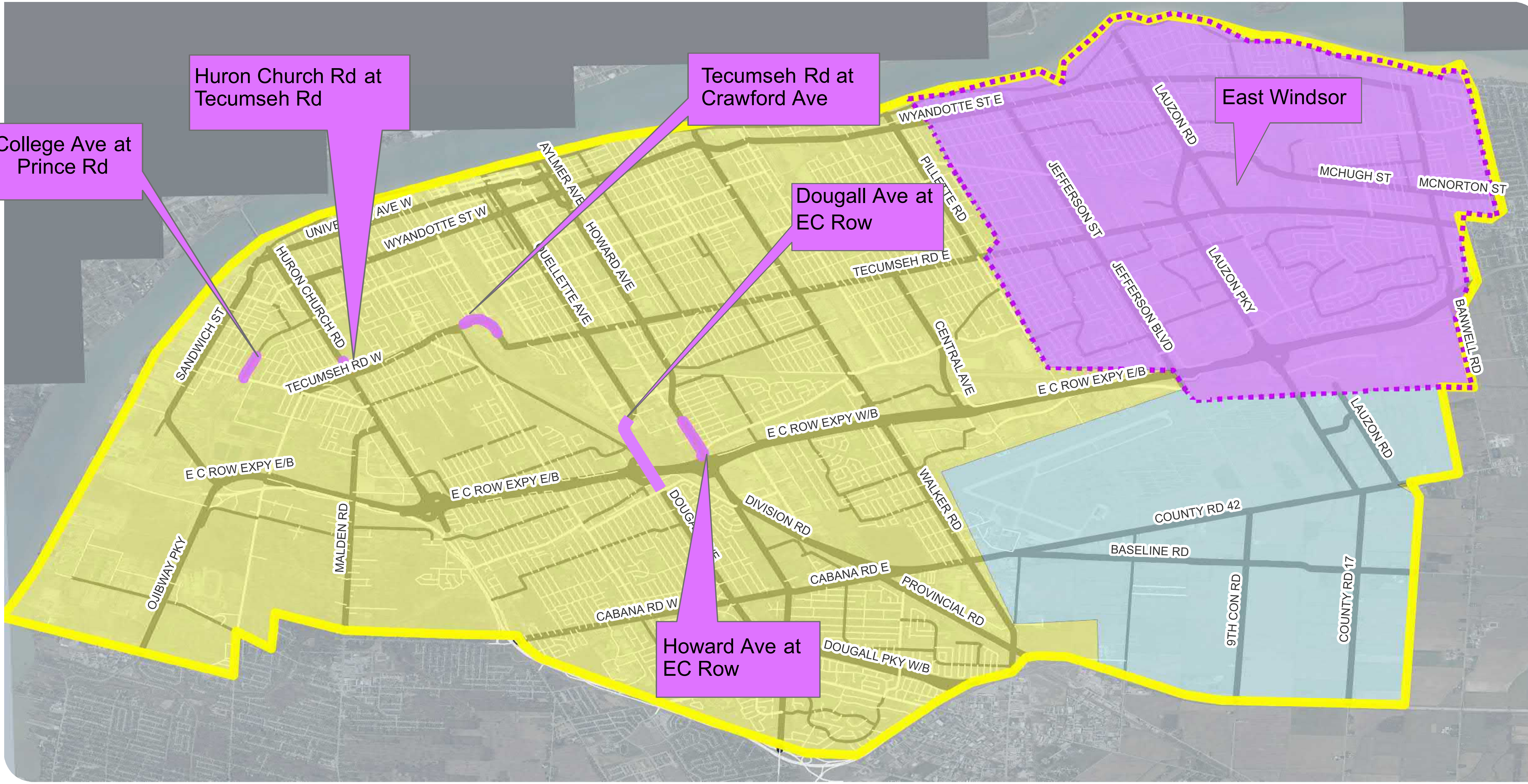
MAP DRAWING INFORMATION:
PROBLEM AREA DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: SD
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

N E S W

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

LOW IMPACT DEVELOPMENT (LID) MEASURES

FIGURE F.5.1

Recommend installation of LIDs area-wide. Proposed storm system solutions do not include the incremental benefit of LID measures.

Recommend installation of LIDs area-wide. Proposed storm system solutions include the incremental benefit of LID measures.

Future Development. Recommend integration of LIDs.

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

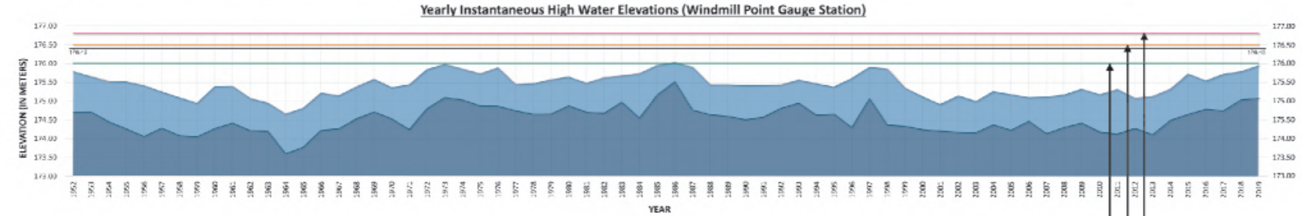
PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

ANALYSIS – AREAS AFFECTED AT FLOOD LEVELS

EAST RIVERSIDE FLOOD RISK ASSESSMENT

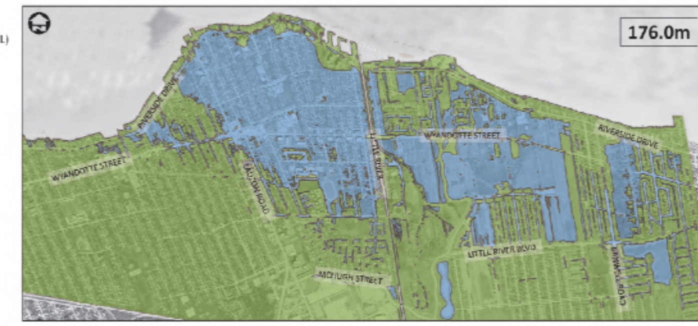
The graph below presents the historical yearly instantaneous high and low water levels from 1952 – Present day.

Yearly Instantaneous High Water Elevations (Windmill Point Gauge Station)



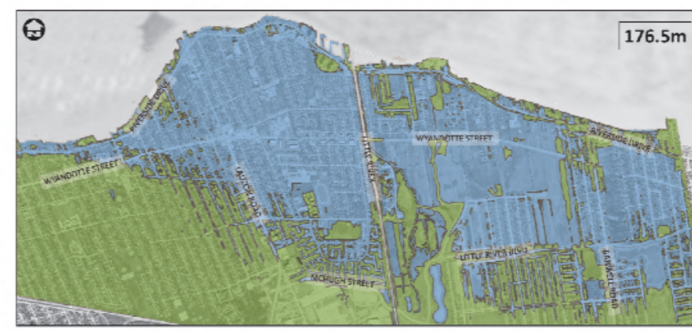
LEGEND
- 176.8m (2050 1:100-YEAR INSTANTANEOUS WATER LEVEL)
- 176.5m (CURRENT 1:100-YEAR INSTANTANEOUS WATER LEVEL)
- CURRENT HIGH WATER LEVEL (176.0m)
- HISTORICAL YEARLY INSTANTANEOUS HIGH WATER LEVELS
- HISTORICAL YEARLY INSTANTANEOUS LOW WATER LEVELS

LEGEND
- AREA BELOW 176.0m
- AREA ABOVE 176.0m



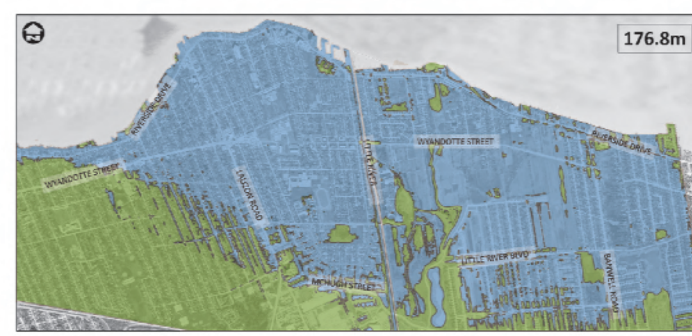
The blue area represents the area of land that is below the current existing water level of 176.0m.

LEGEND
- AREA BELOW 176.5m
- AREA ABOVE 176.5m



The blue area represents the area of land that is below the current 1:100-year instantaneous water level of 176.5m.

LEGEND
- AREA BELOW 176.8m
- AREA ABOVE 176.8m



The blue area represents the area of land that is below the future 2050 1:100-year instantaneous water level of 176.8m.

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

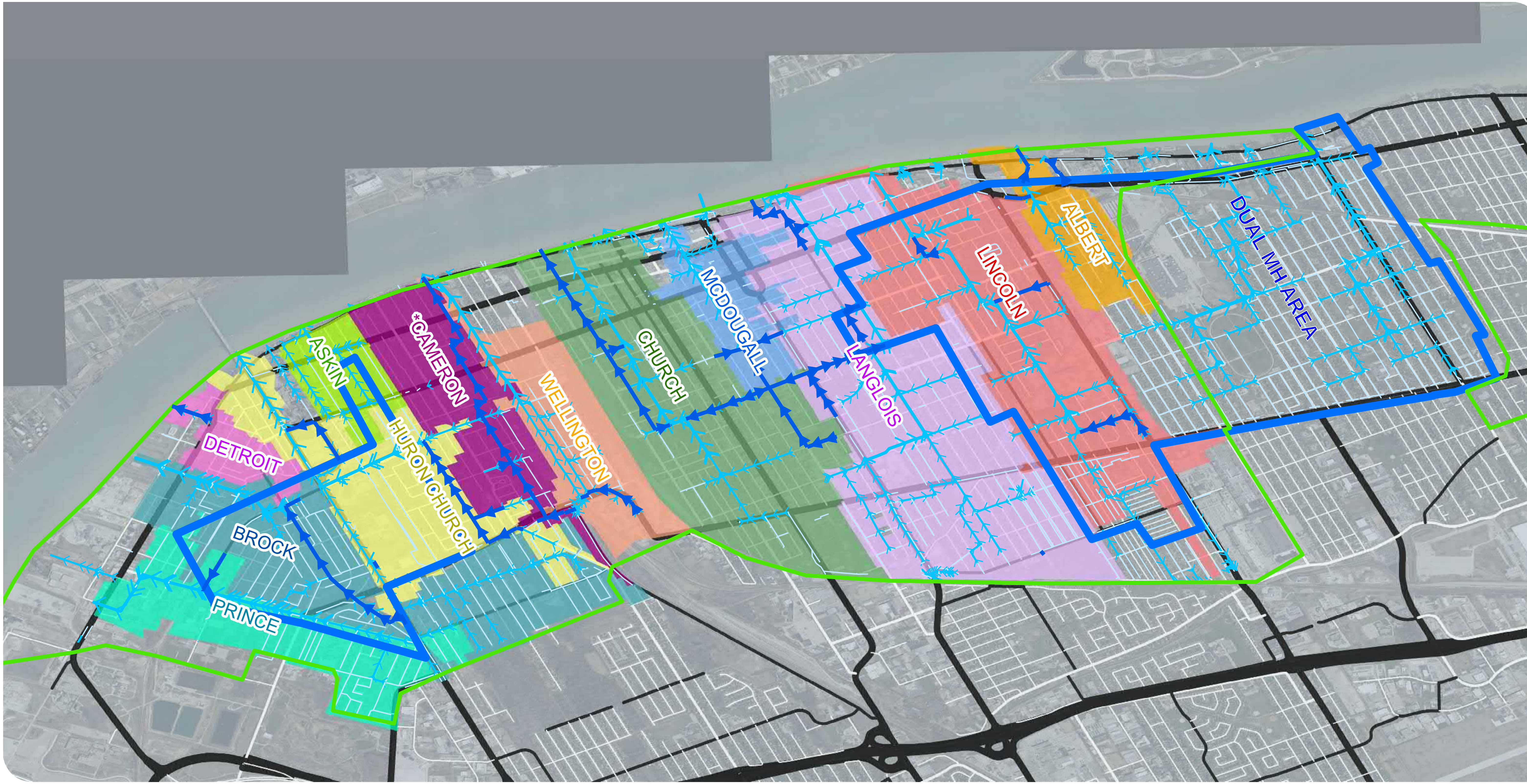
ANAYSIS OF INSTANTANEOUS HIGH WATER LEVELS ALONG DETROIT RIVER

FIGURE F.5.2

DRAWING INFORMATION:
DATA AND FIGURE FROM EAST RIVERSIDE FLOOD RISK ASSESSMENT
BY LANDMARK ENGINEERS INC.

MAP CREATED BY: SD
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

Central Windsor Proposed Separated Storm Drainage Mosaic

FIGURE F.5.3

- DUAL MAINTENANCE HOLE AREA
- EXISTING STORM SEWER 900mm OR GREATER
- PROPOSED STORM SEWER
- COMBINED AREA
- PRINCE DRAINAGE AREA
- BROCK DRAINAGE AREA
- PRINCE DRAINAGE AREA
- HURON CHURCH DRAINAGE AREA
- ASKIN DRAINAGE AREA
- CAMERON DRAINAGE AREA
- WELLINGTON DRAINAGE AREA
- CHURCH DRAINAGE AREA
- MCDOUGALL DRAINAGE AREA
- LANGLOIS DRAINAGE AREA
- LINCOLN DRAINAGE AREA
- ALBERT DRAINAGE AREA

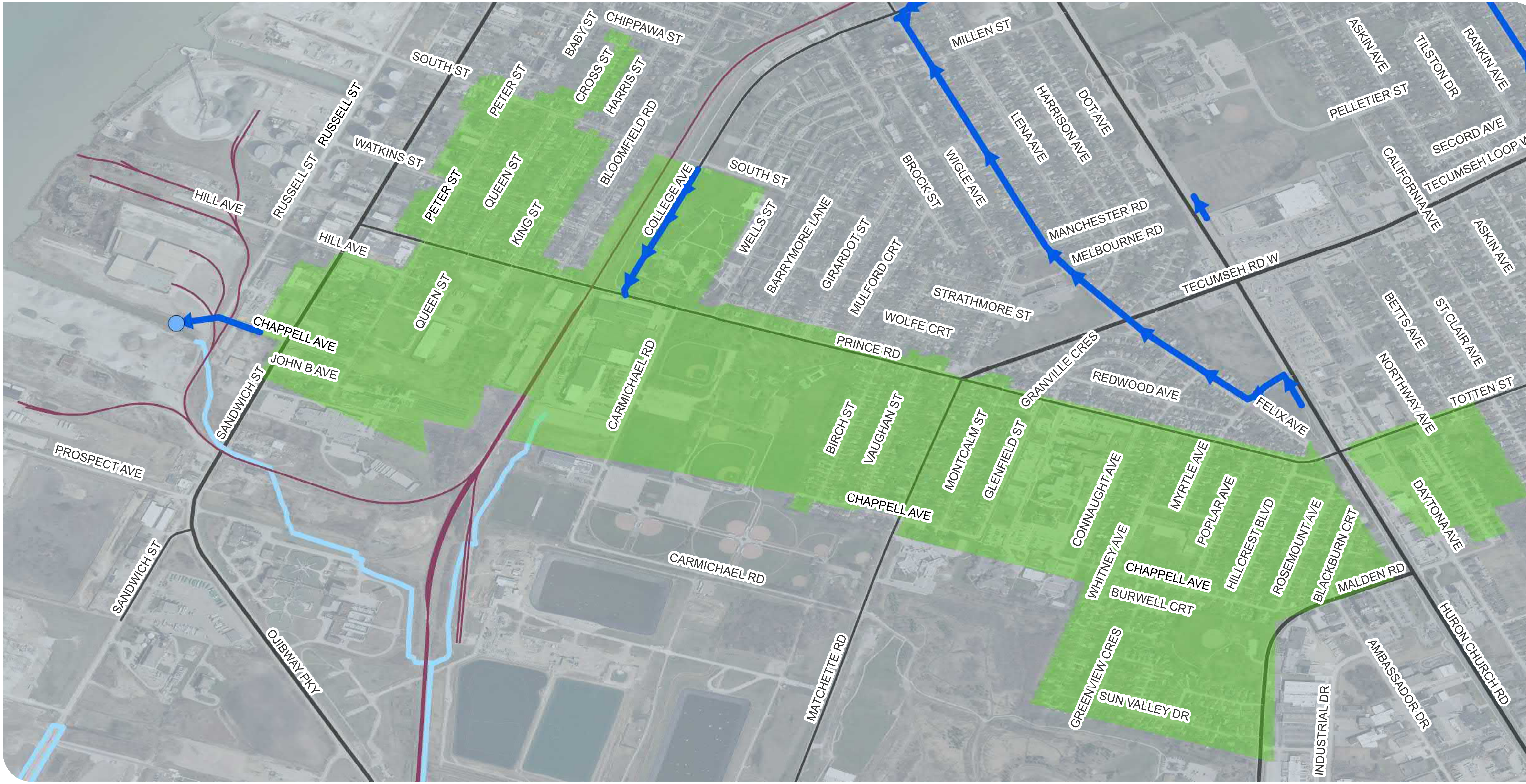
DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:35,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - PRINCE RD TRUNK STORM SEWER IMPROVEMENTS (STM-C1 & STM-C9)

FIGURE F.5.4

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

RAILWAY

MUNICIPAL DRAINS

PRINCE ROAD PROPOSED DRAINAGE AREA

PROPOSED NEW OR UPGRADED STORM SEWERS

PROPOSED NEW STORM SEWER OUTFALL

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:10,500

PROJECT: 17-6638 | STATUS: FINAL | DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - BROCK ST TRUNK STORM SEWER IMPROVEMENTS (STM-C10)

FIGURE F.5.5

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
BROCK ROAD PROPOSED DRAINAGE AREA
PROPOSED NEW OR UPGRADED STORM SEWERS
PROPOSED NEW STORM SEWER OUTFALL

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:6,000

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - DETROIT ST TRUNK STORM SEWER IMPROVEMENTS (STM-C2)

FIGURE F.5.6

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS	RAILWAY
CLASS 1 AND 2 COLLECTOR ROADS	MUNICIPAL DRAINS
DETROIT STREET PROPOSED DRAINAGE AREA	PROPOSED NEW STORM SEWER OUTFALL
PROPOSED NEW OR UPGRADED STORM SEWERS	

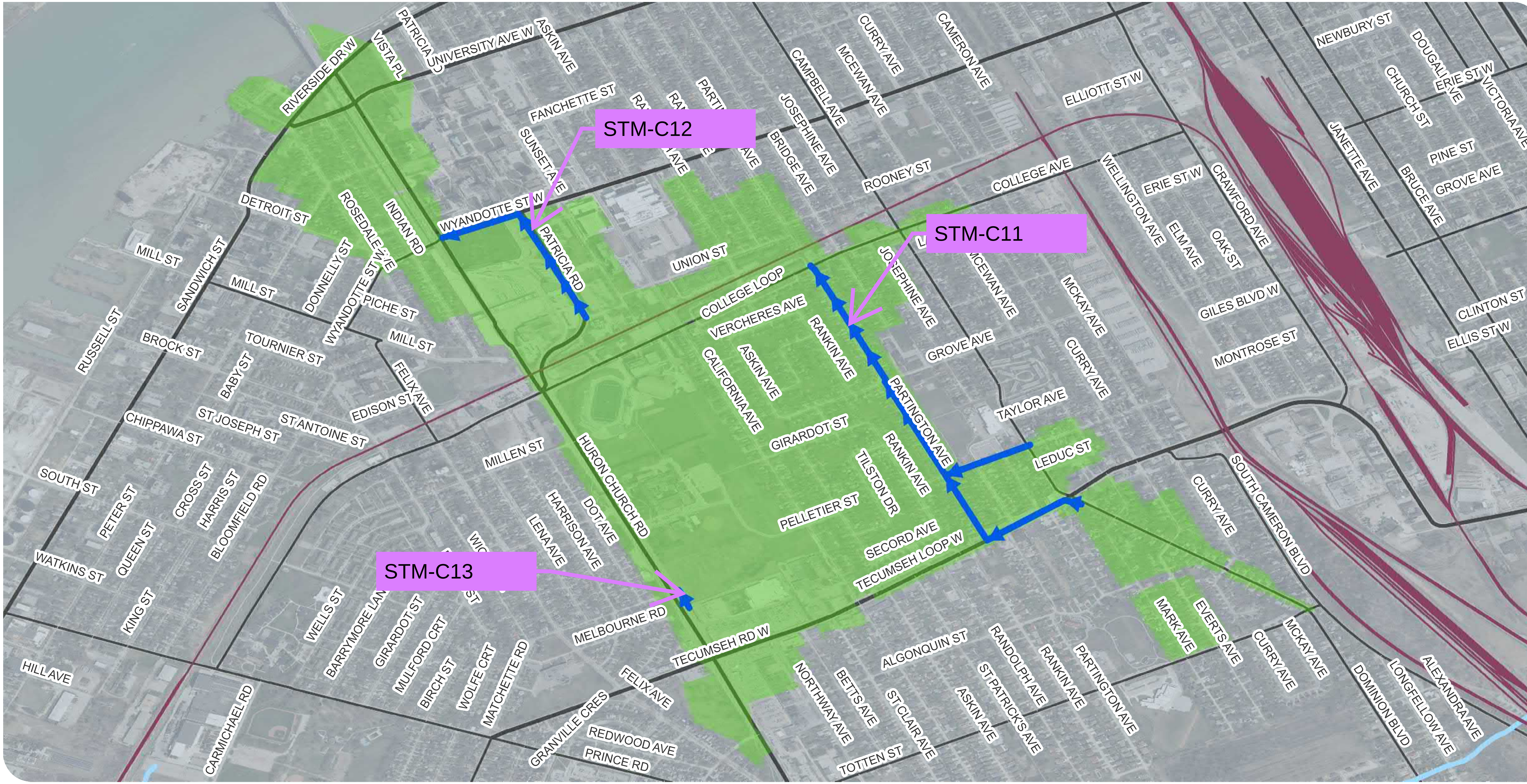
DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:6,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - HURON CHURCH RD TRUNK STORM SEWER IMPROVEMENTS (STM-C11, STM-C12 AND STM-C13)

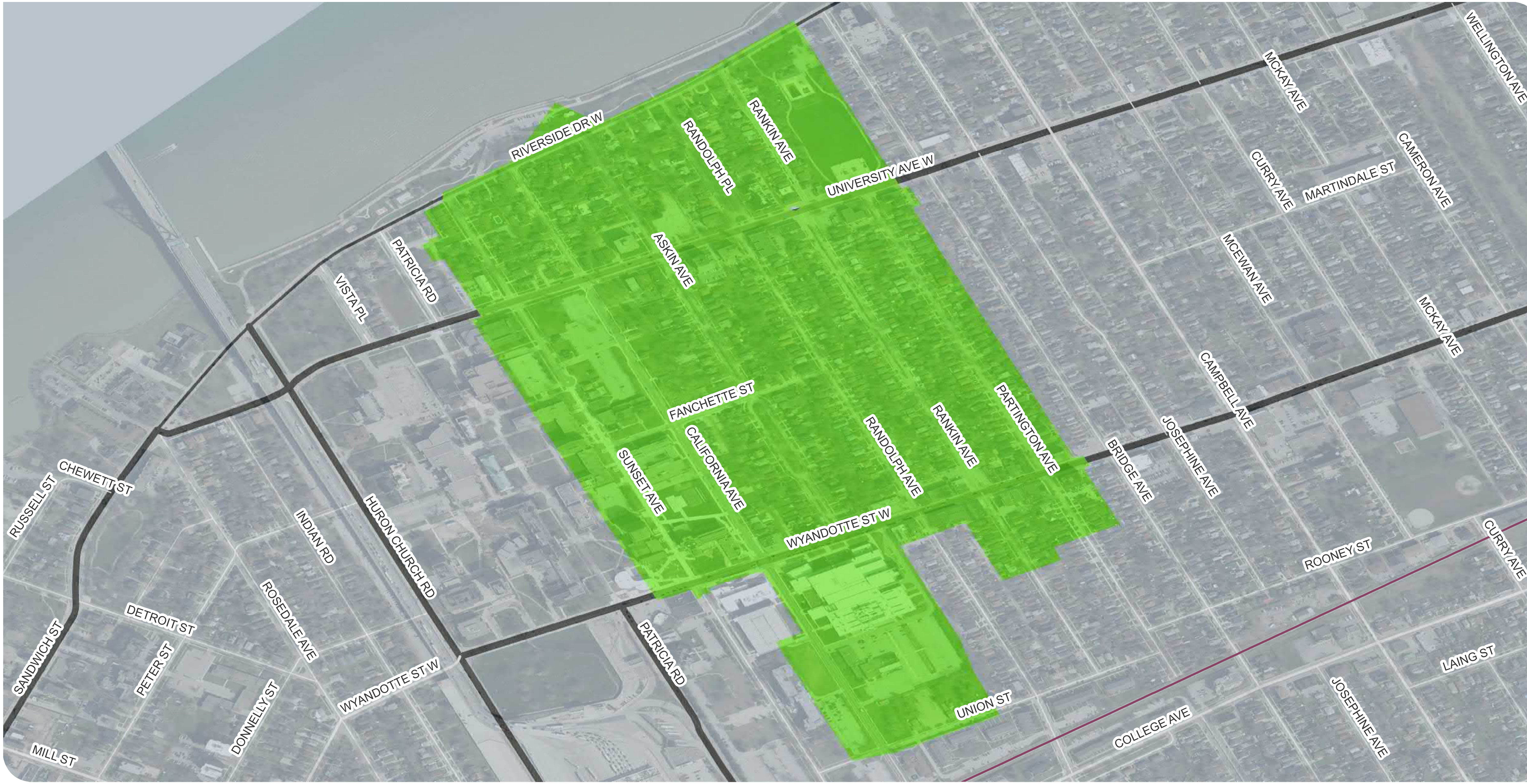
FIGURE F.5.7

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
HURON CHURCH ROAD PROPOSED DRAINAGE AREA
PROPOSED NEW OR UPGRADED STORM SEWERS
PROPOSED NEW STORM SEWER OUTFALL

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:13,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - ASKIN RD STORM SEWER DRAINAGE AREA

FIGURE F.5.8

THE CITY OF WINDSOR

Legend	
EXPRESSWAY AND ARTERIAL ROADS	RAILWAY
CLASS 1 AND 2 COLLECTOR ROADS	ASKIN ROAD PROPOSED DRAINAGE AREA

DILLON CONSULTING

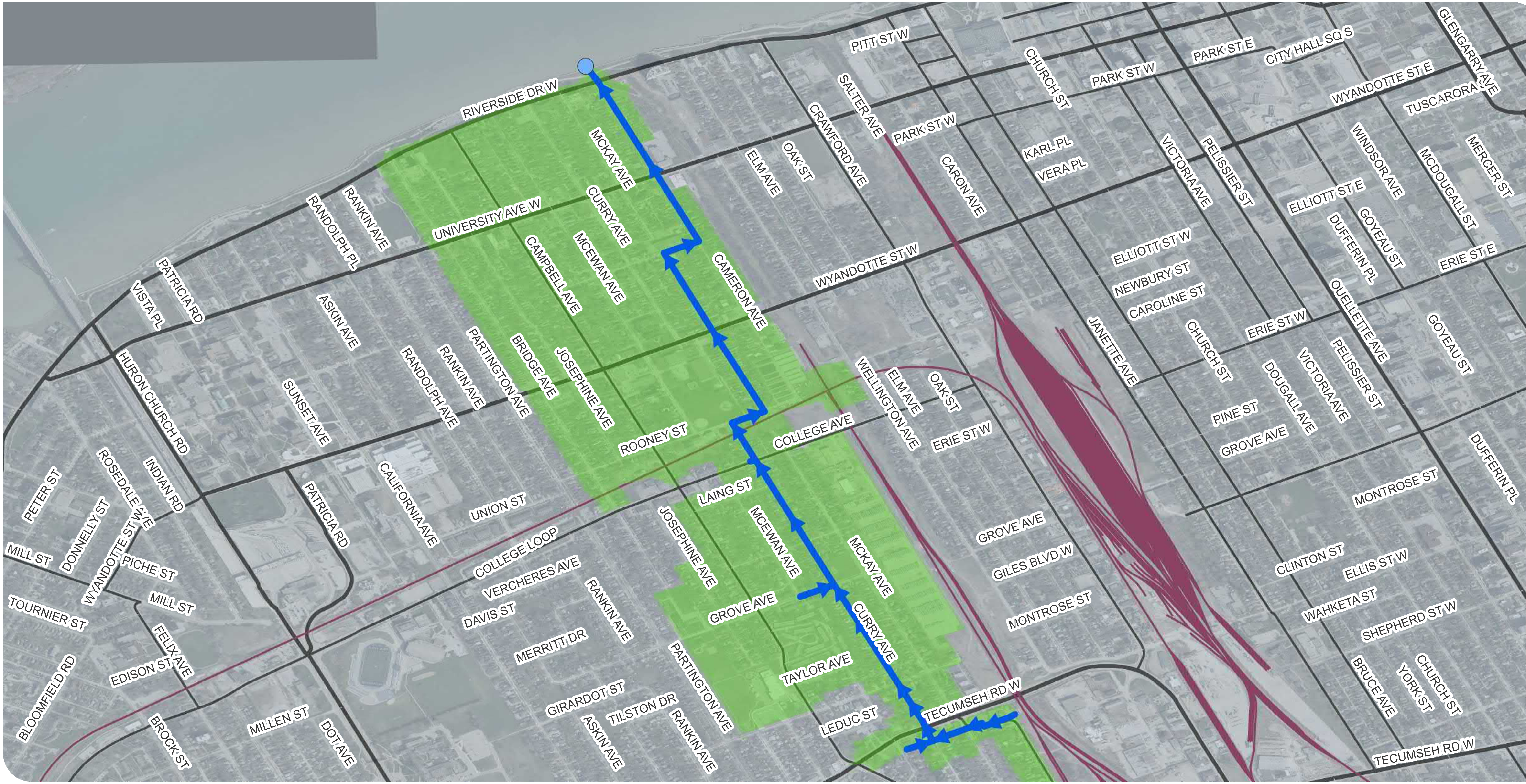
Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:6,500

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - CAMERON ST TRUNK SEWER IMPROVEMENTS (STM-C3)

FIGURE F.5.9

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

RAILWAY

MUNICIPAL DRAINS

CAMERON AVE PROPOSED DRAINAGE AREA

PROPOSED NEW OR UPGRADED STORM SEWERS

PROPOSED NEW STORM SEWER OUTFALL

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:12,500

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - WELLINGTON AVE TRUNK STORM SEWER SYSTEM IMPROVEMENTS (STM-C14)

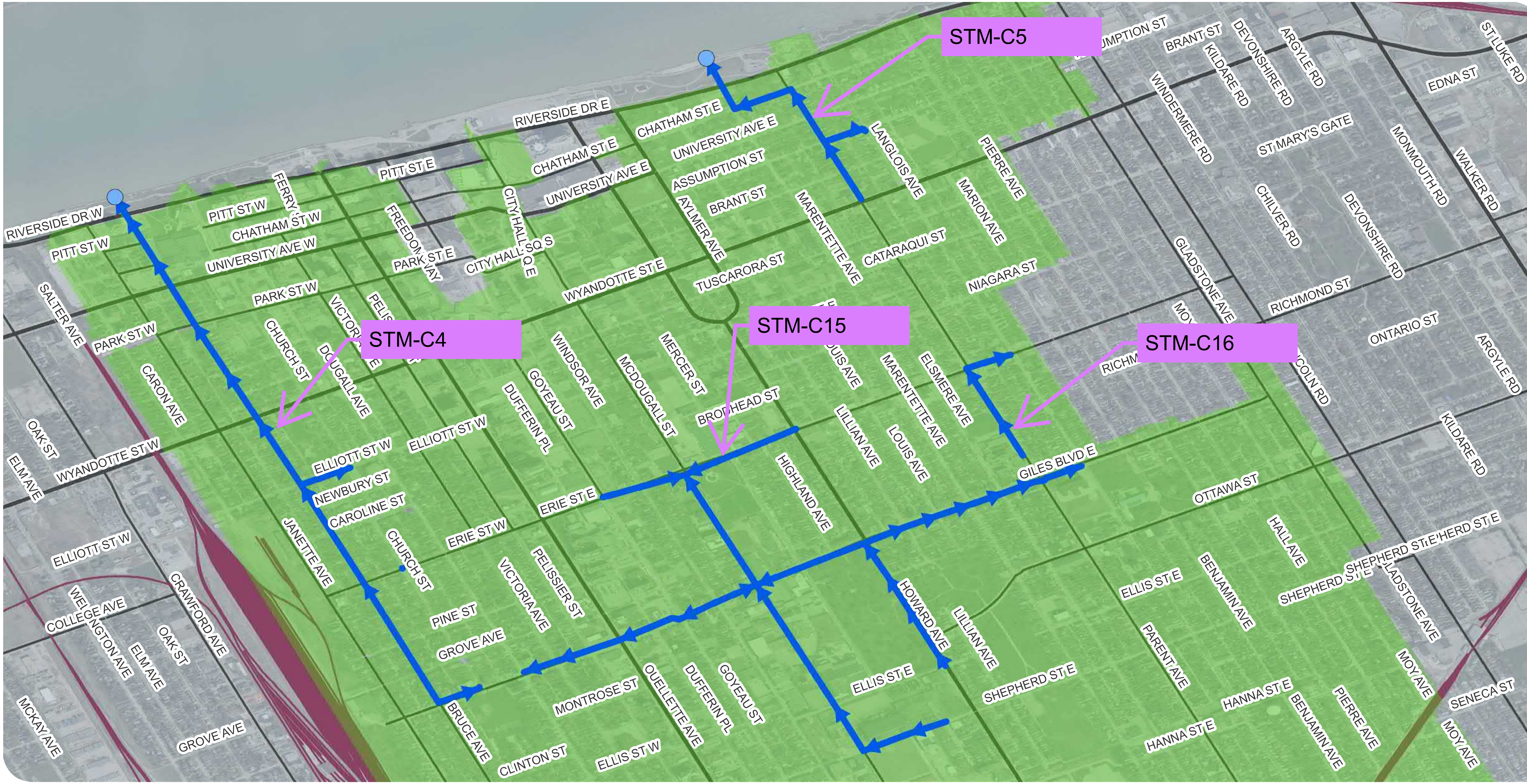
FIGURE F.5.10

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
WELLINGTON AVE PROPOSED DRAINAGE AREA
PROPOSED NEW OR UPGRADED STORM SEWERS
PROPOSED NEW STORM SEWER OUTFALL

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:2,500

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - CHURCH-MCDOUGALL-LANGLOIS-TRUNK STORM SEWER SYSTEM IMPROVEMENTS (STM-C4,C5, C15 & C16)

FIGURE F.5.11

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS	RAILWAY
CLASS 1 AND 2 COLLECTOR ROADS	MUNICIPAL DRAINS
CHURCH-MCDOUGALL-LANGLOIS PROPOSED DRAINAGE AREA	PROPOSED NEW STORM SEWER OUTFALL
PROPOSED NEW OR UPGRADED STORM SEWERS	

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:12,500

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - LINCOLN TRUNK STORM SEWER SYSTEM IMPROVEMENTS (STM-C17, C18 AND C19)

FIGURE F.5.12

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

RAILWAY

LINCOLN ROAD PROPOSED DRAINAGE AREA

PROPOSED NEW OR UPGRADED STORM SEWERS

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE : 1:10,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - ALBERT RD TRUNK STORM SEWER SYSTEM IMPROVEMENTS (STM-C7)

FIGURE F.5.13

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS	RAILWAY
CLASS 1 AND 2 COLLECTOR ROADS	ALBERT ROAD PROPOSED DRAINAGE AREA
PROPOSED NEW OR UPGRADED STORM SEWERS	PROPOSED NEW STORM SEWER OUTFALL

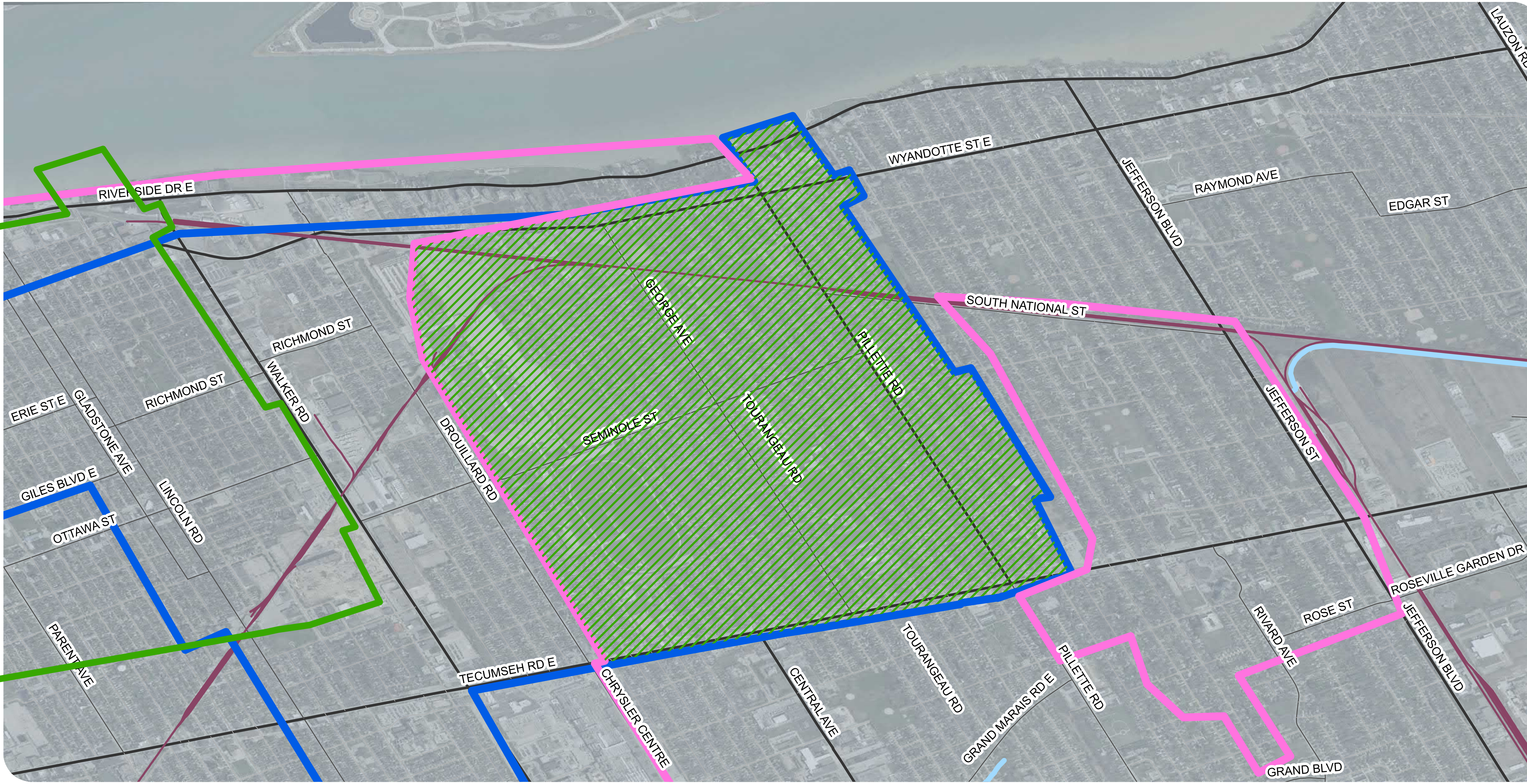
DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE : 1:8,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - DUAL MANHOLE SEPARATION AREA

FIGURE F.5.14

EXPRESSWAY AND ARTERIAL ROADS	RAILWAY
CLASS 1 AND 2 COLLECTOR ROADS	MUNICIPAL DRAINS
COMBINED SEWER SYSTEM AREA	DUAL MANHOLE SEWER SYSTEM AREA
DUAL MANHOLE SEPARATION AREA	

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:20,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

YPRES ALTERNATIVE 1 (PREFERRED)

UNDERGROUND STORAGE AT OPTIMIST PARK, PARKING LOT.

YPRES ALTERNATIVE 2

SURFACE STORAGE AT OPTIMIST PARK, WOOD LOT.

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - YPRES AVE FLOOD RISK REDUCTION ALTERNATIVES (STM-C6)

FIGURE F.5.15

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
PROPOSED NEW OR UPGRADED STORM SEWERS
UNDERGOUND STORAGE
SURFACE STORAGE IN WOODLOT

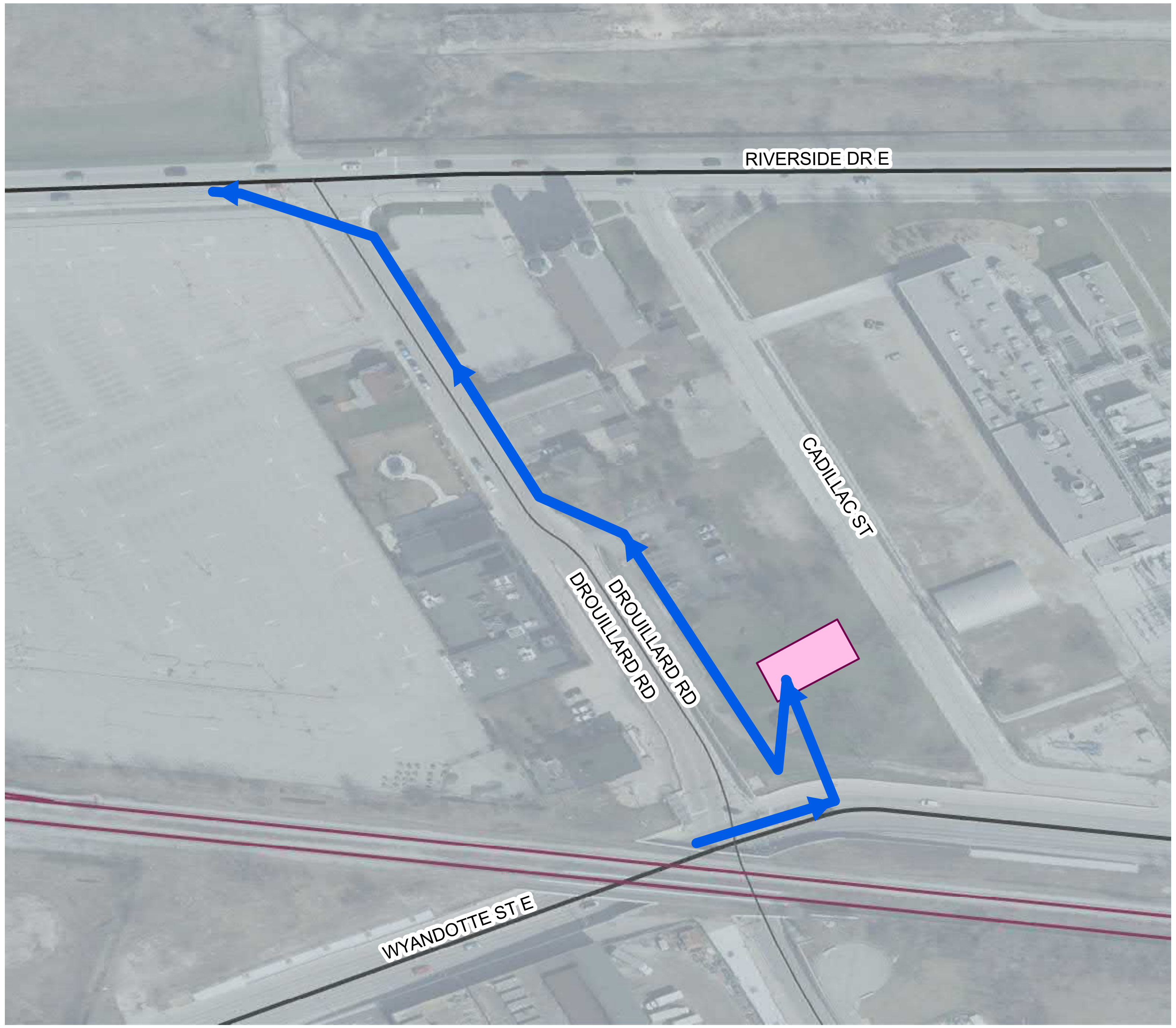
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:3,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

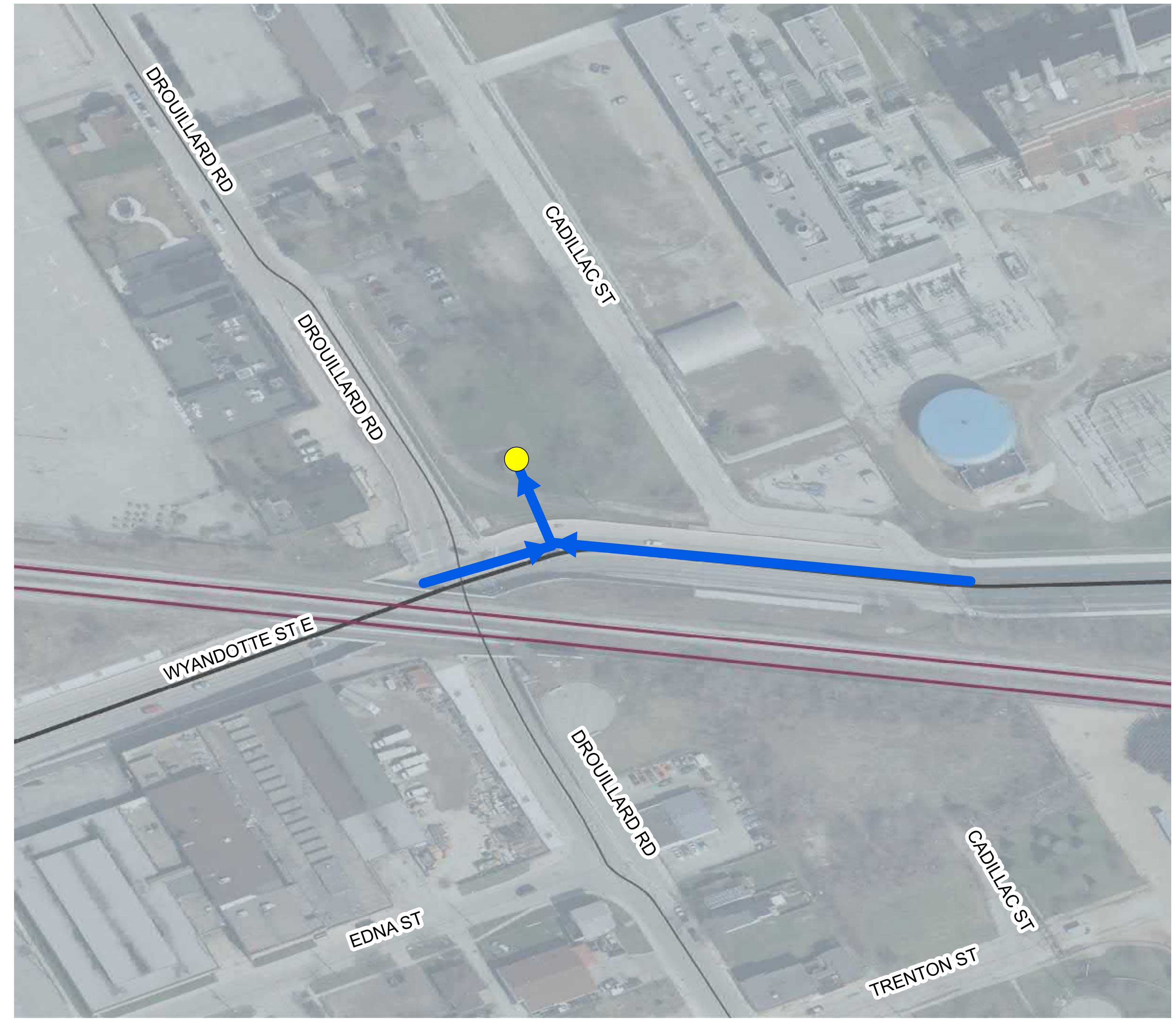
DROUILLARD ALTERNATIVE 1 (PREFERRED)

New Pump Station and Upgraded Sewers on Drouillard Road and Wyandotte St.E.



DROUILLARD ALTERNATIVE 2

Existing Pump Station with Underground Storage on Wyandotte St. E.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

CENTRAL WINDSOR - PROPOSED NEW STORM SEWERS DROUILLARD ALTERNATIVES SYSTEM (STM-C8)

FIGURE F.5.16

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
PROPOSED NEW OR UPGRADED STORM SEWERS
NEW PUMPSTATION LOCATION/FOOTPRINT
EXISITNG PUMP STATION

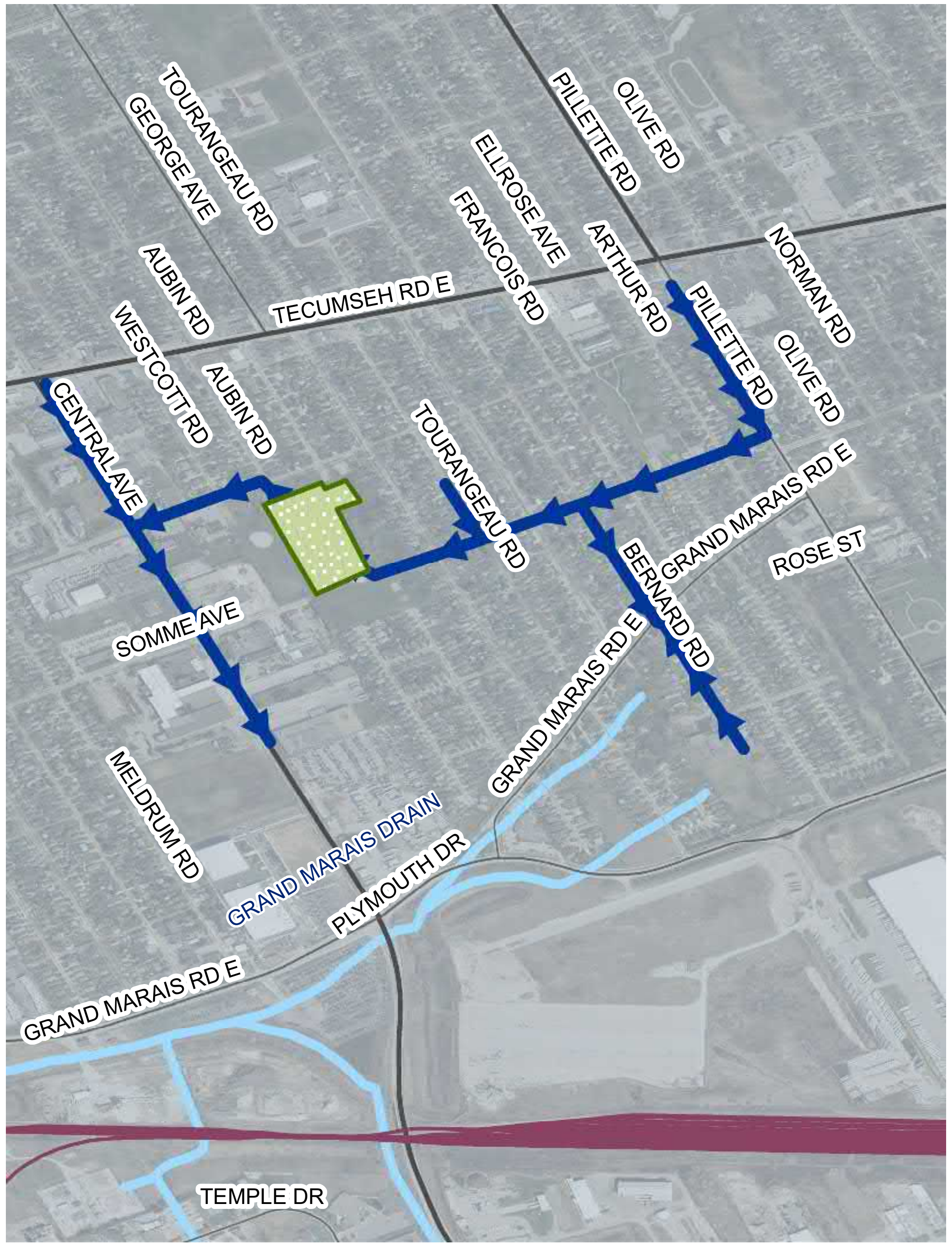
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE : 1:2000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

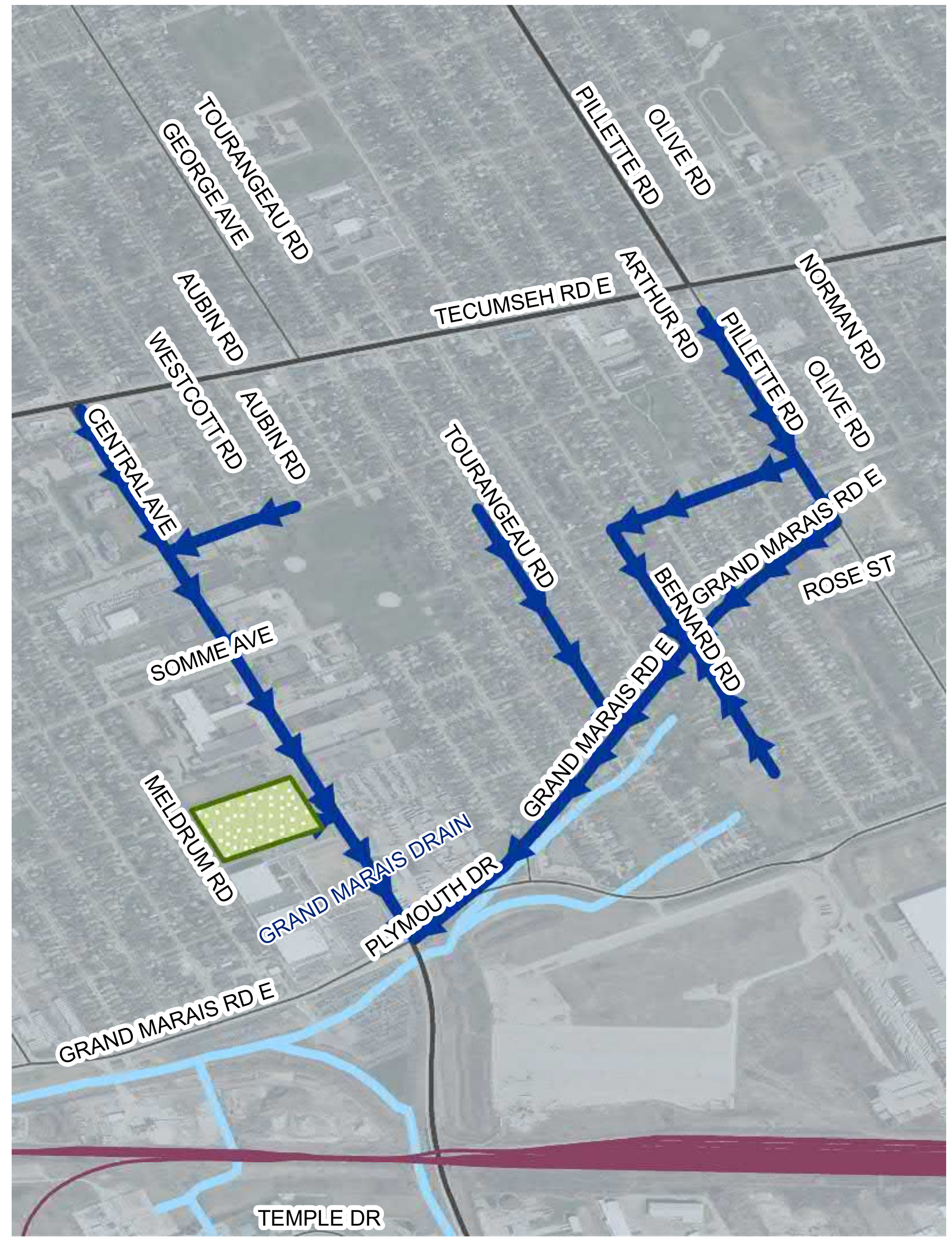
CENTRAL, PILLETTE AND REGIONAL AREA 7 ALTERNATIVE 1

Proposed storm sewers and underground stormwater management facility within McDonald Park, including LIDs along all sewers.



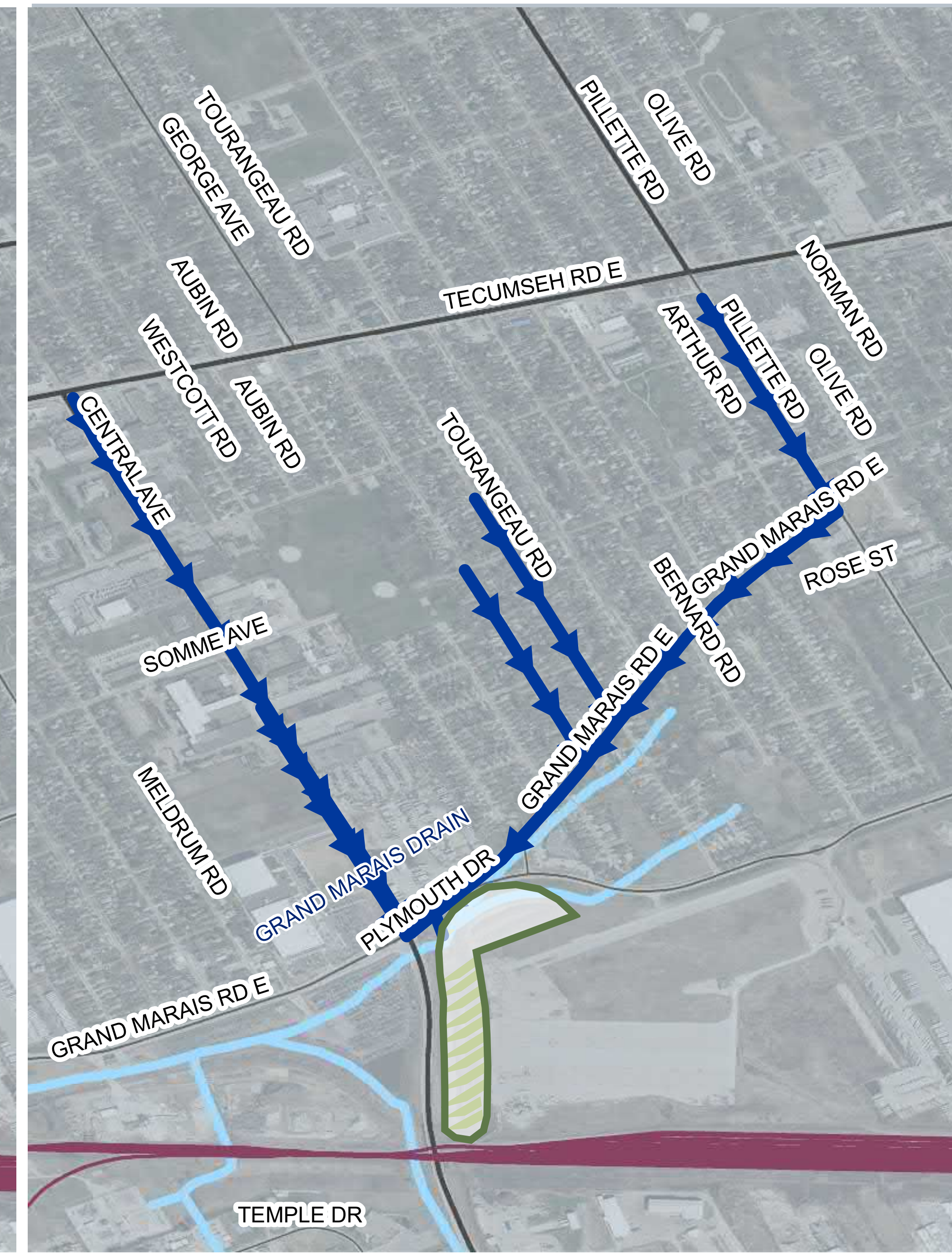
CENTRAL, PILLETTE AND REGIONAL AREA 7 ALTERNATIVE 2

Proposed storm sewers to proposed underground or surface stormwater management facility within vacant land north of YMCA, including LIDs along all sewers.



CENTRAL, PILLETTE AND REGIONAL AREA 7 ALTERNATIVE 3 (PREFERRED)

Proposed storm sewers to expanded Central Ave. stormwater pond.



Legend

- EXPRESSWAY AND ARTERIAL ROADS
- CLASS 1 AND 2 COLLECTOR ROADS
- RAILWAY
- MUNICIPAL DRAINS
- STORM SEWER IMPROVEMENTS
- UNDERGROUND STORMWATER STORAGE
- STORMWATER POND IMPROVEMENT EXPANSION

Note: The existing private pond reconfiguration and additional property acquisition will be required for the new central pond configuration.

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR - CENTRAL, PILLETTE AND REGIONAL AREA 7 SURFACE FLOODING ALTERNATIVES (STM-S7)

FIGURE F.5.17

THE CITY OF WINDSOR

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Aquafor Beech Limited

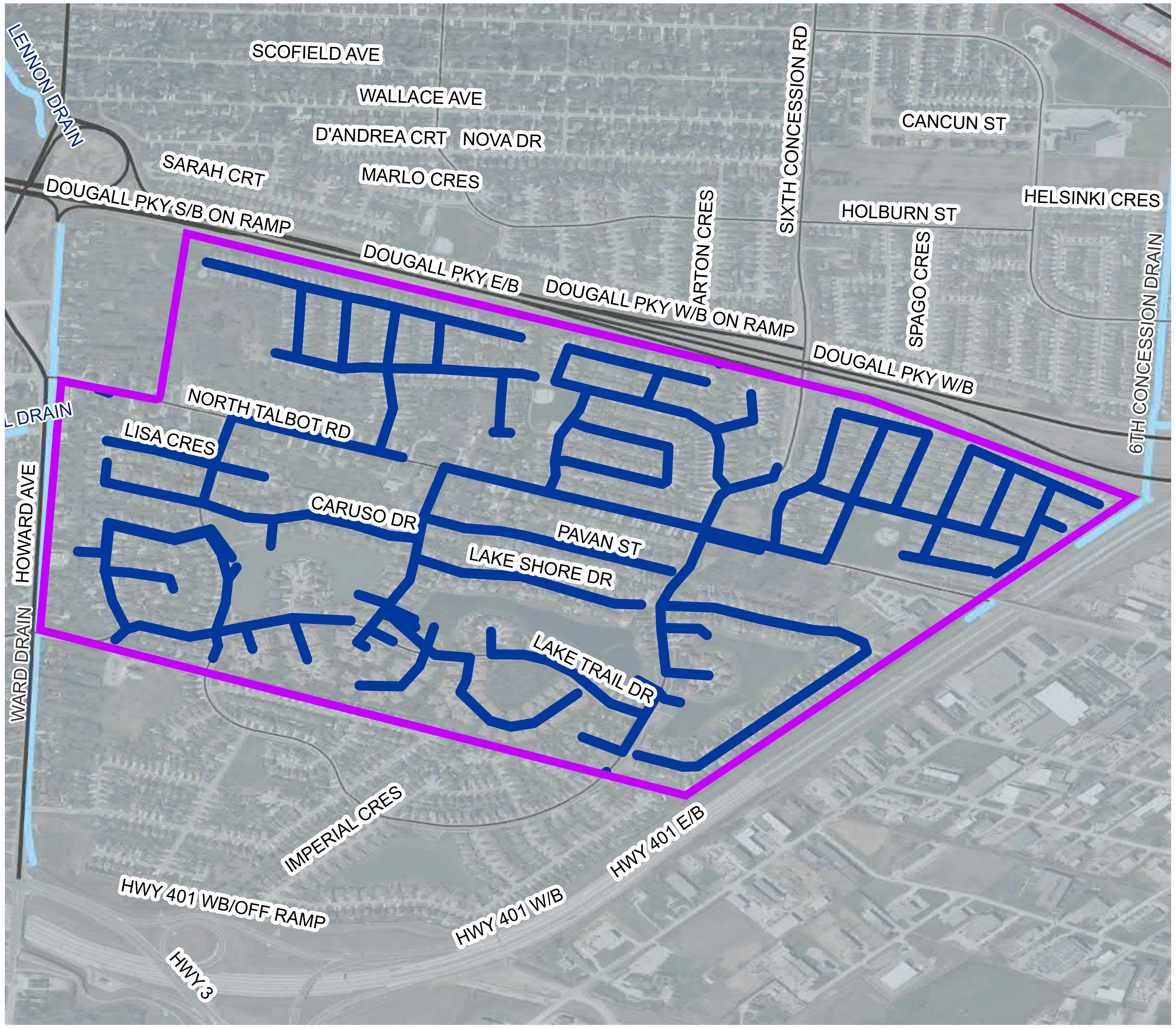
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: GCS NORTH AMERICAN 1983

SCALE : 1:15,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

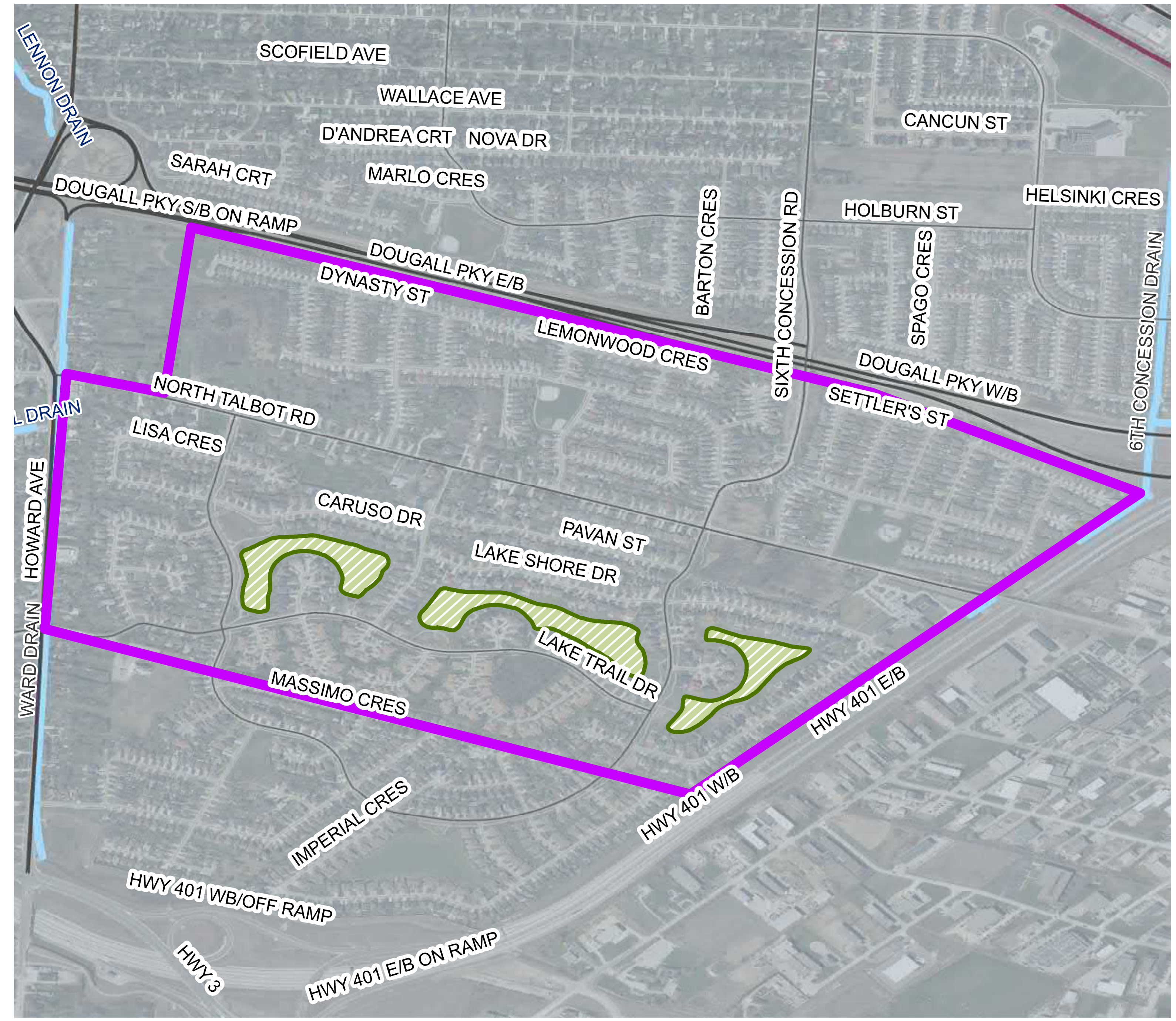
REGIONAL AREA 8 ALTERNATIVE 1

Low impact development (LID) measures (exfiltration trenches along stormsewers) and mandatory downspout disconnection.



REGIONAL AREA 8 ALTERNATIVE 2 (PREFERRED)

Lower pond normal water levels and mandatory downspout disconnection.



EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
UNDERGROUND STORMWATER STORAGE
EXISTING STORMWATER POND IMPROVEMENTS

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR - SOUTHWOOD LAKES SURFACE FLOODING ALTERNATIVES (STM-S8)

FIGURE F.5.18

THE CITY OF WINDSOR

DILLON CONSULTING

Aquafor Beech Limited

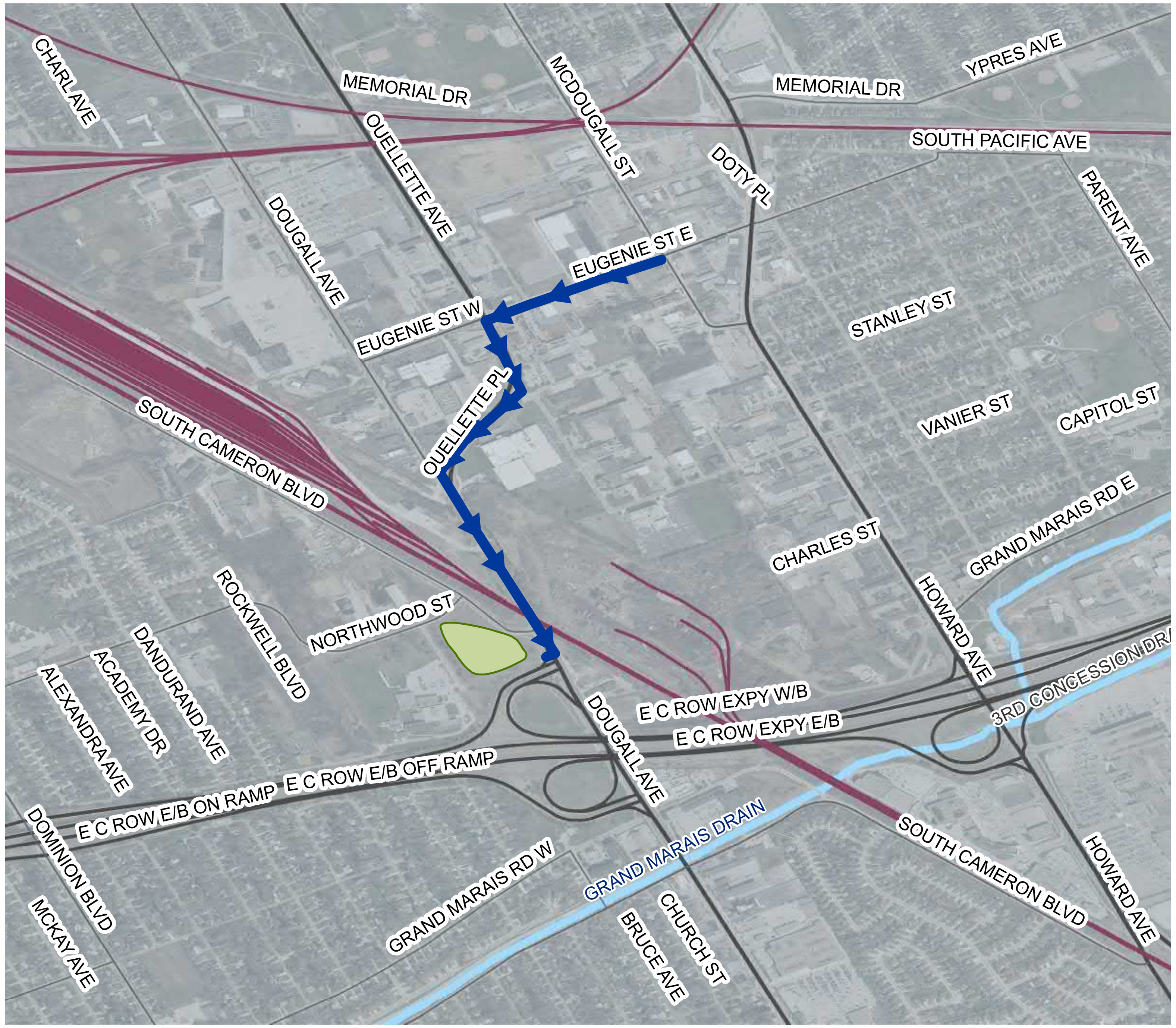
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE : 1:14,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

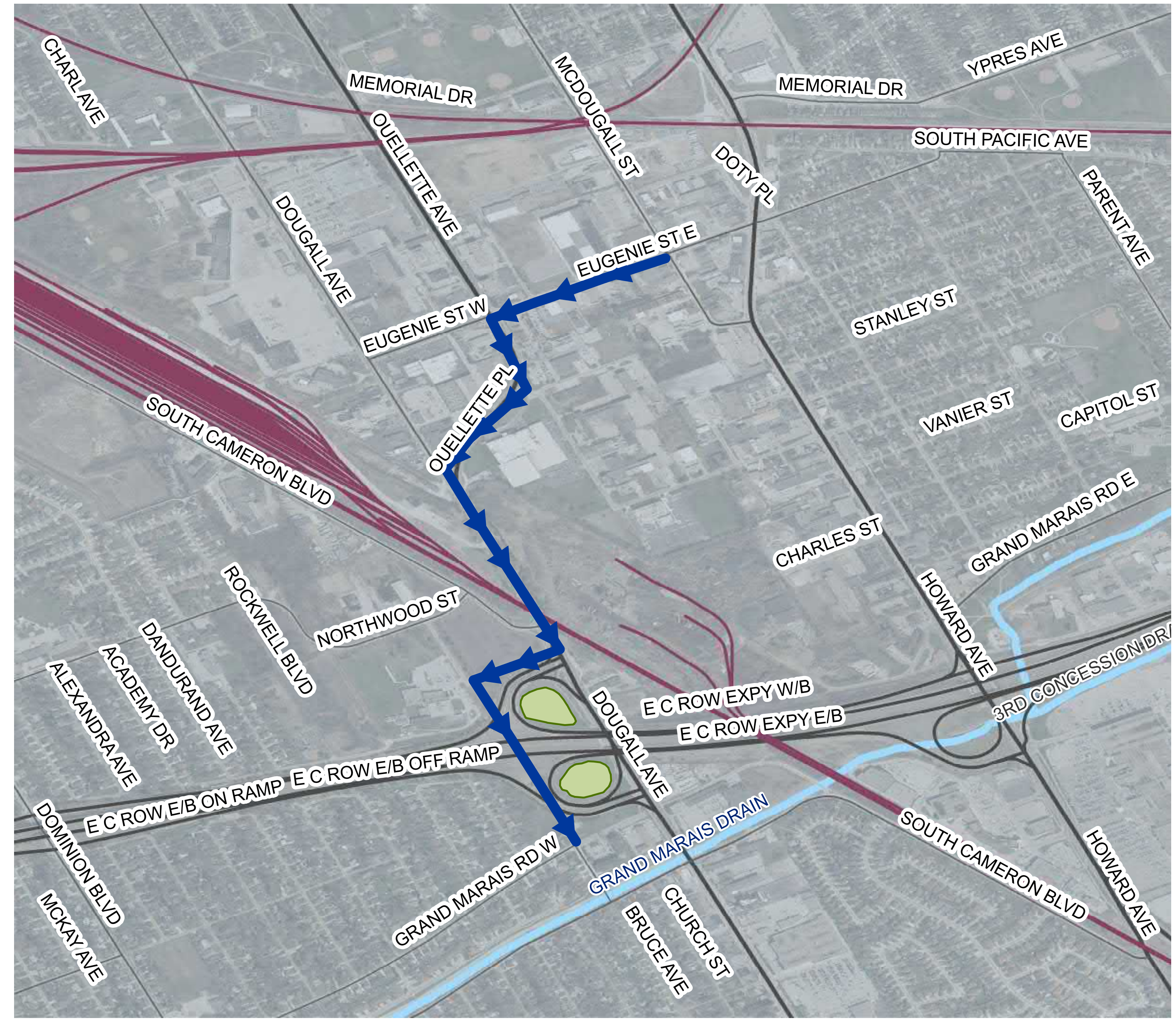
DOUGALL AVE. ALTERNATIVE 1 (PREFERRED)

Proposed trunk storm sewer from Eugenie Street to proposed stormwater management pond within vacant property south of Northwood St.



DOUGALL AVE. ALTERNATIVE 2

Proposed trunk storm sewer from Eugenie Street to two proposed stormwater ponds within EC ROW ON/OFF ramp areas.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR - DOUGALL AVE FLOOD RISK REDUCTION ALTERNATIVES (ROAD-S1)

FIGURE F.5.19

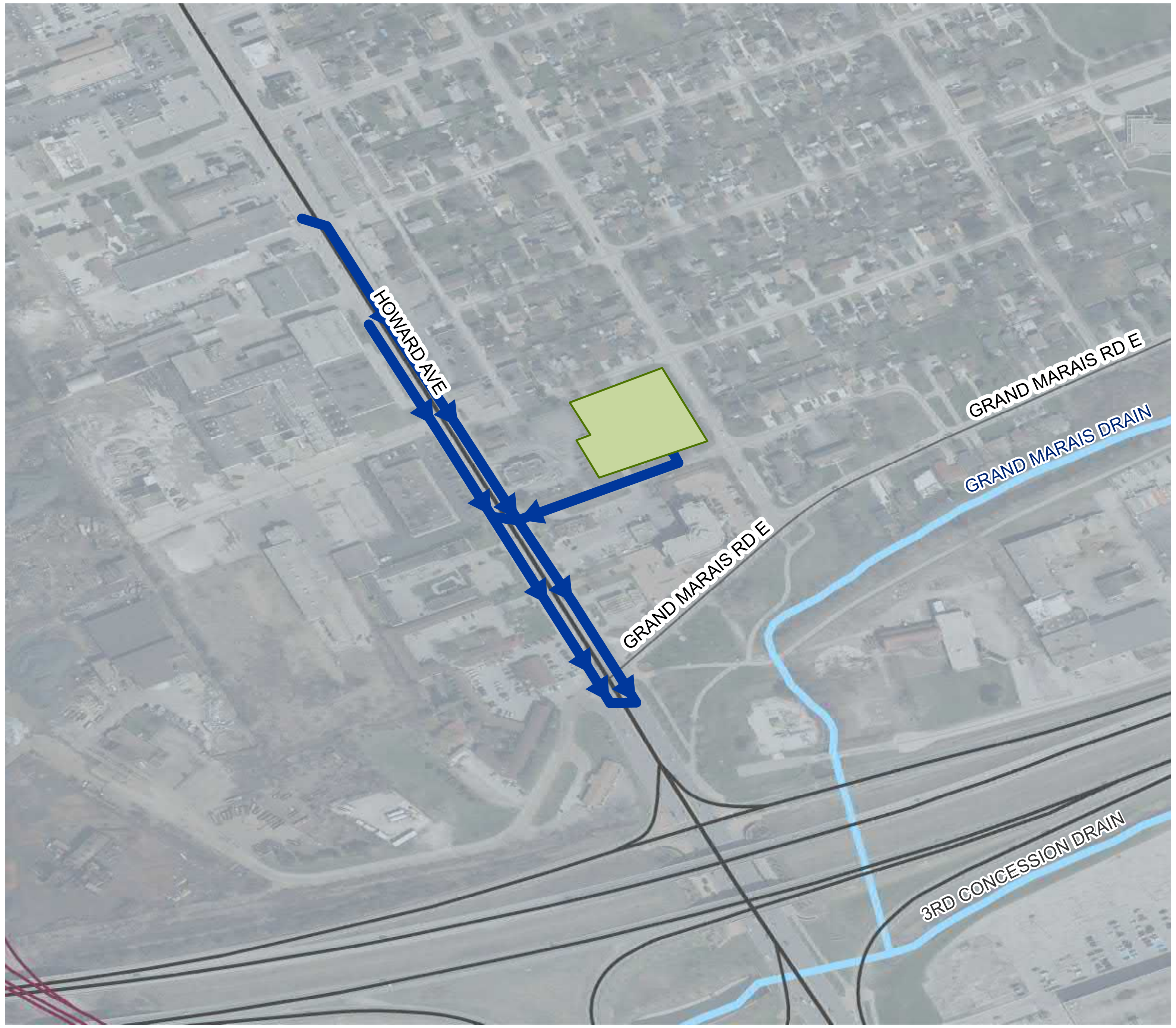
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORMWATER STORAGE POND

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: GCS NORTH AMERICAN 1983

SCALE : 1:14,500

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

HOWARD AVE. ALTERNATIVE	HOWARD AVE. ALTERNATIVE 2 (PREFERRED)
New trunk sewers on Howard Ave. to new stormwater pond within existing residential area.	New trunk sewers on Howard Ave. to new stormwater pond within exisitng commercial property.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR - HOWARD AVE FLOOD RISK REDUCTION ALTERNATIVES (ROAD-S2)

FIGURE F.5.20

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORMWATER STORAGE POND

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE : 1:5,000

N W E S

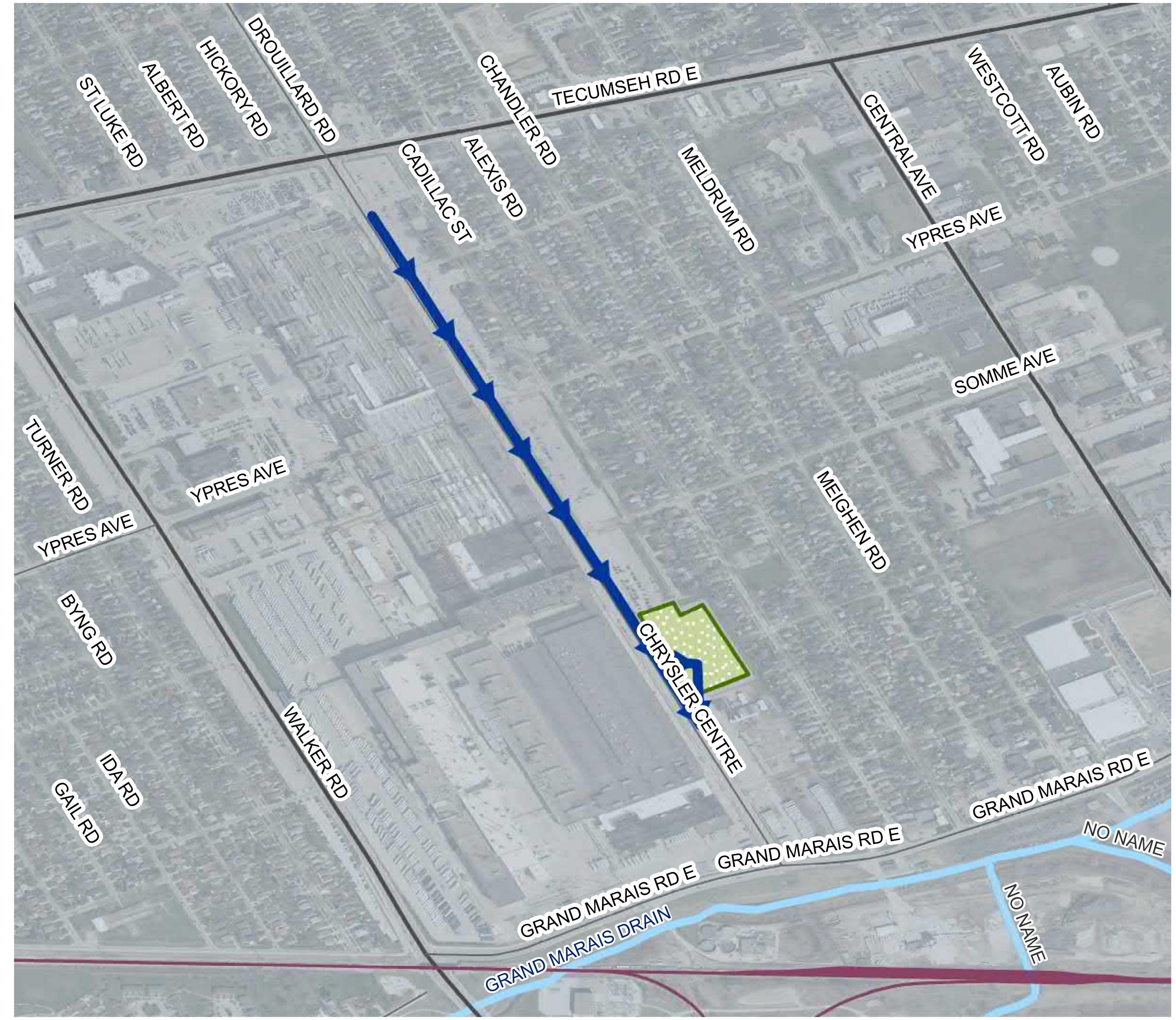
PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

CHRYSLER CENTRE ALTERNATIVE 1

Proposed storm sewer on Chrysler Centre from Tecumseh Road to two proposed underground stormwater management facilities within privately owned parking lot area.

CHRYSLER CENTRE ALTERNATIVE 2 (PREFERRED)

Proposed storm sewer on Chrysler Centre from Tecumseh Road to one proposed underground stormwater management facility within privately owned parking lot area.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

SOUTH WINDSOR - CHRYSLER CENTRE FLOOD RISK REDUCTION ALTERNATIVES (ROAD-S3)

FIGURE F.5.21

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
UNDERGROUND STORMWATER STORAGE

DILLON CONSULTING

Aquafor Beech Limited

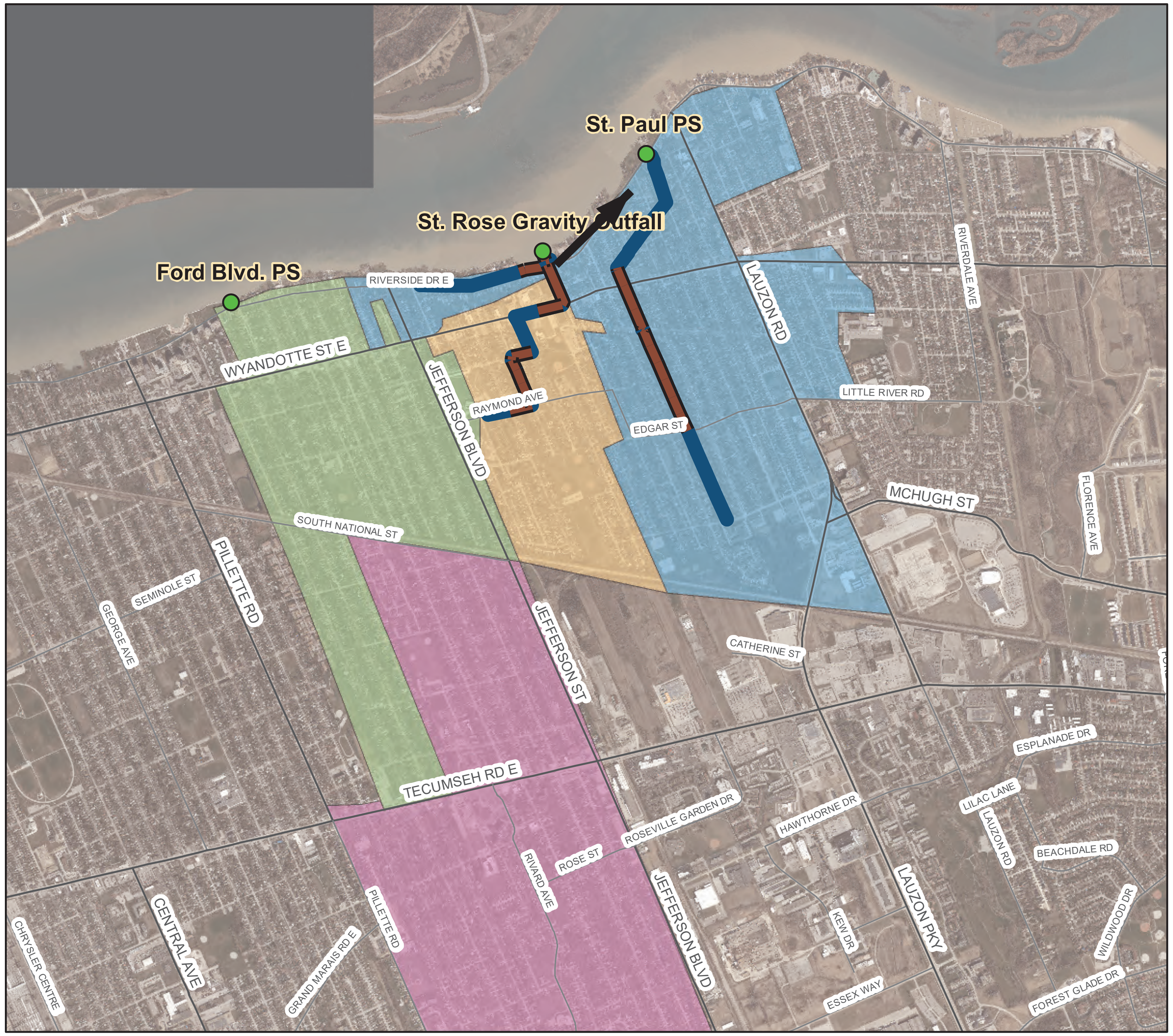
MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: GCS NORTH AMERICAN 1983

SCALE : 1:10,000

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

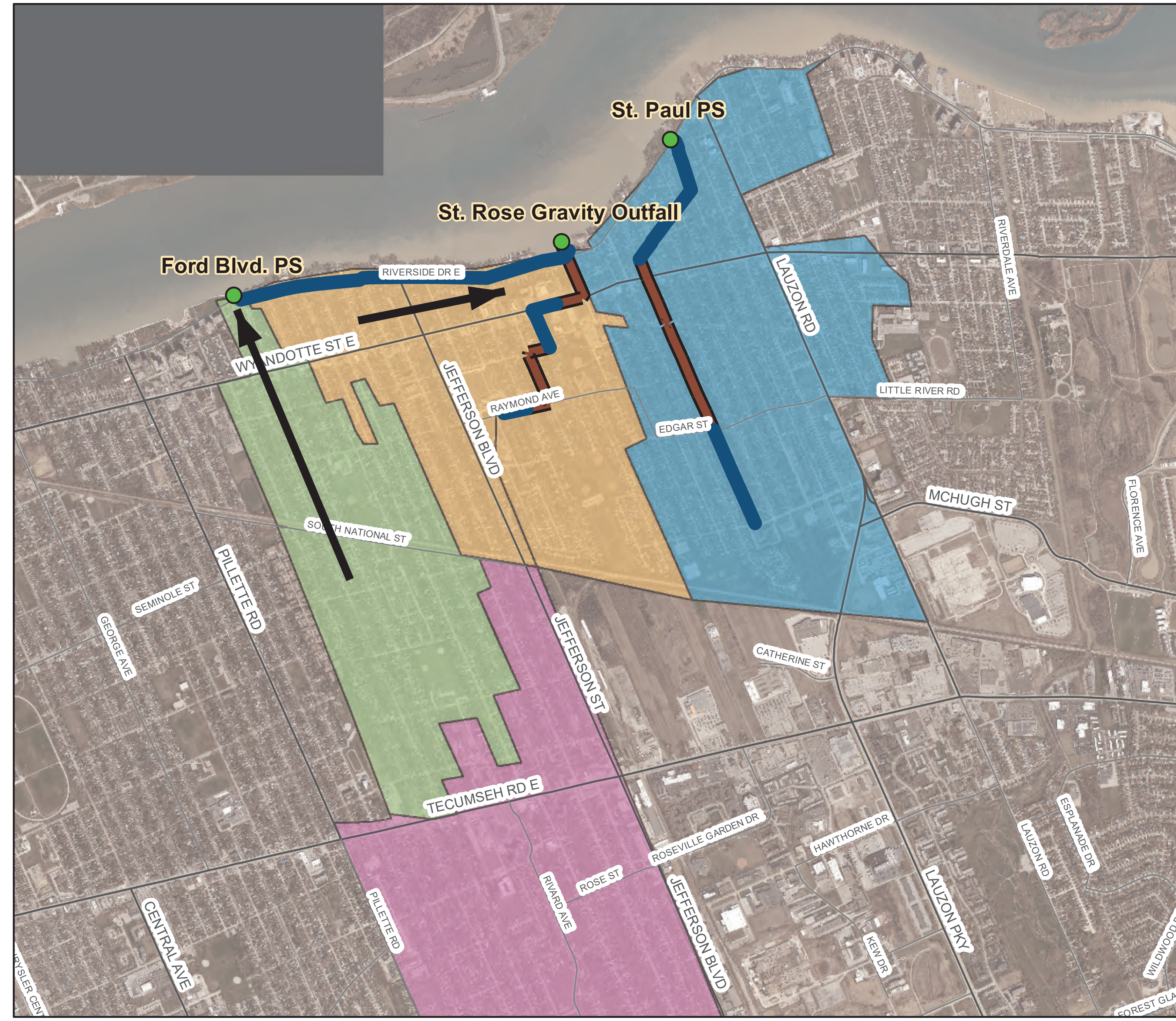
STM-E1-1: ALTERNATIVE 1

Pump Station Upgrades at St. Paul Ave. and Ford Blvd. and New Pump Station at St. Rose Ave.
2.6 km of New Storm Sewers (525mm - 2700mm); and 1.9 km of box culverts (1.8mX0.9m to 3.05mX1.83m); and Existing drainage areas manitained.



STM-E1-2: PREFERRED ALTERNATIVE

Pump Station Upgrades at St. Paul Ave. and Ford Blvd. and New Pump Station at St. Rose Ave.
3.7 km of New Storm Sewers (525mm - 2700mm) and 1.9 km of box culverts (1.8mX0.9m to 3.05mX1.83m); and Modified drainage areas.



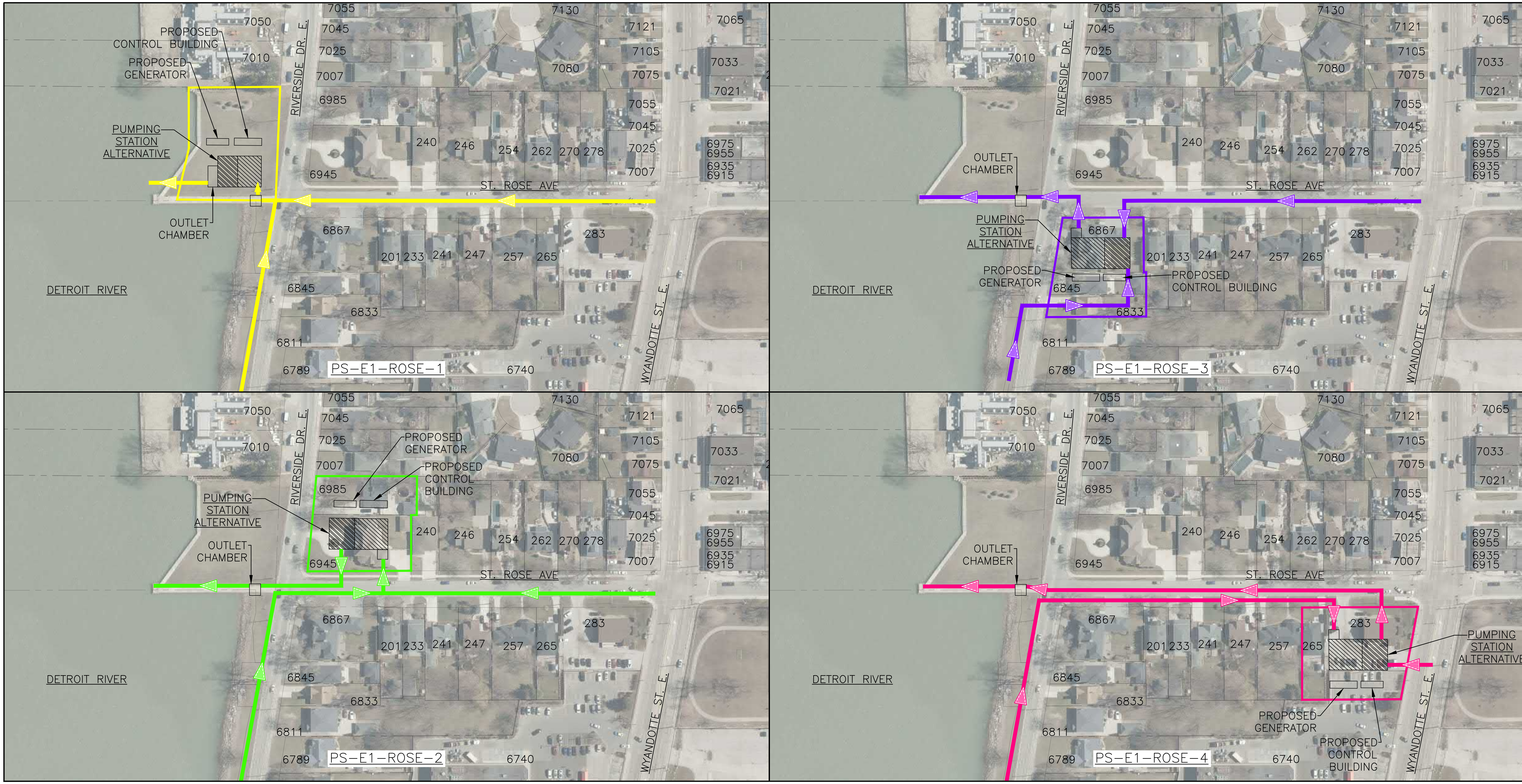
CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL AREA 1 & 2
SURFACE FLOODING ALTERNATIVES (STM-E1)
FIGURE F.5.22

STORM PUMP STATION (PS)
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
RAILWAY
STORM SEWER IMPROVEMENTS
BOX CULVERTS
ST. PAUL DRAINAGE AREA
ST. ROSE GRAVITY OUTFALL DRAINAGE AREA
FORD BLVD. PS DRAINAGE AREA
COMBINED SEWER DRAINAGE AREA

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

Riverside Drive East - Storm Alternatives
PROPOSED ALTERNATIVES
ST. ROSE PUMP STATION LOCATIONS
FIGURE F.5.22.1

PS–E1–ROSE–1 (Preferred Alternative)	HIGHER PORTION OF PUMP STATION
PS–E1–ROSE–2	LOWER PORTION OF PUMP STATION
PS–E1–ROSE–3	PROPERTY LINE
PS–E1–ROSE–4	

NOTE:
Alternative site plan configurations are based on preliminary site plans and should be used for reference only. The more refined conceptual design of the preferred alternative St. Rose Pump Station is included in the Technical Volume 3 report.

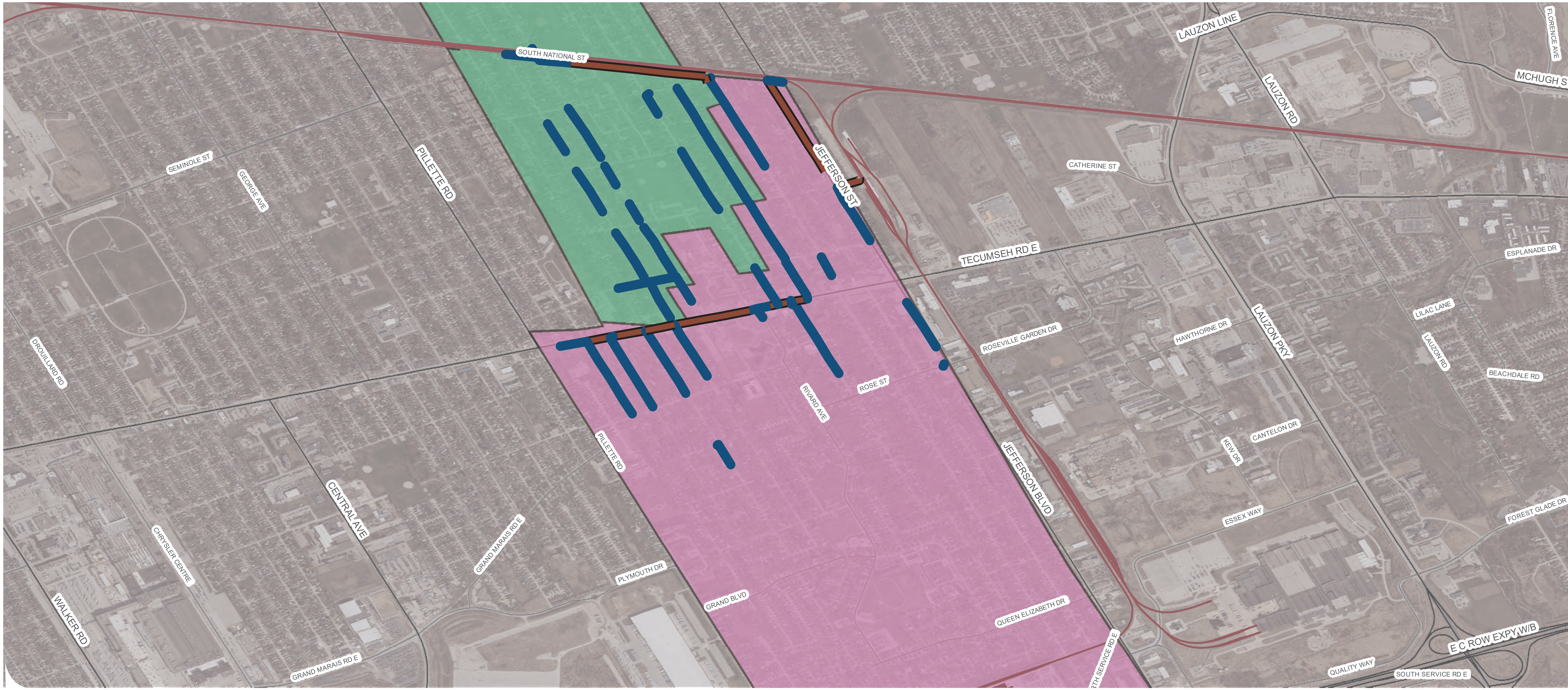
DILLON CONSULTING
Aquafor Beech Limited

MAP CREATED BY: IDW
MAP CHECKED BY: LMH
MAP PROJECTION: NAD 1983 UTM ZONE 17N

PROJECT: 17-6638 STATUS: FINAL DATE: November 2020

REGIONAL AREAS 3&4 FLOOD RISK REDUCTION ALTERNATIVE (STM-E3)

Complete seperation of combined sewage flows into seperated storm and sanitary sewer systems. New storm sewers (ranging from 450mm - 1650mm diameter to 1800mm X 3000mm box culverts). Reduction of drainage area to Little River and re-direction to the Detroit River via the Ford Blvd storm sewer. Construction includes approximately 9.5 km of new storm sewers.



RAILWAY
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 & 2 COLLECTOR ROADS
STORM SEWER IMPROVEMENTS
BOX CULVERTS
FORD DR. PS DRAINAGE AREA
COMBINED SEWER DRAINAGE AREA

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL AREA 3&4 FLOOD RISK REDUCTION ALTERNATIVE (STM-E3)

FIGURE F.5.23

THE CITY OF WINDSOR

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Aquafor Beech Limited

MAP CREATED BY: SD
MAP CHECKED BY: IW / DM
MAP PROJECTION: NAD 1983 UTM Zone 17N

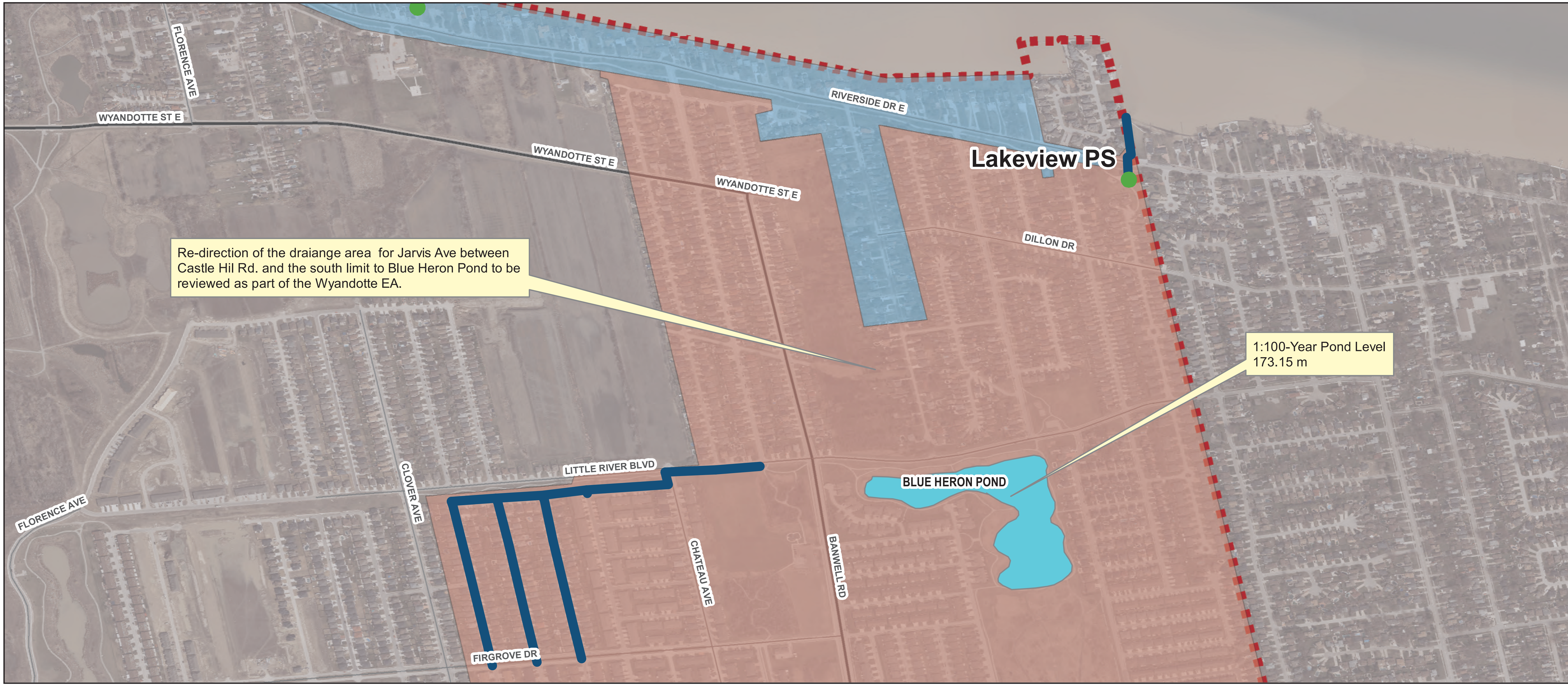
NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

REGIONAL AREA 5 SURFACE FLOODING ALTERNATIVES (STM-E5)

Upgrade of Lakeview Pump Station and construction of approximately 160 m of sewer from Lakeview PS to outfall, approximately 640 m of new storm sewer south of and within Little River Blvd., and approximately 1.2 km of storm sewer upgrades between Firgrove Dr. and Little River Rd.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL AREA 5 SURFACE FLOOD REDUCTION ALTERNATIVE (STM-E5)

FIGURE F.5.24

THE CITY OF WINDSOR

STORM PS	EXPRESSWAY AND ARTERIAL ROADS	STORM SEWER IMPROVEMENTS
	CLASS 1 AND 2 COLLECTOR ROADS	STORM BOX CULVERTS
STUDY AREA	RAILWAY	

EAST MARSH DRAINAGE AREA

LAKEVIEW DRAINAGE AREA

DILLON CONSULTING

Aquafor Beech Limited

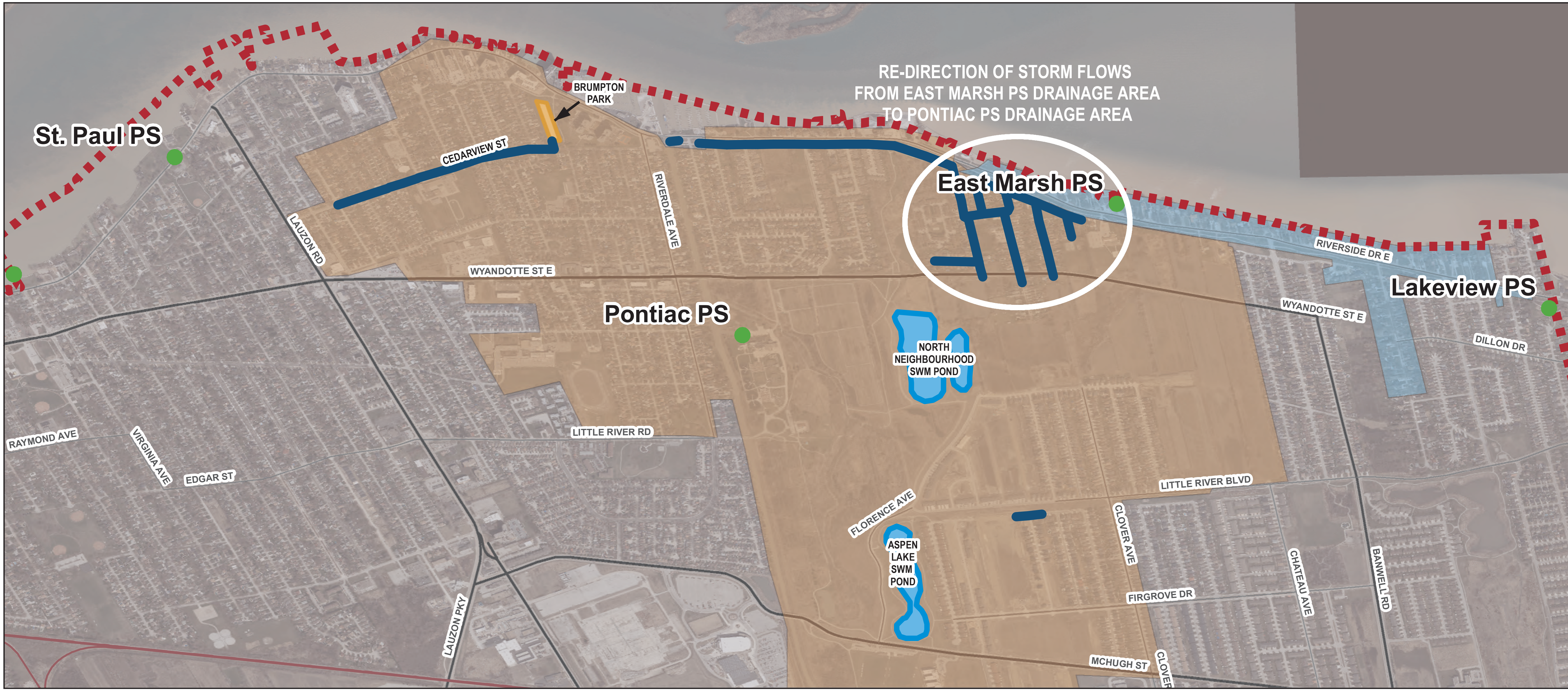
MAP CREATED BY: SD
MAP CHECKED BY: DM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

REGIONAL AREA 6 FLOOD RISK REDUCTION ALTERNATIVE (STM-E6)

Re-direction of storm flow from East Marsh Pump Station drainage area to the Pontiac Pump Station. New sewers servicing the North and South Neighbourhoods. Upgrade of Cedarview sewer and new storm sewers (450 mm to 1500 mm diameter). New underground storage in Brumpton Park. Construction of approximately 4 km of new sewers.



STORM PS	EXPRESSWAY AND ARTERIAL ROADS	STORM SEWER IMPROVEMENTS	STORMWATER STORAGE POND	PONTIAC DRAINAGE AREA
	CLASS 1 AND 2 COLLECTOR ROADS	STORM BOX CULVERTS	LID	EAST MARSH DRAINAGE AREA
STUDY AREA	RAILWAY		UNDERGROUND STORAGE	

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL AREA 6 FLOOD RISK REDUCTION ALTERNATIVE (STM-E6)

FIGURE F.5.25

THE CITY OF WINDSOR

DILLON CONSULTING

Aquafor Beech Limited

MAP CREATED BY: TBD
MAP CHECKED BY: TBD
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

JEFFERSON BLVD & RAYMOND AVE - ALTERNATIVE 1 (ROAD-E2-1)

Underground SWM facility on David Suzuki Public School property
In-line storage / box culverts and conveyance in roadway

JEFFERSON BLVD & RAYMOND AVE - ALTERNATIVE 2 (ROAD-E2-2 - PREFERRED)

Sewer upgrade through David Suzuki Public School property;
Sewer upgrade on Raymond Ave.;
Garden Crt Dr. sewer re-directed from Jefferson Blvd. to the proposed St. Rose trunk (STM-E1) via Raymond Ave.;
In-line storage / box culverts upgrade of Jefferson Blvd. trunk sewer.

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

JEFFERSON BLVD & RAYMOND AVE (ROAD-E2)
FIGURE F.5.26

THE CITY OF WINDSOR

STORM PS
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORM BOX CULVERTS
SURCHARGE/PARK STORAGE

DILLON CONSULTING
Aquafor Beech Limited

MAP CREATED BY: SD
MAP CHECKED BY: DM
MAP PROJECTION: NAD 1983 UTM Zone 17N

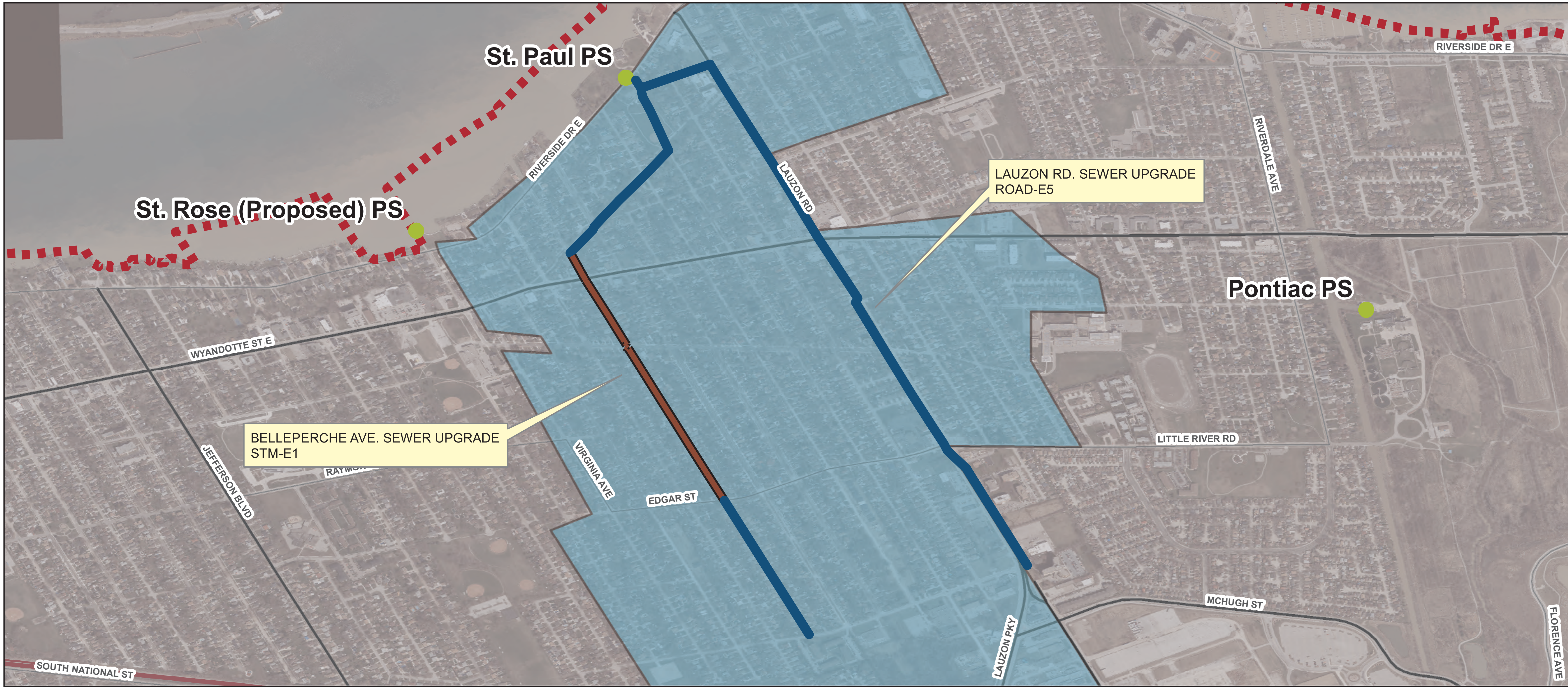
NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

ST. PAUL PUMPING STATION DRAINAGE AREA RISK REDUCTION ALTERNATIVE: BELLEPERCHE AVE. (STM-E2) AND LAUZON RD. (ROAD-E5)

Sewer upgrades on Lauzon Rd. (2 km of new 2400 mm diameter sewer and deeper sewer near the St. Paul PS) together with Regional Area 2 Flood Risk Reduciton Preferred Alternative on Belleperche Ave.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

ST. PAUL PS DRAINAGE AREA ALTERNATIVE (STM-E1/ROAD-E5)

FIGURE F.5.27

THE CITY OF WINDSOR

STORM PS

EXPRESSWAY AND ARTERIAL ROADS

CLASS 1 AND 2 COLLECTOR ROADS

RAILWAY

MUNICIPAL DRAINS

STUDY AREA

STORM SEWER IMPROVEMENTS

STORM BOX CULVERTS

DILLON CONSULTING

Aquafor Beech Limited

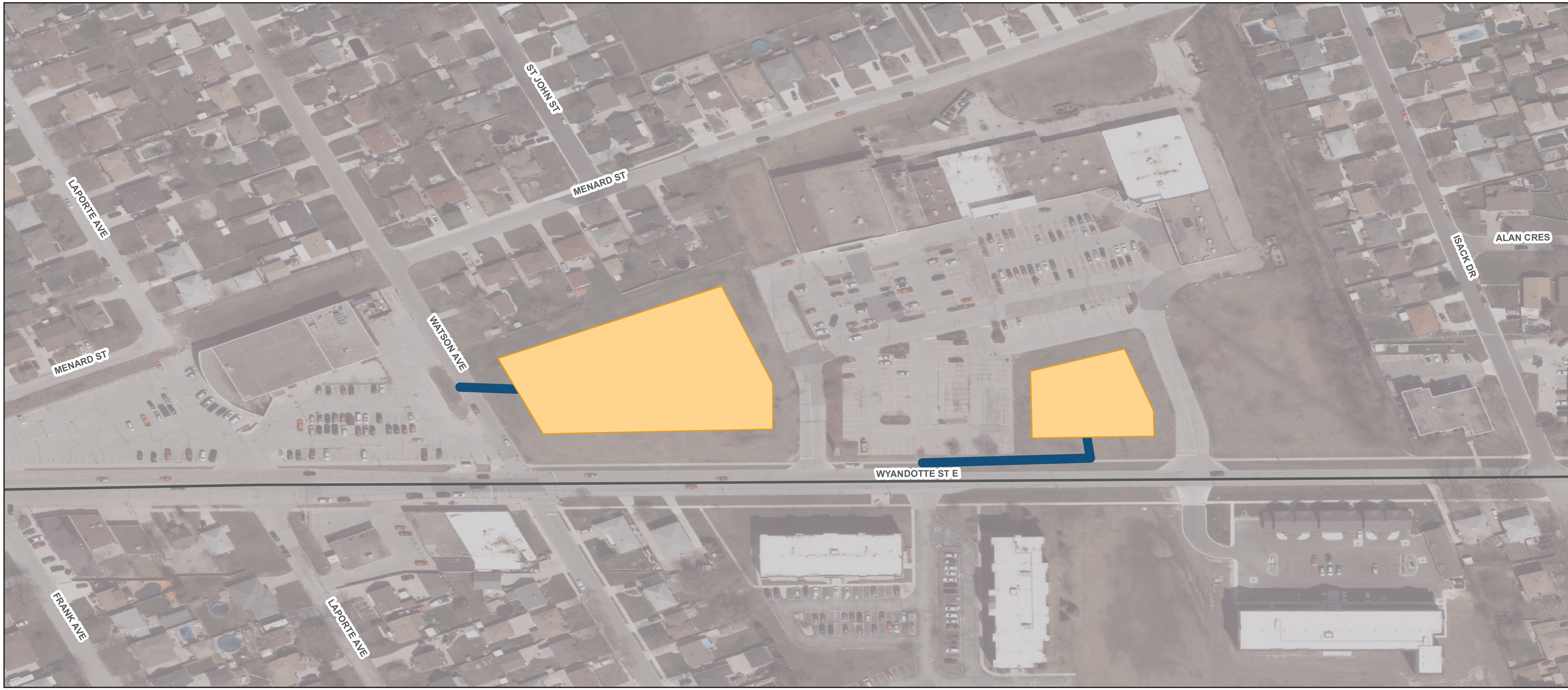
MAP CREATED BY: SD
MAP CHECKED BY: LMH / DEM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOTTO SCALE

PROJECT: 17-6638 | STATUS: FINAL | DATE: NOVEMBER 2020

WYANDOTTE ST E AT WATSON AVE (ROAD-E9)

Underground surcharge storage within vacant commercially-zoned land and fronting commercial property on north side of Wyandotte St. E (Riverside Plaza)



STORM PS
EXPRESSWAY AND ARTERIAL ROADS
STORM SEWER IMPROVEMENTS
SURCHARGE/PARK STORAGE
CLASS 1 AND 2 COLLECTOR ROADS
STORM BOX CULVERTS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

WYANDOTTE ST E AST WATSON AVE ALTERNATIVE (ROAD-E9)
FIGURE F.5.28

THE CITY OF WINDSOR

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Aquafor Beech Limited

MAP CREATED BY: SD
MAP CHECKED BY: DM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

N W E S

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

MCHUGH ST. (ROAD-E7), NCNORTON ST. (ROAD-E8) AND BANWELL RD. (ROAD-E10) CLIMATE CHANGE RISK REDUCTION ALTERNATIVE

Sewer upgrades (2.6 km of 900 mm to 2400 mm diameter) and new box culverts (520 m of 4600 mm X 2400 mm)

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

MCHUGH ST, MCNORTON ST, BANWELL RD (ROAD-E7,8,10)
FIGURE F.5.29

STORM PS
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORM BOX CULVERTS

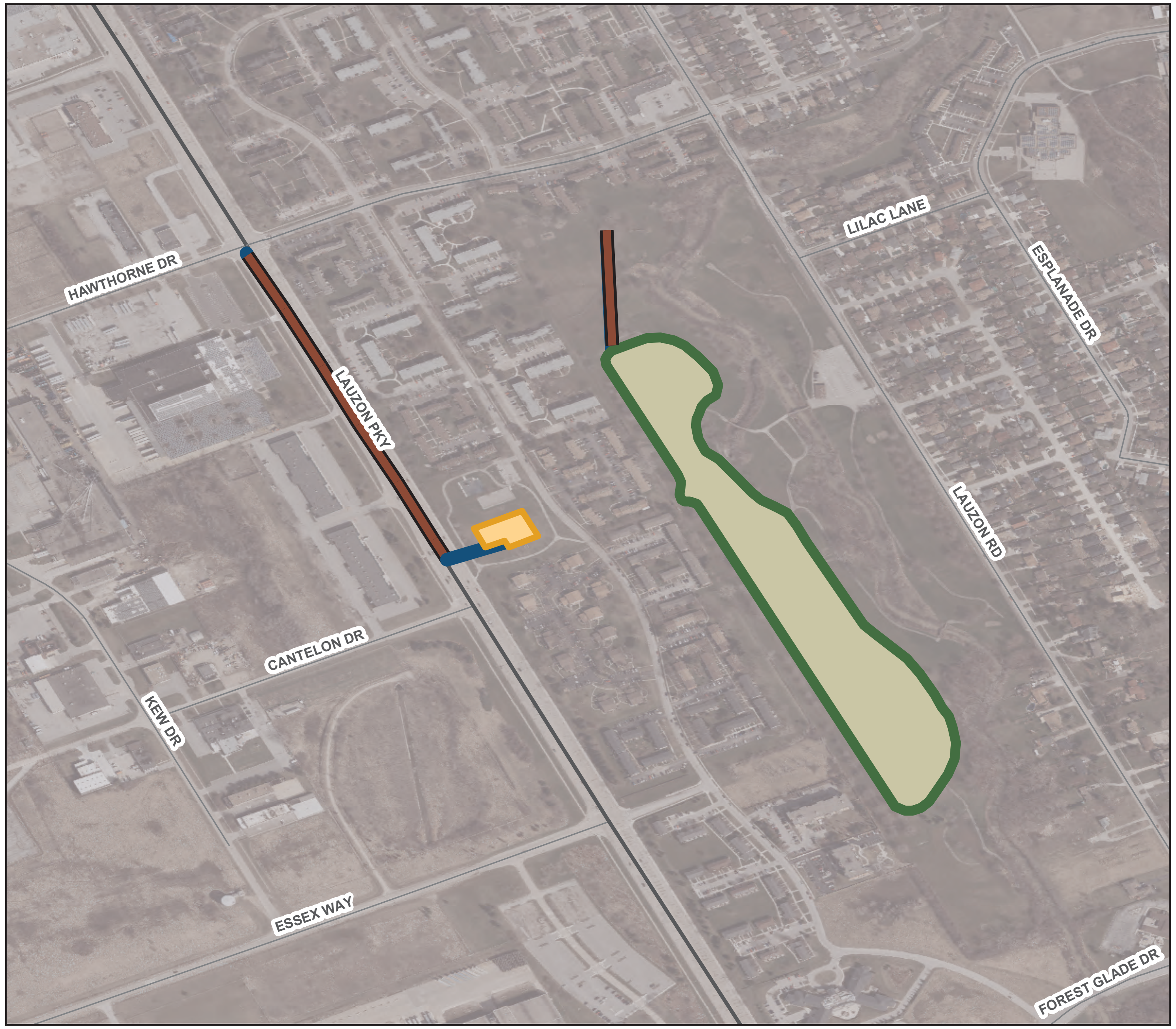
MAP CREATED BY: SD
MAP CHECKED BY: DEM / LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

LAUZON PKWY / HAWTHORNE DR / LITTLE RIVER GOLF COURSE - ALT 1

Upgrade storm sewer on Lauzon Pkwy to twin box culvert with underground surcharge storage in Meadowbrook Park.
New SWM pond in golf course lands to control flows to Little River.



LAUZON PKWY / HAWTHORNE DR / LITTLE RIVER GOLF COURSE - ALT 2 (PREFERRED)

Upgrade storm sewer on Lauzon Pkwy to box culvert with underground surcharge storage in Meadowbrook Park.
500 m of LID on commercial properties and re-grading of 250 m of Lauzon Pkwy.
New SWM pond in golf course lands to control flows to Little River.

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

LAUZON PKWY / HAWTHORN DR / LITTLE RIVER GOLF COURSE ALTERNATIVE (ROAD-E4)

FIGURE F.5.30

STORM PS
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORM BOX CULVERTS
STORMWATER STORAGE POND
LID
SURCHARGE/PARK STORAGE

MAP CREATED BY: SD
MAP CHECKED BY: DEM / LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

MCHUGH ST (LAUZON LINE TO DARFIELD DR) - ROAD-E6 ALT 1 (PREFERRED)	MCHUGH ST (LAUZON LINE TO DARFIELD DR) - ROAD-E6 ALT 2
Box culverts (3600 mm X 1800 mm to 4600 mm X 1800 mm) and re-grading of approx.350 m of McHugh St.	Upgrade sewers with overflow to SWM pond on developable lands

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

MCHUGH ST (LAUZON LN TO DARFIELD DR) ALTERNATIVE (ROAD-E6)

FIGURE F,5,31

STORM PS
EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORM BOX CULVERTS
STORMWATER STORAGE POND

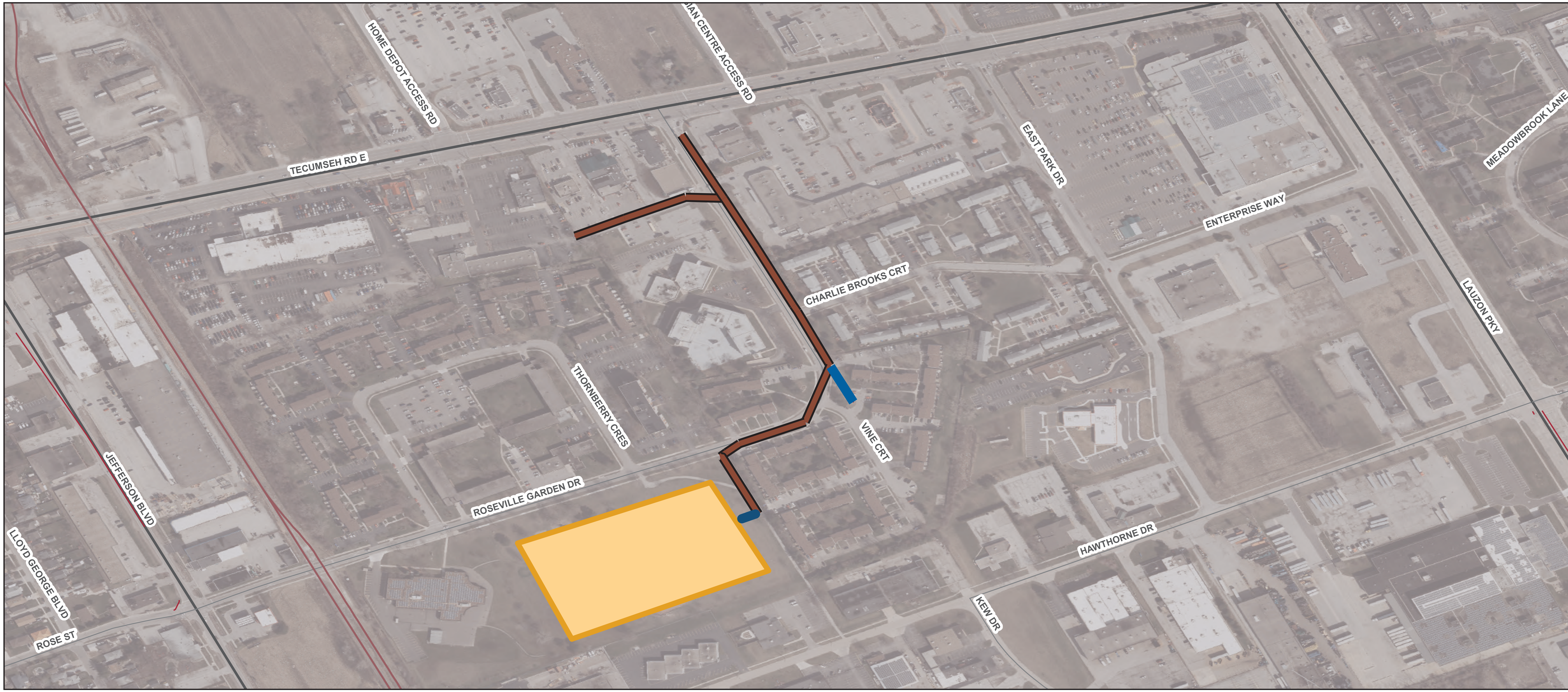
MAP CREATED BY: SD
MAP CHECKED BY: DEM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

ROSEVILLE GARDEN FLOOD RISK REDUCTION ALTERNATIVE (ROAD-E11)

25,000 m3 of offline underground surcharge storage in Roseville Park and Roseville Public School property along with upstream sewer upgrades and LID uptake.



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

ROSEVILLE GARDEN FLOOD RISK REDUCTION ALTERNATIVE (ROAD-E11)

FIGURE F.5.32

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS
CLASS 1 AND 2 COLLECTOR ROADS
STUDY AREA
RAILWAY
MUNICIPAL DRAINS
STORM SEWER IMPROVEMENTS
STORM BOX CULVERTS
SURCHARGE/PARK STORAGE

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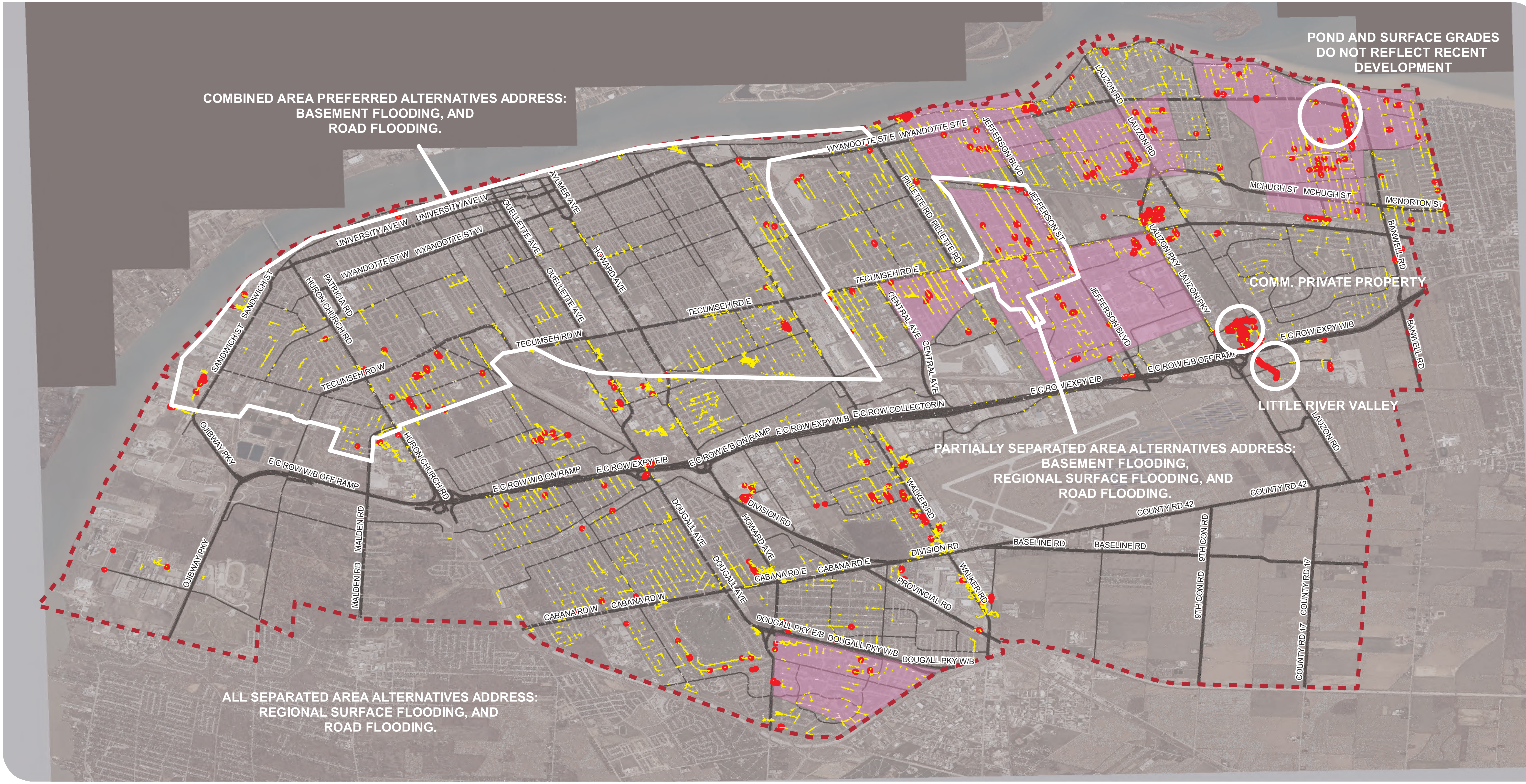
MAP CREATED BY: SD
MAP CHECKED BY: DEM
MAP PROJECTION: NAD 1983 UTM Zone 17N

NOT TO SCALE

N S E W

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020



CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL STORM SYSTEM PROBLEM AREAS & 1:100 YEAR STORM FOR REGIONALSURFACE FLOODING ALTERNATIVES

FIGURE F.5.33

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS	STUDY AREA	SURFACE FLOODING DEPTH LESS THAN 0.30 m (1.0 ft)
CLASS 1 AND 2 COLLECTOR ROADS	REGIONAL SURFACE FLOODING AREA	SURFACE FLOODING DEPTH MORE THAN 0.30 m (1.0 ft)

NOTES:

Red areas are exaggerated to primarily show surface flooding at low points in roadways, ditches, parking lots, and existing open space and lands under development

DILLON CONSULTING

Aquafor Beech Limited

MAP DRAWING INFORMATION:
PROBLEM AREAS BASED ON DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: SD/IDW
MAP CHECKED BY: DEM/LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

CITY OF WINDSOR

SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

REGIONAL STORM SYSTEM PROBLEM AREAS & CLIMATE CHANGE STORM FOR REGIONAL SURFACE FLOODING ALTERNATIVES

FIGURE F.5.34

THE CITY OF WINDSOR

EXPRESSWAY AND ARTERIAL ROADS	STUDY AREA
CLASS 1 AND 2 COLLECTOR ROADS	REGIONAL SURFACE FLOODING AREA
SURFACE FLOODING DEPTH LESS THAN 0.30 m (1.0 ft)	SURFACE FLOODING DEPTH MORE THAN 0.30 m (1.0 ft)

NOTES:

Red areas have been exaggerated to primarily show surface flooding at low points in roadways, ditches, parking lots, and existing open space and lands under development

DILLON CONSULTING

Aquafor Beech Limited

MAP DRAWING INFORMATION:
PROBLEM AREAS BASED ON DATA PROVIDED BY THE CITY OF WINDSOR

MAP CREATED BY: SD
MAP CHECKED BY: DEM/LMH
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:60,000

PROJECT: 17-6638 STATUS: FINAL DATE: NOVEMBER 2020

Appendix E-1

Outlet Capacity Impact Assessment (June 2020)

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THE CORPORATION OF THE CITY OF WINDSOR

Outlet Capacity Impact Assessment

Windsor Sewer and Coastal Flood Protection Master Plan

Revised: June 2020 - 17-6638

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1.0 Introduction

1.1 Windsor Sewer and Coastal Flood Protection Master Plan

In the past decade the City of Windsor (City) has experienced significant rainfall events with prevalent surface and basement flooding. These significant rainfall events include June 4th, 5th, and 6th 2010, November 29th, and 30th 2011, August 11th 2014, September 28th 2016 and August 28th-29th 2017. The City received over 2,200, 2,800, and 6,000 reports of basement flooding from the 2010, 2016, and 2017 rainfall events.

During the September 2016 storm event the City's east-side received nearly 100 mm of rainfall over 24 hours and caused significant surface and basement flooding. The rainfall amount recorded at the Little River PCP/Pontiac Pump Station rain gauge confirms that East Windsor potentially experienced the worst of the storm. The August 2017 storm event lasted approximately 28 hours and had a maximum measured rainfall amount of 212 mm logged in the southwest of Windsor, other rain gauges in Windsor recorded less precipitation. The August 2017 event was more severe than the 1:100 year event for many locations; although the severity varied spatially throughout the City.

Following the August 28th-29th, 2017 rainfall event the Mayor developed an 8-point plan to address flooding within the City; this included expediting the completion of the Sewer Master Plan, as outlined in the *Flow Monitoring and Hydraulic Modeling of the Sewer System report* (Dillon Consulting Limited & Aquafor Beech Limited, 2016). Following the City's Council resolution CR660/2017, on November 6th, 2017, Dillon Consulting Limited (Dillon) was retained as the lead consulting firm to develop and evaluate solutions to reduce the risk of both basement and surface flooding.

In spring of 2019 concerns of record high water levels in Lake St. Clair and Detroit River triggered an expansion of the study's scope to include a review of solutions to reduce the risk of coastal flooding, as part of the Sewer and Coastal Flood Protection Master Plan (MP). The MP will be completed in accordance with Master Plan Approach No. 2 of the Municipal Class Environmental Assessment satisfying requirements for Schedule B projects.

1.2 Study Overview

The solutions developed as part of the MP to reduce surface flooding risks included improvements to existing and/or recommended new overland drainage routes, storm sewer pipes, pump stations, and storage systems. The assessment of existing conditions and proposed solutions were completed with the InfoWorks ICM software where a City-wide all pipe network (storm, sanitary and combined sewers) and a two-dimension surface mesh model was used.

The Essex Region Conservation Authority (ERCA) was consulted as part of the technical working group for this project. ERCA identified that flood risk reduction solutions should not negatively impact watercourses receiving flow from these altered sewer and overland flow systems. To measure and confirm the potential hydrologic and hydraulic impact of the solutions it was agreed an outlet capacity assessment would be completed for the receiving watercourses accepting modified flow regimes from the City's sewer systems.

Potential negative impacts from a change in flow regime to the receiving watercourse would include worsen flooding and/or erosion in-stream. Three receiving systems are accepting the modified flow regimes per the recommended improvements from the MP, include:

- The Detroit River;
- The Little River watercourse; and
- The Grand Marias Drain (GMD) watercourse.

It was agreed with ERCA that additional flow volume and/or increased peak flow to the Detroit River would not be considered as having a negative impact and consequently an outlet capacity assessment would not be required for outfalls to this system.

A separate study for the Little River watercourse is being completed to review the existing and potential future floodplain. It is recommended the future outlet capacity assessment for Little River be completed using the hydrologic and hydraulic models that are developed as part of that study. This work will then be completed at a later time.

A recent study of the GMD was completed by Landmark Engineers Inc. (Landmark) entitled *Grand Marais Drain Hydrologic and Hydraulic Models* (2019), which included the development of a joint hydrologic-hydrodynamic PCSWMM model and hydraulic HEC-RAS model of the GMD watercourse. This PCSWMM model would be used as the basis for the outlet capacity impact assessment where inflow from the impacted outfalls would be represented (both existing and proposed conditions) with the model output from the MP InfoWorks ICM software.

It should be noted other tributaries on Turkey Creek, besides the GMD (i.e. Lennon Drain, Cahill Drain, etc.), are not proposed to have improvements that would modify flow regime. Therefore, no assessment will be completed for those watercourses.

1.3 Study Objectives

The primary objective of the analysis is to assess hydrological and hydraulic impact of the proposed sewer improvements on the GMD's potential for flooding and in-stream erosion. The assessment is limited to systems within the City of Windsor. The MP recommendations for surface flooding risk reduction measures within the GMD watershed area were developed with the intent of achieving "no negative impact" on this receiving watercourse. Therefore, solutions were developed by providing additional upstream storage coupled with low impact development (LID) measures while maintaining the same outlet pipes to GMD.

The metrics considered in the assessment include maintaining or reducing water surface elevations and peak flows. "No negative impact" to the GMD would be identified as the following:

- **Water Surface Elevation** - up to 0.02 m increase in peak elevation; and

- **Peak Flow Rate** - up to 50 L/s (0.050 m^3/s) increase.

The above criteria were selected with an awareness of the watercourse and modelling software representing the drain; specifically what type of changes in flow regime would have a nominal impact. Ideally the proposed solutions would result in maintaining or reducing peak conditions for both water surface elevations and peak flow rates.

Total runoff volume is not a metric considered for evaluation (i.e. maintaining an existing conditions water balance is not an objective), although with the proposed LIDs, infiltration of stormwater will likely increase providing a reduced total volume entering the receiving watercourse. The study is based upon relative impacts in the receiving system. The hydrologic and hydraulic model estimates of the existing systems are based upon modifications to the GMD PCSWMM model (2019), as identified in the following sections of the report.

2.0 Summary of Proposed Improvements

2.1 Existing Conditions

The GMD is a major watercourse located within the City of Windsor. The drain originates near Pillette Road and flows westerly along Grand Marais Road towards the Town of LaSalle where the drain discharges into Turkey Creek. Turkey Creek continues to flow westerly through the Town of LaSalle and ultimately discharges into the Detroit River. Refer to **Figure 1.**

2.2 Summary of Impacted Outfalls

The MP recommends stormwater system improvement in four sub-watersheds of the GMD:

- Central, Pillette and Regional Area 7 Sub-Watershed
- Chrysler Center Sub-Watershed
- Howard Sub-Watershed
- Dougall Sub-Watershed

The following sections summarize the proposed improvement, more details can be found in the MP Technical Report Volume 2. The location of the impacted sub-watersheds are presented in **Figure 2**.

2.2.1 Central, Pillette and Regional Area 7 Sub-Watershed

To reduce surface flooding in the Central, Pillette and Regional Area 7 sub-watershed, system improvements have been recommended. These improvements include upgrading select storm sewer pipes though out the sub-watershed area. In addition, it is recommended to expand the existing Central Pond to provide a total of 85,000 m^3 of storage.

2.2.2 Chrysler Center Sub-Watershed

To reduce surface flooding in the Chrysler Center sub-watershed, system improvements have been recommended. A new storm sewer is proposed that will outlet to a below grade surcharge storage system located below the existing Chrysler Center parking lot. The proposed underground storage will have a total storage capacity of 11,000 m^3.

2.2.3 Howard Sub-Watershed

To reduce surface flooding in the Howard Avenue sub-watershed, system improvements have been recommended. The existing storm sewer should be upsized to provide additional conveyance capacity draining to a new surcharge pond providing approximately 3,000 m^3 of storage.

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2.2.4 Dougall Sub-Watershed

To reduce surface flooding in the Dougall Avenue sub-watershed, system improvements have been recommended. The existing storm sewer should be upsized to provide additional conveyance capacity draining to a new surcharge pond providing approximately of 14,000 m^3 of storage.

3.0 Assessment Methodology

3.1 Design Storms

ERCA released the *Windsor/Essex Region Stormwater Management Standards Manual* (December 2018) that recommends the design storm return periods and frequency distributions to assess urban and rural drainage systems. The Chicago 4-hour distribution represents a high intensity thunderstorm and is recommended as the design storm type to assess conveyance capacity of urban systems.

The selection of the design storm time step, and consequently peak rainfall intensity, has a significant impact on estimates of peak sewer hydraulic grade line (HGL) and surface ponding conditions. Further, the *Stormwater Management Standards Manual* has recommended time steps as a function of percent impervious and consequence of flow conveyance capacity being exceeded. The average contributing percent impervious land use cover is approximately 50%, per the 2019 PCSWMM model. Under medium consequence of exceedance and the average impervious land use cover percentage, a 15 minute step time would be recommended. The design storm distribution type used in the assessment is the Chicago Storm with 4-hour duration and 15 minute time steps.

A stress test was applied to evaluate the potential climate change risk across the study area. The climate change stress test design storm was represented with the 1:100 year Chicago 4-hour storm intensities increased by a 40% factor. Details of the design storm events used in the assessment are provided in **Table 1**.

Table 1 – Summary of Design Storm Parameters

Design Storm Event	Duration (Hours)	Total Volume (mm)	Peak Intensity (mm/hr)
1:5 Year	4	49.5	88.4
1:100 Year	4	81.6	143.7
Climate Change Stress Test	4	144.2	201.2

It should be recognized that design storms including the Chicago distribution design storm event are not real storm events and are developed using statistics from a single location's rain gauge. The statistics are based on past events that are not necessarily representative of future conditions.

3.2 Existing Models Considered in Assessment

3.2.1 Grand Marais Drain Hydrologic and Hydraulic Model

In 2012 Landmark completed a Class Environmental Assessment for the concrete channel improvements to the GMD (Dougall to Huron Church), in the preceding years Dillon and Landmark jointly completed technical and other supporting studies for this waterway.

A recent study of the GMD was completed by Landmark entitled *Grand Marais Drain Hydrologic and Hydraulic Models* (2019), which included the development of a joint hydrologic-hydrodynamic PCSWMM model and hydraulic HEC-RAS model of the GMD watercourse.

The PCSWMM model was developed as a one-dimensional (1D) hydrodynamic tool to assess hydrology and peak flows in the GMD, and it includes the following:

- Over 50 sub-catchments representing approximately 2,500 ha of contributing drainage area;
- Approximately 200 nodes;
- Four storage nodes; and
- Over 200 conduits with an average length of 145 m.

This PCSWMM model was used in the outlet capacity impact assessment coupled with inflow hydrographs from the MP InfoWorks ICM model.

3.2.2 Windsor Sewer and Coastal Flood Protection MP – InfoWorks ICM

As part of the MP, the InfoWorks ICM version 8.5.4 software was used to simulate the existing and proposed flow conditions, as part of a City-wide model of the minor (sewers) and major (overland) drainage systems. The minor system was modelled using a 1D model network while the major (overland) system was modelled using a two-dimensional (2D) approach.

The InfoWorks ICM software was used to develop an all-sewers model (storm, sanitary, and combined) with over 2,900 combined sewer sections, 9,100 storm sewer sections, and 7,600 sanitary sewer sections. There are also over 350 control structures within the system. The control structures include overflow sewers, interceptor manholes from the sanitary/combined sewers to the storm sewers, and backflow prevention devices.

The 2D surface mesh was developed using a digital elevation map of the ground surface to represent a major system network that was coupled with the 1D sewer system links. This approach allows for the analysis of surface ponding depths within depressed areas and localized roadway low points while accounting for the movement of overland flow through the study area. The 1D elements are connected to the 2D mesh elements to ensure that once the capacity of the 1D system (the underground sewer) is exceeded, the mesh will begin to dynamically compute overland flow routing and surface ponding. The total surface area accounted for in the 2D mesh grid is approximately 11,550 ha, which is represented by over 2.5 million triangular elements.

3.2.3 InfoWork ICM Outputs

The InfoWorks ICM model results included hydrographs representing the sewer inflow to the GMD. From a review of these hydrographs, the proposed improvements decrease the peak flow rates entering the receiving watercourse. A summary of the peak flow rates are provided in **Table 2**. The largest reduction in peak flow rates were under the less intense storm event, having a 1:5 year return period, with reductions over 45%. The smallest reductions were under the most intense storm event, the climate change stress test, with reductions of at least 6%. Detailed hydrographs of the existing and proposed flow entering the GMD are presented in **Appendix A**.

Table 2 – Summary of Inflow Hydrographs from Infoworks ICM

Location	Return Period	Peak Flow – Existing (m^3/s)	Peak Flow – Proposed (m^3/s)	Percent Reduction
Central Pond	1:5 Year	1.72	0.94	45.7%
	100 Year	2.38	1.48	38.0%
	Climate Change	7.06	5.48	22.4%
Grand Marais Pump	5 Year	4.46	3.31	25.8%
	100 Year	4.11	3.18	22.6%
	Climate Change	4.45	3.78	15.1%
Chrysler A	5 Year	0.57	0.31	45.3%
	100 Year	0.84	0.60	28.8%
	Climate Change	0.95	0.78	17.8%
Chrysler B	5 Year	0.62	0.56	10.2%
	100 Year	0.13	0.11	14.3%
	Climate Change	0.18	0.17	7.4%
Howard	5 Year	1.85	1.28	30.9%
	100 Year	1.72	1.60	7.3%
	Climate Change	2.07	1.93	6.6%
Dougall	5 Year	5.27	4.50	14.6%
	100 Year	6.68	5.64	15.7%
	Climate Change	7.60	6.40	15.8%

3.3 Model Integration – PCSWMM and InfoWorks ICM

The PCSWMM model (2019) was updated to assess the impact of the change in flow regime on the receiving system. Updates to the PCSWMM model included:

- Editing junctions that experience flooding under the 1:100 year event to include ponded areas;
- The addition of three design storm patterns (i.e., hyetographs) as used in the InfoWorks ICM model (refer to Section 3.1 for additional details);

- Sub-watersheds with proposed stormwater improvements (refer to Section 2.0) were modified to be represented by the InfoWorks ICM hydrographs; and
- The inflow hydrographs were added to the junctions listed below in **Table 3**. A comparisons of the layout of the 2019 existing conditions model and the 2020 existing conditions model **Figures 3 and 4**.

Table 3 – Summary of Inflow Points from InfoWorks

Name	Junction ID (InfoWorks)	Junction ID (PCSWMM)	Description
Central Pond	7R7207.9	J12955.5	Outflow From Central Pond
Grand Marais Pump	7R288 & 7R290	J12676.2	Pumped Outflow from Central Sub-Watershed
ChryslerA	7R479.1	J12524.2	
ChryslerB	7R4428.1	J12415.2	
Howard	7RO6511.1	J9789.2	Outlet of Howard Sub-Watershed
Dougall	8R58.1	J8716.3	Outlet of Dougall Sub-Watershed

Figure 3 identifies storage nodes in the 2019 existing conditions model. Those storage nodes are identified in the Landmark (2019) Report as representation of depression storage and where included in the model to better mimic hydrologic response. A storage node is not shown for Central Pond in **Figure 4** as the effect of the proposed expanded Central Pond is included in the InfoWorks ICM output hydrographs and the pond is not modelled as a storage node in the PCSWMM software.

4.0 Impact Assessment Results

To assess the impact of the proposed change in flow regime, four comparison points were selected along the GMD, at locations identified in **Figure 2**. These points were used to compare peak flow rate and peak HGL between the existing and proposed scenarios. **Table 4** describes the location of the four comparison points.

Table 4 – Summary of Comparison Point Locations

Name	Junction ID (PCSWMM)	Description
CP1	J12641.2	On GMD, 35 m downstream of Grand Marais Pump and 600 m downstream of Central Pond inflow points; approximately 510 m west of Central Road.
CP2	J12117.3	On GMD, 290 m Downstream of Chrysler B and 400 m downstream of Chrysler A inflow points; approximately 90 m east of Walker Road.
CP3	J8485.6	On GMD, 225 m downstream of Dougall and 1,300 m downstream of Howard inflow points; approximately 430 m west of Dougall Avenue.
CP4	J6801	On GMD, 510 m upstream of Outfall into Turkey Drain; approximately 550 m east of Huron Church Road.

4.1 Existing Model Comparison

The first step in the assessment was to update the original 2019 model to accept the outflow hydrographs from Infoworks ICM. The updated baseline 2020 model was not directly calibrated, but outputs were compared to the calibrated 2019 model. This comparison includes the 1:5 year and 1:100 year outputs from both models. The peak HGL and peak flow rates at each comparison point are provided in **Table 5**. Detailed hydrograph comparisons and PCSWMM model outputs are presentenced in **Appendix B** and **Appendix E**, respectively.

Table 5 – Comparison of 2019 and 2020 Existing Condition PCSWMM Model Outputs

Location	Return Period	Peak HGL – Existing 2019 (m)	Peak HGL – Existing 2020 (m)	Peak Flow – Existing 2019 (m^3/s)	Peak Flow – Existing 2020 (m^3/s)
CP1	5 Year	183.87	184.03	4.88	5.77
	100 Year	184.62	184.67	6.73	6.68
CP2	5 Year	183.32	183.43	7.56	8.64
	100 Year	184.24	184.28	9.69	9.72
CP3	5 Year	179.52	179.55	25.78	26.35
	100 Year	180.27	180.29	50.84	50.68
CP4	5 Year	178.13	178.18	30.21	31.28
	100 Year	179.10	179.12	60.99	62.47

The peak HGL estimates in the 2020 model are higher than those estimated in the 2019 model. The largest change in peak HGL conditions between the two baseline models was an increase in HGL of 0.16 m under the 1:5 year storm at the most upstream end. The smallest change in peak HGL conditions between the two baseline models was 0.02 m under the 1:100 year storm, at the downstream end.

Further, the peak flow rates in the 2020 model are on average higher than those estimated in the 2019 model, with percentage changes in peak flow rates from 2 to 18 % for the 1:5 year storm and - 1 to 2 % for the 1:100 year storm.

The updated 2020 PCSWMM model is considered appropriate for the relative change comparison required for this outlet capacity analysis.

4.2 Proposed Conditions Analysis

The 2020 baseline model was then updated with the proposed condition inflow hydrographs from InfoWorks ICM. The peak HGL and peak flow rates at each comparison point are provided in **Table 6**. Detailed hydrograph comparisons and PCSWMM model outputs are presented in **Appendix C**.

Table 6 – Summary of Results from the Proposed Condition PCSWMM Models

Location	Return Period	Peak HGL – Existing (m)	Peak HGL – Proposed (m)	Peak Flow – Existing (m^3/s)	Peak Flow – Proposed (m^3/s)
CP1	1:5 Year	184.03	183.82	5.77	4.52
	1:100 Year	184.67	184.35	6.68	5.10
	Climate Change	185.56	185.32	11.39	9.89
CP2	1:5 Year	183.43	183.30	8.64	7.30
	1:100 Year	184.28	184.09	9.72	8.01
	Climate Change	184.89	184.78	13.89	11.98
CP3	1:5 Year	179.55	179.53	26.35	26.06
	1:100 Year	180.29	180.28	50.68	50.19
	Climate Change	180.75	180.74	67.18	66.61
CP4	1:5 Year	178.18	178.16	31.28	30.84
	1:100 Year	179.12	179.10	62.47	61.56
	Climate Change	179.72	179.71	89.11	88.38

In all instances the peak HGL estimates under proposed condition are lower than those estimated in the existing conditions model. The decrease in peak HGL ranged from 0.01 m to 0.32 m. The decrease was the largest at the upstream of the system, CP1 and CP2. The upstream end of the GMD is more sensitive as the proposed surface flooding improvements account for a larger relative portion of the total flow in the drain. Whereas downstream in the system (i.e., CP3 and CP4) there is a significant contribution of flow from non-improved areas.

Similar to the peak HGL, the peak flow rates under proposed conditions are lower than those estimated in the existing conditions model. This decrease in peak flow ranged from 1 % to 24 %, with the largest decrease occurring at the upstream end of the GMD. The results from the 1:100 year and climate change stress test simulations at CP1 and CP2, identify that the HGL and flow rate are elevated on the tail end of the hydrographs for approximately 16 hours, after which the flow rates between existing and proposed conditions become approximately equivalent.

Since the proposed improvements lower the peak HGL and peak flow rates in the GMD, there is “no negative impact” as a result of the proposed improvements.

Further, it should be noted the above comparison is conservative as LID measures were recommended City-wide as part of the proposed comprehensive measures. The effect and benefit of the LIDs were not accounted for in the InfoWorks ICM model, and consequently are not included in the hydrologic impact assessment of the GMD. The LID measures would reduce total proposed runoff volumes below existing condition values, with potential for further modest reductions to peak HGL and flow rates, and also to reductions to the flow rates before and after the peak.

5.0 Sensitivity Analysis

A sensitivity analysis of the model was completed to better understand potential uncertainty in model predictions based on changes in user selected inputs. Specifically, the sensitivity analysis was focused on changes to the inflow hydrographs, flow rates, and the downstream boundary conditions. The following sections summarize the results of two independent sensitivity assessments for each of the variables. Detailed outputs from the sensitivity analysis are attached in **Appendix D**.

5.1 Inflow Sensitivity Analysis

A review of the model's sensitivity to increases/decreases of the inflow hydrographs was completed for the 1:5 year and climate change stress test storm events under proposed conditions. Four different flow conditions were considered in the sensitivity review:

- 1:5 year plus 50% – Hydrographs at each inflow location were altered to be the 1:5 year return period InfoWorks ICM inflow hydrographs increased by 50%;
- 1:5 year minus 50% – Hydrographs at each inflow location were altered to be the 1:5 year return period InfoWorks ICM inflow hydrographs decreased by 50%;
- climate change stress test plus 50% – Hydrographs at each inflow location were altered to be the climate change stress test InfoWorks ICM inflow hydrographs increased by 50%; and
- climate change stress test minus 50% – Hydrographs at each inflow location were altered to be the climate change stress test InfoWorks ICM inflow hydrographs decreased by 50%.

The resulting impacts of varying inflow hydrographs on HGL and flow rate are presented in **Table 7**.

Table 7 – Summary Results from the Flow Sensitivity Analysis

Location	Inflow Hydrograph	Peak HGL – 1:5 Year (m)	Peak Flow– 1:5 Year (m^3/s)	Peak HGL – CC (m)	Peak Flow – CC (m^3/s)
CP1	50% Decrease	-0.24	-29.1%	-0.43	-35.2%
	No Change	183.82	4.52	185.32	9.89
	50% Increase	+0.25	+28.1%	+0.42	+30.4%
CP2	50% Decrease	-0.14	-20.7%	-0.19	-14.5%
	No Change	183.30	7.30	184.78	11.98
	50% Increase	+0.16	+19.0%	+0.15	+17.3%
CP3	50% Decrease	-0.07	-8.1%	-0.08	-5.5%
	No Change	179.53	26.06	180.74	66.61
	50% Increase	+0.07	+8.4%	+0.08	+5.5%
CP4	50% Decrease	-0.07	-7.3%	-0.07	-4.1%
	No Change	178.16	30.84	179.71	88.38
	50% Increase	+0.08	+7.5%	+0.06	+4.1%

The peak HGL and peak flow rate at CP3 and CP4 are the least impacted by the changes made to the inflow hydrographs. In contrast, the peak HGL and peak flow rate at CP1 and CP2 appear to be more sensitive to changes in the inflow hydrograph. This is most likely because the relative increase/decrease of inflow is a higher portion of the total flow at these locations.

5.2 Boundary Condition Sensitivity Analysis

A review of the models sensitivity to changes in downstream boundary condition was completed for the 1:5 year and 1:100 year storm events under proposed conditions. Three boundary conditions were considered in the sensitivity review:

- Normal – a variable water surface elevation is calculated in the model based on inflow and normal depth conditions at the upstream reach;
- Fixed – a constant water surface elevation (178.93 m) is maintained at the outlet which is based on the flood plain mapping 1:100 year water surface elevation at the outfall provided by Landmark; and
- Fixed + 0.30 m – a constant water surface elevation (179.23 m) is maintained at the outlet which is based on the flood plain mapping 1:100 year water surface elevation at the outfall provided by Landmark plus 0.30 m.

The resulting impacts of a varying boundary conditions on HGL are presented in **Table 8**.

Table 8 - Summary Results from the Downstream Boundary Conditions Sensitivity Analysis

Location	Downstream Boundary Condition	Peak HGL – 1:5-Year (m)	Peak HGL – 1:100-Year (m)
CP1	Normal	183.82	184.35
	Fixed: – 178.93 m	183.82	184.35
	Fixed – 179.23 m	183.82	184.35
CP2	Normal	183.30	184.09
	Fixed – 178.93 m	183.30	184.09
	Fixed – 179.23 m	183.30	184.09
CP3	Normal	179.53	180.28
	Fixed – 178.93 m	179.62	180.29
	Fixed – 179.23 m	179.72	180.33
CP4	Normal	178.16	179.10
	Fixed – 178.93 m	179.00	179.14
	Fixed – 179.23 m	179.30	179.39

In general, CP1 and CP2 peak HGL conditions were not impacted under the varying boundary conditions. The peak HGL at CP3 shows some sensitivity to the varying boundary conditions under the 1:5 year return period. Lastly, the HGL at CP4 is the most sensitive to different outfall boundary condition, this is caused by the close proximity of CP4 to the boundary.

6.0 Conclusion

6.1 Summary

The MP recommendations included proposed surface flooding risk reduction alternatives that may have a potential hydrologic and hydraulic impact on the receiving watercourses, specifically the GMD watercourse as reviewed in this assessment. Following discussions with the MP technical working group including the local conservation authority, ERCA, and to assess this impact, an outlet capacity assessment of the recommended improvements on the GMD's flow regime was completed.

The MP included representations of existing flooding conditions and proposed flooding solutions that were developed with the InfoWorks ICM software which included a City-wide all pipe network (storm, sanitary and combined sewers) and a two-dimensional surface mesh accounting for overland flow. The solutions developed as part of the MP to reduce surface flooding risk included improvements to existing and/or recommended new overland drainage routes, storm sewer pipes, and storage systems.

Given the known sensitivity of the GMD, the proposed MP solutions to address surface flooding in the same watershed were tailored to provide no impact or potentially improve conditions in this receiving watercourse.

An existing conditions joint hydrologic-hydrodynamic PCSWMM model of the GMD watercourse was developed as part of the recently-completed study, Grand Marais Drain Hydrologic and Hydraulic Models (2019). That study's PCSWMM model was used as the basis for the outlet capacity impact assessment where discharges from the impacted outfalls were represented with the model outputs from the MP InfoWorks ICM software.

6.2 Objective and Findings

The primary objective of the analysis is to assess hydrological and hydraulic impact of the proposed MP sewer improvements on the GMD's potential for flooding and in-stream erosion.

The metrics considered in the assessment include maintaining or reducing water surface elevations and peak flows. "No negative impact" to the GMD would be identified as the following:

- **Water Surface Elevation** - up to 0.02 m increase in peak elevation; and
- **Peak Flow Rate** - up to 50 L/s (0.050 m3/s) increase.

The integrated PCSWMM-InfoWorks ICM model assessment found in all instances the peak HGL and peak flow rate under proposed conditions were lower than those estimated under existing conditions. The decrease in peak HGL ranged from 0.01 m to 0.32 m. This decrease in peak flow ranged from 1 % to 24 %, with the largest decrease occurring at the upstream end of the GMD.

In regards to impact of timing of flow and flow volume:

- The results from the 1:100 year and climate change stress test simulations identify at CP1 and CP2, the HGL and flow rate is elevated on the tail end of the hydrographs for approximately 16 hours, after which the flow rates between existing and proposed conditions become approximately equivalent; and
- The impact assessment is conservative as LID measures were recommended City-wide as part of the comprehensive measures, but not accounted for in the model. The LID measures would reduce proposed total runoff volumes to levels less than existing conditions, providing additional reductions in peak HGL and flow rates before and after the peak.

Since the proposed solutions lower the peak HGL and peak flow rates in the GMD, there is "no negative impact" as a result of the proposed improvements. Further, under the proposed solutions which include upstream storage and LID measures to increase infiltration, it was found that the potential for flooding inundation and in-stream erosion would be lower than under existing conditions.

It should be noted that these findings are generally expected, as the proposed solutions were to provide additional storage and infiltration, while maintaining the existing outlet pipes and pumping schemes to the GMD. Unlike stormwater management reports, which commonly address change (or increase) in imperviousness land coverage; the proposed solutions from the MP manage the same volume of runoff but with additional storage, attenuating local flows which consequently reduces flow rate discharged into the watercourse, the GMD.

It should be noted other tributaries on Turkey Creek, besides the GMD (i.e. Lennon Drain, Cahill Drain, etc.), are not proposed to have improvements that would modify flow regime. Therefore, no assessment was needed for those watercourses.

6.3 Recommendations

The following recommendations from this assessment are provided:

- That this assessment be accepted as a review of the potential impact the MP proposed surface flooding solutions have on the GMD;
- That the assessment found "no negative impact" to the GMD, with the more likely outcome being an improvement to the watercourse in terms of reduced potential flooding inundation and in-stream erosion; and
- It is recommended the outlet capacity assessment for Little River be completed at a later time, using the hydrologic and hydraulic models from the separate study for the Little River watercourse, currently being developed to review the floodplain.

Figures

WINDSOR SEWER MASTERPLAN
GRAND MARAIS DRAIN OUTLET ASSESSMENT

GRAND MARAIS DRAIN WATERSHED
FIGURE 1

Legend

- Grand Marais Drain Watershed upstream of Huron Church Rd
- Grand Marais Drain
- Major Roads

0 200 400 800 1,200 Meters

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: ARC
MAP CHECKED BY: IDW
MAP PROJECTION: NAD 1983 UTM Zone 17N

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

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PROJECT: 17-6638
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DATE: 04/08/20

WINDSOR SEWER MASTERPLAN
GRAND MARAIS DRAIN OUTLET ASSESSMENT

IMPACTED EXISTING SUB-WATERSHEDS
FIGURE 2

Legend

- Grand Marais Drain Watershed upstream of Huron Church Rd
- Comparison Point
- Inflow Point
- Grand Marais Drain
- Central Pond Sub-Watershed
- Grand Marais Pump Sub-Watershed
- Chrysler Sub-Watershed
- Dougall Sub-Watershed
- Howard Sub-Watershed

0 200 400 800 1,200 Meters

N E S W

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: ARC
MAP CHECKED BY: IDW
MAP PROJECTION: NAD 1983 UTM Zone 17N

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

DILLON CONSULTING

PROJECT: 17-6638
STATUS: FINAL
DATE: 04/08/20

WINDSOR SEWER MASTERPLAN
GRAND MARAIS DRAIN OUTLET ASSESSMENT

2019 EXISTING CONDITIONS MODEL SCHEMATIC
FIGURE 3

Legend

- Outfalls
- Storages
- Conduits
- Grand Marais Drain
- Major Roads
- Subcatchments

0 200 400 800 1,200 Meters

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

MAP CREATED BY: ARC
MAP CHECKED BY: IDW
MAP PROJECTION: NAD 1983 UTM Zone 17N

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

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PROJECT: 17-6638
STATUS: FINAL
DATE: 04/08/20

WINDSOR SEWER MASTERPLAN

GRAND MARAIS DRAIN OUTLET ASSESSMENT

2020 EXISTING & PROPOSED CONDITIONS MODEL SCHEMATIC

FIGURE 4

Legend

- Outfalls
- Storages
- Conduits
- Grand Marais Drain
- Major Roads
- PCSWMM Subcatchments
- Central Pond Sub-Watershed
- Grand Marais Pump Sub-Watershed
- Chrysler Sub-Watershed
- Dougall Sub-Watershed
- Howard Sub-Watershed

0 200 400 800 1,200 Meters

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR

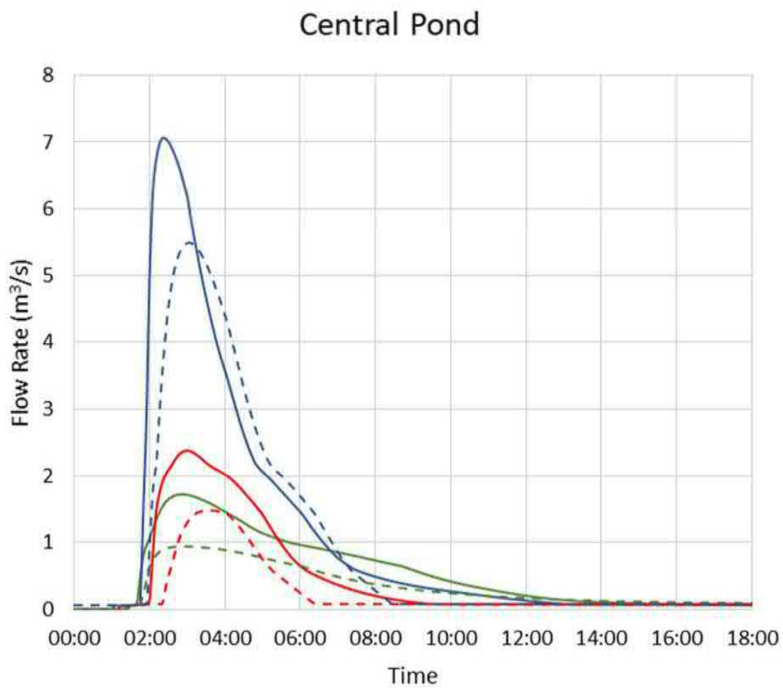
MAP CREATED BY: ARC
MAP CHECKED BY: IDW
MAP PROJECTION: NAD 1983 UTM Zone 17N

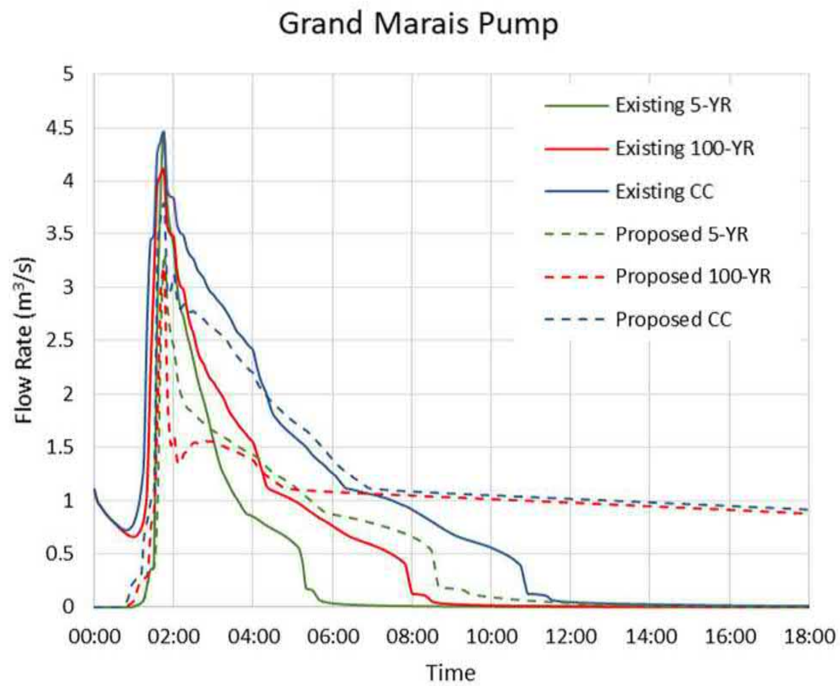
DILLON CONSULTING

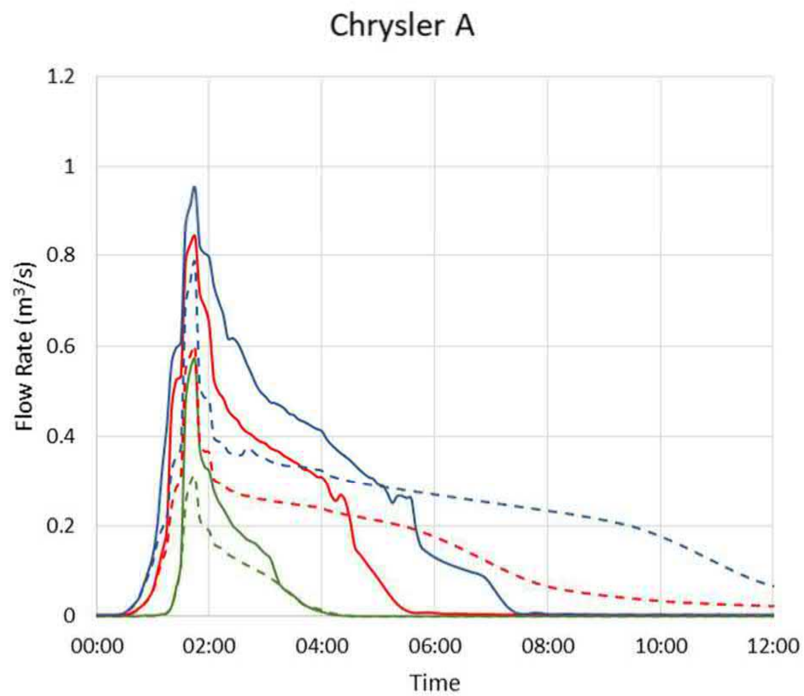
PROJECT: 17-6638
STATUS: FINAL
DATE: 04/09/20

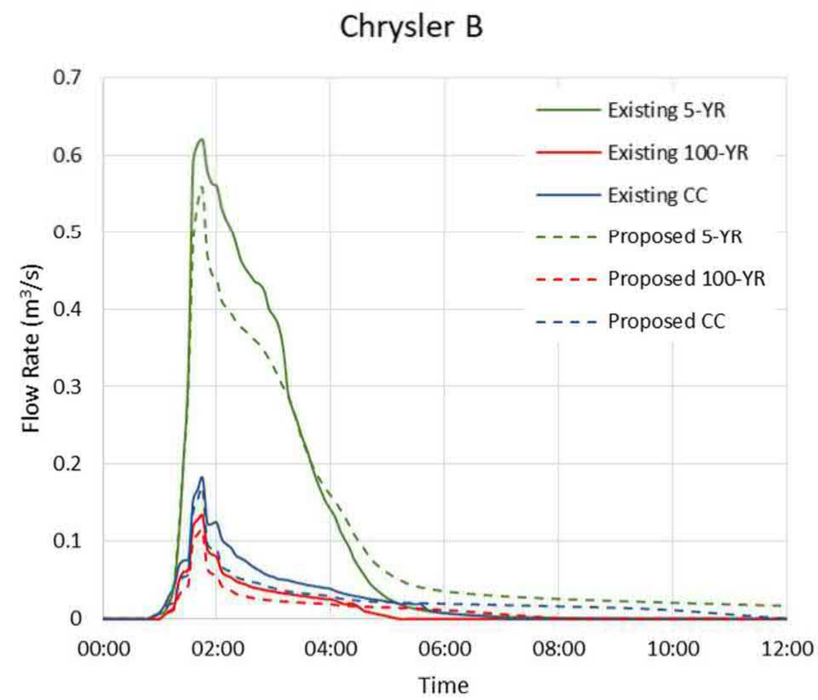
Appendix A

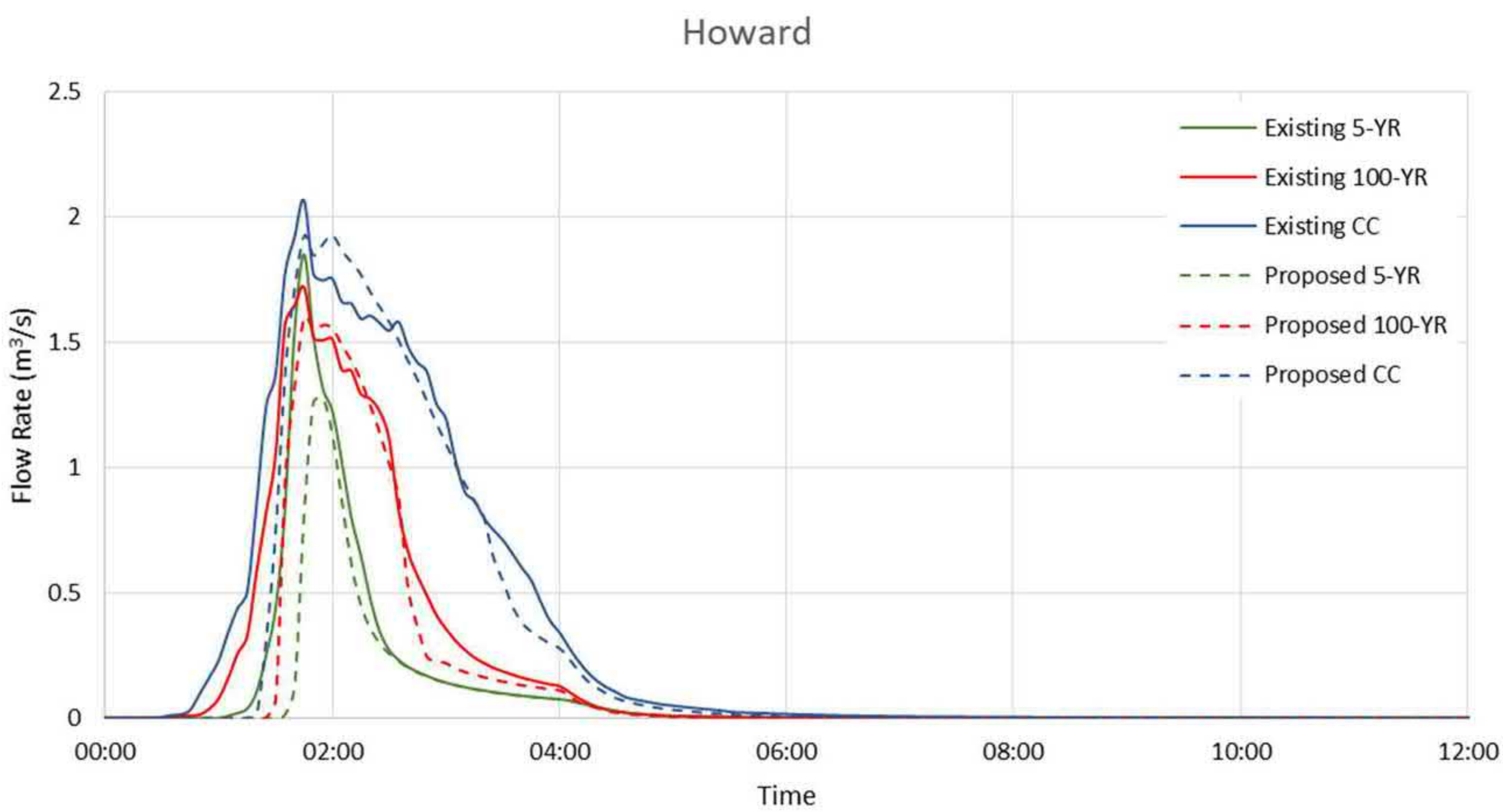
Inflow Hydrographs

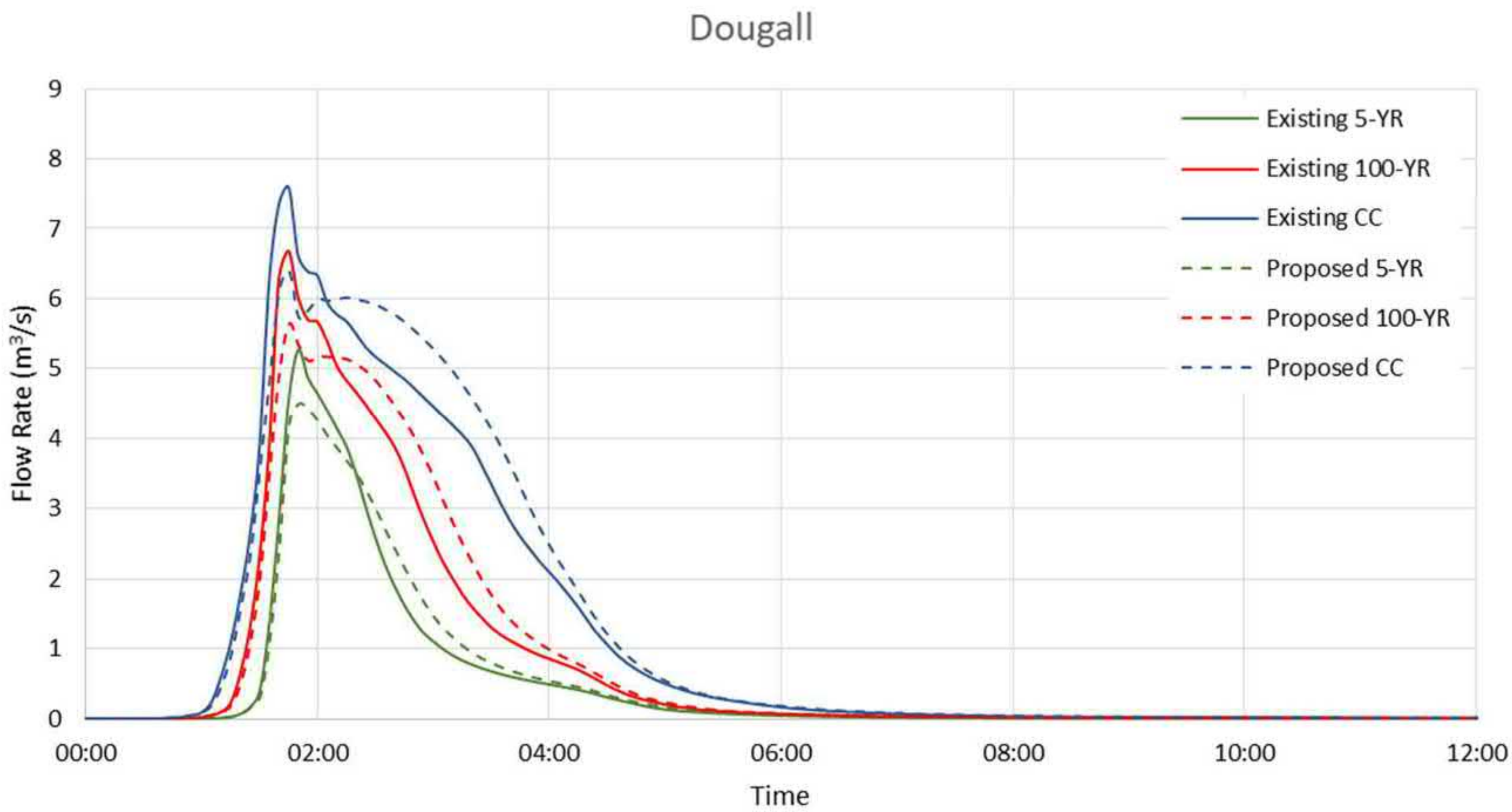

Central Pond
Flow Rate (m³/s)
8
7
6
5
4
3
2
1
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
Time


Grand Marais Pump
Flow Rate (m³/s)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
Time
Existing 5-YR
Existing 100-YR
Existing CC
Proposed 5-YR
Proposed 100-YR
Proposed CC


Chrysler A
Flow Rate (m³/s)
Time
1.2
1
0.8
0.6
0.4
0.2
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00


Chrysler B
Flow Rate (m³/s)
Time
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
Existing 5-YR
Existing 100-YR
Existing CC
Proposed 5-YR
Proposed 100-YR
Proposed CC

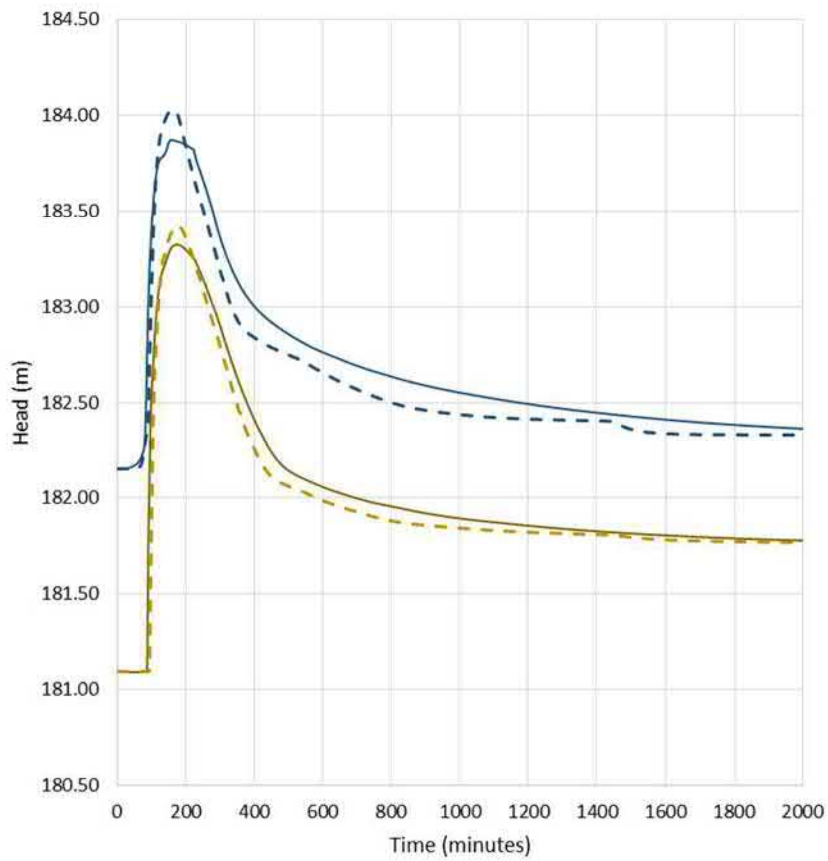

Howard
2.5
2
1.5
1
0.5
0
Flow Rate (m3/s)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
Time
Existing 5-YR
Existing 100-YR
Existing CC
Proposed 5-YR
Proposed 100-YR
Proposed CC

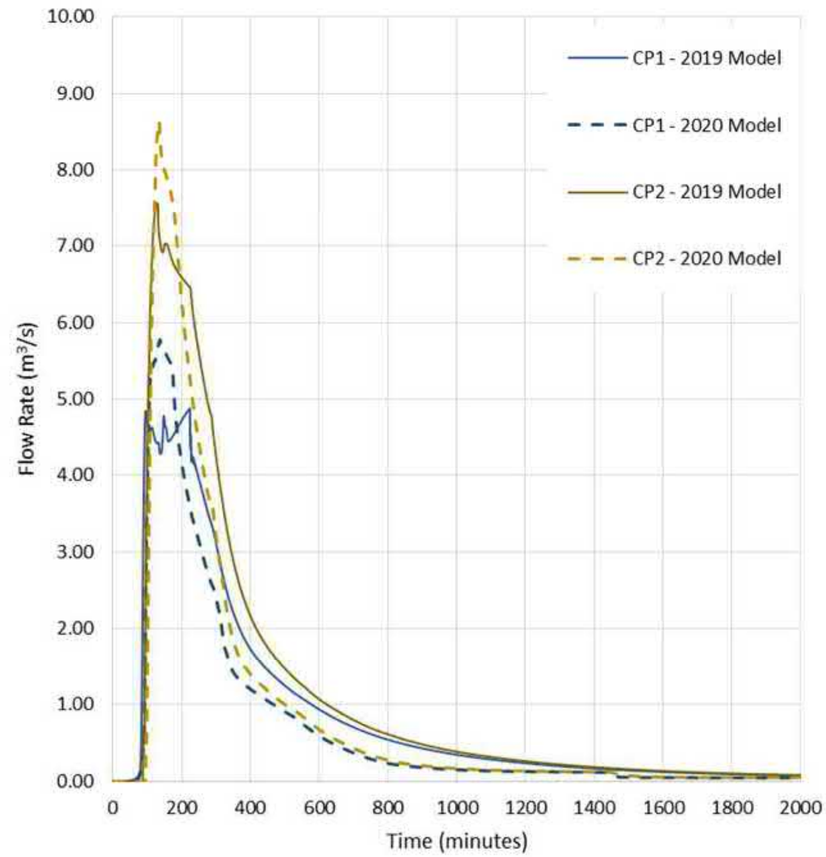

Dougall
Flow Rate (m³/s)
9
8
7
6
5
4
3
2
1
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
Time
Existing 5-YR
Existing 100-YR
Existing CC
Proposed 5-YR
Proposed 100-YR
Proposed CC

Appendix B

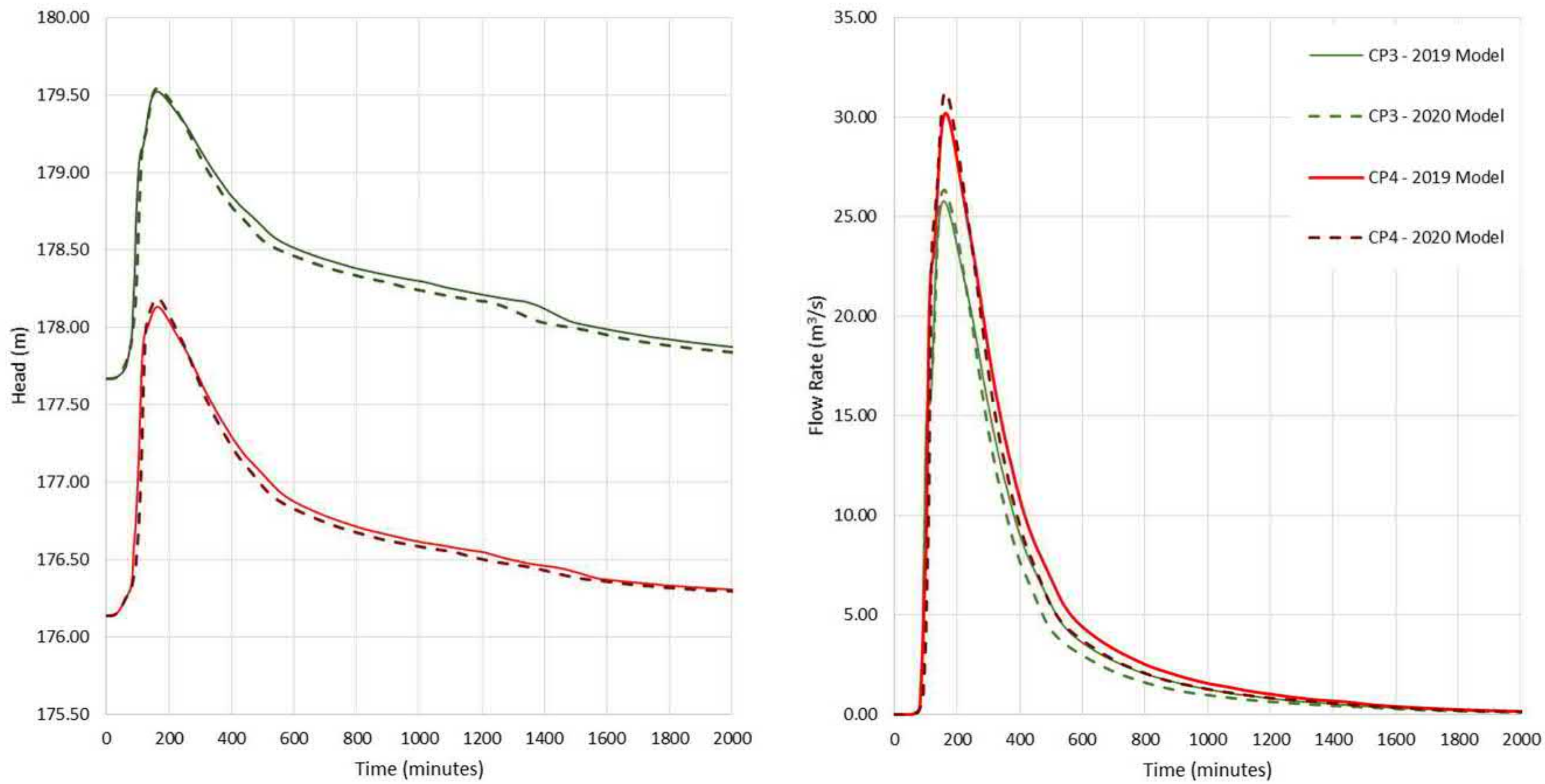
Existing Condition

5-Year Design Storm

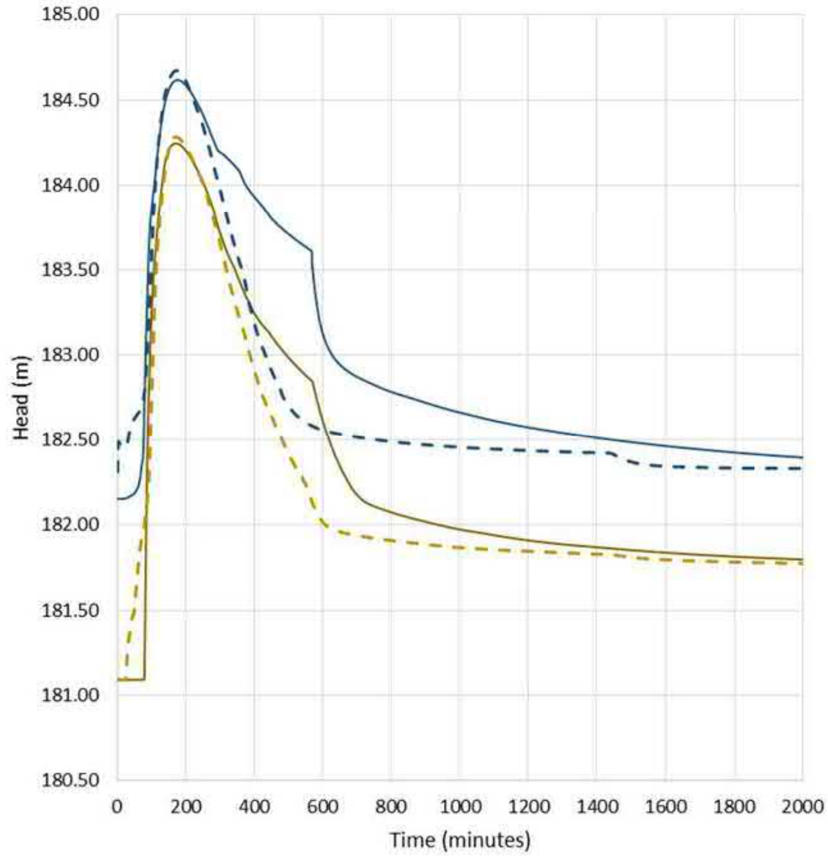


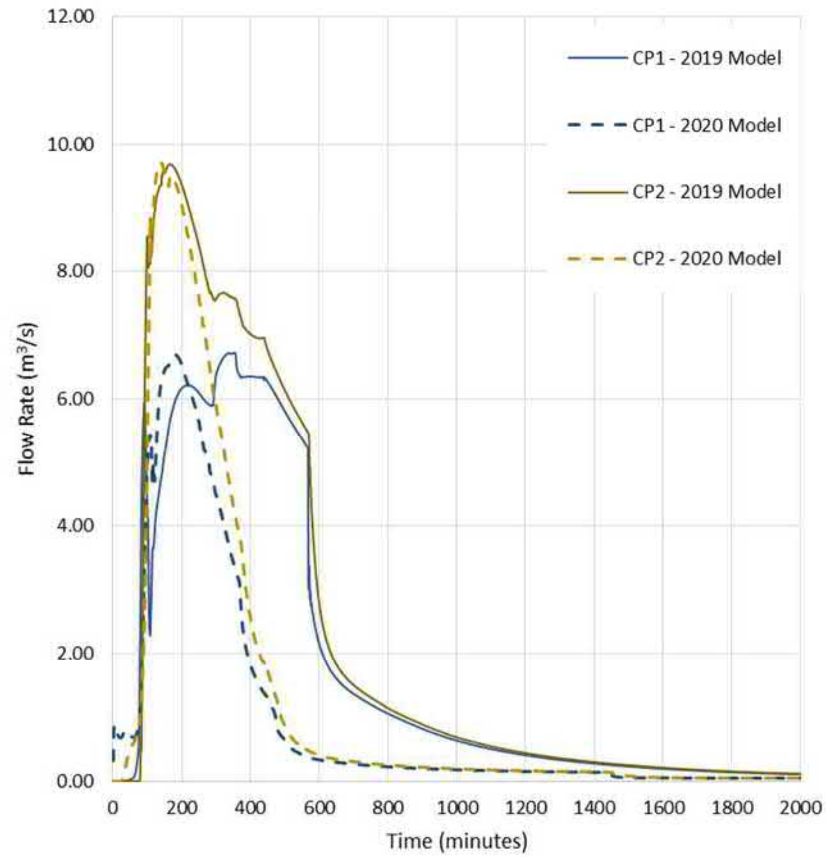


5-Year Design Storm

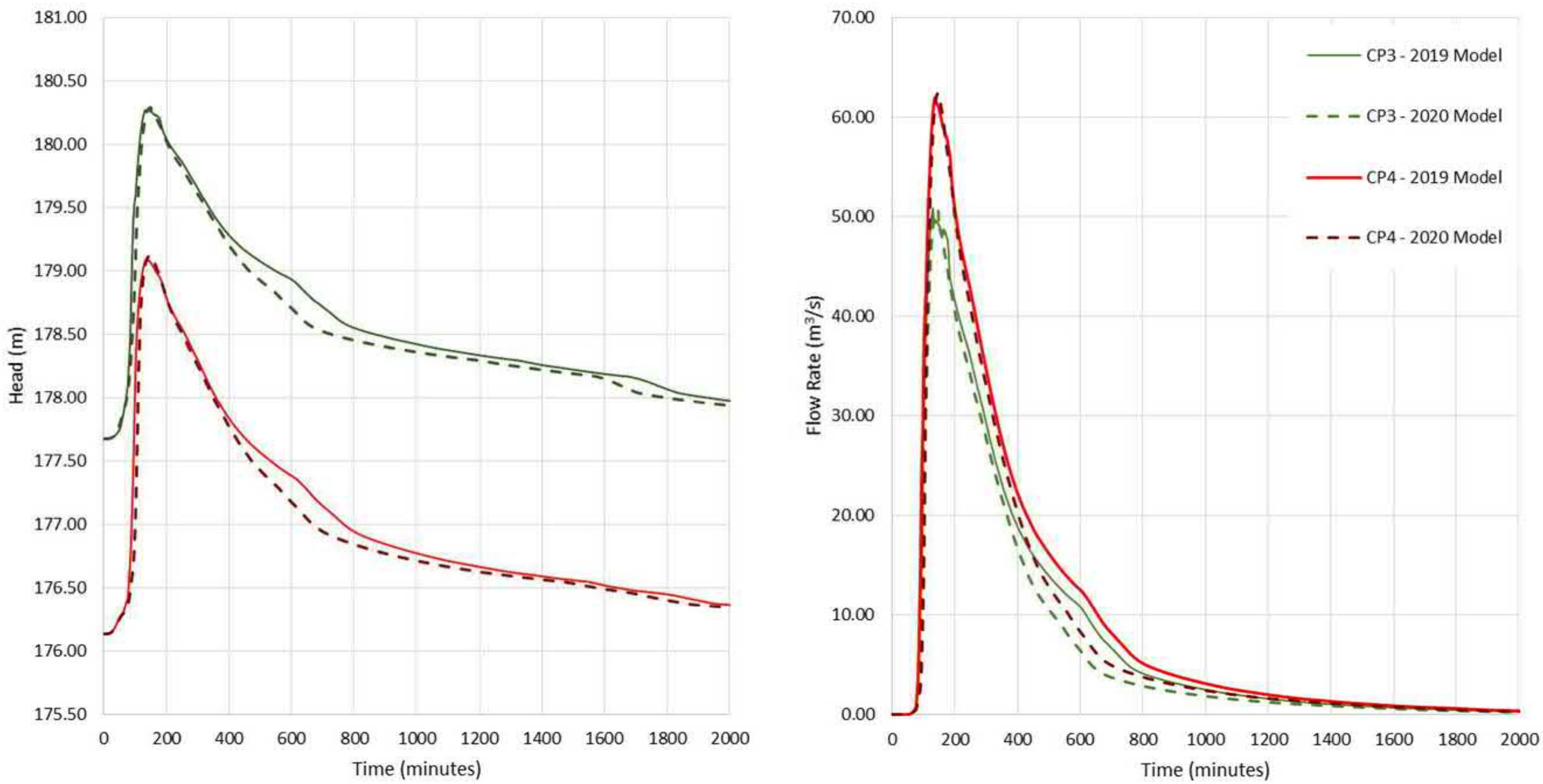


100-Year Design Storm





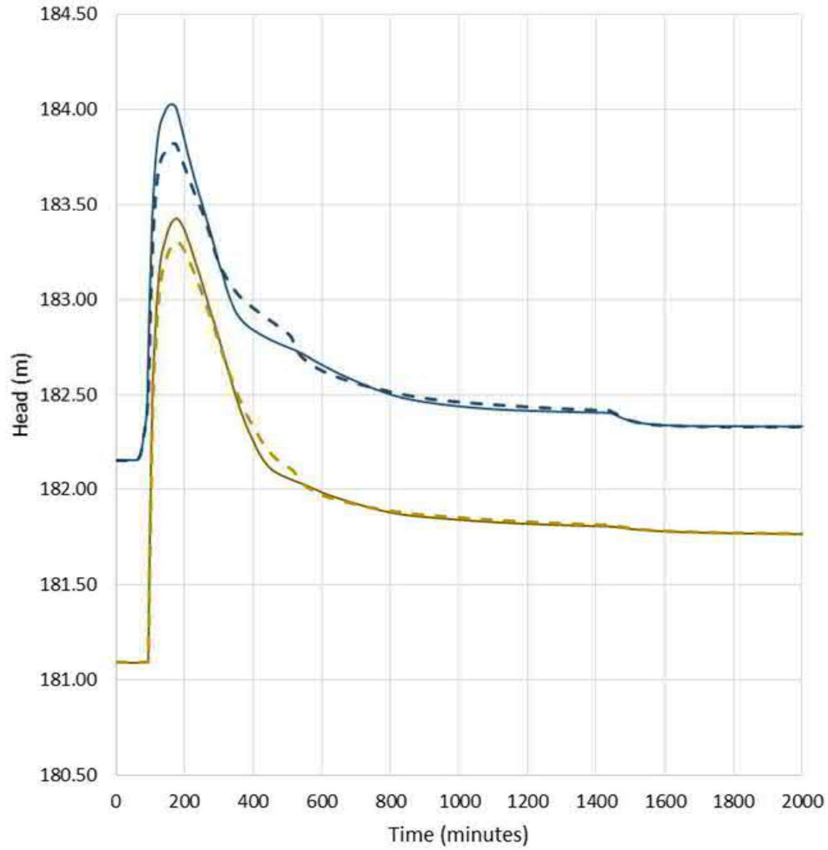
100-Year Design Storm

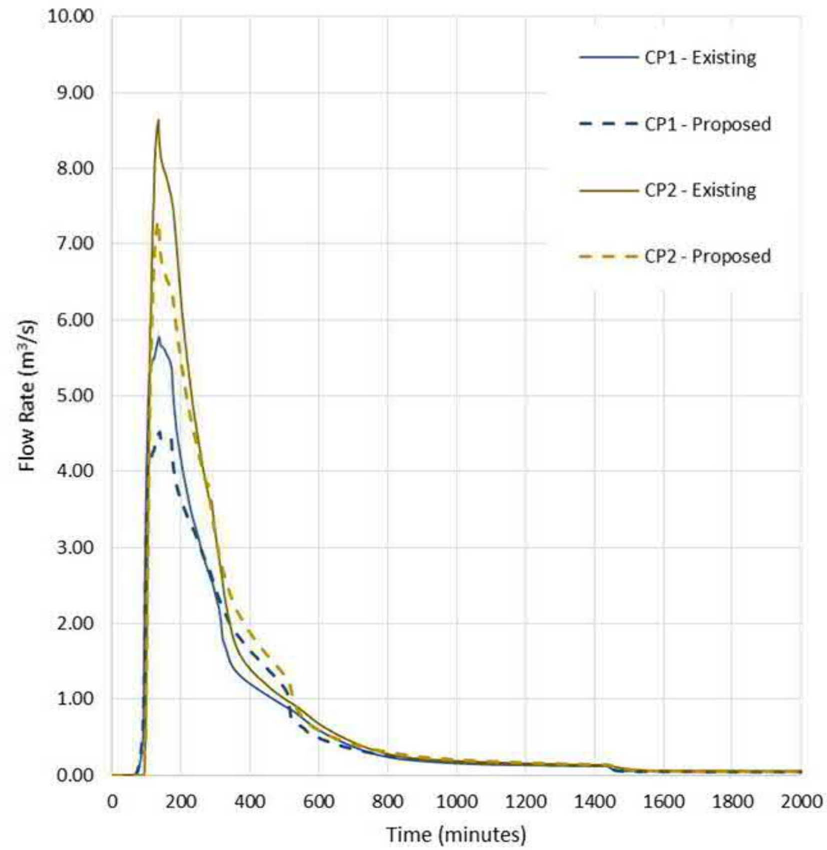


Appendix C

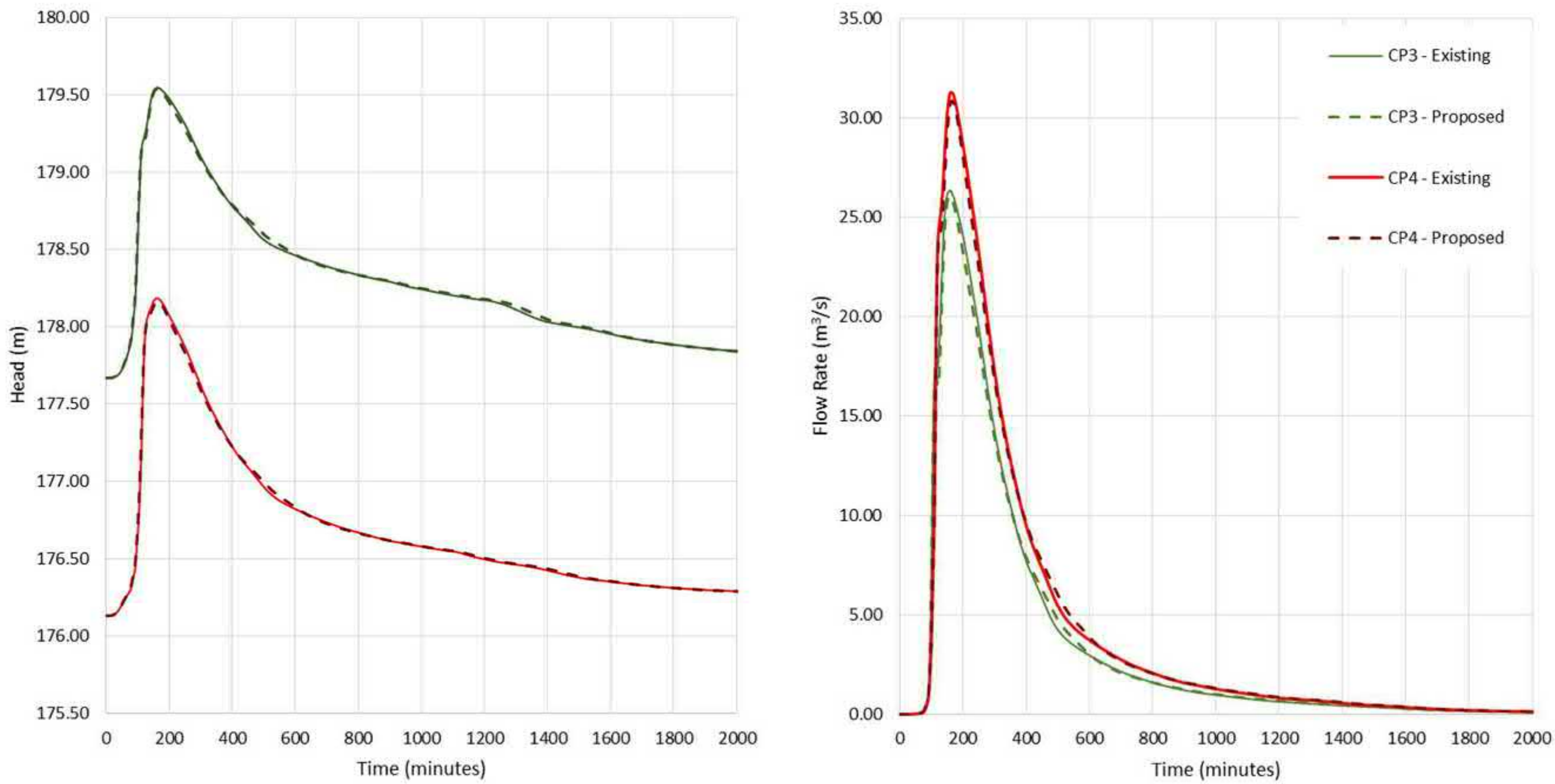
Proposed Condition

5-Year Design Storm

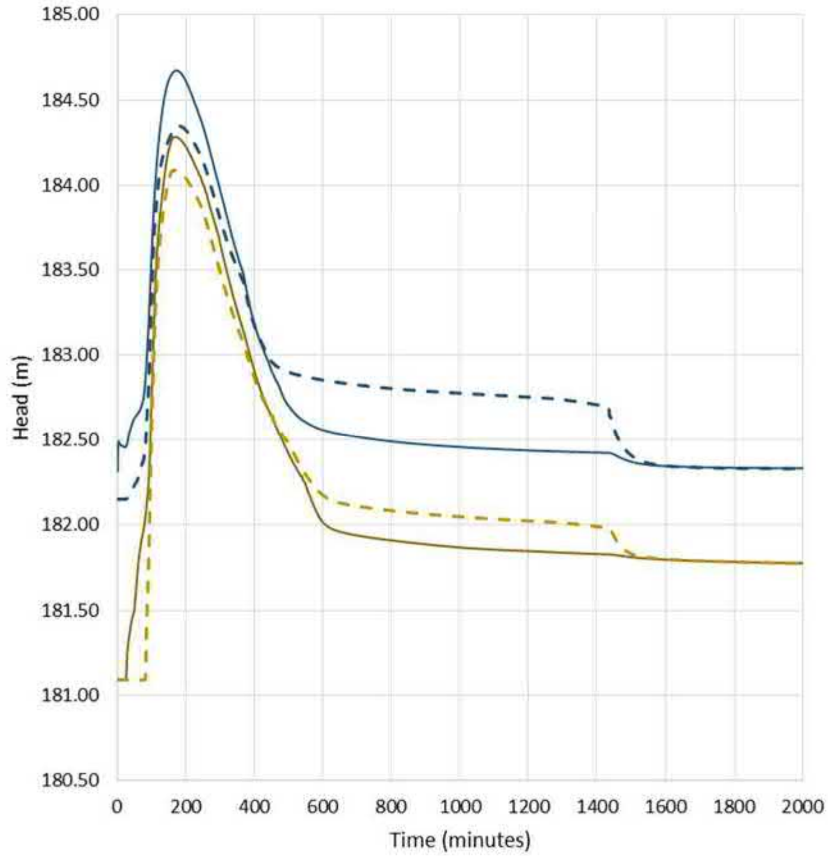


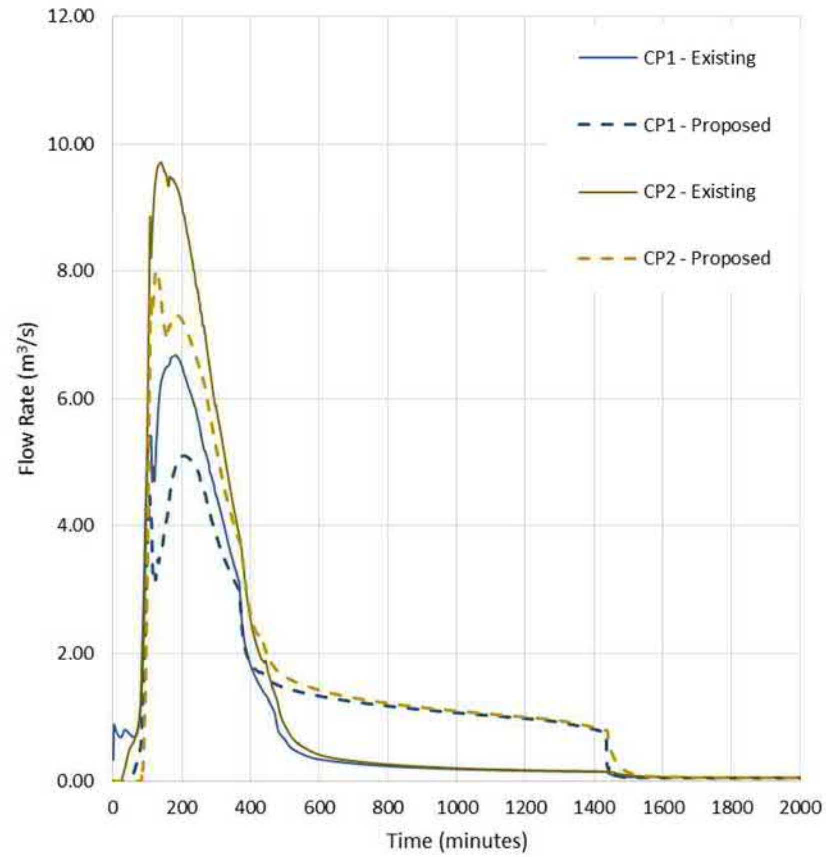


5-Year Design Storm

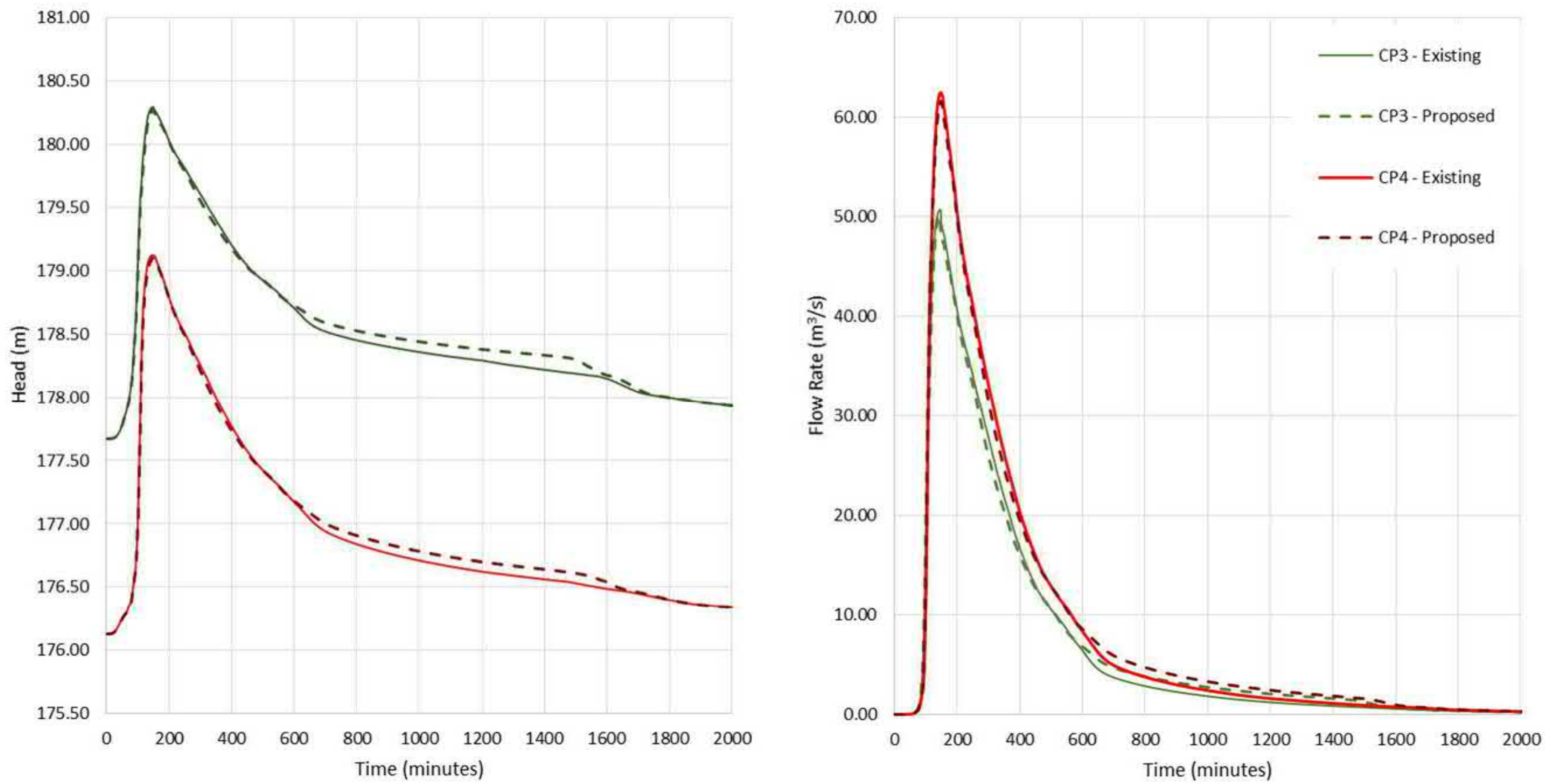


100-Year Design Storm

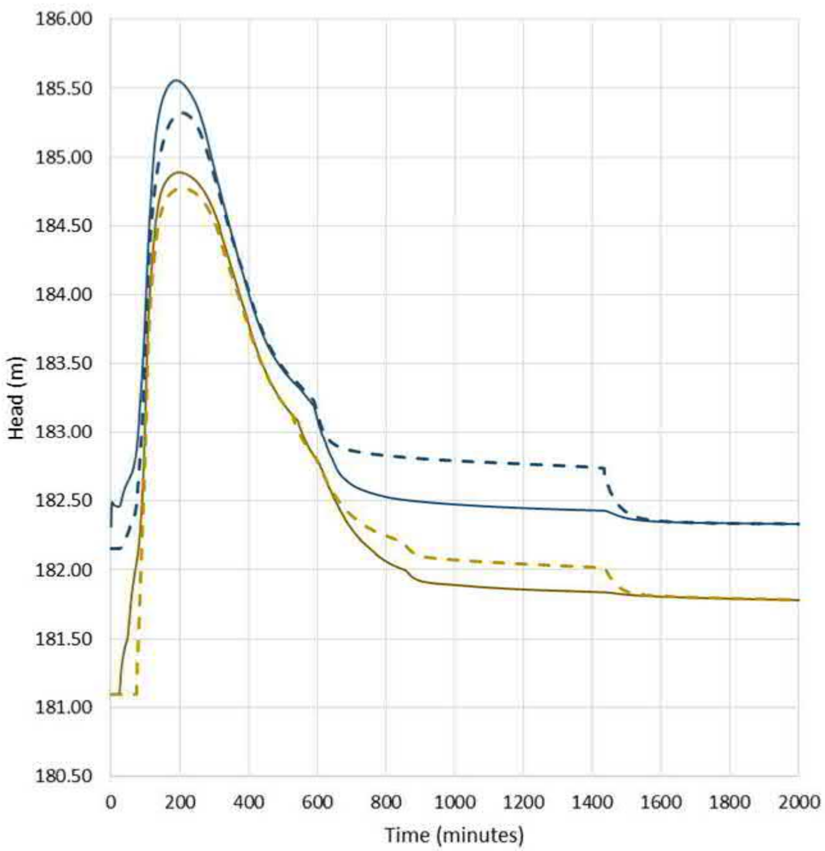


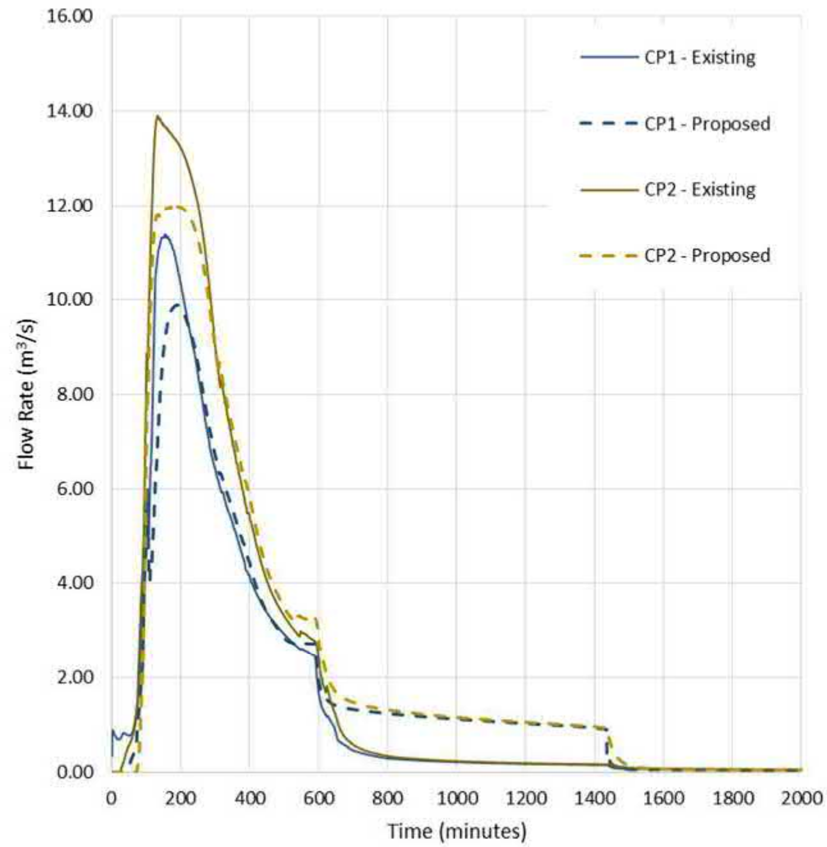


100-Year Design Storm

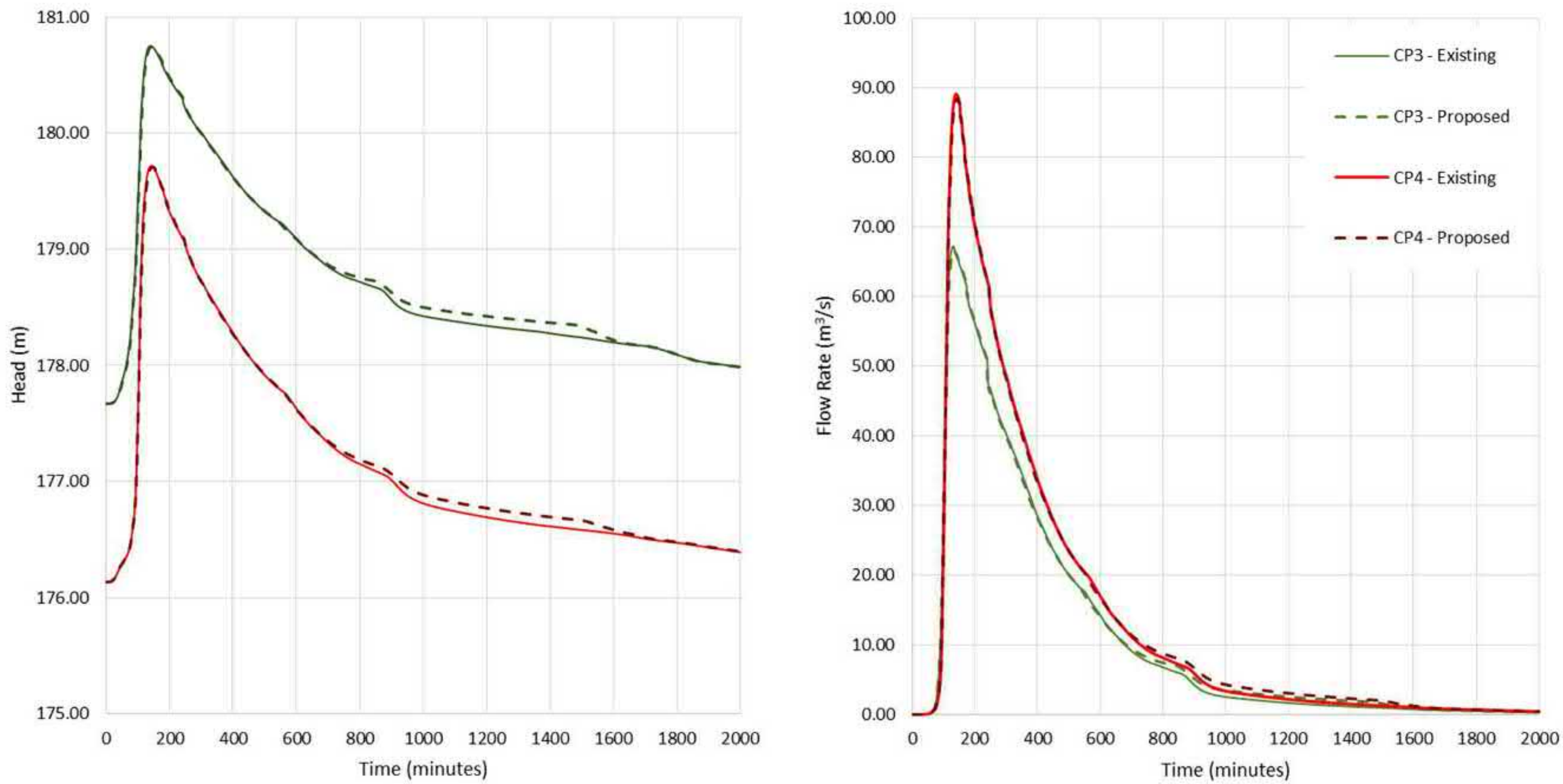


Climate Change



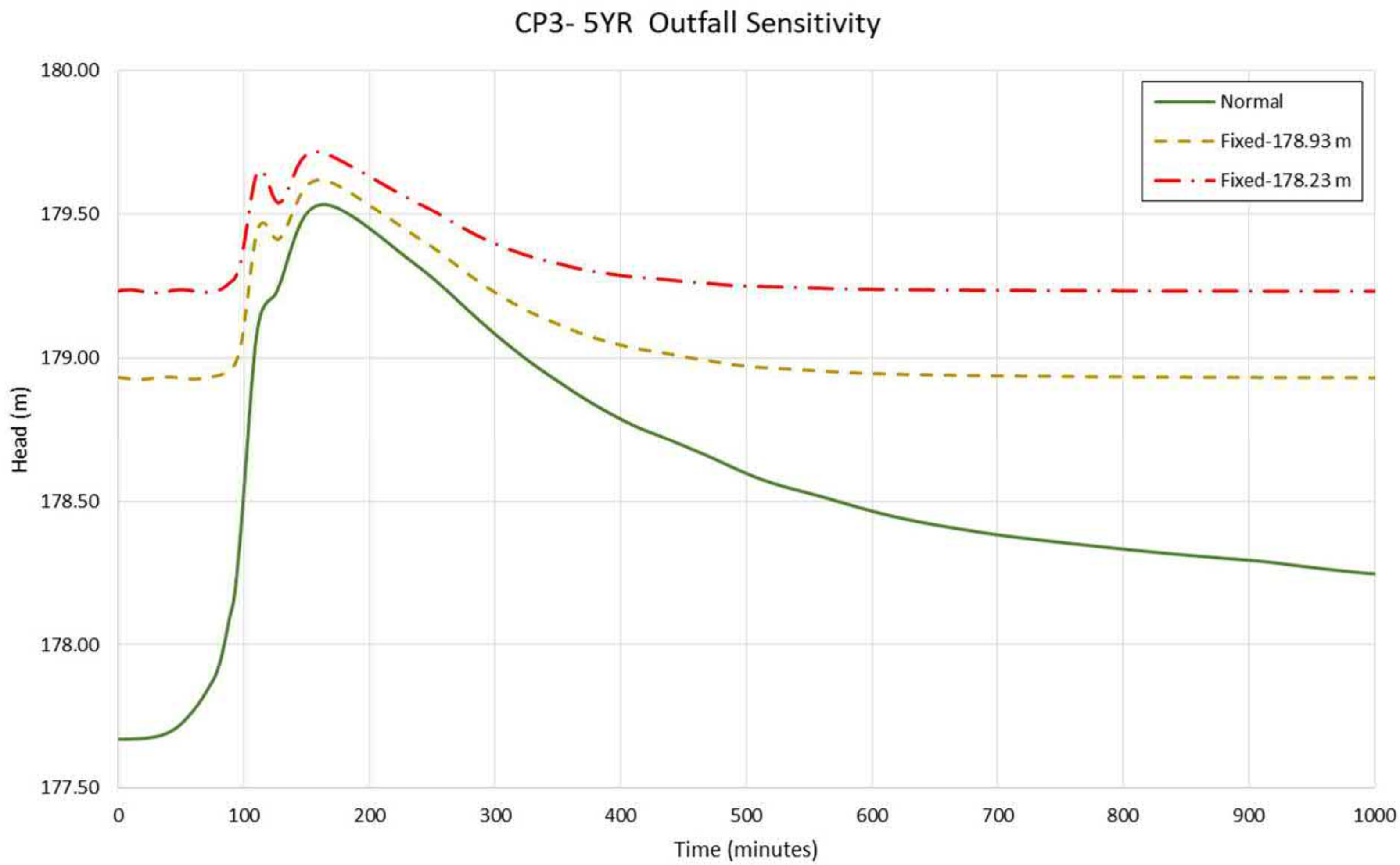


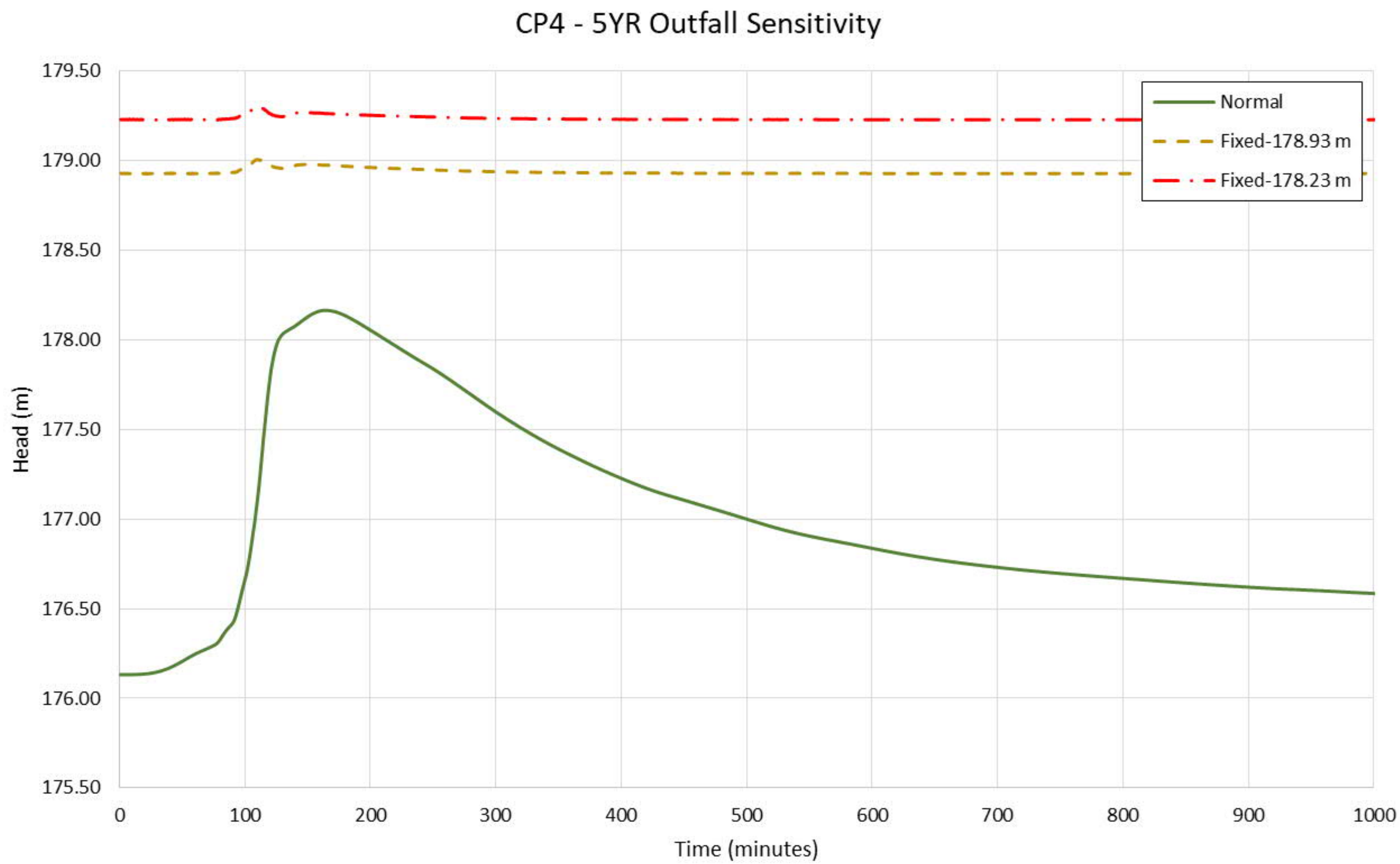
Climate Change

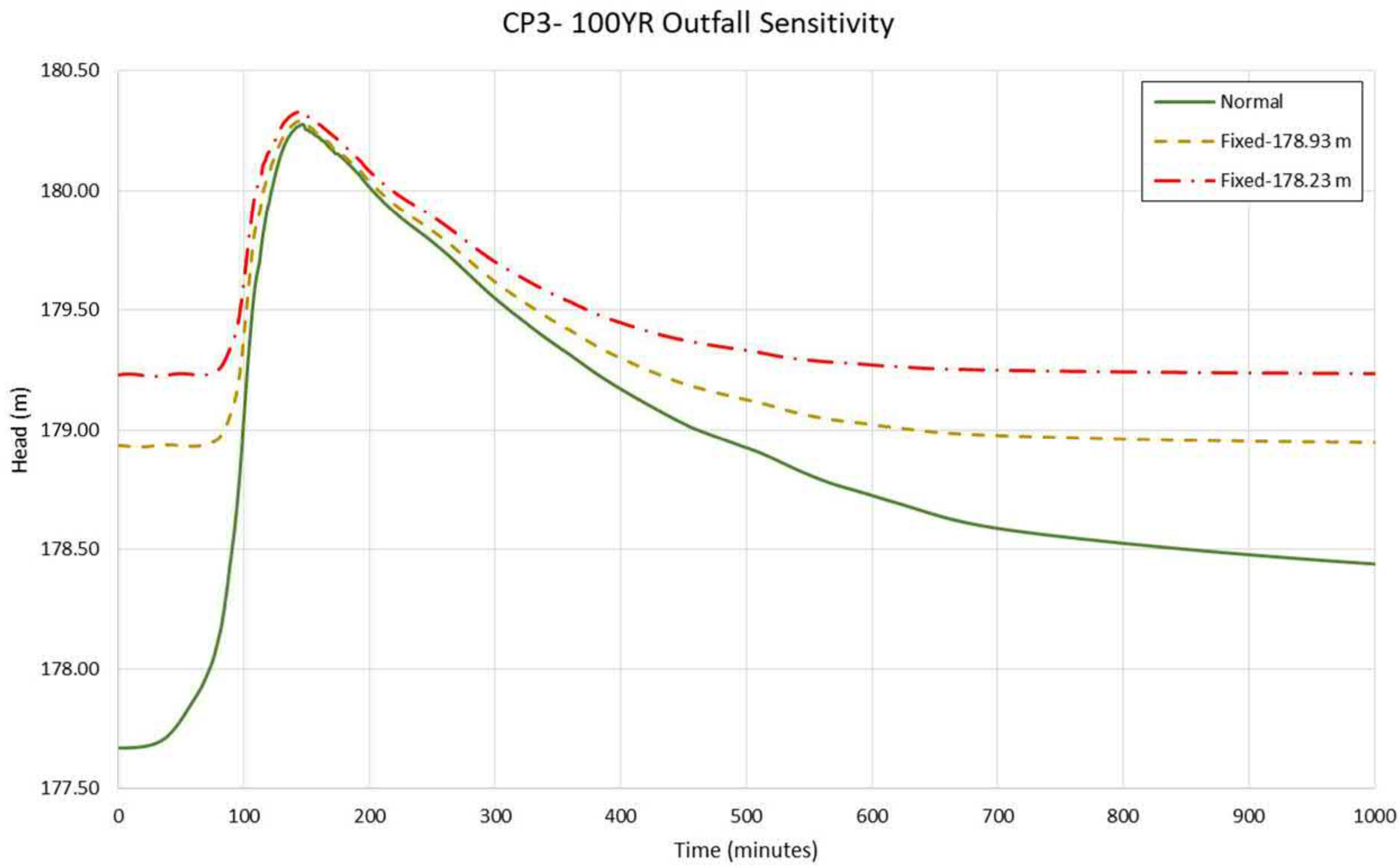


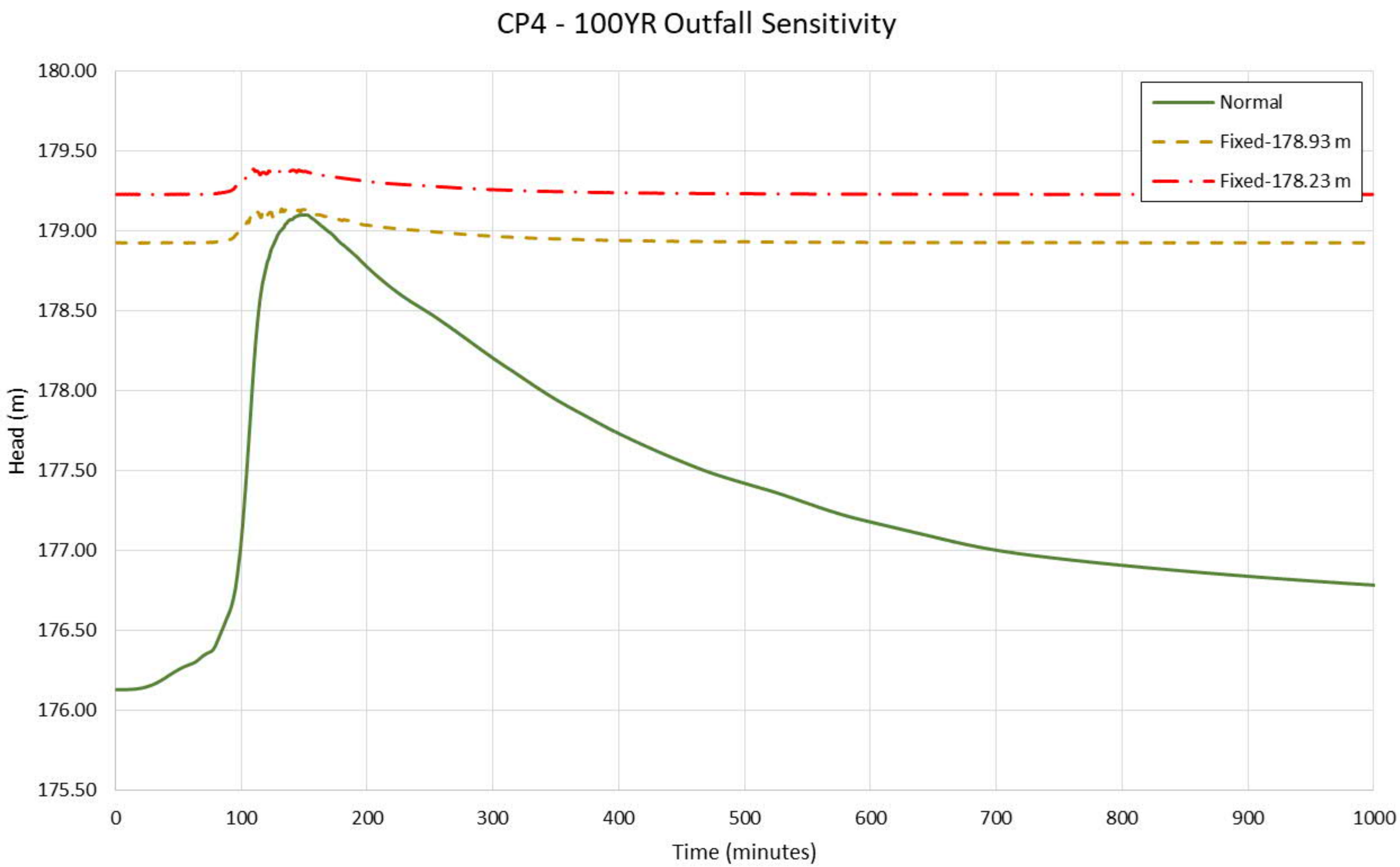
Appendix D

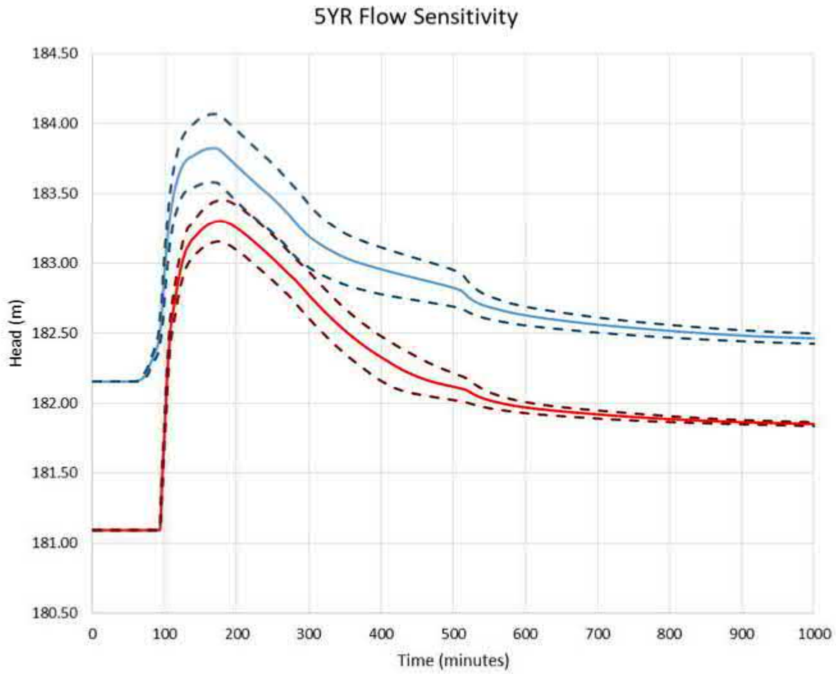
Sensitivity Analysis

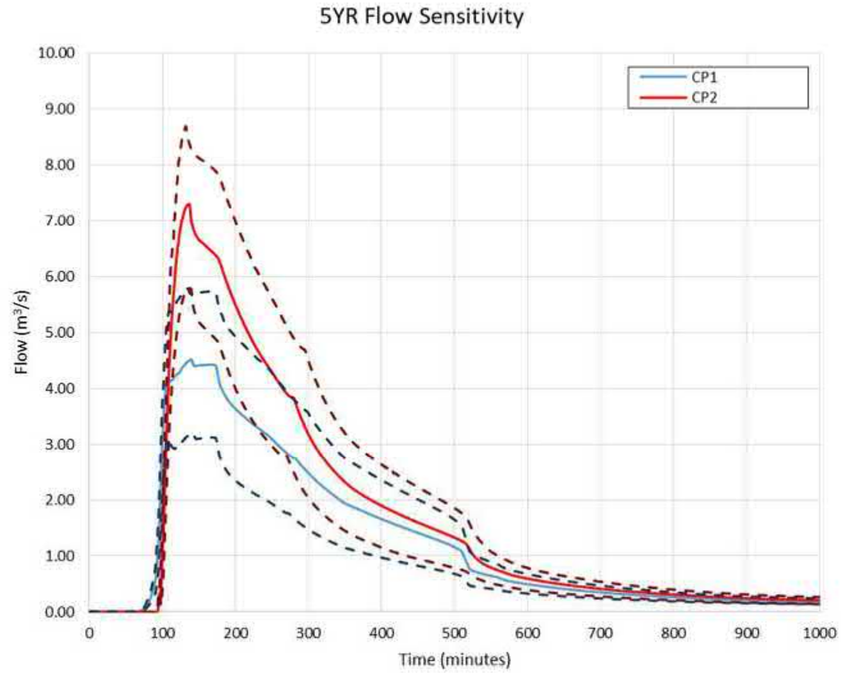

CP3- 5YR Outfall Sensitivity
180.00
179.50
179.00
178.50
178.00
177.50
Head (m)
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)
Normal
Fixed-178.93 m
Fixed-178.23 m

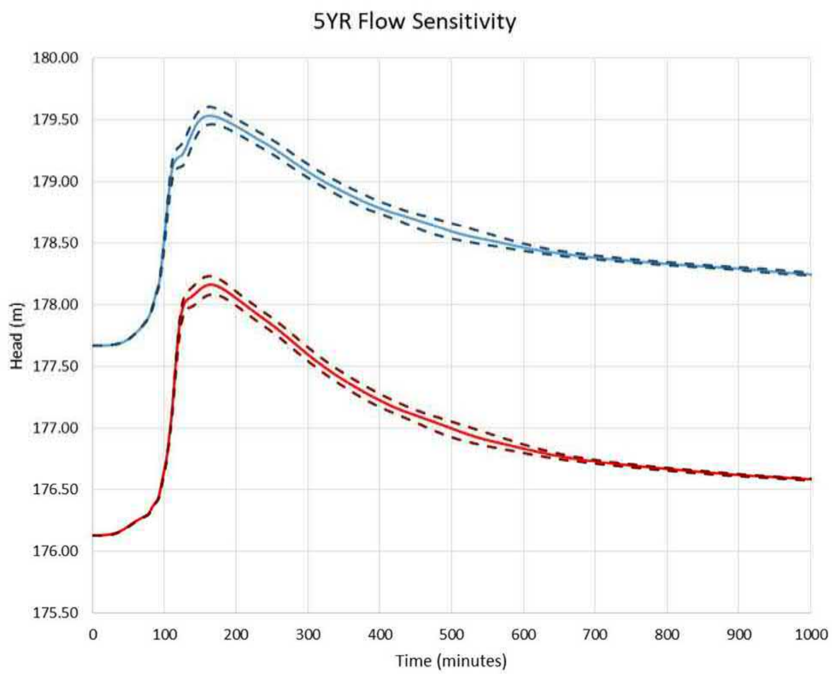

CP4 - 5YR Outfall Sensitivity
Head (m)
179.50
179.00
178.50
178.00
177.50
177.00
176.50
176.00
175.50
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)
Normal
Fixed-178.93 m
Fixed-178.23 m

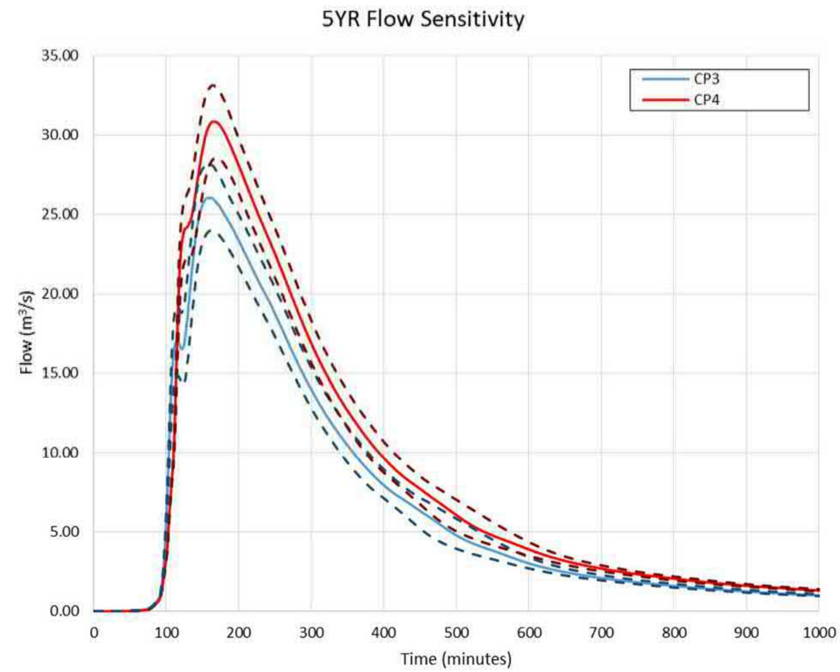

CP3- 100YR Outfall Sensitivity
Head (m)
180.50
180.00
179.50
179.00
178.50
178.00
177.50
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)
Normal
Fixed-178.93 m
Fixed-178.23 m

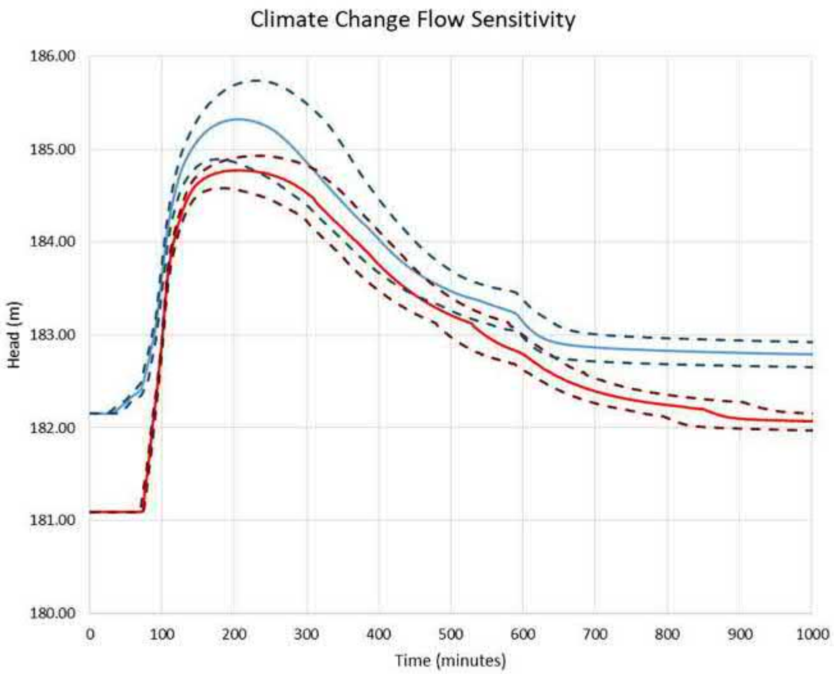

CP4 - 100YR Outfall Sensitivity
Head (m)
180.00
179.50
179.00
178.50
178.00
177.50
177.00
176.50
176.00
175.50
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)
Normal
Fixed-178.93 m
Fixed-178.23 m

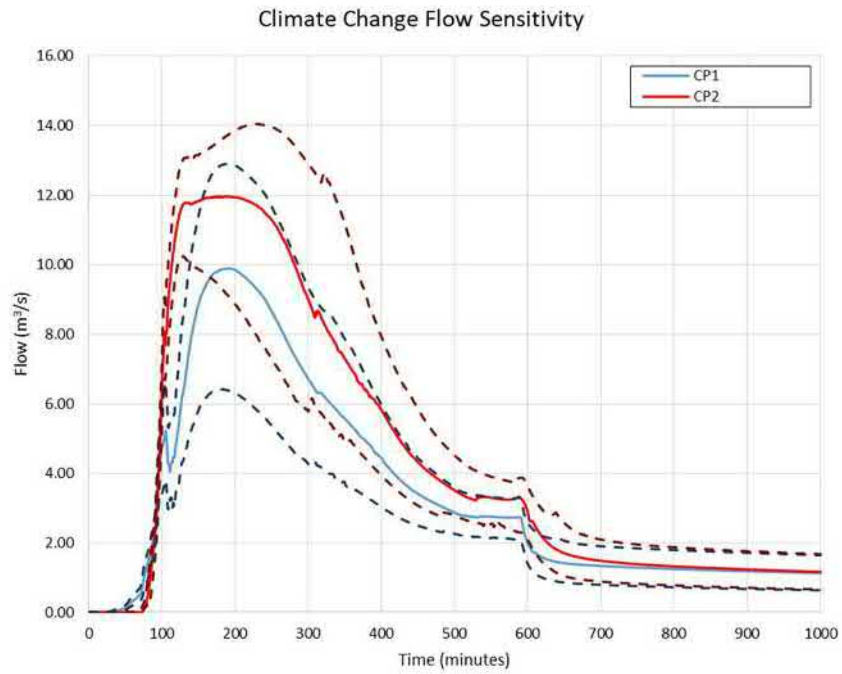

5YR Flow Sensitivity
Head (m)
184.50
184.00
183.50
183.00
182.50
182.00
181.50
181.00
180.50
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)

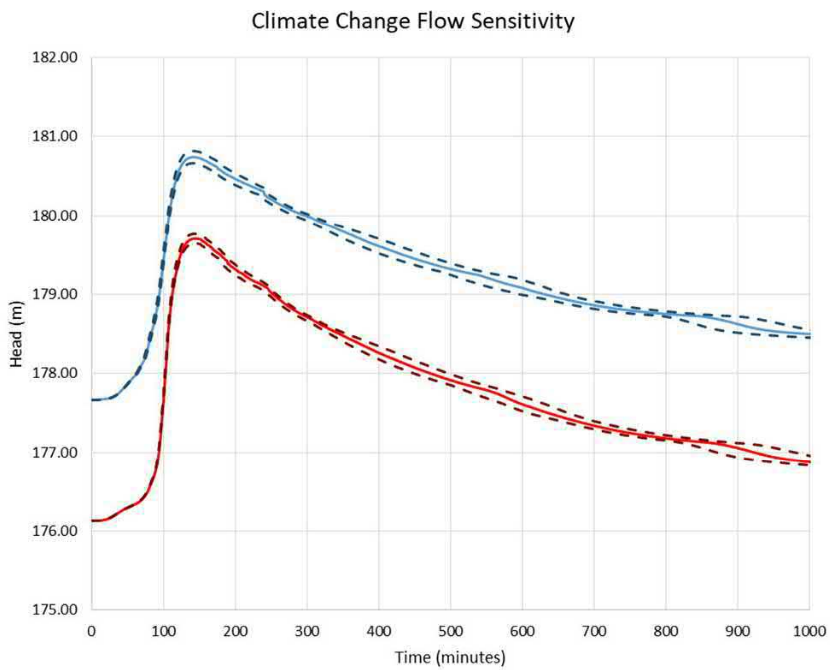

5YR Flow Sensitivity
CP1
CP2
Flow (m³/s)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)

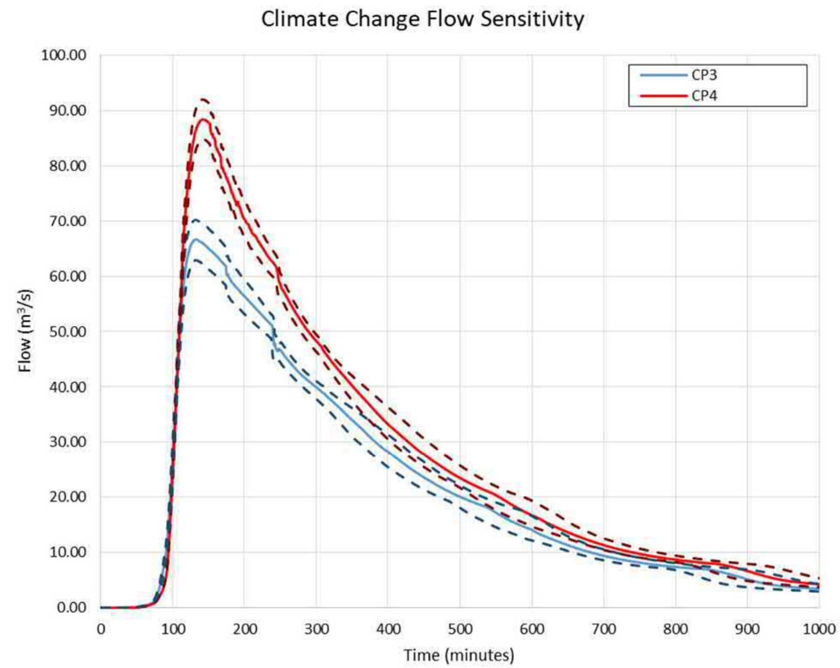

5YR Flow Sensitivity
Head (m)
Time (minutes)
180.00
179.50
179.00
178.50
178.00
177.50
177.00
176.50
176.00
175.50
0
100
200
300
400
500
600
700
800
900
1000


5YR Flow Sensitivity
Flow (m³/s)
Time (minutes)
CP3
CP4
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
100
200
300
400
500
600
700
800
900
1000


Climate Change Flow Sensitivity
186.00
185.00
184.00
183.00
182.00
181.00
180.00
Head (m)
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)


Climate Change Flow Sensitivity
CP1
CP2
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Flow (m³/s)
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)


Climate Change Flow Sensitivity
Head (m)
182.00
181.00
180.00
179.00
178.00
177.00
176.00
175.00
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)


Climate Change Flow Sensitivity
Flow (m³/s)
CP3
CP4
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
100
200
300
400
500
600
700
800
900
1000
Time (minutes)

Appendix E

Sample PCSWMM Output

Landmark 100-Year Existing Conditions

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

Hydrologic Model for the Grand Marais Drain - Version 2 (27Aug2019)

WARNING 04: minimum elevation drop used for Conduit C103A
WARNING 03: negative offset ignored for Link C107
WARNING 03: negative offset ignored for Link C11_1
WARNING 03: negative offset ignored for Link C50
WARNING 03: negative offset ignored for Link C55
WARNING 04: minimum elevation drop used for Conduit CJ10016.1
WARNING 04: minimum elevation drop used for Conduit CJ10066.1
WARNING 04: minimum elevation drop used for Conduit CJ10475.3
WARNING 03: negative offset ignored for Link CJ10614.5
WARNING 04: minimum elevation drop used for Conduit CJ10614.5
WARNING 04: minimum elevation drop used for Conduit CJ10694.8
WARNING 04: minimum elevation drop used for Conduit CJ11913.3
WARNING 04: minimum elevation drop used for Conduit CJ11919.8
WARNING 03: negative offset ignored for Link CJ12415.2
WARNING 03: negative offset ignored for Link CJ12627.6
WARNING 03: negative offset ignored for Link CJ7026.4
WARNING 03: negative offset ignored for Link CJ8696.4
WARNING 04: minimum elevation drop used for Conduit CJ8716.3
WARNING 04: minimum elevation drop used for Conduit CJ9902.3
WARNING 04: minimum elevation drop used for Conduit CJ9966.3
WARNING 03: negative offset ignored for Link Temple_Open
WARNING 02: maximum depth increased for Node J10016.1
WARNING 02: maximum depth increased for Node J10066.1
WARNING 02: maximum depth increased for Node J10094.5
WARNING 02: maximum depth increased for Node J10144.4
WARNING 02: maximum depth increased for Node J10244.4
WARNING 02: maximum depth increased for Node J10344.4
WARNING 02: maximum depth increased for Node J10614.5
WARNING 02: maximum depth increased for Node J10694.8
WARNING 02: maximum depth increased for Node J10749
WARNING 02: maximum depth increased for Node J11048.5
WARNING 02: maximum depth increased for Node J11248.4
WARNING 02: maximum depth increased for Node J11648.4
WARNING 02: maximum depth increased for Node J11748.1
WARNING 02: maximum depth increased for Node J118
WARNING 02: maximum depth increased for Node J11848.1
WARNING 02: maximum depth increased for Node J11881.3
WARNING 02: maximum depth increased for Node J11896.4
WARNING 02: maximum depth increased for Node J11913.3
WARNING 02: maximum depth increased for Node J11919.8
WARNING 02: maximum depth increased for Node J12091.1
WARNING 02: maximum depth increased for Node J12177.5
WARNING 02: maximum depth increased for Node J12213.2
WARNING 02: maximum depth increased for Node J12263.1
WARNING 02: maximum depth increased for Node J12359.8
WARNING 02: maximum depth increased for Node J12390.7
WARNING 02: maximum depth increased for Node J12418
WARNING 02: maximum depth increased for Node J12442.1
WARNING 02: maximum depth increased for Node J12491.9
WARNING 02: maximum depth increased for Node J12524.2
WARNING 02: maximum depth increased for Node J12613.3
WARNING 02: maximum depth increased for Node J12641.2
WARNING 02: maximum depth increased for Node J12676.2
WARNING 02: maximum depth increased for Node J201
WARNING 02: maximum depth increased for Node J6318.4
WARNING 02: maximum depth increased for Node J6357.5
WARNING 02: maximum depth increased for Node J6507.5
WARNING 02: maximum depth increased for Node J6653.2
WARNING 02: maximum depth increased for Node J6801
WARNING 02: maximum depth increased for Node J7040.9
WARNING 02: maximum depth increased for Node J7055.4
WARNING 02: maximum depth increased for Node J7157.8
WARNING 02: maximum depth increased for Node J7307
WARNING 02: maximum depth increased for Node J7564
WARNING 02: maximum depth increased for Node J7578.9
WARNING 02: maximum depth increased for Node J7681.8
WARNING 02: maximum depth increased for Node J7762.1
WARNING 02: maximum depth increased for Node J7885.5
WARNING 02: maximum depth increased for Node J8086
WARNING 02: maximum depth increased for Node J8485.6
WARNING 02: maximum depth increased for Node J8696.4
WARNING 02: maximum depth increased for Node J8716.3
WARNING 02: maximum depth increased for Node J8768.8
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WARNING 02: maximum depth increased for Node J8872.8
WARNING 02: maximum depth increased for Node J9058.4
WARNING 02: maximum depth increased for Node J9090.7
WARNING 02: maximum depth increased for Node J9204.3
WARNING 02: maximum depth increased for Node J9294.7
WARNING 02: maximum depth increased for Node J9313.3
WARNING 02: maximum depth increased for Node J9812.9
WARNING 02: maximum depth increased for Node J9829.2
WARNING 02: maximum depth increased for Node J9843.1
WARNING 02: maximum depth increased for Node J9881.6
WARNING 02: maximum depth increased for Node J9902.3
WARNING 02: maximum depth increased for Node J9923.8
WARNING 02: maximum depth increased for Node J9966.3

****
Element Count
****
Number of rain gages 18
Number of subcatchments ... 53
Number of nodes 195
Number of links 209
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_100yr_12hr_t1hr	Chicago_100yr_12hr_t1hr	INTENSITY	60 min.
Chicago_100yr_4h	Chicago_100yr_4h	INTENSITY	15 min.
Chicago_100yr_6hrDuation_1hrTimesteps	Chicago_100yr_6hrDuation_1hrTimesteps	INTENSITY	60 min.
Chicago_12h	Chicago_12h	INTENSITY	15 min.
Chicago_25yr_4h	Chicago_25yr_4h	INTENSITY	15 min.
Chicago_3h	Chicago_3h	INTENSITY	1 min.
Chicago_5yr_4h	Chicago_5yr_4h	INTENSITY	5 min.
GrandMaraisAug2017	GMAug2017	INTENSITY	15 min.
GrandMaraisNov2017	GrandMaraisNov2017	INTENSITY	15 min.
HowardAug2017	HowardAug2017	INTENSITY	15 min.
HowardNov2017	HowardNov2017	INTENSITY	15 min.
HuronEstatesAug2017	HuronEstateAug2017	INTENSITY	15 min.
HuronEstatesNov2017	HuronEstatesNov2017	INTENSITY	15 min.
June17,18-2014	June17,18-2014	VOLUME	15 min.
May25-27,2011	May25-27,2011	INTENSITY	60 min.
May27,28-2014	May27,28-2014	VOLUME	15 min.
October1995	Oct3-6,1995	INTENSITY	60 min.
Sept10-12,2000	Sept10-12,2000	INTENSITY	15 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S101	88.00	400.00	70.00	0.2000	Chicago_100yr_4h	J10
S101B	41.77	298.38	52.00	0.2000	Chicago_100yr_4h	J101B
S102	91.48	914.78	45.00	0.2000	Chicago_100yr_4h	SU102
S102B	57.63	384.19	45.00	0.2000	Chicago_100yr_4h	J102B
S103	51.71	738.72	45.00	0.2000	Chicago_100yr_4h	J103
S104	86.20	907.41	57.00	0.2000	Chicago_100yr_4h	SU104
S105	73.85	492.32	98.00	0.2000	Chicago_100yr_4h	J105
S106	25.86	1292.97	39.00	0.2000	Chicago_100yr_4h	J12955.5
S107	52.20	372.86	60.00	0.2000	Chicago_100yr_4h	J107
S108A	12.00	342.97	25.00	0.2000	Chicago_100yr_4h	SU108A
S108B	15.31	191.33	30.00	0.2000	Chicago_100yr_4h	SU108B
S109	56.30	866.17	47.00	0.2000	Chicago_100yr_4h	J109
S110	100.00	416.67	67.00	0.2000	Chicago_100yr_4h	J110
S111	73.73	670.29	36.00	0.2000	Chicago_100yr_4h	J97
S112	38.72	968.05	45.00	0.2000	Chicago_100yr_4h	J64
S113	72.92	560.94	40.00	0.2000	Chicago_100yr_4h	J113
S114	83.80	419.00	52.00	0.2000	Chicago_100yr_4h	J1145
S115	30.00	300.00	2.00	0.2000	Chicago_100yr_4h	J1145
S116A	44.00	314.29	53.00	0.2000	Chicago_100yr_4h	J116A
S116B	9.87	109.67	45.00	0.2000	Chicago_100yr_4h	J116B
S117	19.45	972.73	56.00	0.2000	Chicago_100yr_4h	J10444.3
S118	101.28	779.06	51.00	0.2000	Chicago_100yr_4h	J118
S119	48.15	535.03	78.00	0.2000	Chicago_100yr_4h	J118

S121	38.08	476.04	25.00	0.2000	Chicago_100yr_4h	J32
S201	8.38	186.27	40.00	0.2000	Chicago_100yr_4h	J201
S202	45.00	529.41	30.00	0.2000	Chicago_100yr_4h	J50
S203	41.53	415.28	45.00	0.2000	Chicago_100yr_4h	J203
S204A	21.48	536.98	2.00	0.2000	Chicago_100yr_4h	J204A
S204B	8.93	297.62	5.00	0.2000	Chicago_100yr_4h	J204B
S205	23.41	212.77	2.00	0.2000	Chicago_100yr_4h	J205
S206	97.12	539.53	37.00	0.2000	Chicago_100yr_4h	J48
S207	30.05	500.91	45.00	0.2000	Chicago_100yr_4h	J207
S208	29.97	299.74	43.00	0.2000	Chicago_100yr_4h	J208
S209	38.97	433.04	38.00	0.2000	Chicago_100yr_4h	J209
S301	125.95	1259.49	70.00	0.2000	Chicago_100yr_4h	J301
S302A	18.30	457.45	3.00	0.2000	Chicago_100yr_4h	J44
S302B	39.62	396.21	43.00	0.2000	Chicago_100yr_4h	J302B
S303	44.91	449.09	44.00	0.2000	Chicago_100yr_4h	J21
S304	44.27	402.44	44.00	0.2000	Chicago_100yr_4h	J31
S305	25.20	280.02	54.00	0.2000	Chicago_100yr_4h	J56
S306	70.00	1000.00	55.00	0.2000	Chicago_100yr_4h	J9204.3
S307	38.00	345.45	40.00	0.2000	Chicago_100yr_4h	J6
S308	84.00	466.67	40.00	0.2000	Chicago_100yr_4h	J18
S309	39.00	260.00	50.00	0.2000	Chicago_100yr_4h	J20
S310	24.00	342.86	50.00	0.2000	Chicago_100yr_4h	J59
S311	56.00	373.33	45.00	0.2000	Chicago_100yr_4h	J58
S312A	51.68	234.91	50.00	0.2000	Chicago_100yr_4h	J35
S312B	60.00	300.00	64.00	0.2000	Chicago_100yr_4h	J37
S313	12.39	412.94	70.00	0.2000	Chicago_100yr_4h	J33
S314A	25.00	277.78	45.00	0.2000	Chicago_100yr_4h	J314A
S314B	12.73	127.31	38.00	0.2000	Chicago_100yr_4h	J314B
S315	36.30	279.23	50.00	0.2000	Chicago_100yr_4h	J315
S316	60.00	400.00	40.00	0.2000	Chicago_100yr_4h	J34

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	181.94	4.20	0.0	
J10	JUNCTION	180.45	4.00	88000.0	
J10016.1	JUNCTION	180.60	4.71	0.0	
J10066.1	JUNCTION	180.60	4.71	0.0	
J10094.5	JUNCTION	180.85	5.62	0.0	
J101	JUNCTION	180.30	3.00	0.0	
J10144.4	JUNCTION	179.87	5.62	0.0	
J101B	JUNCTION	180.50	3.40	130000.0	
J102	JUNCTION	182.40	3.00	0.0	
J10244.4	JUNCTION	179.91	6.63	0.0	
J102B	JUNCTION	185.80	1.20	0.0	
J103	JUNCTION	183.15	4.50	51000.0	
J10344.4	JUNCTION	179.97	6.63	0.0	
J103B	JUNCTION	185.62	2.00	0.0	
J10444.3	JUNCTION	180.15	5.32	0.0	
J10475.3	JUNCTION	180.15	5.20	0.0	
J105	JUNCTION	182.23	4.00	0.0	
J10500	JUNCTION	180.10	5.51	0.0	
J10614.5	JUNCTION	180.10	5.30	0.0	
J10679.3	JUNCTION	179.50	5.19	0.0	
J10694.8	JUNCTION	179.55	6.16	0.0	
J107	JUNCTION	183.32	4.88	52000.0	
J10749	JUNCTION	180.15	6.02	0.0	
J10848.5	JUNCTION	180.20	6.02	0.0	
J109	JUNCTION	182.73	3.77	56000.0	
J11	JUNCTION	180.51	4.00	88000.0	
J110	JUNCTION	181.96	6.64	90000.0	
J11048.5	JUNCTION	180.30	5.77	0.0	
J112	JUNCTION	180.28	3.32	0.0	
J11248.4	JUNCTION	180.40	5.85	0.0	
J113	JUNCTION	182.34	4.66	73000.0	
J11448.4	JUNCTION	180.50	5.85	0.0	
J1145	JUNCTION	185.30	3.00	113000.0	
J11648.4	JUNCTION	180.75	5.24	0.0	
J116A	JUNCTION	182.09	2.81	44000.0	
J116B	JUNCTION	181.78	2.02	10000.0	
J11748.1	JUNCTION	181.10	5.92	0.0	
J118	JUNCTION	182.60	3.00	263000.0	
J11848.1	JUNCTION	181.40	5.96	0.0	
J11881.3	JUNCTION	181.48	6.61	0.0	
J11896.4	JUNCTION	180.40	7.71	0.0	

J11913.3	JUNCTION	180.40	6.62	0.0
J11919.8	JUNCTION	180.70	6.32	0.0
J11939.6	JUNCTION	180.90	6.23	0.0
J11972.5	JUNCTION	180.92	5.45	0.0
J12	JUNCTION	183.19	1.50	88000.0
J12011.7	JUNCTION	180.94	5.31	0.0
J12037.2	JUNCTION	181.06	6.26	0.0
J12067.5	JUNCTION	181.07	4.54	0.0
J12091.1	JUNCTION	181.08	6.45	0.0
J12117.3	JUNCTION	181.09	6.49	0.0
J12152.8	JUNCTION	181.10	6.47	0.0
J12160.9	JUNCTION	181.50	6.04	0.0
J12177.5	JUNCTION	181.50	6.28	0.0
J12213.2	JUNCTION	181.54	6.27	0.0
J12263.1	JUNCTION	181.54	5.91	0.0
J12330.4	JUNCTION	181.60	5.84	0.0
J12340	JUNCTION	181.60	5.84	0.0
J12359.8	JUNCTION	181.73	5.72	0.0
J12390.7	JUNCTION	181.77	5.72	0.0
J12415.2	JUNCTION	181.98	5.15	0.0
J12418	JUNCTION	181.77	5.95	0.0
J12442.1	JUNCTION	181.80	5.95	0.0
J12491.9	JUNCTION	181.82	5.33	0.0
J12524.2	JUNCTION	181.84	5.43	0.0
J12591.8	JUNCTION	181.86	5.43	0.0
J12613.3	JUNCTION	181.90	5.39	0.0
J12627.6	JUNCTION	182.10	5.03	0.0
J12641.2	JUNCTION	182.15	4.99	0.0
J12676.2	JUNCTION	182.30	5.23	0.0
J12795	JUNCTION	182.33	5.23	0.0
J12955.5	JUNCTION	180.72	8.31	0.0
J13	JUNCTION	180.57	3.83	0.0
J18	JUNCTION	179.00	4.00	84000.0
J19	JUNCTION	180.60	4.40	0.0
J2	JUNCTION	182.04	4.86	0.0
J20	JUNCTION	180.30	2.70	40000.0
J201	JUNCTION	180.29	1.50	8000.0
J203	JUNCTION	180.85	3.00	74000.0
J204A	JUNCTION	181.75	3.00	20000.0
J204B	JUNCTION	182.85	1.00	32000.0
J205	JUNCTION	182.90	2.00	0.0
J207	JUNCTION	181.37	3.50	50000.0
J208	JUNCTION	179.49	3.67	30000.0
J209	JUNCTION	176.90	5.00	344000.0
J21	JUNCTION	180.50	2.60	45000.0
J22	JUNCTION	182.41	4.00	100000.0
J23	JUNCTION	182.26	4.50	156000.0
J3	JUNCTION	181.75	4.85	0.0
J301	JUNCTION	181.17	5.00	125000.0
J302B	JUNCTION	180.39	2.97	40000.0
J31	JUNCTION	180.50	2.40	44000.0
J314A	JUNCTION	181.35	3.50	30000.0
J314B	JUNCTION	181.94	3.50	12000.0
J315	JUNCTION	180.90	3.50	40000.0
J32	JUNCTION	181.54	2.35	0.0
J33	JUNCTION	183.00	3.50	12000.0
J34	JUNCTION	184.49	2.81	60000.0
J35	JUNCTION	179.35	4.45	111000.0
J36	JUNCTION	184.59	2.71	0.0
J37	JUNCTION	181.50	2.20	70000.0
J4	JUNCTION	181.46	5.04	0.0
J44	JUNCTION	180.65	3.00	144000.0
J45	JUNCTION	182.80	2.30	0.0
J46	JUNCTION	180.68	3.10	0.0
J47	JUNCTION	178.72	4.43	0.0
J48	JUNCTION	177.92	4.00	305000.0
J5	JUNCTION	181.16	4.74	0.0
J50	JUNCTION	178.90	4.30	0.0
J53	JUNCTION	187.60	1.50	0.0
J56	JUNCTION	180.50	2.70	25000.0
J57	JUNCTION	0.00	0.00	0.0
J58	JUNCTION	181.50	1.80	56000.0
J59	JUNCTION	180.70	2.70	24000.0
J6	JUNCTION	180.25	1.95	38000.0
J61	JUNCTION	183.10	5.20	0.0
J6318.4	JUNCTION	175.61	7.45	0.0
J6357.5	JUNCTION	175.67	7.21	0.0
J64	JUNCTION	182.50	2.90	39000.0
J65	JUNCTION	182.56	3.04	0.0

J6507.5	JUNCTION	175.83	7.29	0.0
J66	JUNCTION	182.52	2.78	0.0
J6653.2	JUNCTION	175.97	7.29	0.0
J67	JUNCTION	182.47	2.73	0.0
J68	JUNCTION	182.43	2.77	0.0
J6801	JUNCTION	176.13	7.72	0.0
J69	JUNCTION	182.39	2.81	0.0
J7	JUNCTION	186.73	1.12	0.0
J70	JUNCTION	182.35	2.85	0.0
J7040.9	JUNCTION	176.40	7.72	0.0
J7055.4	JUNCTION	176.50	7.27	0.0
J71	JUNCTION	182.31	2.79	0.0
J7157.8	JUNCTION	176.60	7.27	0.0
J7307	JUNCTION	176.75	6.96	0.0
J7357.6	JUNCTION	176.80	6.96	0.0
J7564	JUNCTION	176.98	6.54	0.0
J7578.9	JUNCTION	176.99	6.54	0.0
J7681.8	JUNCTION	177.07	6.53	0.0
J77	JUNCTION	182.51	5.73	0.0
J7762.1	JUNCTION	177.14	6.28	0.0
J7784.1	JUNCTION	177.15	6.50	0.0
J78	JUNCTION	182.49	5.38	0.0
J7885.5	JUNCTION	177.23	6.48	0.0
J79	JUNCTION	182.47	5.04	0.0
J8	JUNCTION	186.08	2.25	0.0
J80	JUNCTION	182.45	4.69	0.0
J8086	JUNCTION	177.38	6.35	0.0
J81	JUNCTION	182.43	4.35	0.0
J82	JUNCTION	181.89	6.31	0.0
J8285.6	JUNCTION	177.53	6.26	0.0
J83	JUNCTION	181.82	5.98	0.0
J84	JUNCTION	181.75	5.65	0.0
J8485.6	JUNCTION	177.67	6.29	0.0
J85	JUNCTION	181.68	5.32	0.0
J86	JUNCTION	181.61	4.99	0.0
J8696.4	JUNCTION	177.81	6.29	0.0
J87	JUNCTION	181.54	4.66	0.0
J8716.3	JUNCTION	177.81	6.17	0.0
J8768.8	JUNCTION	177.84	6.17	0.0
J88	JUNCTION	181.47	4.33	0.0
J8872.8	JUNCTION	177.91	6.05	0.0
J8915.1	JUNCTION	177.94	6.40	0.0
J9	JUNCTION	180.87	4.33	0.0
J9023.5	JUNCTION	178.88	5.42	0.0
J9036.3	JUNCTION	178.89	5.43	0.0
J9058.4	JUNCTION	179.00	5.28	0.0
J9090.7	JUNCTION	179.20	5.28	0.0
J9204.3	JUNCTION	179.30	5.25	0.0
J9223.6	JUNCTION	179.33	4.37	0.0
J9243.4	JUNCTION	179.37	4.63	0.0
J9283.1	JUNCTION	179.39	7.61	0.0
J9294.7	JUNCTION	180.25	6.61	0.0
J9313.3	JUNCTION	180.30	6.57	0.0
J9338.7	JUNCTION	180.28	6.72	0.0
J9385.8	JUNCTION	180.09	8.41	0.0
J9499.8	JUNCTION	178.34	10.16	0.0
J9528.4	JUNCTION	178.35	9.54	0.0
J9563	JUNCTION	178.36	8.63	0.0
J9597.4	JUNCTION	178.37	7.73	0.0
J97	JUNCTION	180.91	3.09	73000.0
J9789.2	JUNCTION	180.25	4.34	0.0
J9802	JUNCTION	180.31	3.58	0.0
J9812.9	JUNCTION	180.40	3.84	0.0
J9829.2	JUNCTION	180.43	3.89	0.0
J9843.1	JUNCTION	180.47	4.06	0.0
J9881.6	JUNCTION	180.54	4.25	0.0
J9902.3	JUNCTION	180.53	4.26	0.0
J9912	JUNCTION	180.57	4.01	0.0
J9923.8	JUNCTION	180.60	4.18	0.0
J9966.3	JUNCTION	180.60	4.36	0.0
J6291.6	OUTFALL	175.65	7.40	0.0
SU102	STORAGE	182.00	3.50	0.0
SU104	STORAGE	184.60	4.00	0.0
SU108A	STORAGE	182.08	4.00	0.0
SU108B	STORAGE	182.23	4.00	0.0

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Link Summary

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Name	From Node	To Node	Type	Length	%Slope	Roughness
C100	J59	J8086	CONDUIT	45.7	1.4873	0.0130
C101	J58	J8485.6	CONDUIT	71.0	0.8062	0.0130
C103A	J103	J103B	CONDUIT	10.0	0.0030	0.0130
C107	J107	J11919.8	CONDUIT	158.5	1.3929	0.0130
C11_1	J101B	J1	CONDUIT	25.4	-5.4966	0.0130
C11_2	J1	J12676.2	CONDUIT	12.9	0.3861	0.0130
C110_1	J110	J82	CONDUIT	119.1	0.0588	0.0130
C110_2	J82	J83	CONDUIT	119.1	0.0588	0.0130
C110_3	J83	J84	CONDUIT	119.1	0.0588	0.0130
C110_4	J84	J85	CONDUIT	119.1	0.0588	0.0130
C110_5	J85	J86	CONDUIT	119.1	0.0588	0.0130
C110_6	J86	J87	CONDUIT	119.1	0.0588	0.0130
C110_7	J87	J88	CONDUIT	119.1	0.0588	0.0130
C110_8	J88	J11648.4	CONDUIT	119.1	0.0588	0.0130
C113_1	J113	J2	CONDUIT	108.3	0.2715	0.0130
C113_2	J2	J3	CONDUIT	108.3	0.2715	0.0130
C113_3	J3	J4	CONDUIT	108.3	0.2715	0.0130
C113_4	J4	J5	CONDUIT	108.3	0.2706	0.0130
C113_5	J5	J9	CONDUIT	108.3	0.2715	0.0130
C113_6	J9	J13	CONDUIT	108.3	0.2715	0.0130
C113_7	J13	J112	CONDUIT	108.3	0.2716	0.0130
C13	J10	J101	CONDUIT	21.0	0.6988	0.0130
C14	J10	J11	CONDUIT	9.2	-0.1847	0.0130
C15	J11	J101B	CONDUIT	10.0	0.5511	0.0130
C16	J101	J12	CONDUIT	13.3	-22.2367	0.0130
C25	J112	J10679.3	CONDUIT	66.1	0.2965	0.0240
C26	J19	J9597.4	CONDUIT	83.4	0.0959	0.0130
C27	J105	J12177.5	CONDUIT	47.0	0.7447	0.0130
C28	J105	J12177.5	CONDUIT	46.0	0.8196	0.0130
C29	J105	J12177.5	CONDUIT	65.0	0.4508	0.0130
C30	J105	J12177.5	CONDUIT	39.0	0.8975	0.0130
C31	J110	J23	CONDUIT	563.6	0.0248	0.0130
C32_1	J110	J77	CONDUIT	118.8	0.0160	0.0130
C32_2	J77	J78	CONDUIT	118.8	0.0160	0.0130
C32_3	J78	J79	CONDUIT	118.8	0.0160	0.0130
C32_4	J79	J80	CONDUIT	118.8	0.0168	0.0130
C32_5	J80	J81	CONDUIT	118.8	0.0160	0.0130
C32_6	J81	J22	CONDUIT	118.8	0.0160	0.0130
C33	J22	J12037.2	CONDUIT	107.2	0.6623	0.0130
C34	J23	J12037.2	CONDUIT	257.3	0.2177	0.0130
C35	J109	J23	CONDUIT	134.3	0.1042	0.0130
C36	J109	J11648.4	CONDUIT	308.1	-0.0214	0.0130
C38	J109	J23	CONDUIT	27.0	1.9448	0.0130
C39	SU108B	J11248.4	CONDUIT	75.0	0.5867	0.0130
C4_1	J1145	J61	CONDUIT	828.5	0.2655	0.0130
C4_2	J61	J118	CONDUIT	1169.5	0.0428	0.0800
C40	SU108A	J11648.4	CONDUIT	84.0	0.7631	0.0130
C44	J116A	J10016.1	CONDUIT	69.2	0.0679	0.0130
C46	J116B	J32	CONDUIT	166.9	0.1402	0.0130
C47	J32	J9789.2	CONDUIT	83.2	1.1960	0.0240
C48	J33	J9313.3	CONDUIT	20.0	2.5008	0.0130
C49	J35	J9204.3	CONDUIT	45.8	0.1091	0.0130
C50	J34	J36	CONDUIT	35.2	-0.2784	0.0130
C51	J36	J35	CONDUIT	733.5	0.7144	0.0400
C52	J37	J9090.7	CONDUIT	109.2	1.5017	0.0130
C53	J37	J8915.1	CONDUIT	74.0	2.6900	0.0130
C54	J314B	J314A	CONDUIT	262.8	0.2253	0.0130
C55	J314A	J8285.6	CONDUIT	1249.7	0.3059	0.0130
C56	J315	J7885.5	CONDUIT	1072.5	0.1117	0.0130
C57	J301	J44	CONDUIT	659.7	0.0558	0.0130
C61_4	J97	J11048.5	CONDUIT	97.0	0.3743	0.0130
C62	J44	J8716.3	CONDUIT	602.0	0.3719	0.0130
C63	J302B	J8716.3	CONDUIT	676.2	0.2934	0.0130
C64	J204A	J207	CONDUIT	207.2	0.1559	0.0130
C65	J205	J204B	CONDUIT	226.5	0.0221	0.0300
C67	J207	J46	CONDUIT	589.5	0.1184	0.0130
C7_1	J118	J65	CONDUIT	55.3	0.0759	0.0500
C7_2	J65	J66	CONDUIT	55.3	0.0741	0.0500
C7_3	J66	J67	CONDUIT	55.3	0.0759	0.0500
C7_4	J67	J68	CONDUIT	55.3	0.0741	0.0500
C7_5	J68	J69	CONDUIT	55.3	0.0759	0.0500
C7_6	J69	J70	CONDUIT	55.3	0.0741	0.0500
C7_7	J70	J71	CONDUIT	55.3	0.0741	0.0500
C7_8	J71	J19	CONDUIT	55.3	0.0759	0.0500
C71	J208	J48	CONDUIT	329.0	0.4763	0.0130
C76	J201	J48	CONDUIT	999.1	0.2368	0.0130

C85	J204B	J45	CONDUIT	162.1	0.0309	0.0300
C89	J64	J11048.5	CONDUIT	78.8	1.1427	0.0130
C94	J6	J6507.5	CONDUIT	247.6	0.3029	0.0130
C95	J18	J7357.6	CONDUIT	77.5	1.0694	0.0130
C96	J20	J7564	CONDUIT	68.9	1.4538	0.0130
C97	J21	J6801	CONDUIT	128.5	0.3643	0.0130
C98	J31	J7040.9	CONDUIT	111.0	0.6209	0.0130
C99	J56	J7564	CONDUIT	121.8	0.4443	0.0130
Central_Deziel	J53	J7	CONDUIT	380.0	0.2289	0.0300
Central_ECR	J8	J12955.5	CONDUIT	1019.8	0.2040	0.0400
Central_ECR_Cul	J7	J8	CONDUIT	129.2	0.5031	0.0240
Central_NServRoad	J102B	SU102	CONDUIT	533.1	0.7128	0.0300
Central_Pond_600CSP	SU102	J102	CONDUIT	10.0	0.5000	0.0240
Central_Pond_600HDPE	SU102	J102	CONDUIT	10.0	14.5517	0.0240
Central_Pond_900	SU102	J102	CONDUIT	10.0	10.0504	0.0240
CJ10016.1	J10016.1	J9966.3	CONDUIT	49.9	0.0006	0.0420
CJ10066.1	J10066.1	J10016.1	CONDUIT	50.0	0.0006	0.0420
CJ10094.5	J10094.5	J10066.1	CONDUIT	28.3	0.8828	0.0390
CJ10144.4	J10144.4	J10094.5	CONDUIT	49.9	-1.9631	0.0380
CJ10244.4	J10244.4	J10144.4	CONDUIT	100.0	0.0400	0.0430
CJ10344.4	J10344.4	J10244.4	CONDUIT	100.0	0.0600	0.0400
CJ10444.3	J10444.3	J10344.4	CONDUIT	99.9	0.1802	0.0390
CJ10475.3	J10475.3	J10444.3	CONDUIT	30.5	0.0010	0.0390
CJ10500	J10500	J10475.3	CONDUIT	24.7	1.7831	0.0130
CJ10500_2	J10500	J10475.3	CONDUIT	24.7	1.7430	0.0130
CJ10614.5	J10614.5	J10500	CONDUIT	114.4	0.0003	0.0300
CJ10679.3	J10679.3	J10614.5	CONDUIT	64.8	0.0154	0.0300
CJ10694.8	J10694.8	J10679.3	CONDUIT	15.5	0.0020	0.0130
CJ10749	J10749	J10694.8	CONDUIT	54.2	0.0184	0.0410
CJ10848.5	J10848.5	J10749	CONDUIT	99.5	0.0503	0.0410
CJ11048.5	J11048.5	J10848.5	CONDUIT	200.0	0.0500	0.0400
CJ11248.4	J11248.4	J11048.5	CONDUIT	200.0	0.0500	0.0420
CJ11448.4	J11448.4	J11248.4	CONDUIT	200.0	0.0500	0.0380
CJ11648.4	J11648.4	J11448.4	CONDUIT	200.0	0.1250	0.0390
CJ11748.1	J11748.1	J11648.4	CONDUIT	99.7	0.3509	0.0400
CJ11848.1	J11848.1	J11748.1	CONDUIT	100.0	0.2999	0.0300
CJ11881.3	J11881.3	J11848.1	CONDUIT	33.2	0.2413	0.0300
CJ11896.4	J11896.4	J11881.3	CONDUIT	15.1	0.1327	0.0300
CJ11913.3	J11913.3	J11896.4	CONDUIT	17.0	0.0018	0.0110
CJ11919.8	J11919.8	J11913.3	CONDUIT	6.5	0.0047	0.0300
CJ11939.6	J11939.6	J11919.8	CONDUIT	19.7	1.0137	0.0300
CJ11972.5	J11972.5	J11939.6	CONDUIT	32.9	0.0608	0.0300
CJ12011.7	J12011.7	J11972.5	CONDUIT	39.4	0.0508	0.0300
CJ12037.2	J12037.2	J12011.7	CONDUIT	25.5	0.1963	0.0110
CJ12067.5	J12067.5	J12037.2	CONDUIT	30.3	0.0330	0.0250
CJ12091.1	J12091.1	J12067.5	CONDUIT	23.6	0.0423	0.0250
CJ12117.3	J12117.3	J12091.1	CONDUIT	26.2	0.0381	0.0250
CJ12152.8	J12152.8	J12117.3	CONDUIT	35.2	0.0284	0.0250
CJ12160.9	J12160.9	J12152.8	CONDUIT	8.1	-0.6163	0.0110
CJ12177.5	J12177.5	J12160.9	CONDUIT	16.7	0.0600	0.0110
CJ12213.2	J12213.2	J12177.5	CONDUIT	35.6	0.0842	0.0250
CJ12263.1	J12263.1	J12213.2	CONDUIT	49.9	0.0601	0.0250
CJ12330.4	J12330.4	J12263.1	CONDUIT	67.2	0.1042	0.0250
CJ12340	J12340	J12330.4	CONDUIT	9.6	0.1043	0.0110
CJ12359.8	J12359.8	J12340	CONDUIT	19.9	0.6543	0.0250
CJ12390.7	J12390.7	J12359.8	CONDUIT	31.0	0.1292	0.0250
CJ12415.2	J12415.2	J12390.7	CONDUIT	24.3	0.8639	0.0250
CJ12418	J12418	J12415.2	CONDUIT	2.8	0.7097	0.0250
CJ12442.1	J12442.1	J12418	CONDUIT	24.3	0.1237	0.0250
CJ12491.9	J12491.9	J12442.1	CONDUIT	49.9	0.0401	0.0250
CJ12524.2	J12524.2	J12491.9	CONDUIT	32.3	0.0619	0.0250
CJ12591.8	J12591.8	J12524.2	CONDUIT	67.5	0.0296	0.0250
CJ12613.3	J12613.3	J12591.8	CONDUIT	21.5	0.1861	0.0250
CJ12627.6	J12627.6	J12613.3	CONDUIT	14.4	1.3940	0.0250
CJ12641.2	J12641.2	J12627.6	CONDUIT	13.5	0.3921	0.0250
CJ12676.2	J12676.2	J12641.2	CONDUIT	35.1	0.3992	0.0300
CJ12795	J12795	J12676.2	CONDUIT	118.8	0.0253	0.0300
CJ12894.8	J12955.5	J12795	CONDUIT	99.8	0.0601	0.0300
CJ6318.4	J6318.4	J6291.6	CONDUIT	26.8	0.0374	0.0150
CJ6357.5	J6357.5	J6318.4	CONDUIT	39.1	0.0256	0.0150
CJ6507.5	J6507.5	J6357.5	CONDUIT	149.8	0.1068	0.0150
CJ6653.2	J6653.2	J6507.5	CONDUIT	145.7	0.0961	0.0150
CJ6801	J6801	J6653.2	CONDUIT	147.7	0.1097	0.0150
CJ7026.4	J7040.9	J6801	CONDUIT	239.9	0.1117	0.0150
CJ7055.4	J7055.4	J7040.9	CONDUIT	14.6	0.6870	0.0150
CJ7157.8	J7157.8	J7055.4	CONDUIT	102.4	0.0977	0.0150
CJ7307	J7307	J7157.8	CONDUIT	149.0	0.1007	0.0150
CJ7357.6	J7357.6	J7307	CONDUIT	50.8	0.0984	0.0150
CJ7564	J7564	J7357.6	CONDUIT	206.4	0.0872	0.0150

CJ7578.9	J7578.9	J7564	CONDUIT	14.8	0.0674	0.0150
CJ7681.8	J7681.8	J7578.9	CONDUIT	103.0	0.0680	0.0150
CJ7762.1	J7762.1	J7681.8	CONDUIT	80.3	0.0872	0.0150
CJ7784.1	J7784.1	J7762.1	CONDUIT	22.0	0.0455	0.0150
CJ7885.5	J7885.5	J7784.1	CONDUIT	101.5	0.0789	0.0150
CJ8086	J8086	J7885.5	CONDUIT	200.3	0.0749	0.0150
CJ8285.6	J8285.6	J8086	CONDUIT	199.7	0.0751	0.0150
CJ8485.6	J8485.6	J8285.6	CONDUIT	200.0	0.0700	0.0150
CJ8696.4	J8696.4	J8485.6	CONDUIT	210.8	0.0664	0.0150
CJ8716.3	J8716.3	J8696.4	CONDUIT	20.0	0.0015	0.0150
CJ8768.8	J8768.8	J8716.3	CONDUIT	52.5	0.0571	0.0150
CJ8872.8	J8872.8	J8768.8	CONDUIT	104.0	0.0865	0.0150
CJ8915.1	J8915.1	J8872.8	CONDUIT	42.3	0.0638	0.0150
CJ9023.5	J9023.5	J8915.1	CONDUIT	108.4	0.8489	0.0300
CJ9036.3	J9036.3	J9023.5	CONDUIT	12.8	0.0781	0.0300
CJ9058.4	J9058.4	J9036.3	CONDUIT	22.1	0.4983	0.0300
CJ9090.7	J9090.7	J9058.4	CONDUIT	32.2	0.6204	0.0300
CJ9204.3	J9204.3	J9090.7	CONDUIT	113.6	0.0880	0.0300
CJ9223.6	J9223.6	J9204.3	CONDUIT	19.3	0.2595	0.0200
CJ9243.4	J9243.4	J9223.6	CONDUIT	19.8	0.2015	0.0250
CJ9283.1	J9283.1	J9243.4	CONDUIT	39.7	0.0504	0.0200
CJ9294.7	J9294.7	J9283.1	CONDUIT	11.5	0.1733	0.0250
CJ9313.3	J9313.3	J9294.7	CONDUIT	18.6	0.2685	0.0250
CJ9338.7	J9338.7	J9313.3	CONDUIT	19.3	-0.1036	0.0300
CJ9385.8	J9385.8	J9338.7	CONDUIT	47.1	0.2547	0.0300
CJ9499.8	J9499.8	J9385.8	CONDUIT	114.0	0.0368	0.0250
CJ9528.4	J9528.4	J9499.8	CONDUIT	28.6	0.0349	0.0180
CJ9563	J9563	J9528.4	CONDUIT	34.4	0.0290	0.0180
CJ9597.4	J9597.4	J9563	CONDUIT	34.4	0.0290	0.0180
CJ9789.2	J9789.2	J9597.4	CONDUIT	185.9	0.0409	0.0250
CJ9802	J9802	J9789.2	CONDUIT	12.9	0.4668	0.0200
CJ9812.9	J9812.9	J9802	CONDUIT	10.9	0.8260	0.0110
CJ9829.2	J9829.2	J9812.9	CONDUIT	16.4	0.1834	0.0290
CJ9843.1	J9843.1	J9829.2	CONDUIT	13.9	0.2880	0.0390
CJ9881.6	J9881.6	J9843.1	CONDUIT	38.5	0.1819	0.0350
CJ9902.3	J9902.3	J9881.6	CONDUIT	20.8	0.0015	0.0500
CJ9912	J9912	J9902.3	CONDUIT	9.7	0.1032	0.0110
CJ9923.8	J9923.8	J9912	CONDUIT	11.8	0.2542	0.0400
CJ9966.3	J9966.3	J9923.8	CONDUIT	42.4	0.0007	0.0400
GMD_CassenCul	J102	J12955.5	CONDUIT	276.9	0.0722	0.0240
Northway_Cleary	J46	J47	CONDUIT	874.8	0.2235	0.0130
Northway_Mark1	J203	J46	CONDUIT	139.7	0.1231	0.0130
Northway_Mark2	J45	J203	CONDUIT	962.1	0.2030	0.0130
Northway_Trunk1	J209	J6507.5	CONDUIT	456.6	0.1187	0.0130
Northway_Trunk2	J48	J209	CONDUIT	792.6	0.1287	0.0130
Northway_Trunk3	J47	J48	CONDUIT	407.6	0.1963	0.0130
Northway_Trunk4	J50	J47	CONDUIT	283.4	0.0424	0.0130
Temple_Open	J103B	J12795	CONDUIT	468.4	0.7030	0.0800
Central_SWMP1	SU102	J102	TYPE1 PUMP			
GMPS_P1	J101	J12676.2	TYPE2 PUMP			
GMPS_P2	J12	J12676.2	TYPE2 PUMP			
P5	J103	J103B	TYPE2 PUMP			
Rhodes_SWMP1	SU104	J53	TYPE1 PUMP			
W1	SU102	J102	WEIR			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C100	CIRCULAR	1.05	0.87	0.26	1.05	1	3.33
C101	CIRCULAR	1.05	0.87	0.26	1.05	1	2.45
C103A	CIRCULAR	0.70	0.38	0.17	0.70	1	0.05
C107	CIRCULAR	1.50	1.77	0.38	1.50	1	8.34
C11_1	CIRCULAR	1.50	1.77	0.38	1.50	1	16.58
C11_2	CIRCULAR	1.05	0.87	0.26	1.05	1	1.70
C110_1	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_2	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_3	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_4	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_5	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_6	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_7	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_8	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C113_1	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_2	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_3	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99

C113_4	CIRCULAR	1.80	2.54	0.45	1.80	1	5.98
C113_5	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_6	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_7	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C13	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C14	CIRCULAR	1.50	1.77	0.38	1.50	1	3.04
C15	CIRCULAR	1.50	1.77	0.38	1.50	1	5.25
C16	CIRCULAR	1.50	1.77	0.38	1.50	1	33.34
C25	CIRCULAR	1.05	0.87	0.26	1.05	1	0.81
C26	RECT_CLOSED	2.44	10.42	0.78	4.27	1	20.97
C27	CIRCULAR	1.50	1.77	0.38	1.50	1	6.10
C28	CIRCULAR	0.68	0.36	0.17	0.68	1	0.76
C29	CIRCULAR	1.50	1.77	0.38	1.50	1	4.75
C30	CIRCULAR	0.45	0.16	0.11	0.45	1	0.27
C31	CIRCULAR	0.90	0.64	0.23	0.90	1	0.29
C32_1	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_2	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_3	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_4	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_5	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_6	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C33	CIRCULAR	0.68	0.36	0.17	0.68	1	0.68
C34	CIRCULAR	0.90	0.64	0.23	0.90	1	0.84
C35	CIRCULAR	0.90	0.64	0.23	0.90	1	0.58
C36	CIRCULAR	0.82	0.53	0.21	0.82	1	0.21
C38	CIRCULAR	0.45	0.16	0.11	0.45	1	0.40
C39	CIRCULAR	1.05	0.87	0.26	1.05	1	2.09
C4_1	CIRCULAR	1.50	1.77	0.38	1.50	1	3.64
C4_2	TRAPEZOIDAL	3.00	19.50	1.52	11.00	1	6.67
C40	CIRCULAR	0.60	0.28	0.15	0.60	1	0.54
C44	CIRCULAR	0.68	0.36	0.17	0.68	1	0.22
C46	CIRCULAR	0.68	0.36	0.17	0.68	2	0.31
C47	HORIZ_ELLIPSE	1.50	2.86	0.46	2.10	1	7.75
C48	CIRCULAR	0.90	0.64	0.23	0.90	1	2.86
C49	CIRCULAR	1.05	0.87	0.26	1.05	1	0.90
C50	CIRCULAR	1.20	1.13	0.30	1.20	1	2.06
C51	TRAPEZOIDAL	2.50	11.87	1.19	8.50	1	28.12
C52	CIRCULAR	1.35	1.43	0.34	1.35	1	6.54
C53	CIRCULAR	1.50	1.77	0.38	1.50	1	11.60
C54	CIRCULAR	0.75	0.44	0.19	0.75	1	0.53
C55	CIRCULAR	1.50	1.77	0.38	1.50	1	3.91
C56	CIRCULAR	1.05	0.87	0.26	1.05	1	0.91
C57	CIRCULAR	1.82	2.62	0.46	1.82	1	2.82
C61_4	CIRCULAR	1.20	1.13	0.30	1.20	1	2.39
C62	CIRCULAR	1.82	2.62	0.46	1.82	1	7.27
C63	CIRCULAR	2.13	3.55	0.53	2.13	1	9.69
C64	CIRCULAR	1.20	1.13	0.30	1.20	1	1.54
C65	TRAPEZOIDAL	1.00	4.00	0.62	6.00	1	1.44
C67	CIRCULAR	0.90	0.64	0.23	0.90	1	0.62
C7_1	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_2	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_3	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_4	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_5	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_6	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_7	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_8	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C71	CIRCULAR	1.50	1.77	0.38	1.50	1	4.88
C76	CIRCULAR	1.50	1.77	0.38	1.50	1	3.44
C85	TRAPEZOIDAL	1.00	4.00	0.62	6.00	1	1.70
C89	CIRCULAR	0.90	0.64	0.23	0.90	1	1.94
C94	CIRCULAR	1.05	0.87	0.26	1.05	1	1.50
C95	CIRCULAR	1.20	1.13	0.30	1.20	1	4.03
C96	CIRCULAR	1.00	0.79	0.25	1.00	1	2.89
C97	CIRCULAR	1.05	0.87	0.26	1.05	1	1.65
C98	CIRCULAR	1.05	0.87	0.26	1.05	1	2.15
C99	CIRCULAR	0.90	0.64	0.23	0.90	1	1.21
Central_Deziel	TRIANGULAR	1.00	1.50	0.42	3.00	1	1.33
Central_ECR	TRAPEZOIDAL	2.25	9.84	1.08	7.75	1	11.70
Central_ECR_Cul	HORIZ_ELLIPSE	1.12	1.59	0.34	1.83	1	2.31
Central_NServRoad	TRAPEZOIDAL	1.20	6.00	0.71	8.00	1	13.43
Central_Pond_600CSP	CIRCULAR	0.75	0.44	0.19	0.75	1	0.43
Central_Pond_600HDPE	CIRCULAR	0.75	0.44	0.19	0.75	1	2.30
Central_Pond_900	CIRCULAR	0.90	0.64	0.23	0.90	1	3.11
CJ10016.1	10016.1	4.36	148.70	0.95	200.00	1	8.44
CJ10066.1	10066.1	4.71	141.51	1.59	115.56	1	11.35
CJ10094.5	10094.5	4.32	145.13	1.63	118.63	1	483.80
CJ10144.4	10144.4	5.62	330.22	1.79	200.00	1	1796.91
CJ10244.4	10244.4	5.42	237.44	1.58	200.00	1	149.59

CJ10344.4	10344.4	6.63	616.11	1.56	400.00	1	506.41
CJ10444.3	10444.3	5.32	208.72	1.68	200.00	1	321.34
CJ10475.3	10461.3	4.85	170.86	2.49	100.00	1	25.42
CJ10500	ARCH	2.50	8.67	0.75	4.40	1	73.35
CJ10500_2	ARCH	2.50	8.67	0.75	4.40	1	72.52
CJ10614.5	10614.5	5.30	295.95	1.35	200.00	1	19.71
CJ10679.3	10664.7	4.33	81.94	1.67	75.09	1	47.83
CJ10694.8	RECT_CLOSED	3.50	17.50	1.03	5.00	1	6.08
CJ10749	10749	5.57	200.08	1.92	134.91	1	102.34
CJ10848.5	10848.5	6.02	172.15	2.10	200.00	1	154.20
CJ11048.5	11048.5	5.60	129.26	0.63	200.00	1	53.20
CJ11248.4	11248.4	5.77	168.37	2.28	119.70	1	155.51
CJ11448.4	11448.4	5.85	214.70	2.10	119.27	1	207.25
CJ11648.4	11648.4	5.24	167.95	1.53	200.00	1	202.13
CJ11748.1	11748.1	5.22	219.15	1.07	200.00	1	339.91
CJ11848.1	11848.1	5.92	298.19	2.15	200.00	1	905.74
CJ11881.3	11881.3	5.96	327.52	2.18	200.00	1	902.49
CJ11896.4	11896.4	6.61	271.64	2.14	113.20	1	547.34
CJ11913.3	RECT_CLOSED	4.00	18.00	1.06	4.50	1	7.21
CJ11919.8	11919.8	6.32	282.12	1.77	200.00	1	94.39
CJ11939.6	11939.6	6.23	261.81	1.86	121.22	1	1327.51
CJ11972.5	11972.5	5.42	209.98	1.22	200.00	1	196.54
CJ12011.7	12006.2	5.25	115.35	1.86	114.39	1	130.92
CJ12037.2	RECT_CLOSED	2.00	6.00	0.60	3.00	1	17.19
CJ12067.5	12067.5	4.49	122.44	1.37	99.81	1	109.80
CJ12091.1	12091.1	4.22	99.14	1.27	99.99	1	95.73
CJ12117.3	12117.3	6.45	358.99	1.61	153.08	1	385.36
CJ12152.8	12148.1	5.51	289.19	1.45	131.29	1	249.71
CJ12160.9	CIRCULAR	2.50	4.91	0.63	2.50	1	25.61
CJ12177.5	MODBASKETHANDLE	5.00	18.28	1.12	4.00	1	43.99
CJ12213.2	12213.2	6.27	182.18	2.35	99.93	1	374.09
CJ12263.1	12263.1	5.88	248.68	1.61	200.00	1	334.78
CJ12330.4	12314	5.80	178.35	1.52	200.00	1	305.00
CJ12340	RECT_CLOSED	3.00	15.00	0.94	5.00	1	42.20
CJ12359.8	12359.8	5.60	224.51	1.44	200.00	1	928.49
CJ12390.7	12390.7	5.72	296.57	1.67	200.00	1	601.13
CJ12415.2	12415.2	3.82	93.78	1.40	66.08	1	435.86
CJ12418	12417	1.05	5.23	0.30	8.59	1	7.90
CJ12442.1	12442.1	5.95	115.92	2.72	31.01	1	318.08
CJ12491.9	12491.9	3.80	53.86	1.96	27.26	1	67.65
CJ12524.2	12524.2	5.33	248.92	1.54	151.89	1	330.50
CJ12591.8	12591.8	5.43	352.26	1.24	200.00	1	280.60
CJ12613.3	12613.3	5.39	354.08	1.24	199.65	1	705.19
CJ12627.6	12627.6	5.03	313.81	0.94	199.68	1	1420.68
CJ12641.2	RECT_CLOSED	3.05	9.30	0.76	3.05	1	19.45
CJ12676.2	12676.2	4.98	370.24	1.49	200.00	1	1015.96
CJ12795	12795	5.23	353.85	1.36	200.00	1	229.70
CJ12894.8	12894.8	3.78	60.29	1.07	109.60	1	51.41
CJ6318.4	6318.4	7.40	318.35	1.94	200.00	1	637.51
CJ6357.5	6357.5	7.17	214.32	2.55	194.96	1	426.87
CJ6507.5	6507.5	7.21	269.82	2.11	200.00	1	967.19
CJ6653.2	6650.9	7.29	231.92	1.93	199.63	1	741.92
CJ6801	6727.3	4.12	58.25	1.55	15.54	1	172.38
CJ7026.4	7026.4	7.72	315.30	2.11	199.45	1	1156.43
CJ7055.4	7048.6	4.39	60.25	1.36	21.19	1	407.74
CJ7157.8	7157.8	7.27	255.82	2.20	199.99	1	902.51
CJ7307	7307	6.08	173.18	2.15	200.00	1	609.73
CJ7357.6	7357.6	6.96	225.17	2.19	200.00	1	793.29
CJ7564	7549.2	6.54	196.07	2.16	200.00	1	645.15
CJ7578.9	7571	4.59	64.07	1.46	20.77	1	142.60
CJ7681.8	7681.8	6.53	194.21	2.14	197.45	1	561.22
CJ7762.1	7747.7	6.28	163.88	2.32	200.00	1	565.38
CJ7784.1	7772.9	4.46	57.37	1.39	19.45	1	101.59
CJ7885.5	7885.5	6.48	169.61	2.22	200.01	1	541.06
CJ8086	8086	6.35	178.27	2.17	200.00	1	545.99
CJ8285.6	8285.6	6.26	189.31	1.95	200.00	1	540.08
CJ8485.6	8485.6	6.22	177.24	2.04	200.00	1	503.70
CJ8696.4	8681.6	6.29	178.29	2.12	200.00	1	505.28
CJ8716.3	8706.5	4.30	58.06	1.32	21.07	1	18.16
CJ8768.8	8768.8	6.17	181.91	1.92	198.78	1	447.48
CJ8872.8	8858.2	6.03	157.22	2.11	198.82	1	506.76
CJ8915.1	8894.2	4.12	54.75	1.53	14.63	1	122.60
CJ9023.5	9005.1	5.15	99.10	1.03	99.20	1	310.38
CJ9036.3	9030.1	4.08	54.11	1.50	14.61	1	66.13
CJ9058.4	9058.4	4.94	138.98	0.69	200.00	1	254.34
CJ9090.7	9090.7	5.28	213.96	1.21	200.00	1	638.22
CJ9204.3	9140.7	5.25	248.37	1.14	198.52	1	268.20
CJ9223.6	9214.6	3.00	22.87	1.10	8.00	1	61.93
CJ9243.4	9235.2	4.05	69.30	0.96	100.00	1	121.01

CJ9283.1	9263.1	4.53	15.95	1.06	4.88	1	18.61
CJ9294.7	9294.7	6.61	164.81	1.87	165.09	1	416.96
CJ9313.3	9303.7	3.62	14.39	1.02	4.88	1	30.17
CJ9338.7	9338.7	6.57	156.36	2.56	125.74	1	313.98
CJ9385.8	9370.6	6.52	172.92	3.00	122.77	1	604.87
CJ9499.8	9442.9	2.42	30.47	1.02	12.80	1	23.78
CJ9528.4	9528.4	9.54	444.72	3.20	152.45	1	1002.56
CJ9563	9581	7.45	270.31	2.44	142.38	1	463.84
CJ9597.4	9581	7.45	270.31	2.44	142.38	1	463.84
CJ9789.2	9680.9	2.47	26.69	1.02	10.97	1	21.81
CJ9802	9802	3.58	69.03	1.97	100.00	1	370.13
CJ9812.9	RECT_CLOSED	3.00	15.00	0.94	5.00	1	118.74
CJ9829.2	9829.2	3.84	66.74	0.94	100.00	1	94.25
CJ9843.1	9843.1	3.89	56.89	1.13	99.70	1	84.92
CJ9881.6	9881.6	4.06	75.90	1.23	100.00	1	105.94
CJ9902.3	9902.3	4.25	93.74	1.34	100.00	1	8.72
CJ9912	RECT_CLOSED	2.50	12.50	0.83	5.00	1	32.33
CJ9923.8	9923.8	3.91	56.97	1.05	99.32	1	74.40
CJ9966.3	9966.3	4.18	78.17	1.24	100.00	1	6.04
GMD_CassenCul	CIRCULAR	2.13	3.56	0.53	2.13	1	2.62
Northway_Cleary	CIRCULAR	2.25	3.98	0.56	2.25	1	9.85
Northway_Mark1	CIRCULAR	1.65	2.14	0.41	1.65	1	3.20
Northway_Mark2	CIRCULAR	1.65	2.14	0.41	1.65	1	4.11
Northway_Trunk1	RECT_CLOSED	2.42	5.88	0.61	2.42	1	11.17
Northway_Trunk2	RECT_CLOSED	2.42	5.88	0.61	2.42	1	11.63
Northway_Trunk3	RECT_CLOSED	2.10	6.30	0.62	3.00	1	15.57
Northway_Trunk4	CIRCULAR	1.95	2.99	0.49	1.95	1	2.93
Temple_Open	TRAPEZOIDAL	1.50	6.00	0.78	7.00	1	5.32

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Shape Summary
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Shape 12417

Area:

0.0006	0.0025	0.0057	0.0101	0.0158
0.0227	0.0309	0.0403	0.0511	0.0630
0.0761	0.0903	0.1056	0.1218	0.1387
0.1565	0.1751	0.1945	0.2146	0.2352
0.2564	0.2780	0.3001	0.3225	0.3454
0.3686	0.3923	0.4168	0.4420	0.4678
0.4945	0.5218	0.5498	0.5787	0.6084
0.6388	0.6700	0.7017	0.7338	0.7664
0.7993	0.8328	0.8666	0.9008	0.9313
0.9561	0.9753	0.9890	0.9973	1.0000

Hrad:

0.0346	0.0692	0.1038	0.1383	0.1729
0.2075	0.2421	0.2767	0.3113	0.3478
0.3861	0.4238	0.4620	0.5069	0.5509
0.5940	0.6363	0.6780	0.7263	0.7751
0.8232	0.8731	0.9249	0.9761	1.0265
1.0755	1.1130	1.1479	1.1827	1.2176
1.2523	1.2870	1.3196	1.3506	1.3818
1.4143	1.4538	1.5008	1.5473	1.5934
1.6392	1.6846	1.7297	1.7235	1.5419
1.3958	1.2770	1.1739	1.0825	1.0000

Width:

0.0366	0.0732	0.1099	0.1465	0.1831
0.2197	0.2564	0.2930	0.3296	0.3641
0.3959	0.4278	0.4588	0.4819	0.5051
0.5282	0.5514	0.5746	0.5912	0.6066
0.6221	0.6354	0.6465	0.6577	0.6689
0.6806	0.6998	0.7207	0.7416	0.7624
0.7833	0.8042	0.8265	0.8499	0.8733
0.8960	0.9139	0.9265	0.9392	0.9519
0.9645	0.9772	0.9899	0.9670	0.8023
0.6383	0.4787	0.3191	0.1596	0.0000

Shape 1616.8

Area:

0.0153	0.0308	0.0467	0.0630	0.0795
0.0964	0.1135	0.1310	0.1488	0.1670
0.1854	0.2042	0.2233	0.2427	0.2624
0.2825	0.3028	0.3235	0.3445	0.3657
0.3868	0.4079	0.4291	0.4502	0.4714
0.4925	0.5137	0.5348	0.5560	0.5771
0.5982	0.6194	0.6405	0.6617	0.6828
0.7040	0.7251	0.7463	0.7674	0.7886

0.8097	0.8308	0.8520	0.8731	0.8943
0.9154	0.9366	0.9577	0.9789	1.0000

Hrad:

0.0454	0.0899	0.1334	0.1760	0.2177
0.2587	0.2989	0.3385	0.3774	0.4156
0.4533	0.4904	0.5270	0.5630	0.5986
0.6338	0.6685	0.7028	0.7371	0.7784
0.8194	0.8599	0.9000	0.9397	0.9791
1.0181	1.0566	1.0949	1.1327	1.1702
1.2073	1.2441	1.2806	1.3167	1.3524
1.3879	1.4230	1.4578	1.4923	1.5264
1.5603	1.5938	1.6271	1.6600	1.6927
1.7251	1.7571	1.7889	1.8205	1.0000

Width:

0.7293	0.7444	0.7595	0.7746	0.7897
0.8047	0.8198	0.8349	0.8500	0.8650
0.8801	0.8952	0.9103	0.9254	0.9404
0.9555	0.9706	0.9857	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 2244_1

Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0512	0.1012	0.1500	0.1978	0.2445
0.2902	0.3348	0.3785	0.4213	0.4632
0.5042	0.5444	0.5837	0.6223	0.6600
0.6971	0.7334	0.7690	0.8039	0.8381
0.8717	0.9047	0.9370	0.9688	1.0000
1.0306	1.0607	1.0902	1.1193	1.1478
1.1758	1.2034	1.2305	1.2571	1.2833
1.3090	1.3343	1.3593	1.3838	1.4079
1.4316	1.4550	1.4780	1.5006	1.5229
1.5449	1.5665	1.5878	1.6088	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 2244_2

Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0512	0.1012	0.1500	0.1978	0.2445
0.2902	0.3348	0.3785	0.4213	0.4632
0.5042	0.5444	0.5837	0.6223	0.6600
0.6971	0.7334	0.7690	0.8039	0.8381
0.8717	0.9047	0.9370	0.9688	1.0000
1.0306	1.0607	1.0902	1.1193	1.1478

1.1758	1.2034	1.2305	1.2571	1.2833
1.3090	1.3343	1.3593	1.3838	1.4079
1.4316	1.4550	1.4780	1.5006	1.5229
1.5449	1.5665	1.5878	1.6088	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 3279

Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0460	0.0915	0.1363	0.1807	0.2244
0.2677	0.3104	0.3526	0.3944	0.4356
0.4763	0.5166	0.5563	0.5957	0.6345
0.6730	0.7110	0.7485	0.7856	0.8224
0.8587	0.8946	0.9301	0.9652	0.9999
1.0343	1.0683	1.1019	1.1352	1.1681
1.2007	1.2329	1.2648	1.2963	1.3276
1.3585	1.3891	1.4194	1.4493	1.4790
1.5084	1.5375	1.5663	1.5948	1.6230
1.6510	1.6786	1.7061	1.7332	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9997
0.9997	0.9997	0.9997	0.9997	0.9997
0.9997	0.9997	0.9997	0.9997	0.9997

Shape 6231.8

Area:

0.0015	0.0033	0.0054	0.0077	0.0103
0.0133	0.0246	0.0471	0.0697	0.0924
0.1153	0.1383	0.1615	0.1847	0.2081
0.2317	0.2553	0.2791	0.3028	0.3266
0.3503	0.3741	0.3978	0.4216	0.4453
0.4691	0.4928	0.5165	0.5403	0.5640
0.5878	0.6115	0.6353	0.6590	0.6828
0.7065	0.7303	0.7540	0.7778	0.8011
0.8234	0.8451	0.8664	0.8871	0.9072
0.9269	0.9460	0.9645	0.9825	1.0000

Hrad:

0.0464	0.0859	0.1211	0.1536	0.1840
0.1556	0.0559	0.1061	0.1558	0.2050
0.2536	0.3018	0.3495	0.3968	0.4436
0.4900	0.5359	0.5825	0.6286	0.6744
0.7196	0.7643	0.8086	0.8524	0.8958
0.9387	0.9812	1.0232	1.0649	1.1061
1.1469	1.1872	1.2272	1.2668	1.3060
1.3448	1.3833	1.4213	1.4590	1.4371
1.4492	1.4599	1.4693	1.4774	1.4844
1.4903	1.4951	1.4989	1.5018	1.0000

Width:

0.0701	0.0813	0.0924	0.1035	0.1146
0.1775	0.9436	0.9492	0.9548	0.9604
0.9659	0.9715	0.9771	0.9827	0.9883
0.9939	0.9994	1.0000	1.0000	1.0000

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	0.9507
0.9281	0.9055	0.8829	0.8603	0.8377
0.8151	0.7925	0.7699	0.7473	0.7247

Shape 6727.3

Area:

0.0015	0.0062	0.0127	0.0213	0.0335
0.0491	0.0683	0.0894	0.1108	0.1324
0.1541	0.1761	0.1981	0.2200	0.2420
0.2640	0.2860	0.3079	0.3299	0.3519
0.3738	0.3958	0.4178	0.4398	0.4617
0.4837	0.5057	0.5277	0.5496	0.5716
0.5936	0.6155	0.6375	0.6595	0.6815
0.7034	0.7254	0.7474	0.7693	0.7913
0.8133	0.8353	0.8572	0.8792	0.9012
0.9232	0.9451	0.9671	0.9866	1.0000

Hrad:

0.0265	0.0529	0.0973	0.1079	0.1266
0.1484	0.1743	0.2208	0.2696	0.3176
0.3648	0.4119	0.4586	0.5043	0.5491
0.5931	0.6362	0.6784	0.7199	0.7606
0.8005	0.8396	0.8781	0.9158	0.9529
0.9892	1.0250	1.0601	1.0946	1.1285
1.1618	1.1945	1.2267	1.2584	1.2895
1.3202	1.3503	1.3799	1.4091	1.4377
1.4660	1.4938	1.5211	1.5481	1.5746
1.6007	1.6264	1.6518	1.4305	1.0000

Width:

0.1403	0.2806	0.3109	0.4720	0.6331
0.7942	0.9399	0.9680	0.9774	0.9868
0.9962	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.7495	0.4711

Shape 7048.6

Area:

0.0019	0.0043	0.0070	0.0102	0.0138
0.0204	0.0317	0.0439	0.0566	0.0698
0.0835	0.0977	0.1125	0.1278	0.1435
0.1598	0.1766	0.1939	0.2118	0.2301
0.2489	0.2683	0.2882	0.3085	0.3294
0.3508	0.3728	0.3952	0.4181	0.4416
0.4655	0.4900	0.5150	0.5405	0.5665
0.5930	0.6201	0.6476	0.6757	0.7042
0.7333	0.7629	0.7930	0.8236	0.8545
0.8850	0.9148	0.9439	0.9723	1.0000

Hrad:

0.0567	0.1029	0.1434	0.1805	0.2153
0.1354	0.1662	0.2200	0.2716	0.3215
0.3697	0.4165	0.4619	0.5063	0.5495
0.5919	0.6334	0.6741	0.7141	0.7535
0.7923	0.8306	0.8684	0.9057	0.9426
0.9791	1.0152	1.0511	1.0865	1.1217
1.1567	1.1914	1.2258	1.2600	1.2940
1.3278	1.3614	1.3948	1.4281	1.4612
1.4942	1.5270	1.5597	1.5951	1.6396
1.6638	1.6837	1.7014	1.7172	1.0000

Width:

0.0694	0.0827	0.0960	0.1093	0.1226
0.3041	0.3866	0.4031	0.4197	0.4363
0.4529	0.4694	0.4860	0.5026	0.5192
0.5357	0.5523	0.5689	0.5855	0.6020
0.6186	0.6352	0.6518	0.6683	0.6849
0.7015	0.7180	0.7346	0.7512	0.7678
0.7843	0.8009	0.8175	0.8341	0.8506
0.8672	0.8838	0.9004	0.9169	0.9335
0.9501	0.9666	0.9832	0.9974	0.9971
0.9764	0.9539	0.9313	0.9088	0.8863

Shape 7571

Area:

0.0019	0.0043	0.0070	0.0102	0.0139
0.0218	0.0334	0.0456	0.0583	0.0715
0.0853	0.0995	0.1143	0.1297	0.1455
0.1619	0.1788	0.1962	0.2142	0.2327
0.2517	0.2712	0.2913	0.3119	0.3330
0.3546	0.3768	0.3995	0.4227	0.4464
0.4707	0.4955	0.5208	0.5467	0.5730
0.5999	0.6273	0.6553	0.6838	0.7127
0.7420	0.7715	0.8012	0.8307	0.8597
0.8885	0.9169	0.9449	0.9726	1.0000

Hrad:

0.0549	0.0994	0.1384	0.1741	0.1661
0.1224	0.1705	0.2221	0.2716	0.3193
0.3655	0.4102	0.4538	0.4962	0.5377
0.5783	0.6180	0.6571	0.6955	0.7332
0.7705	0.8072	0.8435	0.8793	0.9147
0.9498	0.9846	1.0190	1.0531	1.0870
1.1206	1.1540	1.1871	1.2201	1.2528
1.2854	1.3178	1.3500	1.3821	1.4187
1.4597	1.5003	1.5407	1.5764	1.6106
1.6433	1.6745	1.7044	1.7329	1.0000

Width:

0.0717	0.0858	0.0998	0.1138	0.1650
0.3644	0.4002	0.4179	0.4356	0.4532
0.4709	0.4886	0.5063	0.5239	0.5416
0.5593	0.5769	0.5946	0.6123	0.6300
0.6476	0.6653	0.6830	0.7007	0.7183
0.7360	0.7537	0.7713	0.7890	0.8067
0.8244	0.8420	0.8597	0.8774	0.8951
0.9127	0.9304	0.9481	0.9657	0.9790
0.9880	0.9969	0.9946	0.9831	0.9716
0.9600	0.9485	0.9369	0.9254	0.9138

Shape 7772.9

Area:

0.0021	0.0046	0.0075	0.0109	0.0147
0.0216	0.0336	0.0465	0.0599	0.0738
0.0882	0.1031	0.1185	0.1343	0.1507
0.1675	0.1848	0.2026	0.2208	0.2396
0.2588	0.2786	0.2988	0.3195	0.3407
0.3623	0.3845	0.4071	0.4303	0.4539
0.4780	0.5025	0.5276	0.5532	0.5792
0.6057	0.6327	0.6602	0.6882	0.7166
0.7455	0.7747	0.8041	0.8338	0.8637
0.8939	0.9236	0.9527	0.9806	1.0000

Hrad:

0.0562	0.1021	0.1422	0.1790	0.2134
0.1338	0.1637	0.2177	0.2695	0.3196
0.3681	0.4151	0.4608	0.5053	0.5488
0.5914	0.6330	0.6739	0.7140	0.7535
0.7923	0.8306	0.8684	0.9056	0.9424
0.9788	1.0148	1.0505	1.0858	1.1208
1.1554	1.1898	1.2240	1.2579	1.2915
1.3250	1.3582	1.3912	1.4241	1.4567
1.4940	1.5348	1.5751	1.6150	1.6545
1.6908	1.7095	1.7224	1.6999	1.0000

Width:

0.0760	0.0902	0.1045	0.1187	0.1330
0.3284	0.4199	0.4360	0.4520	0.4681
0.4841	0.5001	0.5162	0.5322	0.5482
0.5643	0.5803	0.5964	0.6124	0.6284
0.6445	0.6605	0.6766	0.6926	0.7086
0.7247	0.7407	0.7567	0.7728	0.7888
0.8049	0.8209	0.8369	0.8530	0.8690
0.8851	0.9011	0.9171	0.9332	0.9492
0.9609	0.9689	0.9770	0.9851	0.9931
0.9966	0.9736	0.9480	0.8985	0.0000

Shape 8

Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000

0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0440	0.0877	0.1309	0.1739	0.2164
0.2587	0.3005	0.3421	0.3833	0.4241
0.4647	0.5049	0.5448	0.5844	0.6237
0.6626	0.7013	0.7396	0.7777	0.8155
0.8529	0.8901	0.9270	0.9637	1.0000
1.0361	1.0719	1.1074	1.1427	1.1777
1.2124	1.2469	1.2811	1.3151	1.3488
1.3823	1.4155	1.4485	1.4813	1.5138
1.5461	1.5782	1.6100	1.6416	1.6730
1.7042	1.7351	1.7659	1.7964	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 8706.5

Area:

0.0020	0.0043	0.0071	0.0103	0.0138
0.0193	0.0299	0.0422	0.0549	0.0682
0.0820	0.0963	0.1111	0.1264	0.1422
0.1586	0.1754	0.1927	0.2106	0.2290
0.2479	0.2672	0.2871	0.3076	0.3285
0.3499	0.3718	0.3943	0.4172	0.4407
0.4647	0.4892	0.5142	0.5397	0.5657
0.5922	0.6193	0.6468	0.6749	0.7034
0.7325	0.7621	0.7922	0.8228	0.8538
0.8848	0.9153	0.9453	0.9737	1.0000

Hrad:

0.0574	0.1045	0.1458	0.1835	0.2189
0.1479	0.1575	0.2122	0.2648	0.3156
0.3646	0.4122	0.4585	0.5035	0.5476
0.5906	0.6328	0.6742	0.7149	0.7549
0.7943	0.8332	0.8715	0.9094	0.9469
0.9839	1.0206	1.0569	1.0929	1.1286
1.1640	1.1992	1.2341	1.2688	1.3032
1.3375	1.3715	1.4054	1.4391	1.4727
1.5060	1.5393	1.5724	1.6054	1.6407
1.6772	1.7120	1.7209	1.6737	1.0000

Width:

0.0696	0.0823	0.0950	0.1076	0.1203
0.2602	0.3845	0.4008	0.4172	0.4335
0.4498	0.4662	0.4825	0.4988	0.5151
0.5315	0.5478	0.5641	0.5805	0.5968
0.6131	0.6295	0.6458	0.6621	0.6785
0.6948	0.7111	0.7275	0.7438	0.7601
0.7765	0.7928	0.8091	0.8255	0.8418
0.8581	0.8744	0.8908	0.9071	0.9234
0.9398	0.9561	0.9724	0.9888	0.9969
0.9844	0.9720	0.9430	0.8756	0.8082

Shape 8894.2

Area:

0.0015	0.0062	0.0126	0.0211	0.0332
0.0489	0.0680	0.0891	0.1105	0.1321
0.1539	0.1759	0.1979	0.2199	0.2418
0.2638	0.2858	0.3078	0.3298	0.3518
0.3738	0.3958	0.4178	0.4397	0.4617
0.4837	0.5057	0.5277	0.5497	0.5717
0.5937	0.6157	0.6376	0.6596	0.6816
0.7036	0.7256	0.7476	0.7696	0.7916
0.8135	0.8355	0.8575	0.8795	0.9015
0.9235	0.9455	0.9675	0.9870	1.0000

Hrad:

0.0268	0.0535	0.0991	0.1088	0.1273
0.1492	0.1755	0.2231	0.2720	0.3201
0.3672	0.4149	0.4617	0.5076	0.5525
0.5964	0.6395	0.6816	0.7230	0.7635
0.8031	0.8421	0.8802	0.9176	0.9543
0.9904	1.0257	1.0604	1.0945	1.1279
1.1607	1.1930	1.2246	1.2558	1.2864

1.3164	1.3459	1.3750	1.4035	1.4316
1.4592	1.4864	1.5131	1.5394	1.5652
1.5907	1.6158	1.6404	1.4174	1.0000

Width:

0.1405	0.2810	0.3060	0.4690	0.6320
0.7950	0.9406	0.9649	0.9762	0.9875
0.9989	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.7415	0.4374

Shape 9030.1

Area:

0.0012	0.0050	0.0110	0.0182	0.0291
0.0439	0.0625	0.0841	0.1061	0.1281
0.1501	0.1721	0.1941	0.2161	0.2381
0.2601	0.2821	0.3041	0.3261	0.3481
0.3702	0.3922	0.4142	0.4362	0.4582
0.4802	0.5022	0.5242	0.5462	0.5682
0.5902	0.6122	0.6342	0.6562	0.6782
0.7003	0.7223	0.7443	0.7663	0.7883
0.8103	0.8323	0.8543	0.8763	0.8983
0.9203	0.9423	0.9643	0.9858	1.0000

Hrad:

0.0270	0.0540	0.0911	0.1095	0.1219
0.1411	0.1655	0.2048	0.2556	0.3053
0.3540	0.4016	0.4482	0.4938	0.5386
0.5824	0.6253	0.6674	0.7086	0.7491
0.7888	0.8277	0.8658	0.9033	0.9401
0.9761	1.0116	1.0464	1.0805	1.1141
1.1471	1.1795	1.2113	1.2426	1.2733
1.3036	1.3333	1.3626	1.3913	1.4196
1.4474	1.4748	1.5018	1.5283	1.5544
1.5801	1.6054	1.6304	1.5084	1.0000

Width:

0.1130	0.2261	0.2935	0.4049	0.5827
0.7604	0.9247	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.8543	0.4381

Shape 9214.6

Area:

0.0048	0.0185	0.0347	0.0514	0.0685
0.0862	0.1044	0.1231	0.1422	0.1619
0.1821	0.2026	0.2233	0.2443	0.2653
0.2863	0.3073	0.3283	0.3493	0.3703
0.3913	0.4123	0.4332	0.4542	0.4752
0.4962	0.5172	0.5382	0.5592	0.5802
0.6012	0.6222	0.6432	0.6641	0.6851
0.7061	0.7271	0.7481	0.7691	0.7901
0.8111	0.8321	0.8531	0.8741	0.8950
0.9160	0.9370	0.9580	0.9790	1.0000

Hrad:

0.0274	0.0636	0.1148	0.1640	0.2116
0.2575	0.3021	0.3453	0.3873	0.4283
0.4701	0.5123	0.5536	0.5966	0.6389
0.6800	0.7200	0.7590	0.7969	0.8338
0.8699	0.9050	0.9392	0.9726	1.0051
1.0369	1.0679	1.0982	1.1278	1.1568
1.1850	1.2127	1.2397	1.2661	1.2919
1.3172	1.3420	1.3662	1.3900	1.4132
1.4360	1.4583	1.4802	1.5016	1.5227
1.5433	1.5635	1.5833	1.6028	1.0000

Width:

0.4545	0.7583	0.7822	0.8061	0.8300
0.8539	0.8778	0.9017	0.9256	0.9495
0.9684	0.9831	0.9978	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 9263.1

Area:

0.0008	0.0031	0.0069	0.0123	0.0193
0.0277	0.0378	0.0493	0.0624	0.0771
0.0933	0.1110	0.1303	0.1511	0.1750
0.2027	0.2304	0.2581	0.2858	0.3135
0.3412	0.3689	0.3966	0.4243	0.4520
0.4797	0.5074	0.5351	0.5628	0.5905
0.6182	0.6459	0.6736	0.7010	0.7277
0.7536	0.7787	0.8031	0.8268	0.8496
0.8718	0.8931	0.9135	0.9323	0.9495
0.9652	0.9792	0.9901	0.9974	1.0000

Hrad:

0.0355	0.0711	0.1066	0.1421	0.1777
0.2132	0.2487	0.2843	0.3198	0.3554
0.3909	0.4264	0.4620	0.4975	0.4590
0.5154	0.5684	0.6184	0.6656	0.7102
0.7524	0.7925	0.8305	0.8667	0.9011
0.9339	0.9652	0.9952	1.0238	1.0511
1.0774	1.1025	1.1267	1.1447	1.1599
1.1733	1.1848	1.1948	1.2031	1.2101
1.2157	1.2200	1.2142	1.2040	1.1923
1.1793	1.1553	1.1128	1.0626	1.0000

Width:

0.0557	0.1113	0.1670	0.2226	0.2783
0.3340	0.3896	0.4453	0.5009	0.5566
0.6122	0.6679	0.7236	0.7792	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.9767	0.9493
0.9218	0.8944	0.8670	0.8396	0.8122
0.7847	0.7573	0.7078	0.6508	0.5939
0.5370	0.4563	0.3316	0.1855	0.0000

Shape 9303.7

Area:

0.0027	0.0110	0.0247	0.0438	0.0659
0.0882	0.1108	0.1336	0.1566	0.1800
0.2038	0.2280	0.2524	0.2769	0.3015
0.3260	0.3505	0.3751	0.3996	0.4242
0.4487	0.4733	0.4978	0.5223	0.5469
0.5714	0.5960	0.6205	0.6450	0.6693
0.6930	0.7161	0.7388	0.7608	0.7824
0.8034	0.8238	0.8437	0.8631	0.8819
0.9001	0.9171	0.9331	0.9479	0.9616
0.9742	0.9848	0.9928	0.9982	1.0000

Hrad:

0.0352	0.0704	0.1057	0.1409	0.2046
0.2650	0.3222	0.3767	0.4287	0.4777
0.5236	0.5695	0.6142	0.6575	0.6988
0.7381	0.7757	0.8117	0.8460	0.8789
0.9105	0.9407	0.9698	0.9977	1.0246
1.0504	1.0753	1.0993	1.1222	1.1391
1.1543	1.1681	1.1804	1.1914	1.2012
1.2097	1.2171	1.2235	1.2288	1.2332
1.2295	1.2216	1.2126	1.2026	1.1917
1.1750	1.1382	1.1016	1.0527	1.0000

Width:

0.2233	0.4467	0.6700	0.8933	0.9037
0.9141	0.9245	0.9349	0.9453	0.9588
0.9793	0.9909	0.9996	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.9989	0.9768
0.9548	0.9327	0.9107	0.8886	0.8665
0.8445	0.8224	0.8004	0.7783	0.7562
0.7179	0.6725	0.6271	0.5817	0.5363
0.4800	0.3798	0.2797	0.1468	0.0000

Shape 9442.9

Area:

0.0204	0.0407	0.0611	0.0815	0.1019

	0.1222	0.1426	0.1630	0.1834	0.2037
	0.2241	0.2445	0.2649	0.2852	0.3056
	0.3260	0.3464	0.3667	0.3871	0.4075
	0.4279	0.4482	0.4686	0.4890	0.5094
	0.5297	0.5501	0.5705	0.5909	0.6112
	0.6316	0.6520	0.6724	0.6927	0.7131
	0.7335	0.7538	0.7742	0.7946	0.8150
	0.8353	0.8556	0.8755	0.8948	0.9136
	0.9319	0.9497	0.9670	0.9837	1.0000
Hrad:					
	0.0470	0.0933	0.1389	0.1838	0.2280
	0.2717	0.3147	0.3570	0.3988	0.4400
	0.4806	0.5207	0.5602	0.5991	0.6376
	0.6755	0.7129	0.7498	0.7862	0.8221
	0.8576	0.8926	0.9271	0.9612	0.9949
	1.0281	1.0610	1.0934	1.1254	1.1570
	1.1882	1.2191	1.2496	1.2797	1.3094
	1.3388	1.3679	1.3966	1.4249	1.4530
	1.4807	1.4960	1.5012	1.5054	1.5085
	1.5108	1.5121	1.5126	1.5123	1.0000
Width:					
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	0.9855	0.9606	0.9356	0.9107
	0.8857	0.8608	0.8358	0.8109	0.7859

Shape 9680.9

Area:					
	0.0203	0.0406	0.0609	0.0811	0.1014
	0.1217	0.1420	0.1623	0.1826	0.2028
	0.2231	0.2434	0.2637	0.2840	0.3043
	0.3245	0.3448	0.3651	0.3854	0.4057
	0.4260	0.4463	0.4665	0.4868	0.5071
	0.5274	0.5477	0.5680	0.5882	0.6085
	0.6288	0.6491	0.6694	0.6897	0.7100
	0.7302	0.7505	0.7708	0.7911	0.8114
	0.8317	0.8519	0.8722	0.8921	0.9115
	0.9303	0.9485	0.9662	0.9834	1.0000
Hrad:					
	0.0482	0.0955	0.1419	0.1876	0.2325
	0.2766	0.3200	0.3626	0.4046	0.4458
	0.4864	0.5263	0.5655	0.6042	0.6422
	0.6796	0.7165	0.7527	0.7885	0.8236
	0.8583	0.8924	0.9260	0.9591	0.9918
	1.0239	1.0556	1.0868	1.1176	1.1480
	1.1779	1.2074	1.2365	1.2652	1.2935
	1.3214	1.3489	1.3761	1.4029	1.4294
	1.4555	1.4813	1.5024	1.5059	1.5082
	1.5096	1.5101	1.5097	1.5085	1.0000
Width:					
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	0.9946	0.9676	0.9405
	0.9135	0.8864	0.8594	0.8323	0.8053

****
Transect Summary
****

Transect 10016.1

Area:					
	0.0003	0.0014	0.0031	0.0054	0.0080
	0.0107	0.0136	0.0165	0.0196	0.0231
	0.0270	0.0311	0.0353	0.0397	0.0442
	0.0489	0.0536	0.0585	0.0635	0.0687

0.0739	0.0793	0.0848	0.0904	0.0961
0.1019	0.1079	0.1141	0.1203	0.1267
0.1333	0.1401	0.1470	0.1541	0.1614
0.1691	0.1778	0.1895	0.2067	0.2260
0.2472	0.2806	0.3323	0.3995	0.4779
0.5644	0.6609	0.7711	0.8844	1.0000

Hrad:

0.0453	0.0907	0.1360	0.1940	0.2622
0.3329	0.3993	0.4619	0.4961	0.5302
0.5678	0.6240	0.6830	0.7411	0.7992
0.8566	0.9127	0.9676	1.0214	1.0742
1.1261	1.1770	1.2271	1.2760	1.3243
1.3714	1.4159	1.4599	1.5037	1.5454
1.5833	1.6213	1.6593	1.6905	1.7067
1.7223	1.7256	1.6982	1.6124	1.5304
1.4634	1.3352	1.1877	1.0607	0.9637
0.9413	0.9219	0.9178	0.9599	1.0000

Width:

0.0058	0.0116	0.0174	0.0212	0.0229
0.0237	0.0246	0.0254	0.0282	0.0312
0.0341	0.0356	0.0369	0.0380	0.0391
0.0401	0.0412	0.0422	0.0432	0.0442
0.0452	0.0463	0.0473	0.0483	0.0494
0.0505	0.0516	0.0528	0.0540	0.0553
0.0568	0.0583	0.0597	0.0615	0.0641
0.0668	0.0833	0.1290	0.1565	0.1719
0.1923	0.3848	0.4917	0.6273	0.7026
0.7627	0.8966	0.9580	0.9788	1.0000

Transect 10066.1

Area:

0.0003	0.0013	0.0028	0.0050	0.0078
0.0112	0.0149	0.0188	0.0231	0.0276
0.0324	0.0373	0.0424	0.0478	0.0533
0.0590	0.0649	0.0710	0.0772	0.0836
0.0902	0.0969	0.1039	0.1110	0.1182
0.1257	0.1333	0.1411	0.1492	0.1576
0.1663	0.1753	0.1849	0.1970	0.2106
0.2276	0.2519	0.2916	0.3379	0.3907
0.4459	0.5024	0.5607	0.6199	0.6796
0.7401	0.8012	0.8637	0.9292	1.0000

Hrad:

0.0289	0.0577	0.0866	0.1154	0.1443
0.1827	0.2230	0.2593	0.2955	0.3342
0.3739	0.4123	0.4496	0.4858	0.5212
0.5558	0.5901	0.6253	0.6601	0.6942
0.7270	0.7588	0.7901	0.8210	0.8515
0.8817	0.9116	0.9376	0.9579	0.9751
0.9936	1.0131	0.9602	0.9895	1.0013
0.9974	0.9342	0.8395	0.7819	0.7421
0.7270	0.7322	0.7638	0.7995	0.8378
0.8784	0.9204	0.9593	0.9768	1.0000

Width:

0.0082	0.0163	0.0245	0.0326	0.0408
0.0458	0.0494	0.0535	0.0574	0.0604
0.0630	0.0655	0.0680	0.0705	0.0730
0.0755	0.0780	0.0801	0.0822	0.0843
0.0865	0.0888	0.0911	0.0934	0.0958
0.0981	0.1004	0.1032	0.1069	0.1110
0.1151	0.1191	0.1466	0.1665	0.1884
0.2464	0.4460	0.5675	0.6345	0.7113
0.7250	0.7475	0.7663	0.7731	0.7816
0.7900	0.7988	0.8281	0.8866	1.0000

Transect 10094.5

Area:

0.0004	0.0015	0.0034	0.0059	0.0090
0.0127	0.0170	0.0219	0.0274	0.0332
0.0393	0.0456	0.0522	0.0590	0.0660
0.0733	0.0807	0.0884	0.0963	0.1044
0.1127	0.1212	0.1299	0.1389	0.1482
0.1577	0.1676	0.1778	0.1884	0.1995
0.2112	0.2246	0.2400	0.2583	0.2773
0.2968	0.3190	0.3437	0.3733	0.4084
0.4493	0.4947	0.5503	0.6092	0.6701
0.7322	0.7963	0.8626	0.9302	1.0000

Hrad:

0.0262	0.0524	0.0818	0.1109	0.1389
0.1663	0.1934	0.2202	0.2525	0.2897

0.3284	0.3662	0.4030	0.4389	0.4746
0.5105	0.5457	0.5803	0.6142	0.6475
0.6805	0.7117	0.7415	0.7706	0.7981
0.8234	0.8434	0.8620	0.8801	0.8870
0.8789	0.8520	0.8675	0.8698	0.8757
0.8949	0.9268	0.9525	0.9649	0.9658
0.9618	0.9562	0.9302	0.9256	0.9291
0.9381	0.9494	0.9639	0.9811	1.0000

Width:

0.0109	0.0218	0.0311	0.0396	0.0481
0.0566	0.0651	0.0736	0.0800	0.0844
0.0878	0.0912	0.0946	0.0980	0.1012
0.1042	0.1072	0.1101	0.1131	0.1161
0.1190	0.1222	0.1256	0.1291	0.1329
0.1370	0.1422	0.1476	0.1533	0.1612
0.1727	0.2035	0.2431	0.2656	0.2733
0.2870	0.3283	0.3673	0.4706	0.5431
0.6084	0.6926	0.8241	0.8493	0.8704
0.8931	0.9222	0.9490	0.9746	1.0000

Transect 10144.4

Area:

0.0003	0.0012	0.0024	0.0038	0.0054
0.0071	0.0090	0.0111	0.0134	0.0158
0.0184	0.0212	0.0241	0.0274	0.0309
0.0346	0.0385	0.0425	0.0467	0.0511
0.0557	0.0605	0.0655	0.0708	0.0763
0.0821	0.0881	0.0943	0.1008	0.1076
0.1148	0.1235	0.1343	0.1489	0.1703
0.2001	0.2394	0.2829	0.3296	0.3786
0.4303	0.4866	0.5471	0.6087	0.6716
0.7354	0.8001	0.8655	0.9322	1.0000

Hrad:

0.0310	0.0665	0.1141	0.1569	0.1965
0.2339	0.2697	0.3043	0.3380	0.3709
0.4033	0.4351	0.4588	0.4780	0.5041
0.5384	0.5721	0.6054	0.6376	0.6681
0.6963	0.7184	0.7425	0.7676	0.7945
0.8225	0.8497	0.8733	0.8970	0.9085
0.8765	0.9101	0.9416	0.9479	0.9129
0.8540	0.7910	0.7583	0.7471	0.7480
0.7530	0.7611	0.7720	0.7957	0.8245
0.8566	0.8912	0.9278	0.9607	1.0000

Width:

0.0090	0.0166	0.0191	0.0217	0.0242
0.0268	0.0293	0.0319	0.0344	0.0370
0.0395	0.0420	0.0455	0.0496	0.0531
0.0556	0.0580	0.0605	0.0631	0.0658
0.0688	0.0725	0.0761	0.0796	0.0829
0.0861	0.0895	0.0933	0.0971	0.1026
0.1140	0.1387	0.1898	0.2529	0.3660
0.4947	0.6168	0.6612	0.7065	0.7385
0.7985	0.8794	0.8944	0.9159	0.9305
0.9438	0.9557	0.9668	0.9911	1.0000

Transect 10244.4

Area:

0.0004	0.0016	0.0032	0.0051	0.0071
0.0095	0.0121	0.0149	0.0179	0.0212
0.0247	0.0285	0.0325	0.0368	0.0413
0.0461	0.0512	0.0565	0.0620	0.0678
0.0739	0.0802	0.0867	0.0936	0.1007
0.1081	0.1158	0.1237	0.1319	0.1403
0.1491	0.1580	0.1673	0.1768	0.1869
0.1977	0.2096	0.2231	0.2389	0.2618
0.2967	0.3456	0.4166	0.4946	0.5740
0.6548	0.7373	0.8221	0.9099	1.0000

Hrad:

0.0340	0.0714	0.1235	0.1703	0.2137
0.2547	0.2939	0.3318	0.3688	0.4049
0.4404	0.4754	0.5082	0.5408	0.5730
0.6051	0.6377	0.6719	0.7053	0.7383
0.7717	0.8038	0.8335	0.8632	0.8932
0.9253	0.9569	0.9886	1.0203	1.0521
1.0843	1.1165	1.1487	1.1664	1.1638
1.1399	1.0822	1.0252	0.9319	0.9528
0.9491	0.9116	0.8476	0.8275	0.8361
0.8582	0.8897	0.9214	0.9591	1.0000

Width:

0.0087	0.0164	0.0190	0.0216	0.0243
0.0269	0.0295	0.0321	0.0347	0.0373
0.0399	0.0426	0.0454	0.0482	0.0511
0.0540	0.0568	0.0594	0.0621	0.0649
0.0676	0.0704	0.0734	0.0765	0.0796
0.0824	0.0853	0.0882	0.0911	0.0940
0.0969	0.0998	0.1026	0.1070	0.1136
0.1232	0.1383	0.1563	0.1948	0.3276
0.4123	0.6720	0.8319	0.8643	0.8759
0.8943	0.9120	0.9466	0.9739	1.0000

Transect 10344.4

Area:

0.0002	0.0009	0.0017	0.0026	0.0036
0.0048	0.0061	0.0075	0.0090	0.0106
0.0124	0.0143	0.0164	0.0187	0.0211
0.0237	0.0264	0.0293	0.0323	0.0355
0.0388	0.0423	0.0460	0.0498	0.0539
0.0582	0.0626	0.0674	0.0726	0.0787
0.0858	0.0942	0.1061	0.1199	0.1358
0.1539	0.1732	0.1951	0.2218	0.2599
0.3141	0.3791	0.4487	0.5201	0.5952
0.6720	0.7500	0.8299	0.9143	1.0000

Hrad:

0.0421	0.0976	0.1601	0.2164	0.2685
0.3177	0.3649	0.4106	0.4550	0.4984
0.5341	0.5640	0.5937	0.6314	0.6717
0.7119	0.7515	0.7900	0.8285	0.8669
0.9043	0.9400	0.9725	1.0027	1.0338
1.0666	1.0940	1.0827	1.1229	1.1687
1.2000	1.2152	1.1908	1.1683	1.1295
1.1152	1.1143	1.1076	1.0142	0.8933
0.7750	0.7405	0.7492	0.7704	0.6460
0.7217	0.7910	0.8532	0.9261	1.0000

Width:

0.0053	0.0087	0.0100	0.0114	0.0128
0.0141	0.0155	0.0169	0.0183	0.0196
0.0214	0.0234	0.0255	0.0274	0.0290
0.0307	0.0324	0.0342	0.0360	0.0378
0.0396	0.0416	0.0437	0.0460	0.0483
0.0506	0.0532	0.0580	0.0644	0.0765
0.0880	0.1198	0.1527	0.1692	0.2039
0.2166	0.2333	0.2704	0.4001	0.5070
0.7144	0.7971	0.8180	0.8459	0.8881
0.8970	0.9131	0.9636	0.9912	1.0000

Transect 10444.3

Area:

0.0004	0.0017	0.0036	0.0057	0.0081
0.0108	0.0139	0.0172	0.0209	0.0248
0.0291	0.0336	0.0385	0.0437	0.0492
0.0549	0.0608	0.0669	0.0733	0.0799
0.0868	0.0939	0.1013	0.1090	0.1170
0.1253	0.1339	0.1428	0.1522	0.1619
0.1722	0.1832	0.1957	0.2132	0.2369
0.2654	0.2999	0.3362	0.3736	0.4128
0.4533	0.4956	0.5401	0.5884	0.6405
0.6949	0.7572	0.8291	0.9066	1.0000

Hrad:

0.0313	0.0648	0.1114	0.1533	0.1921
0.2289	0.2643	0.2987	0.3322	0.3651
0.3971	0.4288	0.4603	0.4931	0.5290
0.5660	0.6024	0.6382	0.6726	0.7053
0.7368	0.7671	0.7971	0.8258	0.8547
0.8800	0.9070	0.9280	0.9489	0.9643
0.9742	0.9445	0.9319	0.8742	0.8770
0.8691	0.8538	0.8482	0.8513	0.8580
0.8682	0.8788	0.8867	0.8851	0.8968
0.9131	0.9249	0.9488	0.9809	1.0000

Width:

0.0085	0.0164	0.0193	0.0223	0.0253
0.0283	0.0313	0.0343	0.0373	0.0403
0.0433	0.0464	0.0494	0.0523	0.0547
0.0569	0.0591	0.0614	0.0637	0.0661
0.0686	0.0713	0.0740	0.0768	0.0797
0.0829	0.0859	0.0897	0.0935	0.0980
0.1033	0.1139	0.1380	0.2140	0.2421
0.3150	0.3522	0.3605	0.3748	0.3901
0.4051	0.4237	0.4497	0.4944	0.5210

0.5576	0.6658	0.7361	0.7884	1.0000

Transect 10461.3

Area:

0.0013	0.0051	0.0105	0.0166	0.0232
0.0305	0.0383	0.0467	0.0556	0.0652
0.0755	0.0861	0.0970	0.1081	0.1193
0.1308	0.1425	0.1544	0.1666	0.1790
0.1916	0.2045	0.2178	0.2313	0.2452
0.2594	0.2740	0.2888	0.3041	0.3197
0.3361	0.3536	0.3733	0.3991	0.4272
0.4563	0.4883	0.5241	0.5603	0.5967
0.6332	0.6699	0.7069	0.7441	0.7815
0.8192	0.8571	0.8979	0.9464	1.0000

Hrad:

0.0194	0.0388	0.0708	0.1011	0.1295
0.1564	0.1821	0.2070	0.2308	0.2534
0.2764	0.3074	0.3384	0.3695	0.3999
0.4298	0.4592	0.4869	0.5142	0.5411
0.5663	0.5899	0.6128	0.6355	0.6578
0.6797	0.7003	0.7213	0.7422	0.7532
0.7655	0.7936	0.8153	0.8204	0.8246
0.8295	0.8294	0.8261	0.8298	0.8369
0.8458	0.8559	0.8679	0.8816	0.9034
0.9280	0.9529	0.9744	0.9884	1.0000

Width:

0.0446	0.0891	0.1016	0.1119	0.1222
0.1325	0.1427	0.1530	0.1636	0.1746
0.1851	0.1895	0.1934	0.1970	0.2005
0.2041	0.2077	0.2119	0.2161	0.2202
0.2251	0.2305	0.2361	0.2417	0.2473
0.2531	0.2594	0.2654	0.2714	0.2812
0.2953	0.3253	0.3862	0.4827	0.5036
0.5282	0.6037	0.6358	0.6388	0.6419
0.6454	0.6494	0.6533	0.6572	0.6612
0.6659	0.6707	0.7965	0.8934	1.0000

Transect 10614.5

Area:

0.0003	0.0014	0.0027	0.0043	0.0060
0.0078	0.0098	0.0119	0.0142	0.0167
0.0193	0.0221	0.0250	0.0280	0.0313
0.0349	0.0387	0.0427	0.0468	0.0511
0.0556	0.0604	0.0653	0.0705	0.0758
0.0814	0.0873	0.0933	0.0996	0.1060
0.1128	0.1199	0.1273	0.1370	0.1559
0.1836	0.2170	0.2554	0.3005	0.3555
0.4147	0.4746	0.5352	0.5963	0.6590
0.7236	0.7901	0.8592	0.9290	1.0000

Hrad:

0.0387	0.0807	0.1438	0.2010	0.2541
0.3039	0.3514	0.3971	0.4412	0.4842
0.5262	0.5673	0.6078	0.6450	0.6671
0.6846	0.7261	0.7669	0.8065	0.8435
0.8765	0.9082	0.9422	0.9745	1.0065
1.0389	1.0736	1.1067	1.1384	1.1718
1.1947	1.2111	1.2134	1.1515	1.0976
1.0274	0.9628	0.9146	0.8699	0.8142
0.8006	0.8038	0.8188	0.8401	0.8592
0.8850	0.9061	0.9359	0.9684	1.0000

Width:

0.0095	0.0182	0.0203	0.0225	0.0246
0.0268	0.0289	0.0310	0.0332	0.0353
0.0375	0.0396	0.0417	0.0441	0.0477
0.0519	0.0542	0.0565	0.0589	0.0615
0.0644	0.0675	0.0704	0.0735	0.0766
0.0798	0.0827	0.0858	0.0891	0.0922
0.0963	0.1012	0.1076	0.2114	0.3287
0.4310	0.5002	0.5695	0.6983	0.8213
0.8309	0.8426	0.8488	0.8598	0.8940
0.9124	0.9537	0.9694	0.9816	1.0000

Transect 10664.7

Area:

0.0007	0.0029	0.0064	0.0104	0.0149
0.0200	0.0257	0.0318	0.0386	0.0458
0.0536	0.0619	0.0707	0.0802	0.0901
0.1007	0.1117	0.1232	0.1350	0.1472
0.1598	0.1728	0.1861	0.1998	0.2139

	0.2284	0.2433	0.2586	0.2744	0.2906
	0.3073	0.3244	0.3419	0.3599	0.3783
	0.3972	0.4166	0.4365	0.4572	0.4789
	0.5023	0.5275	0.5608	0.6055	0.6623
	0.7217	0.7830	0.8511	0.9238	1.0000
Hrad:					
	0.0256	0.0512	0.0864	0.1227	0.1562
	0.1879	0.2182	0.2475	0.2760	0.3039
	0.3314	0.3584	0.3850	0.4111	0.4361
	0.4588	0.4908	0.5222	0.5531	0.5836
	0.6139	0.6436	0.6730	0.7018	0.7303
	0.7582	0.7831	0.8082	0.8332	0.8582
	0.8834	0.9095	0.9355	0.9587	0.9826
	1.0065	1.0283	1.0451	1.0466	1.0414
	1.0121	1.0358	1.0463	1.0220	1.0115
	1.0064	1.0069	1.0030	1.0009	1.0000
Width:					
	0.0185	0.0369	0.0473	0.0541	0.0608
	0.0676	0.0744	0.0811	0.0879	0.0947
	0.1014	0.1082	0.1150	0.1219	0.1290
	0.1370	0.1418	0.1466	0.1514	0.1562
	0.1609	0.1656	0.1704	0.1752	0.1800
	0.1849	0.1905	0.1961	0.2018	0.2074
	0.2129	0.2181	0.2234	0.2294	0.2352
	0.2410	0.2474	0.2552	0.2674	0.2821
	0.3055	0.3354	0.4736	0.7033	0.7281
	0.7580	0.7959	0.9061	0.9306	1.0000

Transect 10664.7(orig)

Area:					
	0.0004	0.0016	0.0034	0.0056	0.0081
	0.0108	0.0139	0.0172	0.0208	0.0247
	0.0289	0.0334	0.0382	0.0433	0.0487
	0.0544	0.0604	0.0666	0.0729	0.0795
	0.0863	0.0933	0.1005	0.1080	0.1156
	0.1234	0.1314	0.1465	0.1708	0.1966
	0.2228	0.2494	0.2765	0.3039	0.3316
	0.3598	0.3884	0.4174	0.4469	0.4772
	0.5084	0.5408	0.5778	0.6211	0.6712
	0.7236	0.7826	0.8499	0.9229	1.0000
Hrad:					
	0.0363	0.0727	0.1227	0.1742	0.2218
	0.2667	0.3097	0.3513	0.3918	0.4315
	0.4704	0.5088	0.5465	0.5836	0.6191
	0.6513	0.6968	0.7414	0.7852	0.8284
	0.8714	0.9137	0.9553	0.9963	1.0368
	1.0762	1.1117	1.0749	0.9876	0.9365
	0.9120	0.9046	0.9084	0.9178	0.9337
	0.9539	0.9758	0.9967	1.0095	1.0200
	1.0164	1.0495	1.0771	1.0846	1.0998
	1.1046	1.0823	0.9965	1.0040	1.0000
Width:					
	0.0098	0.0196	0.0251	0.0287	0.0323
	0.0359	0.0395	0.0430	0.0466	0.0502
	0.0538	0.0574	0.0610	0.0647	0.0685
	0.0727	0.0752	0.0778	0.0803	0.0829
	0.0854	0.0879	0.0904	0.0929	0.0955
	0.0981	0.1011	0.2611	0.3165	0.3217
	0.3269	0.3321	0.3366	0.3415	0.3462
	0.3509	0.3560	0.3618	0.3700	0.3795
	0.3937	0.4117	0.4873	0.6114	0.6291
	0.6872	0.7693	0.8868	0.9223	1.0000

Transect 10749

Area:					
	0.0005	0.0020	0.0039	0.0061	0.0086
	0.0113	0.0142	0.0174	0.0209	0.0246
	0.0285	0.0327	0.0373	0.0421	0.0472
	0.0525	0.0582	0.0641	0.0704	0.0770
	0.0840	0.0914	0.0991	0.1073	0.1158
	0.1247	0.1340	0.1436	0.1537	0.1641
	0.1751	0.1867	0.1993	0.2178	0.2494
	0.2849	0.3221	0.3609	0.4009	0.4425
	0.4865	0.5322	0.5798	0.6296	0.6808
	0.7340	0.7902	0.8505	0.9249	1.0000
Hrad:					
	0.0287	0.0615	0.1066	0.1473	0.1849
	0.2203	0.2540	0.2865	0.3181	0.3489
	0.3785	0.4049	0.4320	0.4576	0.4845

0.5135	0.5410	0.5660	0.5873	0.6078
0.6292	0.6515	0.6739	0.6971	0.7189
0.7415	0.7654	0.7906	0.8140	0.8335
0.8498	0.8492	0.8238	0.8073	0.7786
0.7577	0.7681	0.7862	0.8093	0.8350
0.8611	0.8875	0.9144	0.9368	0.9678
0.9921	1.0166	0.9856	0.9624	1.0000

Width:

0.0132	0.0244	0.0277	0.0310	0.0343
0.0376	0.0409	0.0442	0.0476	0.0509
0.0543	0.0582	0.0620	0.0660	0.0698
0.0733	0.0769	0.0810	0.0858	0.0908
0.0958	0.1007	0.1057	0.1107	0.1159
0.1211	0.1262	0.1310	0.1362	0.1422
0.1490	0.1595	0.1779	0.3515	0.4528
0.4864	0.5060	0.5234	0.5428	0.5678
0.5998	0.6184	0.6509	0.6723	0.6930
0.7287	0.7571	0.9183	1.0000	1.0000

Transect 10749(orig)

Area:

0.0004	0.0015	0.0030	0.0047	0.0066
0.0087	0.0110	0.0134	0.0161	0.0189
0.0220	0.0252	0.0287	0.0324	0.0363
0.0405	0.0448	0.0494	0.0542	0.0593
0.0647	0.0704	0.0764	0.0826	0.0892
0.0961	0.1032	0.1107	0.1184	0.1265
0.1354	0.1451	0.1559	0.1714	0.1983
0.2318	0.2679	0.3056	0.3451	0.3866
0.4310	0.4784	0.5285	0.5826	0.6393
0.6993	0.7644	0.8341	0.9159	1.0000

Hrad:

0.0328	0.0703	0.1218	0.1683	0.2113
0.2517	0.2903	0.3274	0.3635	0.3986
0.4325	0.4627	0.4936	0.5229	0.5537
0.5868	0.6182	0.6467	0.6711	0.6946
0.7189	0.7444	0.7700	0.7966	0.8215
0.8473	0.8746	0.9034	0.9301	0.9522
0.9664	0.9601	0.9258	0.9027	0.8600
0.8156	0.8147	0.8263	0.8450	0.8667
0.8871	0.9083	0.9274	0.9439	0.9713
0.9871	1.0041	0.9802	0.9700	1.0000

Width:

0.0089	0.0165	0.0188	0.0210	0.0232
0.0255	0.0277	0.0300	0.0322	0.0344
0.0367	0.0394	0.0419	0.0447	0.0473
0.0496	0.0521	0.0548	0.0581	0.0615
0.0648	0.0682	0.0716	0.0749	0.0785
0.0820	0.0854	0.0887	0.0922	0.0982
0.1088	0.1187	0.1340	0.2545	0.3546
0.4118	0.4320	0.4507	0.4722	0.5004
0.5390	0.5680	0.6133	0.6487	0.6781
0.7306	0.7761	0.9028	0.9670	1.0000

Transect 10848.5

Area:

0.0007	0.0026	0.0053	0.0085	0.0122
0.0164	0.0211	0.0263	0.0320	0.0383
0.0449	0.0520	0.0594	0.0671	0.0751
0.0834	0.0920	0.1010	0.1103	0.1200
0.1301	0.1407	0.1517	0.1632	0.1753
0.1878	0.2007	0.2142	0.2281	0.2425
0.2574	0.2728	0.2888	0.3056	0.3233
0.3433	0.3647	0.3876	0.4121	0.4385
0.4674	0.5018	0.5401	0.5847	0.6329
0.6908	0.7555	0.8331	0.9139	1.0000

Hrad:

0.0284	0.0621	0.1022	0.1383	0.1720
0.2042	0.2353	0.2657	0.2956	0.3275
0.3605	0.3931	0.4288	0.4645	0.4987
0.5323	0.5652	0.5962	0.6243	0.6498
0.6759	0.7004	0.7229	0.7447	0.7681
0.7928	0.8172	0.8414	0.8656	0.8905
0.9152	0.9387	0.9498	0.9557	0.9638
0.9970	1.0218	1.0438	1.0461	1.0627
1.0969	1.1175	1.1284	1.1334	1.1424
1.1381	1.1309	1.1077	1.1065	1.0000

Width:

0.0096	0.0172	0.0209	0.0245	0.0282

0.0318	0.0355	0.0392	0.0428	0.0460
0.0489	0.0518	0.0541	0.0562	0.0584
0.0606	0.0628	0.0652	0.0679	0.0710
0.0739	0.0771	0.0806	0.0842	0.0877
0.0910	0.0944	0.0978	0.1013	0.1047
0.1081	0.1117	0.1171	0.1234	0.1313
0.1489	0.1579	0.1686	0.1821	0.1965
0.2166	0.2647	0.2933	0.3291	0.3805
0.4331	0.4941	0.5713	0.5841	1.0000

Transect 10848.5(orig)

Area:

0.0004	0.0017	0.0033	0.0053	0.0076
0.0103	0.0132	0.0165	0.0201	0.0240
0.0282	0.0326	0.0372	0.0420	0.0471
0.0523	0.0577	0.0633	0.0691	0.0752
0.0816	0.0882	0.0951	0.1023	0.1099
0.1177	0.1258	0.1343	0.1430	0.1520
0.1615	0.1751	0.1911	0.2083	0.2271
0.2502	0.2772	0.3085	0.3435	0.3810
0.4207	0.4646	0.5121	0.5682	0.6270
0.6919	0.7610	0.8382	0.9175	1.0000

Hrad:

0.0293	0.0642	0.1055	0.1428	0.1777
0.2109	0.2431	0.2745	0.3054	0.3383
0.3724	0.4061	0.4430	0.4798	0.5151
0.5498	0.5838	0.6159	0.6448	0.6712
0.6982	0.7235	0.7467	0.7693	0.7934
0.8189	0.8441	0.8692	0.8941	0.9198
0.9444	0.9398	0.9206	0.9026	0.8877
0.8835	0.8762	0.8602	0.8403	0.8456
0.8674	0.8843	0.8834	0.8746	0.8996
0.9208	0.9423	0.9559	0.9824	1.0000

Width:

0.0096	0.0172	0.0209	0.0245	0.0282
0.0318	0.0355	0.0392	0.0428	0.0460
0.0489	0.0518	0.0541	0.0562	0.0584
0.0606	0.0628	0.0652	0.0679	0.0710
0.0739	0.0771	0.0806	0.0842	0.0877
0.0910	0.0944	0.0978	0.1013	0.1047
0.1217	0.1761	0.1892	0.2035	0.2279
0.2893	0.3243	0.3807	0.4191	0.4383
0.4665	0.5243	0.5937	0.6549	0.7063
0.7589	0.8199	0.8971	0.9099	1.0000

Transect 11048.5

Area:

0.0008	0.0031	0.0062	0.0098	0.0139
0.0184	0.0235	0.0290	0.0350	0.0415
0.0484	0.0557	0.0636	0.0720	0.0808
0.0903	0.1003	0.1107	0.1215	0.1328
0.1445	0.1566	0.1692	0.1823	0.1958
0.2100	0.2247	0.2401	0.2561	0.2727
0.2908	0.3113	0.3319	0.3527	0.3736
0.3946	0.4160	0.4388	0.4636	0.4926
0.5235	0.5578	0.5954	0.6361	0.6828
0.7343	0.7887	0.8476	0.9137	1.0000

Hrad:

0.0876	0.1872	0.3195	0.4384	0.5488
0.6532	0.7533	0.8505	0.9483	1.0432
1.1364	1.2268	1.3117	1.3963	1.4720
1.5491	1.6435	1.7371	1.8293	1.9204
2.0104	2.0984	2.1859	2.2730	2.3476
2.4078	2.4689	2.5383	2.6088	2.6802
2.3977	2.5217	2.6564	2.7913	2.9240
3.0548	3.0808	3.0334	2.7624	2.7063
2.6844	2.5423	2.5419	2.5433	2.6367
2.7184	2.7627	2.7138	2.6096	1.0000

Width:

0.0090	0.0166	0.0194	0.0222	0.0249
0.0277	0.0305	0.0333	0.0359	0.0385
0.0412	0.0439	0.0468	0.0497	0.0530
0.0562	0.0587	0.0612	0.0638	0.0663
0.0688	0.0714	0.0740	0.0766	0.0797
0.0834	0.0871	0.0906	0.0941	0.0975
0.1172	0.1187	0.1195	0.1202	0.1209
0.1215	0.1269	0.1361	0.1591	0.1730
0.1857	0.2100	0.2245	0.2401	0.2882
0.3057	0.3251	0.3576	0.4370	1.0000

Transect 11048.5(orig)

Area:

0.0003	0.0013	0.0026	0.0042	0.0059
0.0078	0.0100	0.0123	0.0149	0.0176
0.0206	0.0237	0.0271	0.0306	0.0344
0.0384	0.0427	0.0471	0.0517	0.0565
0.0615	0.0667	0.0720	0.0776	0.0834
0.0894	0.0957	0.1037	0.1198	0.1398
0.1636	0.1917	0.2220	0.2531	0.2848
0.3193	0.3550	0.3916	0.4294	0.4701
0.5127	0.5575	0.6047	0.6538	0.7056
0.7594	0.8144	0.8714	0.9314	1.0000

Hrad:

0.0369	0.0789	0.1346	0.1847	0.2312
0.2752	0.3174	0.3584	0.3996	0.4396
0.4788	0.5169	0.5527	0.5884	0.6203
0.6527	0.6925	0.7320	0.7708	0.8092
0.8472	0.8842	0.9211	0.9578	0.9892
1.0146	1.0403	1.0484	0.9766	0.9160
0.4495	0.4753	0.5271	0.5919	0.6530
0.6602	0.7212	0.7746	0.7967	0.8281
0.8660	0.8871	0.9211	0.9698	1.0332
1.0944	1.1492	1.1867	1.2099	1.0000

Width:

0.0090	0.0166	0.0194	0.0222	0.0249
0.0277	0.0305	0.0333	0.0359	0.0385
0.0412	0.0439	0.0468	0.0497	0.0530
0.0562	0.0587	0.0612	0.0638	0.0663
0.0688	0.0714	0.0740	0.0766	0.0797
0.0834	0.0871	0.1807	0.2564	0.2881
0.3605	0.4003	0.4180	0.4243	0.4420
0.4804	0.4889	0.5022	0.5359	0.5649
0.5894	0.6260	0.6543	0.6722	0.7203
0.7378	0.7572	0.7897	0.8691	1.0000

Transect 11248.4

Area:

0.0006	0.0025	0.0050	0.0078	0.0111
0.0147	0.0186	0.0230	0.0277	0.0328
0.0383	0.0441	0.0503	0.0569	0.0639
0.0713	0.0791	0.0873	0.0960	0.1051
0.1146	0.1245	0.1349	0.1457	0.1569
0.1686	0.1808	0.1934	0.2066	0.2203
0.2348	0.2501	0.2664	0.2847	0.3066
0.3334	0.3629	0.3944	0.4284	0.4655
0.5047	0.5462	0.5889	0.6333	0.6820
0.7350	0.7950	0.8585	0.9256	1.0000

Hrad:

0.0250	0.0542	0.0919	0.1259	0.1573
0.1871	0.2156	0.2432	0.2701	0.2965
0.3224	0.3480	0.3728	0.3974	0.4219
0.4451	0.4674	0.4898	0.5124	0.5351
0.5576	0.5802	0.6029	0.6251	0.6474
0.6698	0.6912	0.7107	0.7280	0.7440
0.7498	0.7575	0.7373	0.7473	0.7825
0.8057	0.8268	0.8470	0.8635	0.8812
0.8970	0.9163	0.9375	0.9576	0.9655
0.9813	0.9927	1.0052	1.0043	1.0000

Width:

0.0154	0.0279	0.0325	0.0371	0.0416
0.0462	0.0507	0.0553	0.0598	0.0644
0.0690	0.0735	0.0782	0.0829	0.0875
0.0925	0.0977	0.1029	0.1081	0.1133
0.1185	0.1238	0.1290	0.1344	0.1398
0.1452	0.1509	0.1571	0.1639	0.1712
0.1815	0.1917	0.2106	0.2356	0.2973
0.3528	0.3687	0.3974	0.4443	0.4636
0.4978	0.5135	0.5291	0.5520	0.6110
0.7105	0.7520	0.7903	0.8641	1.0000

Transect 11248.4(orig)

Area:

0.0004	0.0014	0.0028	0.0044	0.0062
0.0082	0.0104	0.0128	0.0154	0.0182
0.0213	0.0245	0.0280	0.0317	0.0356
0.0397	0.0440	0.0486	0.0534	0.0584
0.0637	0.0693	0.0750	0.0810	0.0873
0.0938	0.1006	0.1076	0.1149	0.1225

0.1306	0.1391	0.1482	0.1642	0.1886
0.2253	0.2672	0.3109	0.3569	0.4051
0.4549	0.5076	0.5613	0.6160	0.6731
0.7326	0.7960	0.8613	0.9286	1.0000

Hrad:

0.0272	0.0592	0.1003	0.1373	0.1716
0.2041	0.2352	0.2653	0.2947	0.3234
0.3517	0.3796	0.4067	0.4335	0.4602
0.4856	0.5099	0.5344	0.5590	0.5838
0.6083	0.6330	0.6577	0.6819	0.7063
0.7307	0.7541	0.7753	0.7942	0.8117
0.8180	0.8264	0.8039	0.7778	0.7575
0.7044	0.6815	0.6773	0.6837	0.7007
0.7209	0.7400	0.7731	0.8080	0.8382
0.8744	0.9094	0.9454	0.9737	1.0000

Width:

0.0093	0.0169	0.0196	0.0224	0.0251
0.0279	0.0306	0.0334	0.0361	0.0389
0.0416	0.0444	0.0472	0.0500	0.0528
0.0558	0.0589	0.0621	0.0652	0.0683
0.0715	0.0747	0.0779	0.0811	0.0844
0.0876	0.0910	0.0948	0.0989	0.1033
0.1095	0.1157	0.1356	0.2588	0.3931
0.5456	0.5623	0.5925	0.6300	0.6470
0.6756	0.7065	0.7159	0.7297	0.7653
0.8253	0.8504	0.8734	0.9180	1.0000

Transect 11448.4

Area:

0.0005	0.0020	0.0041	0.0065	0.0093
0.0125	0.0161	0.0201	0.0243	0.0287
0.0333	0.0381	0.0431	0.0483	0.0537
0.0593	0.0652	0.0713	0.0776	0.0842
0.0910	0.0982	0.1056	0.1133	0.1214
0.1298	0.1386	0.1477	0.1571	0.1669
0.1772	0.1882	0.2017	0.2214	0.2520
0.2887	0.3294	0.3715	0.4144	0.4584
0.5034	0.5493	0.5970	0.6470	0.6998
0.7564	0.8145	0.8742	0.9363	1.0000

Hrad:

0.0275	0.0596	0.0987	0.1340	0.1670
0.1984	0.2288	0.2620	0.3003	0.3369
0.3722	0.4063	0.4395	0.4718	0.5029
0.5327	0.5608	0.5883	0.6155	0.6415
0.6658	0.6887	0.7112	0.7321	0.7527
0.7737	0.7946	0.8155	0.8368	0.8569
0.8602	0.8812	0.9121	0.9155	0.8771
0.8419	0.8194	0.8140	0.8187	0.8299
0.8463	0.8678	0.8901	0.9130	0.9348
0.9558	0.9789	1.0031	0.9750	1.0000

Width:

0.0157	0.0286	0.0345	0.0404	0.0464
0.0523	0.0583	0.0631	0.0662	0.0692
0.0723	0.0754	0.0785	0.0816	0.0849
0.0883	0.0919	0.0956	0.0993	0.1032
0.1074	0.1120	0.1166	0.1217	0.1268
0.1320	0.1373	0.1427	0.1480	0.1537
0.1630	0.1756	0.2655	0.3709	0.5280
0.5998	0.6392	0.6533	0.6687	0.6847
0.6996	0.7105	0.7548	0.7883	0.8563
0.8822	0.9072	0.9316	0.9710	1.0000

Transect 11448.4(orig)

Area:

0.0004	0.0014	0.0028	0.0045	0.0065
0.0087	0.0112	0.0139	0.0169	0.0199
0.0231	0.0264	0.0299	0.0335	0.0373
0.0412	0.0452	0.0495	0.0539	0.0584
0.0632	0.0681	0.0733	0.0787	0.0843
0.0901	0.0962	0.1025	0.1091	0.1159
0.1230	0.1306	0.1400	0.1537	0.1752
0.2013	0.2338	0.2707	0.3126	0.3574
0.4069	0.4622	0.5208	0.5817	0.6453
0.7123	0.7811	0.8521	0.9254	1.0000

Hrad:

0.0326	0.0706	0.1171	0.1589	0.1980
0.2353	0.2712	0.3107	0.3561	0.3995
0.4413	0.4818	0.5211	0.5595	0.5963
0.6316	0.6650	0.6976	0.7299	0.7606

0.7894	0.8166	0.8433	0.8680	0.8925
0.9174	0.9422	0.9670	0.9922	1.0160
1.0200	1.0449	1.0815	1.0855	1.0384
0.9928	0.9418	0.9077	0.8807	0.8679
0.8553	0.8465	0.8573	0.8743	0.8942
0.9177	0.9434	0.9700	0.9623	1.0000

Width:

0.0094	0.0171	0.0206	0.0242	0.0277
0.0313	0.0348	0.0377	0.0396	0.0414
0.0432	0.0451	0.0469	0.0488	0.0507
0.0528	0.0549	0.0572	0.0594	0.0617
0.0642	0.0670	0.0697	0.0728	0.0758
0.0789	0.0821	0.0853	0.0885	0.0919
0.0975	0.1050	0.1587	0.2218	0.3220
0.3721	0.4609	0.5308	0.5766	0.6163
0.6891	0.7590	0.7933	0.8230	0.8749
0.8988	0.9258	0.9552	0.9827	1.0000

Transect 11648.4

Area:

0.0005	0.0021	0.0043	0.0068	0.0096
0.0128	0.0163	0.0201	0.0242	0.0286
0.0334	0.0385	0.0439	0.0497	0.0558
0.0623	0.0691	0.0763	0.0838	0.0917
0.0998	0.1083	0.1172	0.1263	0.1358
0.1456	0.1557	0.1661	0.1768	0.1879
0.1994	0.2114	0.2240	0.2393	0.2612
0.2868	0.3166	0.3500	0.3857	0.4221
0.4589	0.4973	0.5439	0.5947	0.6480
0.7048	0.7661	0.8360	0.9127	1.0000

Hrad:

0.0339	0.0698	0.1221	0.1691	0.2126
0.2538	0.2932	0.3313	0.3683	0.4046
0.4403	0.4749	0.5078	0.5404	0.5729
0.6059	0.6390	0.6721	0.7050	0.7382
0.7716	0.8056	0.8363	0.8715	0.9068
0.9416	0.9756	1.0083	1.0382	1.0666
1.0914	1.1104	1.1460	1.1782	1.1753
1.1641	1.1470	1.1250	1.1174	1.1223
1.1056	1.1408	1.1575	1.1733	1.1919
1.2078	1.2222	1.2228	1.2293	1.0000

Width:

0.0084	0.0162	0.0188	0.0214	0.0240
0.0266	0.0292	0.0317	0.0343	0.0369
0.0395	0.0422	0.0449	0.0478	0.0506
0.0533	0.0560	0.0588	0.0615	0.0642
0.0668	0.0694	0.0723	0.0747	0.0771
0.0796	0.0821	0.0847	0.0875	0.0906
0.0940	0.0980	0.1057	0.1562	0.1885
0.2232	0.2575	0.2823	0.2890	0.2926
0.2996	0.3175	0.3943	0.4178	0.4370
0.4748	0.5119	0.5934	0.6447	1.0000

Transect 11648.4(orig)

Area:

0.0004	0.0016	0.0034	0.0053	0.0076
0.0101	0.0128	0.0158	0.0190	0.0225
0.0263	0.0303	0.0346	0.0391	0.0439
0.0490	0.0544	0.0601	0.0660	0.0721
0.0786	0.0853	0.0922	0.0994	0.1069
0.1146	0.1225	0.1307	0.1392	0.1479
0.1570	0.1664	0.1763	0.1883	0.2056
0.2261	0.2506	0.2784	0.3084	0.3395
0.3722	0.4099	0.4655	0.5295	0.5960
0.6659	0.7396	0.8201	0.9058	1.0000

Hrad:

0.0325	0.0669	0.1171	0.1622	0.2040
0.2435	0.2813	0.3178	0.3534	0.3882
0.4224	0.4556	0.4871	0.5184	0.5496
0.5812	0.6131	0.6448	0.6764	0.7082
0.7403	0.7729	0.8024	0.8361	0.8700
0.9033	0.9359	0.9673	0.9960	1.0232
1.0470	1.0652	1.0994	1.1303	1.1275
1.1145	1.0928	1.0661	1.0535	1.0507
1.0224	1.0014	0.9400	0.9327	0.9374
0.9456	0.9620	0.9731	0.9919	1.0000

Width:

0.0084	0.0162	0.0188	0.0214	0.0240
0.0266	0.0292	0.0317	0.0343	0.0369

0.0395	0.0422	0.0449	0.0478	0.0506
0.0533	0.0560	0.0588	0.0615	0.0642
0.0668	0.0694	0.0723	0.0747	0.0771
0.0796	0.0821	0.0847	0.0875	0.0906
0.0940	0.0980	0.1057	0.1562	0.1885
0.2306	0.2709	0.2998	0.3105	0.3227
0.3491	0.4498	0.6375	0.6654	0.6891
0.7339	0.7710	0.8525	0.9038	1.0000

Transect 11748.1

Area:

0.0008	0.0025	0.0048	0.0076	0.0109
0.0147	0.0189	0.0234	0.0281	0.0331
0.0383	0.0438	0.0495	0.0555	0.0617
0.0683	0.0750	0.0820	0.0892	0.0966
0.1042	0.1121	0.1201	0.1285	0.1370
0.1459	0.1549	0.1643	0.1739	0.1839
0.1944	0.2074	0.2235	0.2420	0.2617
0.2827	0.3059	0.3320	0.3633	0.4035
0.4478	0.4957	0.5468	0.6031	0.6677
0.7341	0.8006	0.8671	0.9335	1.0000

Hrad:

0.0497	0.1208	0.1821	0.2387	0.2927
0.3494	0.4167	0.4842	0.5494	0.6136
0.6761	0.7370	0.7969	0.8500	0.9016
0.9573	1.0185	1.0787	1.1355	1.1906
1.2465	1.3004	1.3533	1.4027	1.4525
1.5016	1.5479	1.5922	1.6366	1.6598
1.6202	1.3589	1.1995	1.1807	1.2258
1.2050	1.1804	1.1775	1.0039	0.9300
0.9566	1.0074	1.0468	1.0904	0.9567
1.0503	1.1438	1.2369	1.3298	1.0000

Width:

0.0157	0.0212	0.0266	0.0321	0.0375
0.0424	0.0455	0.0482	0.0509	0.0535
0.0561	0.0587	0.0612	0.0642	0.0672
0.0699	0.0720	0.0742	0.0765	0.0789
0.0812	0.0836	0.0860	0.0887	0.0913
0.0939	0.0968	0.0997	0.1027	0.1071
0.1164	0.1495	0.1838	0.2026	0.2113
0.2327	0.2577	0.2878	0.3793	0.4541
0.4897	0.5206	0.5546	0.6327	0.6976
0.6976	0.6976	0.6976	0.6976	1.0000

Transect 11748.1(orig)

Area:

0.0006	0.0020	0.0037	0.0059	0.0084
0.0114	0.0146	0.0181	0.0217	0.0256
0.0296	0.0338	0.0382	0.0429	0.0477
0.0527	0.0580	0.0634	0.0689	0.0746
0.0805	0.0866	0.0928	0.0992	0.1059
0.1127	0.1197	0.1269	0.1344	0.1421
0.1504	0.1611	0.1745	0.1903	0.2084
0.2290	0.2542	0.2867	0.3249	0.3702
0.4187	0.4702	0.5244	0.5833	0.6496
0.7177	0.7867	0.8566	0.9276	1.0000

Hrad:

0.0382	0.0928	0.1400	0.1836	0.2251
0.2686	0.3204	0.3723	0.4224	0.4718
0.5198	0.5666	0.6127	0.6535	0.6932
0.7360	0.7831	0.8294	0.8730	0.9154
0.9584	0.9998	1.0405	1.0785	1.1168
1.1545	1.1901	1.2242	1.2583	1.2762
1.2435	1.0381	0.9113	0.8903	0.9126
0.8797	0.8415	0.6064	0.5865	0.5894
0.6306	0.6808	0.7249	0.7546	0.7046
0.7737	0.8343	0.8952	0.9525	1.0000

Width:

0.0157	0.0212	0.0266	0.0321	0.0375
0.0424	0.0455	0.0482	0.0509	0.0535
0.0561	0.0587	0.0612	0.0642	0.0672
0.0699	0.0720	0.0742	0.0765	0.0789
0.0812	0.0836	0.0860	0.0887	0.0913
0.0939	0.0968	0.0997	0.1027	0.1071
0.1224	0.1609	0.1995	0.2332	0.2570
0.3166	0.3769	0.4788	0.5717	0.6480
0.6851	0.7185	0.7550	0.8509	0.9236
0.9288	0.9437	0.9574	0.9740	1.0000

Transect 11848.1

Area:

0.0003	0.0012	0.0028	0.0050	0.0078
0.0109	0.0144	0.0180	0.0219	0.0261
0.0304	0.0350	0.0399	0.0452	0.0507
0.0565	0.0627	0.0692	0.0761	0.0832
0.0906	0.0984	0.1064	0.1147	0.1233
0.1323	0.1417	0.1515	0.1631	0.1784
0.1949	0.2160	0.2440	0.2747	0.3066
0.3396	0.3769	0.4235	0.4704	0.5176
0.5653	0.6136	0.6619	0.7102	0.7585
0.8068	0.8551	0.9034	0.9517	1.0000

Hrad:

0.0272	0.0543	0.0815	0.1035	0.1408
0.1776	0.2181	0.2563	0.2924	0.3272
0.3609	0.3906	0.4186	0.4465	0.4730
0.4975	0.5226	0.5486	0.5761	0.6043
0.6328	0.6613	0.6891	0.7156	0.7395
0.7620	0.7813	0.7935	0.7766	0.7945
0.8106	0.8061	0.7789	0.7641	0.7579
0.7563	0.7189	0.7089	0.7085	0.7106
0.7236	0.7491	0.7769	0.8063	0.8371
0.8689	0.9015	0.9348	0.9686	1.0000

Width:

0.0077	0.0154	0.0231	0.0329	0.0377
0.0419	0.0447	0.0475	0.0505	0.0534
0.0564	0.0600	0.0637	0.0675	0.0715
0.0758	0.0801	0.0842	0.0880	0.0918
0.0954	0.0990	0.1027	0.1066	0.1110
0.1156	0.1208	0.1273	0.1857	0.1987
0.2406	0.2979	0.3803	0.3933	0.4077
0.4226	0.5854	0.5885	0.5918	0.5967
0.6082	0.6082	0.6082	0.6082	0.6082
0.6082	0.6082	0.6082	0.6082	1.0000

Transect 11848.1(orig)

Area:

0.0002	0.0009	0.0020	0.0037	0.0057
0.0081	0.0106	0.0133	0.0161	0.0192
0.0224	0.0258	0.0294	0.0332	0.0373
0.0416	0.0462	0.0510	0.0560	0.0612
0.0667	0.0724	0.0783	0.0844	0.0908
0.0974	0.1053	0.1146	0.1274	0.1439
0.1616	0.1833	0.2104	0.2400	0.2712
0.3036	0.3399	0.3836	0.4283	0.4747
0.5234	0.5737	0.6245	0.6756	0.7272
0.7796	0.8332	0.8875	0.9429	1.0000

Hrad:

0.0327	0.0654	0.0981	0.1246	0.1695
0.2138	0.2626	0.3085	0.3520	0.3939
0.4344	0.4703	0.5039	0.5376	0.5694
0.5989	0.6291	0.6605	0.6935	0.7275
0.7618	0.7961	0.8296	0.8615	0.8903
0.9173	0.9286	0.9228	0.8681	0.8606
0.8571	0.8398	0.8074	0.7895	0.7817
0.7799	0.7457	0.7392	0.7399	0.7349
0.7401	0.7679	0.7980	0.8302	0.8625
0.8901	0.9205	0.9521	0.9823	1.0000

Width:

0.0077	0.0154	0.0231	0.0329	0.0377
0.0419	0.0447	0.0475	0.0505	0.0534
0.0564	0.0600	0.0637	0.0675	0.0715
0.0758	0.0801	0.0842	0.0880	0.0918
0.0954	0.0990	0.1027	0.1066	0.1110
0.1156	0.1491	0.1731	0.2696	0.2914
0.3411	0.4059	0.4955	0.5189	0.5434
0.5676	0.7413	0.7562	0.7750	0.8153
0.8571	0.8650	0.8723	0.8783	0.8870
0.9076	0.9232	0.9369	0.9542	1.0000

Transect 11881.3

Area:

0.0002	0.0010	0.0023	0.0046	0.0075
0.0106	0.0139	0.0174	0.0212	0.0251
0.0293	0.0338	0.0385	0.0434	0.0487
0.0541	0.0599	0.0659	0.0721	0.0786
0.0853	0.0922	0.0995	0.1070	0.1148
0.1230	0.1324	0.1460	0.1627	0.1822
0.2053	0.2304	0.2584	0.2990	0.3411

0.3834	0.4259	0.4685	0.5114	0.5545
0.5979	0.6421	0.6868	0.7315	0.7763
0.8210	0.8658	0.9105	0.9553	1.0000

Hrad:

0.0268	0.0535	0.0695	0.0935	0.1347
0.1761	0.2159	0.2540	0.2898	0.3239
0.3569	0.3890	0.4197	0.4481	0.4767
0.5061	0.5342	0.5635	0.5928	0.6220
0.6503	0.6784	0.7055	0.7282	0.7509
0.7804	0.8101	0.8109	0.7982	0.7818
0.7586	0.7437	0.7231	0.6664	0.6525
0.6504	0.6560	0.6673	0.6803	0.6969
0.7107	0.7396	0.7705	0.8024	0.8350
0.8681	0.9017	0.9357	0.9700	1.0000

Width:

0.0066	0.0132	0.0245	0.0366	0.0409
0.0440	0.0470	0.0499	0.0530	0.0562
0.0595	0.0627	0.0661	0.0699	0.0735
0.0770	0.0806	0.0840	0.0873	0.0906
0.0940	0.0974	0.1010	0.1052	0.1095
0.1178	0.1680	0.1996	0.2564	0.2853
0.3355	0.3582	0.4843	0.5779	0.5800
0.5822	0.5846	0.5871	0.5905	0.5938
0.5990	0.6147	0.6147	0.6147	0.6147
0.6147	0.6147	0.6147	0.6147	1.0000

Transect 11881.3(orig)

Area:

0.0002	0.0007	0.0017	0.0034	0.0055
0.0078	0.0103	0.0129	0.0156	0.0186
0.0217	0.0250	0.0284	0.0321	0.0359
0.0400	0.0442	0.0486	0.0532	0.0580
0.0630	0.0681	0.0735	0.0790	0.0848
0.0914	0.1015	0.1161	0.1335	0.1533
0.1762	0.2011	0.2285	0.2658	0.3047
0.3443	0.3849	0.4263	0.4687	0.5119
0.5560	0.6016	0.6483	0.6958	0.7440
0.7930	0.8434	0.8947	0.9468	1.0000

Hrad:

0.0317	0.0634	0.0824	0.1108	0.1596
0.2086	0.2558	0.3009	0.3432	0.3836
0.4228	0.4608	0.4971	0.5308	0.5647
0.5995	0.6328	0.6675	0.7023	0.7368
0.7704	0.8037	0.8357	0.8626	0.8895
0.9164	0.9137	0.8775	0.8391	0.8067
0.7751	0.7563	0.7343	0.6839	0.6744
0.6745	0.6810	0.6923	0.7061	0.7235
0.7383	0.7584	0.7924	0.8204	0.8540
0.8808	0.9103	0.9410	0.9717	1.0000

Width:

0.0066	0.0132	0.0245	0.0366	0.0409
0.0440	0.0470	0.0499	0.0530	0.0562
0.0595	0.0627	0.0661	0.0699	0.0735
0.0770	0.0806	0.0840	0.0873	0.0906
0.0940	0.0974	0.1010	0.1052	0.1095
0.1598	0.2479	0.2893	0.3543	0.3906
0.4485	0.4787	0.6150	0.7189	0.7303
0.7450	0.7617	0.7797	0.7962	0.8118
0.8299	0.8657	0.8711	0.8926	0.9014
0.9267	0.9457	0.9619	0.9782	1.0000

Transect 11896.4

Area:

0.0020	0.0043	0.0066	0.0092	0.0120
0.0149	0.0180	0.0213	0.0248	0.0284
0.0322	0.0362	0.0404	0.0448	0.0495
0.0544	0.0596	0.0651	0.0708	0.0769
0.0832	0.0899	0.0968	0.1041	0.1117
0.1196	0.1280	0.1367	0.1459	0.1555
0.1661	0.1799	0.1993	0.2221	0.2503
0.2831	0.3183	0.3564	0.3987	0.4491
0.5042	0.5593	0.6144	0.6695	0.7245
0.7796	0.8347	0.8898	0.9449	1.0000

Hrad:

0.0579	0.1097	0.1570	0.2008	0.2419
0.2808	0.3180	0.3537	0.3883	0.4218
0.4544	0.4864	0.5171	0.5430	0.5656
0.5883	0.6122	0.6356	0.6596	0.6830
0.7067	0.7301	0.7529	0.7739	0.7938

0.8147	0.8326	0.8510	0.8712	0.8730
0.8837	0.9139	0.9171	0.9104	0.8850
0.8647	0.8490	0.8358	0.8196	0.7908
0.7842	0.7925	0.8076	0.8275	0.8511
0.8774	0.9059	0.9360	0.9675	1.0000

Width:

0.0386	0.0418	0.0451	0.0483	0.0516
0.0548	0.0581	0.0613	0.0646	0.0678
0.0711	0.0743	0.0777	0.0819	0.0869
0.0920	0.0969	0.1020	0.1071	0.1124
0.1177	0.1231	0.1288	0.1349	0.1415
0.1480	0.1553	0.1627	0.1699	0.1816
0.2013	0.3168	0.3875	0.4393	0.5791
0.6140	0.6679	0.7295	0.8312	0.9731
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 11896.4(orig)

Area:

0.0014	0.0028	0.0045	0.0062	0.0080
0.0100	0.0121	0.0143	0.0166	0.0190
0.0216	0.0243	0.0271	0.0300	0.0331
0.0364	0.0399	0.0436	0.0475	0.0515
0.0558	0.0602	0.0649	0.0697	0.0748
0.0802	0.0858	0.0916	0.0980	0.1062
0.1185	0.1395	0.1662	0.1954	0.2284
0.2645	0.3024	0.3424	0.3853	0.4338
0.4855	0.5375	0.5896	0.6426	0.6980
0.7569	0.8163	0.8761	0.9364	1.0000

Hrad:

0.0710	0.1346	0.1926	0.2464	0.2968
0.3445	0.3901	0.4340	0.4763	0.5174
0.5575	0.5966	0.6343	0.6662	0.6938
0.7217	0.7511	0.7797	0.8092	0.8379
0.8670	0.8957	0.9236	0.9494	0.9738
0.9995	1.0214	1.0440	1.0650	1.0437
0.9972	0.9335	0.8765	0.8413	0.8115
0.7985	0.7954	0.7980	0.8008	0.7955
0.8076	0.8304	0.8576	0.8856	0.9040
0.8906	0.9262	0.9632	0.9878	1.0000

Width:

0.0218	0.0237	0.0255	0.0274	0.0292
0.0310	0.0329	0.0347	0.0366	0.0384
0.0402	0.0421	0.0440	0.0464	0.0492
0.0521	0.0549	0.0578	0.0606	0.0636
0.0666	0.0697	0.0729	0.0764	0.0801
0.0838	0.0879	0.0921	0.1137	0.1443
0.2407	0.3877	0.4309	0.4634	0.5446
0.5664	0.5987	0.6352	0.6945	0.7772
0.7949	0.7979	0.8025	0.8274	0.8838
0.9093	0.9137	0.9181	0.9478	1.0000

Transect 11919.8

Area:

0.0006	0.0024	0.0045	0.0067	0.0091
0.0115	0.0141	0.0168	0.0196	0.0226
0.0257	0.0291	0.0327	0.0367	0.0409
0.0453	0.0501	0.0551	0.0604	0.0660
0.0718	0.0779	0.0843	0.0909	0.0977
0.1048	0.1122	0.1198	0.1278	0.1364
0.1462	0.1644	0.1908	0.2218	0.2571
0.2936	0.3319	0.3715	0.4126	0.4560
0.5051	0.5566	0.6110	0.6666	0.7222
0.7777	0.8333	0.8889	0.9444	1.0000

Hrad:

0.0355	0.0832	0.1440	0.2000	0.2521
0.3010	0.3473	0.3913	0.4336	0.4742
0.5003	0.5231	0.5473	0.5734	0.6004
0.6278	0.6559	0.6842	0.7130	0.7422
0.7737	0.8067	0.8390	0.8707	0.9022
0.9341	0.9652	0.9939	1.0016	0.9848
1.0020	0.9916	0.9449	0.8980	0.8668
0.8548	0.8497	0.8553	0.8620	0.8680
0.8605	0.8756	0.8736	0.8991	0.9282
0.9600	0.9938	1.0294	1.0662	1.0000

Width:

0.0140	0.0227	0.0241	0.0254	0.0268
0.0281	0.0295	0.0308	0.0322	0.0335
0.0362	0.0393	0.0424	0.0454	0.0485

0.0515	0.0546	0.0576	0.0607	0.0638
0.0667	0.0694	0.0721	0.0750	0.0778
0.0807	0.0836	0.0868	0.0922	0.1007
0.1276	0.2751	0.3175	0.3813	0.4022
0.4140	0.4354	0.4483	0.4696	0.4981
0.5669	0.5817	0.6201	0.6201	0.6201
0.6201	0.6201	0.6201	0.6201	1.0000

Transect 11919.8(orig)
Area:

0.0005	0.0019	0.0035	0.0052	0.0070
0.0089	0.0109	0.0129	0.0151	0.0174
0.0198	0.0224	0.0252	0.0282	0.0315
0.0349	0.0386	0.0425	0.0465	0.0508
0.0553	0.0600	0.0649	0.0700	0.0753
0.0807	0.0864	0.0923	0.0985	0.1052
0.1144	0.1327	0.1607	0.1947	0.2322
0.2708	0.3111	0.3524	0.3952	0.4398
0.4891	0.5404	0.5942	0.6490	0.7041
0.7596	0.8154	0.8722	0.9323	1.0000

Hrad:

0.0387	0.0908	0.1571	0.2182	0.2750
0.3284	0.3789	0.4270	0.4730	0.5174
0.5459	0.5707	0.5972	0.6256	0.6550
0.6850	0.7156	0.7464	0.7779	0.8098
0.8442	0.8801	0.9154	0.9500	0.9844
1.0191	1.0531	1.0844	1.0928	1.0725
1.0696	1.0203	0.9225	0.8466	0.8060
0.7922	0.7899	0.7994	0.8119	0.8252
0.8289	0.8520	0.8609	0.8917	0.9253
0.9599	0.9941	1.0161	1.0170	1.0000

Width:

0.0140	0.0227	0.0241	0.0254	0.0268
0.0281	0.0295	0.0308	0.0322	0.0335
0.0362	0.0393	0.0424	0.0454	0.0485
0.0515	0.0546	0.0576	0.0607	0.0638
0.0667	0.0694	0.0721	0.0750	0.0778
0.0807	0.0836	0.0868	0.0922	0.1101
0.1826	0.3508	0.4636	0.5299	0.5532
0.5673	0.5914	0.6073	0.6316	0.6628
0.7342	0.7514	0.7927	0.7966	0.8005
0.8057	0.8133	0.8366	0.9338	1.0000

Transect 11939.6
Area:

0.0003	0.0013	0.0028	0.0044	0.0062
0.0080	0.0099	0.0121	0.0148	0.0177
0.0210	0.0244	0.0281	0.0320	0.0361
0.0404	0.0449	0.0497	0.0547	0.0599
0.0653	0.0710	0.0770	0.0833	0.0899
0.0969	0.1044	0.1123	0.1210	0.1308
0.1446	0.1636	0.1870	0.2130	0.2423
0.2765	0.3137	0.3525	0.3927	0.4359
0.4839	0.5385	0.5962	0.6539	0.7115
0.7692	0.8269	0.8846	0.9423	1.0000

Hrad:

0.0329	0.0658	0.1157	0.1661	0.2118
0.2540	0.2865	0.2947	0.3160	0.3449
0.3782	0.4127	0.4464	0.4796	0.5129
0.5450	0.5770	0.6090	0.6408	0.6716
0.7019	0.7259	0.7503	0.7725	0.7922
0.8113	0.8273	0.8252	0.8484	0.8698
0.8737	0.8661	0.8489	0.8353	0.8165
0.7969	0.7913	0.7933	0.7975	0.8001
0.7951	0.7838	0.7869	0.8096	0.8361
0.8655	0.8969	0.9301	0.9645	1.0000

Width:

0.0115	0.0230	0.0271	0.0289	0.0306
0.0324	0.0352	0.0426	0.0487	0.0537
0.0578	0.0616	0.0654	0.0692	0.0729
0.0768	0.0807	0.0844	0.0882	0.0922
0.0962	0.1013	0.1065	0.1121	0.1184
0.1249	0.1323	0.1436	0.1576	0.1925
0.2769	0.3767	0.4271	0.4714	0.5530
0.6283	0.6567	0.6824	0.7305	0.7692
0.8859	0.9840	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 11939.6(orig)

Area:

0.0002	0.0009	0.0020	0.0032	0.0044
0.0057	0.0071	0.0086	0.0105	0.0126
0.0149	0.0174	0.0200	0.0228	0.0257
0.0288	0.0320	0.0354	0.0389	0.0427
0.0465	0.0506	0.0549	0.0593	0.0641
0.0691	0.0744	0.0800	0.0862	0.0932
0.1030	0.1178	0.1385	0.1634	0.1946
0.2319	0.2719	0.3140	0.3574	0.4031
0.4525	0.5068	0.5634	0.6202	0.6773
0.7391	0.8032	0.8678	0.9333	1.0000

Hrad:

0.0379	0.0758	0.1334	0.1915	0.2442
0.2928	0.3303	0.3397	0.3643	0.3976
0.4360	0.4757	0.5146	0.5528	0.5912
0.6282	0.6651	0.7021	0.7387	0.7741
0.8091	0.8368	0.8649	0.8905	0.9132
0.9352	0.9537	0.9512	0.9780	1.0027
1.0070	0.9836	0.9316	0.8788	0.8179
0.7722	0.7540	0.7495	0.7547	0.7627
0.7677	0.7698	0.7845	0.8151	0.8493
0.8785	0.9077	0.9381	0.9685	1.0000

Width:

0.0070	0.0140	0.0165	0.0176	0.0187
0.0197	0.0215	0.0259	0.0297	0.0327
0.0352	0.0375	0.0398	0.0422	0.0444
0.0468	0.0491	0.0514	0.0538	0.0562
0.0586	0.0617	0.0649	0.0683	0.0721
0.0761	0.0806	0.0875	0.0960	0.1173
0.1711	0.2678	0.3281	0.4105	0.5216
0.5802	0.6065	0.6332	0.6653	0.6920
0.7658	0.8283	0.8411	0.8447	0.8517
0.9460	0.9534	0.9637	0.9779	1.0000

Transect 11972.5

Area:

0.0005	0.0020	0.0037	0.0055	0.0074
0.0094	0.0114	0.0136	0.0163	0.0193
0.0226	0.0261	0.0298	0.0337	0.0378
0.0420	0.0465	0.0511	0.0560	0.0611
0.0663	0.0718	0.0776	0.0836	0.0898
0.0964	0.1032	0.1102	0.1175	0.1250
0.1330	0.1413	0.1503	0.1620	0.1756
0.1906	0.2084	0.2280	0.2491	0.2755
0.3155	0.3734	0.4375	0.5054	0.5783
0.6540	0.7325	0.8160	0.9045	1.0000

Hrad:

0.0442	0.1041	0.1789	0.2469	0.3093
0.3672	0.4214	0.4364	0.4551	0.4782
0.5242	0.5709	0.6167	0.6636	0.7112
0.7579	0.8029	0.8443	0.8851	0.9249
0.9658	1.0029	1.0381	1.0736	1.1058
1.1417	1.1804	1.2192	1.2548	1.2794
1.3047	1.3159	1.3081	1.3539	1.3916
1.4208	1.4317	1.4388	1.4445	1.4201
1.2991	1.1743	1.0967	1.0561	1.0237
1.0158	1.0178	1.0134	1.0120	1.0000

Width:

0.0102	0.0163	0.0171	0.0178	0.0186
0.0193	0.0201	0.0235	0.0272	0.0309
0.0330	0.0350	0.0369	0.0388	0.0405
0.0422	0.0440	0.0460	0.0480	0.0501
0.0522	0.0544	0.0569	0.0593	0.0620
0.0645	0.0669	0.0692	0.0717	0.0751
0.0785	0.0831	0.0949	0.1258	0.1365
0.1590	0.1831	0.1968	0.2150	0.2931
0.5043	0.5939	0.6416	0.6815	0.7227
0.7461	0.7705	0.8300	0.8881	1.0000

Transect 12006.2

Area:

0.0009	0.0035	0.0068	0.0106	0.0149
0.0196	0.0248	0.0304	0.0366	0.0432
0.0503	0.0578	0.0657	0.0739	0.0825
0.0913	0.1003	0.1096	0.1192	0.1290
0.1391	0.1493	0.1599	0.1706	0.1816
0.1929	0.2046	0.2167	0.2294	0.2429
0.2593	0.2800	0.3012	0.3228	0.3448
0.3676	0.3913	0.4169	0.4441	0.4744

0.5096	0.5483	0.5894	0.6329	0.6772
0.7242	0.7833	0.8465	0.9164	1.0000

Hrad:

0.0280	0.0632	0.1061	0.1449	0.1809
0.2149	0.2476	0.2791	0.3080	0.3384
0.3692	0.3995	0.4338	0.4672	0.5021
0.5375	0.5716	0.6049	0.6376	0.6706
0.7031	0.7350	0.7666	0.7980	0.8258
0.8493	0.8728	0.9198	0.9662	1.0076
1.0335	1.0425	1.0560	1.0724	1.0903
1.1085	1.1249	1.1375	1.1482	1.1505
1.1413	1.1355	1.1278	1.1252	1.1265
1.1264	1.0800	1.0675	1.0418	1.0000

Width:

0.0173	0.0297	0.0341	0.0386	0.0431
0.0476	0.0520	0.0565	0.0614	0.0659
0.0701	0.0743	0.0775	0.0806	0.0833
0.0857	0.0882	0.0906	0.0931	0.0954
0.0977	0.0999	0.1022	0.1043	0.1070
0.1105	0.1139	0.1188	0.1243	0.1364
0.1901	0.2012	0.2050	0.2095	0.2149
0.2223	0.2360	0.2535	0.2715	0.3061
0.3625	0.3804	0.4097	0.4212	0.4306
0.4929	0.5917	0.6501	0.7050	1.0000

Transect 12006.2(orig)

Area:

0.0003	0.0010	0.0019	0.0030	0.0043
0.0066	0.0105	0.0153	0.0211	0.0281
0.0360	0.0452	0.0555	0.0670	0.0792
0.0922	0.1060	0.1204	0.1355	0.1513
0.1677	0.1846	0.2022	0.2202	0.2391
0.2599	0.2818	0.3042	0.3270	0.3506
0.3760	0.4036	0.4315	0.4594	0.4875
0.5158	0.5444	0.5735	0.6030	0.6334
0.6652	0.6979	0.7314	0.7655	0.7998
0.8349	0.8734	0.9131	0.9546	1.0000

Hrad:

0.0251	0.0567	0.0952	0.1301	0.1575
0.1586	0.1508	0.1574	0.1649	0.1760
0.1899	0.2029	0.2135	0.2323	0.2490
0.2654	0.2828	0.3029	0.3215	0.3409
0.3622	0.3852	0.4041	0.4232	0.4423
0.4292	0.4511	0.4792	0.5059	0.5233
0.5328	0.5274	0.5591	0.5909	0.6226
0.6541	0.6851	0.7156	0.7456	0.7742
0.8009	0.8277	0.8538	0.8802	0.9070
0.9331	0.9485	0.9704	0.9880	1.0000

Width:

0.0099	0.0170	0.0195	0.0221	0.0331
0.0596	0.0854	0.1036	0.1249	0.1454
0.1687	0.1902	0.2158	0.2303	0.2469
0.2627	0.2759	0.2883	0.3025	0.3158
0.3263	0.3348	0.3481	0.3607	0.3802
0.4237	0.4340	0.4418	0.4513	0.4741
0.5278	0.5431	0.5453	0.5479	0.5510
0.5552	0.5630	0.5730	0.5833	0.6031
0.6354	0.6456	0.6624	0.6689	0.6744
0.7100	0.7665	0.7999	0.8313	1.0000

Transect 12067.5

Area:

0.0005	0.0020	0.0041	0.0066	0.0094
0.0126	0.0161	0.0200	0.0243	0.0289
0.0339	0.0392	0.0450	0.0510	0.0575
0.0642	0.0714	0.0789	0.0869	0.0950
0.1035	0.1122	0.1211	0.1304	0.1399
0.1498	0.1599	0.1704	0.1813	0.1927
0.2047	0.2173	0.2307	0.2452	0.2628
0.2837	0.3077	0.3354	0.3691	0.4069
0.4486	0.4955	0.5459	0.5995	0.6594
0.7227	0.7885	0.8573	0.9280	1.0000

Hrad:

0.0324	0.0690	0.1165	0.1592	0.1989
0.2367	0.2730	0.3082	0.3428	0.3767
0.4101	0.4432	0.4760	0.5086	0.5409
0.5730	0.6051	0.6333	0.6689	0.7083
0.7467	0.7838	0.8189	0.8533	0.8874
0.9213	0.9516	0.9756	0.9989	1.0181

1.0284	1.0356	1.0232	1.0025	1.0067
1.0035	1.0338	1.0517	1.0520	1.0463
1.0393	1.0230	1.0141	1.0057	0.9871
0.9844	0.9826	0.9835	0.9909	1.0000

Width:

0.0141	0.0261	0.0311	0.0360	0.0409
0.0459	0.0508	0.0558	0.0607	0.0656
0.0706	0.0755	0.0804	0.0854	0.0903
0.0953	0.1002	0.1058	0.1100	0.1135
0.1169	0.1205	0.1244	0.1284	0.1324
0.1363	0.1409	0.1465	0.1524	0.1590
0.1675	0.1769	0.1907	0.2077	0.2630
0.3051	0.3520	0.4065	0.4913	0.5461
0.5903	0.6703	0.7086	0.7582	0.8533
0.8734	0.9162	0.9566	0.9747	1.0000

Transect 12091.1

Area:

0.0006	0.0022	0.0046	0.0074	0.0105
0.0141	0.0180	0.0224	0.0271	0.0322
0.0377	0.0437	0.0500	0.0567	0.0638
0.0713	0.0792	0.0874	0.0960	0.1047
0.1135	0.1224	0.1317	0.1415	0.1516
0.1621	0.1731	0.1844	0.1961	0.2082
0.2208	0.2339	0.2475	0.2618	0.2767
0.2922	0.3088	0.3356	0.3710	0.4122
0.4555	0.5007	0.5479	0.5984	0.6522
0.7089	0.7688	0.8367	0.9161	1.0000

Hrad:

0.0328	0.0677	0.1168	0.1609	0.2018
0.2406	0.2778	0.3140	0.3493	0.3840
0.4182	0.4520	0.4854	0.5186	0.5515
0.5842	0.6168	0.6492	0.6959	0.7436
0.7902	0.8259	0.8507	0.8761	0.9019
0.9279	0.9564	0.9852	1.0141	1.0423
1.0623	1.0818	1.0958	1.1131	1.1311
1.1405	1.1396	1.1222	1.1053	1.0875
1.0766	1.0715	1.0677	1.0635	1.0595
1.0585	1.0547	1.0373	1.0194	1.0000

Width:

0.0132	0.0255	0.0301	0.0348	0.0394
0.0440	0.0487	0.0533	0.0579	0.0626
0.0672	0.0718	0.0765	0.0811	0.0857
0.0904	0.0950	0.0996	0.1013	0.1027
0.1040	0.1069	0.1118	0.1166	0.1215
0.1263	0.1309	0.1354	0.1399	0.1445
0.1505	0.1568	0.1641	0.1711	0.1782
0.1870	0.2238	0.3506	0.4701	0.4989
0.5199	0.5433	0.5749	0.6141	0.6509
0.6811	0.7286	0.8774	0.9668	1.0000

Transect 12117.3

Area:

0.0004	0.0017	0.0036	0.0055	0.0075
0.0095	0.0115	0.0135	0.0156	0.0179
0.0203	0.0229	0.0256	0.0286	0.0317
0.0350	0.0385	0.0422	0.0461	0.0503
0.0549	0.0598	0.0660	0.0733	0.0824
0.0935	0.1064	0.1206	0.1365	0.1539
0.1740	0.1966	0.2225	0.2515	0.2830
0.3162	0.3546	0.4005	0.4485	0.4965
0.5446	0.5929	0.6412	0.6901	0.7400
0.7907	0.8419	0.8936	0.9460	1.0000

Hrad:

0.0396	0.0793	0.1435	0.2108	0.2730
0.3307	0.3845	0.4349	0.4662	0.4991
0.5377	0.5697	0.5995	0.6282	0.6578
0.6880	0.7197	0.7441	0.7662	0.7901
0.8036	0.8214	0.8695	0.9035	0.9144
0.9083	0.8972	0.8867	0.8768	0.8629
0.8510	0.8336	0.8092	0.7973	0.7847
0.7852	0.7747	0.7241	0.7322	0.7472
0.7666	0.7896	0.8150	0.8303	0.8548
0.8834	0.9127	0.9429	0.9729	1.0000

Width:

0.0154	0.0308	0.0350	0.0354	0.0359
0.0364	0.0368	0.0373	0.0402	0.0429
0.0450	0.0480	0.0513	0.0548	0.0583
0.0618	0.0652	0.0696	0.0744	0.0792

0.0856	0.0968	0.1254	0.1435	0.1849
0.2181	0.2460	0.2736	0.3023	0.3484
0.3799	0.4409	0.5032	0.5406	0.5915
0.6147	0.8016	0.8708	0.8724	0.8740
0.8761	0.8782	0.8805	0.8999	0.9147
0.9266	0.9352	0.9438	0.9693	1.0000

Transect 12148.1

Area:

0.0004	0.0015	0.0031	0.0046	0.0062
0.0080	0.0099	0.0120	0.0142	0.0165
0.0189	0.0214	0.0241	0.0268	0.0297
0.0327	0.0359	0.0393	0.0429	0.0468
0.0510	0.0555	0.0606	0.0665	0.0734
0.0818	0.0924	0.1074	0.1264	0.1503
0.1770	0.2045	0.2329	0.2618	0.2928
0.3323	0.3786	0.4252	0.4720	0.5189
0.5660	0.6133	0.6609	0.7088	0.7569
0.8052	0.8536	0.9022	0.9509	1.0000

Hrad:

0.0376	0.0754	0.1431	0.2046	0.2452
0.2839	0.3212	0.3630	0.4074	0.4506
0.4920	0.5302	0.5667	0.6025	0.6358
0.6642	0.6910	0.7184	0.7344	0.7494
0.7594	0.7665	0.7536	0.7957	0.8289
0.8446	0.8412	0.8005	0.7653	0.7137
0.6898	0.6832	0.6865	0.6981	0.7089
0.6673	0.6345	0.6492	0.6691	0.6927
0.7188	0.7465	0.7755	0.8059	0.8372
0.8694	0.9021	0.9352	0.9687	1.0000

Width:

0.0153	0.0305	0.0307	0.0310	0.0338
0.0373	0.0408	0.0434	0.0452	0.0470
0.0488	0.0510	0.0535	0.0561	0.0589
0.0623	0.0660	0.0697	0.0749	0.0806
0.0872	0.0950	0.1067	0.1285	0.1516
0.1892	0.2277	0.3325	0.4352	0.5136
0.5426	0.5587	0.5737	0.5835	0.6446
0.9011	0.9311	0.9338	0.9364	0.9389
0.9428	0.9488	0.9560	0.9596	0.9632
0.9661	0.9691	0.9725	0.9760	1.0000

Transect 12213.2

Area:

0.0011	0.0038	0.0069	0.0102	0.0138
0.0176	0.0217	0.0260	0.0306	0.0356
0.0414	0.0476	0.0543	0.0614	0.0689
0.0768	0.0852	0.0940	0.1041	0.1159
0.1283	0.1413	0.1549	0.1690	0.1837
0.2001	0.2180	0.2367	0.2561	0.2761
0.2968	0.3181	0.3399	0.3623	0.3853
0.4089	0.4330	0.4578	0.4832	0.5095
0.5369	0.5654	0.5977	0.6380	0.6870
0.7418	0.8029	0.8674	0.9329	1.0000

Hrad:

0.0265	0.0679	0.1110	0.1505	0.1873
0.2219	0.2547	0.2862	0.3138	0.3245
0.3388	0.3635	0.3884	0.4133	0.4393
0.4654	0.4882	0.5114	0.5261	0.4774
0.5070	0.5400	0.5729	0.6062	0.6386
0.6654	0.6885	0.7133	0.7491	0.7835
0.8165	0.8486	0.8797	0.9099	0.9394
0.9675	0.9950	1.0219	1.0469	1.0701
1.0909	1.1102	1.1205	1.1155	1.0860
1.0638	1.0248	1.0131	1.0063	1.0000

Width:

0.0314	0.0427	0.0464	0.0501	0.0537
0.0574	0.0611	0.0648	0.0692	0.0784
0.0875	0.0938	0.1001	0.1064	0.1123
0.1181	0.1249	0.1317	0.1660	0.1763
0.1838	0.1928	0.2018	0.2097	0.2240
0.2499	0.2664	0.2771	0.2866	0.2961
0.3052	0.3135	0.3217	0.3299	0.3379
0.3472	0.3560	0.3641	0.3757	0.3892
0.4064	0.4242	0.5323	0.6098	0.7735
0.8218	0.9300	0.9454	0.9610	1.0000

Transect 12263.1

Area:

	0.0009	0.0024	0.0042	0.0063	0.0087
	0.0114	0.0144	0.0177	0.0213	0.0253
	0.0295	0.0341	0.0392	0.0445	0.0500
	0.0558	0.0619	0.0684	0.0752	0.0824
	0.0899	0.0979	0.1062	0.1149	0.1240
	0.1335	0.1434	0.1536	0.1641	0.1758
	0.1955	0.2187	0.2432	0.2688	0.2954
	0.3230	0.3518	0.3817	0.4134	0.4471
	0.4819	0.5179	0.5559	0.5948	0.6345
	0.6775	0.7378	0.8208	0.9077	1.0000
Hrad:					
	0.0498	0.1050	0.1533	0.1976	0.2395
	0.2797	0.3187	0.3568	0.3943	0.4314
	0.4680	0.5031	0.5222	0.5642	0.6068
	0.6480	0.6800	0.7096	0.7397	0.7699
	0.8000	0.8309	0.8614	0.8905	0.9213
	0.9539	0.9881	1.0226	1.0547	1.0799
	1.0390	1.0241	1.0166	1.0152	1.0191
	1.0323	1.0526	1.0727	1.0887	1.1044
	1.1215	1.1295	1.1430	1.1638	1.1857
	1.2018	1.1777	1.1247	1.0587	1.0000
Width:					
	0.0141	0.0173	0.0205	0.0238	0.0270
	0.0302	0.0334	0.0367	0.0399	0.0431
	0.0464	0.0516	0.0549	0.0576	0.0601
	0.0626	0.0662	0.0701	0.0740	0.0779
	0.0819	0.0859	0.0900	0.0942	0.0984
	0.1023	0.1061	0.1098	0.1139	0.1519
	0.2374	0.2529	0.2650	0.2764	0.2866
	0.2972	0.3100	0.3248	0.3485	0.3630
	0.3725	0.3929	0.4077	0.4154	0.4231
	0.4913	0.8310	0.8903	0.9484	1.0000

Transect 12314

Area:					
	0.0006	0.0022	0.0043	0.0068	0.0097
	0.0131	0.0168	0.0210	0.0255	0.0305
	0.0359	0.0417	0.0480	0.0546	0.0616
	0.0689	0.0764	0.0843	0.0925	0.1011
	0.1100	0.1192	0.1288	0.1388	0.1491
	0.1598	0.1709	0.1824	0.1942	0.2064
	0.2190	0.2321	0.2456	0.2596	0.2742
	0.2894	0.3052	0.3215	0.3384	0.3559
	0.3739	0.3924	0.4126	0.4376	0.4750
	0.5359	0.6353	0.7506	0.8729	1.0000
Hrad:					
	0.0376	0.0876	0.1386	0.1847	0.2279
	0.2694	0.3095	0.3488	0.3875	0.4257
	0.4635	0.5009	0.5382	0.5759	0.6229
	0.6688	0.7087	0.7466	0.7848	0.8234
	0.8618	0.8992	0.9361	0.9733	1.0058
	1.0385	1.0745	1.1107	1.1451	1.1785
	1.2110	1.2395	1.2669	1.2902	1.3056
	1.3292	1.3535	1.3792	1.4049	1.4329
	1.4635	1.4870	1.5011	1.5355	1.5251
	1.4362	1.2685	1.1415	1.0593	1.0000
Width:					
	0.0091	0.0145	0.0177	0.0208	0.0240
	0.0272	0.0304	0.0336	0.0368	0.0399
	0.0431	0.0463	0.0495	0.0526	0.0546
	0.0567	0.0592	0.0620	0.0646	0.0672
	0.0698	0.0724	0.0751	0.0778	0.0808
	0.0839	0.0867	0.0895	0.0924	0.0954
	0.0985	0.1020	0.1057	0.1098	0.1148
	0.1191	0.1235	0.1278	0.1321	0.1363
	0.1403	0.1450	0.1662	0.2344	0.3626
	0.6001	0.8558	0.9242	0.9553	1.0000

Transect 12359.8

Area:					
	0.0004	0.0017	0.0032	0.0051	0.0073
	0.0098	0.0126	0.0157	0.0191	0.0228
	0.0269	0.0312	0.0359	0.0409	0.0467
	0.0532	0.0601	0.0673	0.0748	0.0827
	0.0909	0.0994	0.1083	0.1175	0.1271
	0.1370	0.1473	0.1580	0.1691	0.1806
	0.1925	0.2048	0.2174	0.2305	0.2438
	0.2575	0.2732	0.2922	0.3174	0.3518
	0.3899	0.4300	0.4739	0.5202	0.5694

0.6331	0.7111	0.8033	0.9007	1.0000

Hrad:

0.0383	0.0884	0.1408	0.1882	0.2326
0.2751	0.3163	0.3565	0.3960	0.4350
0.4736	0.5119	0.5499	0.5579	0.5594
0.5877	0.6309	0.6745	0.7195	0.7631
0.8052	0.8448	0.8836	0.9236	0.9618
1.0000	1.0363	1.0710	1.1053	1.1404
1.1768	1.2146	1.2534	1.2925	1.3303
1.3683	1.3946	1.3922	1.3746	1.3328
1.2986	1.2734	1.2405	1.2144	1.1739
1.1255	1.0855	1.0390	1.0117	1.0000

Width:

0.0088	0.0143	0.0173	0.0204	0.0235
0.0266	0.0296	0.0327	0.0358	0.0388
0.0419	0.0450	0.0481	0.0541	0.0620
0.0672	0.0707	0.0741	0.0771	0.0803
0.0836	0.0871	0.0907	0.0942	0.0978
0.1014	0.1053	0.1093	0.1134	0.1174
0.1212	0.1250	0.1286	0.1321	0.1358
0.1395	0.1716	0.2101	0.2984	0.3766
0.3877	0.4252	0.4521	0.4766	0.5575
0.7255	0.8413	0.9660	0.9861	1.0000

Transect 12390.7

Area:

0.0003	0.0013	0.0027	0.0046	0.0068
0.0094	0.0124	0.0158	0.0197	0.0239
0.0286	0.0336	0.0391	0.0449	0.0512
0.0578	0.0647	0.0719	0.0795	0.0873
0.0954	0.1039	0.1126	0.1217	0.1311
0.1407	0.1507	0.1608	0.1730	0.1882
0.2065	0.2298	0.2583	0.2878	0.3178
0.3480	0.3785	0.4092	0.4402	0.4714
0.5029	0.5376	0.5755	0.6165	0.6646
0.7219	0.7836	0.8513	0.9241	1.0000

Hrad:

0.0338	0.0740	0.1140	0.1512	0.1871
0.2223	0.2569	0.2913	0.3254	0.3594
0.3932	0.4270	0.4607	0.4943	0.5304
0.5677	0.6071	0.6464	0.6865	0.7269
0.7639	0.8017	0.8386	0.8751	0.9125
0.9506	0.9905	1.0299	1.0539	1.0501
1.0273	0.9904	0.9670	0.9573	0.9577
0.9654	0.9795	0.9978	1.0188	1.0414
1.0692	1.0951	1.1154	1.1310	1.1330
1.1194	1.1114	1.0266	1.0114	1.0000

Width:

0.0089	0.0156	0.0209	0.0261	0.0314
0.0366	0.0418	0.0471	0.0523	0.0575
0.0628	0.0680	0.0733	0.0785	0.0833
0.0878	0.0919	0.0959	0.0997	0.1034
0.1075	0.1114	0.1154	0.1194	0.1233
0.1270	0.1304	0.1357	0.1759	0.2171
0.2596	0.3497	0.3787	0.3858	0.3899
0.3937	0.3970	0.3999	0.4029	0.4060
0.4091	0.4765	0.5017	0.5924	0.6546
0.7956	0.8100	0.9275	0.9622	1.0000

Transect 12415.2

Area:

0.0005	0.0019	0.0042	0.0073	0.0111
0.0154	0.0200	0.0249	0.0304	0.0364
0.0430	0.0498	0.0570	0.0646	0.0727
0.0813	0.0904	0.0999	0.1097	0.1198
0.1301	0.1407	0.1517	0.1630	0.1745
0.1864	0.1985	0.2110	0.2237	0.2367
0.2504	0.2668	0.2856	0.3074	0.3312
0.3560	0.3818	0.4095	0.4436	0.4882
0.5384	0.5888	0.6394	0.6902	0.7412
0.7923	0.8437	0.8954	0.9473	1.0000

Hrad:

0.0270	0.0540	0.0821	0.1140	0.1473
0.1852	0.2248	0.2540	0.2808	0.3059
0.3415	0.3767	0.4084	0.4363	0.4584
0.4827	0.5118	0.5472	0.5901	0.6333
0.6751	0.7229	0.7696	0.8146	0.8581
0.9005	0.9417	0.9819	1.0208	1.0587
1.0932	1.1120	1.1207	1.1188	1.1150

	1.1134	1.1135	1.1107	1.0843	1.0261
	0.9897	0.9705	0.9603	0.9569	0.9585
	0.9639	0.9719	0.9825	0.9943	1.0000
Width:					
	0.0174	0.0348	0.0513	0.0645	0.0754
	0.0825	0.0878	0.0969	0.1069	0.1177
	0.1240	0.1301	0.1370	0.1453	0.1556
	0.1653	0.1734	0.1789	0.1842	0.1895
	0.1949	0.2007	0.2064	0.2121	0.2181
	0.2229	0.2281	0.2332	0.2389	0.2445
	0.2862	0.3260	0.3768	0.4273	0.4519
	0.4707	0.4886	0.5816	0.6924	0.9203
	0.9354	0.9386	0.9418	0.9449	0.9481
	0.9520	0.9571	0.9622	0.9694	1.0000

Transect 12442.1

Area:					
	0.0010	0.0036	0.0069	0.0109	0.0156
	0.0209	0.0270	0.0337	0.0410	0.0491
	0.0578	0.0671	0.0772	0.0884	0.1006
	0.1136	0.1273	0.1418	0.1570	0.1730
	0.1897	0.2073	0.2257	0.2450	0.2650
	0.2859	0.3076	0.3302	0.3539	0.3793
	0.4054	0.4322	0.4595	0.4906	0.5225
	0.5543	0.5862	0.6180	0.6498	0.6817
	0.7135	0.7453	0.7772	0.8090	0.8408
	0.8727	0.9045	0.9363	0.9682	1.0000
Hrad:					
	0.0216	0.0506	0.0796	0.1058	0.1305
	0.1542	0.1771	0.1996	0.2217	0.2435
	0.2652	0.2866	0.3107	0.3473	0.3798
	0.4098	0.4377	0.4639	0.4886	0.5117
	0.5335	0.5540	0.5734	0.5921	0.6100
	0.6270	0.6430	0.6583	0.6713	0.6801
	0.6947	0.7093	0.7221	0.7173	0.7310
	0.7459	0.7618	0.7784	0.7955	0.8132
	0.8311	0.8494	0.8679	0.8865	0.9053
	0.9242	0.9431	0.9621	0.9810	1.0000
Width:					
	0.0600	0.0944	0.1155	0.1366	0.1576
	0.1787	0.1997	0.2208	0.2419	0.2629
	0.2840	0.3051	0.3300	0.3689	0.3966
	0.4195	0.4430	0.4665	0.4900	0.5145
	0.5395	0.5653	0.5918	0.6168	0.6419
	0.6684	0.6965	0.7252	0.7626	0.8156
	0.8310	0.8476	0.8746	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000

Transect 12442.1(orig)

Area:					
	0.0004	0.0015	0.0029	0.0045	0.0065
	0.0087	0.0112	0.0139	0.0170	0.0203
	0.0239	0.0278	0.0320	0.0366	0.0416
	0.0470	0.0527	0.0587	0.0650	0.0716
	0.0785	0.0859	0.0955	0.1089	0.1250
	0.1443	0.1702	0.1987	0.2294	0.2621
	0.2955	0.3292	0.3633	0.3991	0.4353
	0.4716	0.5079	0.5444	0.5810	0.6176
	0.6544	0.6913	0.7282	0.7653	0.8024
	0.8397	0.8770	0.9144	0.9533	1.0000
Hrad:					
	0.0315	0.0739	0.1162	0.1546	0.1906
	0.2251	0.2587	0.2915	0.3238	0.3557
	0.3873	0.4186	0.4538	0.5072	0.5547
	0.5985	0.6393	0.6775	0.7135	0.7473
	0.7791	0.8082	0.8128	0.7870	0.7577
	0.7206	0.6649	0.6316	0.6085	0.5921
	0.5953	0.6046	0.6169	0.6225	0.6420
	0.6634	0.6863	0.7104	0.7353	0.7608
	0.7870	0.8136	0.8405	0.8677	0.8953
	0.9230	0.9508	0.9788	1.0045	1.0000
Width:					
	0.0159	0.0250	0.0306	0.0361	0.0417
	0.0473	0.0529	0.0584	0.0640	0.0696
	0.0752	0.0807	0.0874	0.0976	0.1050
	0.1110	0.1172	0.1235	0.1297	0.1362
	0.1428	0.1640	0.2246	0.3050	0.3359

0.4675	0.5496	0.5933	0.6373	0.6676
0.6748	0.6813	0.6904	0.7256	0.7276
0.7296	0.7315	0.7335	0.7355	0.7375
0.7394	0.7414	0.7433	0.7452	0.7470
0.7487	0.7504	0.7521	0.8684	1.0000

Transect 12491.9
Area:

0.0038	0.0082	0.0132	0.0188	0.0250
0.0318	0.0391	0.0471	0.0556	0.0647
0.0744	0.0847	0.0956	0.1071	0.1191
0.1318	0.1450	0.1589	0.1739	0.1900
0.2069	0.2245	0.2428	0.2617	0.2812
0.3013	0.3220	0.3434	0.3654	0.3880
0.4113	0.4352	0.4597	0.4849	0.5108
0.5372	0.5643	0.5921	0.6204	0.6493
0.6789	0.7093	0.7406	0.7728	0.8086
0.8461	0.8846	0.9231	0.9615	1.0000

Hrad:

0.0355	0.0664	0.0944	0.1203	0.1448
0.1681	0.1906	0.2125	0.2339	0.2549
0.2755	0.2958	0.3159	0.3358	0.3555
0.3751	0.3945	0.4138	0.4470	0.4774
0.5059	0.5330	0.5589	0.5838	0.6079
0.6311	0.6535	0.6751	0.6960	0.7163
0.7360	0.7551	0.7737	0.7917	0.8094
0.8266	0.8435	0.8601	0.8764	0.8924
0.9077	0.9214	0.9342	0.9468	0.9408
0.9439	0.9569	0.9706	0.9850	1.0000

Width:

0.1070	0.1223	0.1376	0.1529	0.1682
0.1835	0.1988	0.2141	0.2294	0.2447
0.2600	0.2753	0.2907	0.3060	0.3213
0.3366	0.3519	0.3672	0.4066	0.4310
0.4486	0.4662	0.4829	0.4993	0.5149
0.5307	0.5471	0.5636	0.5803	0.5968
0.6130	0.6299	0.6465	0.6631	0.6797
0.6964	0.7126	0.7286	0.7446	0.7606
0.7785	0.8010	0.8254	0.8637	0.9478
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 12491.9(orig)
Area:

0.0018	0.0039	0.0063	0.0089	0.0119
0.0151	0.0186	0.0224	0.0264	0.0307
0.0353	0.0402	0.0454	0.0509	0.0566
0.0626	0.0689	0.0755	0.0826	0.0903
0.0983	0.1067	0.1153	0.1243	0.1336
0.1431	0.1530	0.1631	0.1736	0.1843
0.1954	0.2067	0.2184	0.2303	0.2430
0.2579	0.2752	0.2967	0.3225	0.3537
0.3986	0.4513	0.5109	0.5737	0.6404
0.7094	0.7801	0.8521	0.9253	1.0000

Hrad:

0.0699	0.1309	0.1860	0.2370	0.2852
0.3313	0.3757	0.4188	0.4609	0.5022
0.5428	0.5829	0.6225	0.6616	0.7005
0.7391	0.7774	0.8155	0.8809	0.9406
0.9968	1.0502	1.1013	1.1504	1.1978
1.2436	1.2877	1.3304	1.3715	1.4115
1.4503	1.4879	1.5245	1.5601	1.5914
1.6053	1.6030	1.5775	1.5346	1.4681
1.3646	1.2578	1.1754	1.1148	1.0419
1.0119	1.0008	0.9955	0.9959	1.0000

Width:

0.0259	0.0296	0.0333	0.0370	0.0408
0.0445	0.0482	0.0519	0.0556	0.0593
0.0630	0.0667	0.0704	0.0741	0.0778
0.0815	0.0852	0.0890	0.0985	0.1044
0.1087	0.1130	0.1170	0.1210	0.1247
0.1286	0.1325	0.1365	0.1406	0.1446
0.1485	0.1526	0.1566	0.1607	0.1821
0.2119	0.2583	0.3091	0.3650	0.5151
0.6477	0.7701	0.8130	0.8580	0.9006
0.9290	0.9443	0.9636	0.9815	1.0000

Transect 12524.2
Area:

0.0004	0.0014	0.0027	0.0043	0.0061

0.0081	0.0104	0.0131	0.0161	0.0193
0.0228	0.0266	0.0307	0.0350	0.0395
0.0444	0.0495	0.0550	0.0607	0.0668
0.0731	0.0797	0.0866	0.0937	0.1012
0.1091	0.1176	0.1277	0.1394	0.1532
0.1701	0.1916	0.2220	0.2572	0.2925
0.3281	0.3638	0.3996	0.4356	0.4718
0.5082	0.5458	0.5869	0.6344	0.6883
0.7479	0.8100	0.8727	0.9359	1.0000

Hrad:

0.0342	0.0779	0.1255	0.1684	0.2086
0.2469	0.2833	0.3075	0.3403	0.3764
0.4131	0.4495	0.4864	0.5209	0.5535
0.5849	0.6160	0.6463	0.6788	0.7116
0.7442	0.7783	0.8114	0.8442	0.8755
0.9049	0.9304	0.9461	0.9520	0.9376
0.9074	0.8838	0.8403	0.8132	0.8053
0.8093	0.8213	0.8389	0.8604	0.8846
0.9109	0.9359	0.9552	0.9648	0.9669
0.9654	0.9690	0.9777	0.9900	1.0000

Width:

0.0110	0.0184	0.0222	0.0260	0.0298
0.0336	0.0376	0.0434	0.0481	0.0523
0.0562	0.0602	0.0639	0.0680	0.0723
0.0768	0.0814	0.0862	0.0906	0.0950
0.0994	0.1036	0.1080	0.1123	0.1170
0.1263	0.1390	0.1660	0.1952	0.2322
0.2920	0.3724	0.5381	0.5424	0.5450
0.5477	0.5499	0.5523	0.5547	0.5578
0.5610	0.6118	0.6721	0.7727	0.8660
0.9478	0.9593	0.9674	0.9767	1.0000

Transect 12591.8

Area:

0.0003	0.0010	0.0020	0.0031	0.0044
0.0059	0.0076	0.0095	0.0116	0.0138
0.0163	0.0189	0.0217	0.0246	0.0279
0.0314	0.0352	0.0391	0.0433	0.0476
0.0522	0.0570	0.0620	0.0672	0.0726
0.0782	0.0841	0.0914	0.1032	0.1179
0.1355	0.1611	0.1978	0.2376	0.2779
0.3184	0.3591	0.4003	0.4432	0.4878
0.5334	0.5805	0.6281	0.6761	0.7252
0.7754	0.8265	0.8801	0.9387	1.0000

Hrad:

0.0431	0.0987	0.1582	0.2120	0.2624
0.3105	0.3571	0.4025	0.4472	0.4913
0.5348	0.5780	0.6209	0.6636	0.7374
0.8053	0.8685	0.9278	0.9834	1.0353
1.0842	1.1304	1.1744	1.2165	1.2561
1.2940	1.3295	1.3398	1.2758	1.2012
1.1194	0.9725	0.8153	0.7641	0.7441
0.7423	0.7517	0.7677	0.7854	0.7859
0.8025	0.8268	0.8553	0.8848	0.9062
0.9349	0.9638	0.9834	0.9726	1.0000

Width:

0.0085	0.0141	0.0171	0.0200	0.0230
0.0260	0.0290	0.0320	0.0349	0.0379
0.0409	0.0439	0.0469	0.0498	0.0553
0.0592	0.0623	0.0656	0.0689	0.0724
0.0759	0.0793	0.0827	0.0861	0.0898
0.0934	0.1007	0.1435	0.2218	0.2560
0.3300	0.5084	0.6415	0.6505	0.6551
0.6584	0.6613	0.6810	0.7102	0.7297
0.7569	0.7685	0.7743	0.7812	0.8083
0.8204	0.8514	0.8964	0.9873	1.0000

Transect 12613.3

Area:

0.0003	0.0010	0.0019	0.0030	0.0044
0.0058	0.0075	0.0093	0.0114	0.0136
0.0160	0.0185	0.0213	0.0242	0.0274
0.0308	0.0343	0.0380	0.0419	0.0459
0.0501	0.0546	0.0592	0.0639	0.0690
0.0743	0.0799	0.0859	0.0943	0.1079
0.1283	0.1513	0.1864	0.2256	0.2653
0.3052	0.3461	0.3887	0.4341	0.4807
0.5277	0.5758	0.6251	0.6752	0.7260
0.7779	0.8311	0.8852	0.9410	1.0000

Hrad:

0.0430	0.0981	0.1577	0.2114	0.2617
0.3097	0.3562	0.4015	0.4461	0.4901
0.5335	0.5766	0.6194	0.6619	0.7318
0.8027	0.8706	0.9353	0.9958	1.0524
1.1059	1.1566	1.2047	1.2501	1.2910
1.3280	1.3608	1.3895	1.3717	1.2762
1.1070	1.0120	0.8383	0.7780	0.7504
0.7447	0.7493	0.7569	0.7650	0.7670
0.7905	0.8079	0.8326	0.8597	0.8863
0.9106	0.9373	0.9626	0.9843	1.0000

Width:

0.0084	0.0141	0.0170	0.0200	0.0229
0.0259	0.0289	0.0318	0.0348	0.0378
0.0407	0.0437	0.0467	0.0496	0.0550
0.0571	0.0592	0.0619	0.0650	0.0682
0.0711	0.0742	0.0773	0.0805	0.0847
0.0894	0.0948	0.1105	0.1778	0.2795
0.3565	0.4267	0.6434	0.6471	0.6559
0.6589	0.6884	0.7230	0.7599	0.7713
0.7758	0.8053	0.8181	0.8283	0.8429
0.8649	0.8821	0.9040	0.9396	1.0000

Transect 12627.6

Area:

0.0002	0.0008	0.0018	0.0032	0.0048
0.0066	0.0085	0.0106	0.0128	0.0151
0.0176	0.0202	0.0230	0.0259	0.0290
0.0322	0.0355	0.0390	0.0426	0.0464
0.0502	0.0543	0.0584	0.0627	0.0672
0.0718	0.0766	0.0825	0.0913	0.1058
0.1245	0.1464	0.1716	0.1988	0.2273
0.2586	0.2997	0.3474	0.3975	0.4488
0.5006	0.5528	0.6053	0.6586	0.7133
0.7687	0.8245	0.8810	0.9387	1.0000

Hrad:

0.0527	0.1055	0.1646	0.2522	0.3236
0.3922	0.4579	0.5201	0.5794	0.6356
0.6891	0.7370	0.7817	0.8279	0.8725
0.9152	0.9565	0.9971	1.0368	1.0752
1.1123	1.1487	1.1848	1.2182	1.2497
1.2805	1.3108	1.3076	1.2572	1.1237
0.9310	0.8434	0.7579	0.7332	0.7308
0.7312	0.6946	0.6627	0.6320	0.6640
0.6990	0.7370	0.7785	0.8063	0.8443
0.8850	0.9263	0.9670	0.9960	1.0000

Width:

0.0064	0.0128	0.0189	0.0241	0.0270
0.0290	0.0310	0.0333	0.0354	0.0375
0.0396	0.0421	0.0448	0.0469	0.0490
0.0511	0.0533	0.0554	0.0574	0.0595
0.0617	0.0638	0.0659	0.0683	0.0710
0.0736	0.0763	0.1080	0.1806	0.2595
0.3260	0.3647	0.4080	0.4343	0.4639
0.5467	0.7143	0.7632	0.7984	0.8051
0.8125	0.8184	0.8214	0.8484	0.8604
0.8690	0.8774	0.8872	0.9141	1.0000

Transect 12676.2

Area:

0.0002	0.0007	0.0016	0.0032	0.0050
0.0071	0.0092	0.0115	0.0138	0.0163
0.0189	0.0215	0.0243	0.0271	0.0301
0.0331	0.0363	0.0395	0.0428	0.0463
0.0498	0.0534	0.0572	0.0610	0.0650
0.0690	0.0734	0.0801	0.0942	0.1170
0.1491	0.1834	0.2179	0.2525	0.2873
0.3234	0.3639	0.4066	0.4515	0.4982
0.5458	0.5943	0.6435	0.6932	0.7432
0.7936	0.8445	0.8958	0.9475	1.0000

Hrad:

0.0329	0.0659	0.0855	0.1197	0.1702
0.2225	0.2735	0.3224	0.3705	0.4176
0.4638	0.5086	0.5523	0.5949	0.6362
0.6848	0.7451	0.8039	0.8606	0.9155
0.9687	1.0199	1.0694	1.1173	1.1641
1.2087	1.2471	1.2294	1.0950	0.9230
0.7645	0.6972	0.6702	0.6649	0.6708
0.6819	0.6666	0.6789	0.6922	0.7111

0.7348	0.7585	0.7870	0.8170	0.8485
0.8803	0.9129	0.9457	0.9795	1.0000

Width:

0.0063	0.0127	0.0237	0.0325	0.0363
0.0387	0.0409	0.0430	0.0449	0.0468
0.0485	0.0503	0.0521	0.0539	0.0557
0.0575	0.0593	0.0610	0.0628	0.0646
0.0664	0.0685	0.0706	0.0725	0.0744
0.0770	0.0898	0.1719	0.3570	0.5142
0.6378	0.6395	0.6418	0.6440	0.6500
0.7184	0.7796	0.8131	0.8546	0.8782
0.8910	0.9112	0.9190	0.9266	0.9331
0.9413	0.9490	0.9574	0.9646	1.0000

Transect 12795

Area:

0.0002	0.0007	0.0016	0.0028	0.0040
0.0054	0.0069	0.0085	0.0102	0.0120
0.0140	0.0162	0.0187	0.0215	0.0244
0.0275	0.0307	0.0341	0.0376	0.0412
0.0449	0.0488	0.0528	0.0570	0.0612
0.0657	0.0703	0.0754	0.0834	0.0957
0.1112	0.1319	0.1573	0.1867	0.2187
0.2528	0.2897	0.3283	0.3741	0.4270
0.4813	0.5377	0.5947	0.6520	0.7095
0.7672	0.8251	0.8831	0.9413	1.0000

Hrad:

0.0379	0.0757	0.1167	0.1745	0.2275
0.2769	0.3237	0.3685	0.4117	0.4536
0.4974	0.5592	0.6116	0.6583	0.7025
0.7462	0.7892	0.8312	0.8721	0.9122
0.9514	0.9898	1.0273	1.0641	1.0993
1.1313	1.1635	1.1858	1.1131	1.0382
0.9135	0.8277	0.7494	0.6990	0.6769
0.6724	0.6575	0.6771	0.6872	0.6934
0.7087	0.7275	0.7532	0.7830	0.8163
0.8518	0.8892	0.9278	0.9661	1.0000

Width:

0.0062	0.0124	0.0180	0.0200	0.0221
0.0241	0.0261	0.0282	0.0302	0.0322
0.0349	0.0405	0.0444	0.0484	0.0511
0.0533	0.0555	0.0577	0.0600	0.0622
0.0645	0.0667	0.0690	0.0713	0.0738
0.0769	0.0797	0.1106	0.1724	0.2338
0.2981	0.3808	0.4641	0.5184	0.5619
0.5900	0.6486	0.6787	0.8445	0.9124
0.9278	0.9632	0.9672	0.9710	0.9741
0.9772	0.9801	0.9830	0.9878	1.0000

Transect 12894.8

Area:

0.0005	0.0020	0.0045	0.0079	0.0120
0.0165	0.0213	0.0265	0.0321	0.0381
0.0444	0.0511	0.0582	0.0656	0.0734
0.0815	0.0899	0.0986	0.1078	0.1177
0.1281	0.1392	0.1509	0.1631	0.1758
0.1891	0.2028	0.2172	0.2320	0.2473
0.2631	0.2793	0.2961	0.3133	0.3310
0.3491	0.3677	0.3867	0.4062	0.4261
0.4467	0.4678	0.4897	0.5161	0.5558
0.6043	0.6679	0.7624	0.8718	1.0000

Hrad:

0.0353	0.0700	0.1047	0.1400	0.1923
0.2410	0.2869	0.3307	0.3727	0.4133
0.4528	0.4913	0.5291	0.5662	0.6111
0.6752	0.7358	0.7932	0.8466	0.8952
0.9398	0.9810	1.0198	1.0570	1.0926
1.1269	1.1597	1.1916	1.2231	1.2540
1.2842	1.3139	1.3430	1.3722	1.4010
1.4296	1.4582	1.4869	1.5145	1.5401
1.5643	1.5881	1.5954	1.5964	1.5426
1.4179	1.3044	1.1763	1.0914	1.0000

Width:

0.0073	0.0144	0.0215	0.0285	0.0312
0.0339	0.0366	0.0393	0.0420	0.0447
0.0474	0.0501	0.0528	0.0555	0.0579
0.0597	0.0624	0.0650	0.0692	0.0738
0.0784	0.0828	0.0869	0.0907	0.0945
0.0983	0.1022	0.1061	0.1096	0.1131

0.1166	0.1202	0.1237	0.1270	0.1303
0.1336	0.1368	0.1398	0.1432	0.1472
0.1516	0.1559	0.1666	0.2405	0.3259
0.3848	0.5699	0.7508	0.8366	1.0000

Transect 6318.4

Area:

0.0007	0.0015	0.0026	0.0044	0.0084
0.0128	0.0174	0.0223	0.0275	0.0330
0.0387	0.0447	0.0510	0.0576	0.0644
0.0715	0.0789	0.0866	0.0945	0.1028
0.1113	0.1200	0.1291	0.1384	0.1480
0.1579	0.1680	0.1784	0.1891	0.2004
0.2127	0.2259	0.2395	0.2534	0.2678
0.2825	0.2976	0.3137	0.3353	0.3649
0.3996	0.4371	0.4788	0.5378	0.6020
0.6695	0.7411	0.8229	0.9098	1.0000

Hrad:

0.0626	0.1106	0.1523	0.1028	0.1452
0.2064	0.2641	0.3192	0.3719	0.4227
0.4718	0.5196	0.5661	0.6115	0.6560
0.6996	0.7426	0.7848	0.8265	0.8677
0.9084	0.9487	0.9885	1.0281	1.0673
1.1062	1.1448	1.1833	1.2214	1.2856
1.3428	1.3939	1.4424	1.4897	1.5352
1.5789	1.6207	1.6560	1.6522	1.5931
1.5393	1.4910	1.4406	1.3420	1.2620
1.1965	1.1428	1.0769	1.0370	1.0000

Width:

0.0081	0.0103	0.0124	0.0337	0.0455
0.0484	0.0514	0.0543	0.0573	0.0603
0.0632	0.0662	0.0691	0.0721	0.0751
0.0780	0.0810	0.0840	0.0869	0.0899
0.0928	0.0958	0.0988	0.1017	0.1047
0.1077	0.1106	0.1136	0.1165	0.1269
0.1376	0.1445	0.1483	0.1520	0.1561
0.1603	0.1651	0.1950	0.2730	0.3601
0.3904	0.4124	0.5348	0.6766	0.7061
0.7464	0.7913	0.9236	0.9483	1.0000

Transect 6357.5

Area:

0.0009	0.0022	0.0037	0.0060	0.0115
0.0177	0.0243	0.0313	0.0386	0.0464
0.0545	0.0630	0.0719	0.0812	0.0908
0.1009	0.1113	0.1221	0.1333	0.1449
0.1569	0.1693	0.1820	0.1951	0.2086
0.2225	0.2368	0.2515	0.2665	0.2819
0.2985	0.3157	0.3335	0.3517	0.3703
0.3894	0.4090	0.4291	0.4499	0.4741
0.5008	0.5292	0.5591	0.5930	0.6326
0.6769	0.7306	0.7932	0.8789	1.0000

Hrad:

0.0463	0.0821	0.1131	0.0802	0.1030
0.1484	0.1913	0.2322	0.2714	0.3091
0.3457	0.3811	0.4156	0.4494	0.4824
0.5148	0.5466	0.5779	0.6088	0.6393
0.6695	0.6993	0.7289	0.7581	0.7871
0.8159	0.8445	0.8729	0.9012	0.9296
0.9767	1.0211	1.0637	1.1048	1.1445
1.1829	1.2196	1.2548	1.2876	1.3051
1.3187	1.3293	1.3367	1.3321	1.3195
1.3003	1.2597	1.2093	1.1228	1.0000

Width:

0.0083	0.0104	0.0125	0.0307	0.0461
0.0491	0.0520	0.0549	0.0579	0.0608
0.0638	0.0667	0.0697	0.0726	0.0756
0.0785	0.0815	0.0844	0.0874	0.0903
0.0932	0.0962	0.0991	0.1021	0.1050
0.1080	0.1109	0.1139	0.1168	0.1200
0.1300	0.1342	0.1378	0.1412	0.1446
0.1482	0.1523	0.1565	0.1638	0.1982
0.2115	0.2231	0.2371	0.2878	0.3235
0.3768	0.4397	0.5340	0.8030	1.0000

Transect 6507.5

Area:

0.0008	0.0017	0.0029	0.0049	0.0093
0.0142	0.0195	0.0251	0.0310	0.0372

0.0437	0.0506	0.0577	0.0652	0.0729
0.0810	0.0893	0.0980	0.1070	0.1163
0.1259	0.1358	0.1460	0.1566	0.1674
0.1785	0.1900	0.2018	0.2138	0.2262
0.2393	0.2530	0.2671	0.2816	0.2965
0.3117	0.3273	0.3433	0.3597	0.3770
0.3960	0.4209	0.4613	0.5173	0.5795
0.6473	0.7219	0.8035	0.8950	1.0000

Hrad:

0.0562	0.0995	0.1370	0.0960	0.1256
0.1808	0.2329	0.2826	0.3302	0.3761
0.4204	0.4635	0.5054	0.5464	0.5865
0.6258	0.6645	0.7026	0.7401	0.7772
0.8138	0.8501	0.8859	0.9215	0.9568
0.9917	1.0265	1.0610	1.0953	1.1344
1.1927	1.2474	1.2995	1.3494	1.3977
1.4444	1.4895	1.5329	1.5737	1.6094
1.6339	1.6211	1.5424	1.4292	1.3334
1.2529	1.1756	1.1121	1.0572	1.0000

Width:

0.0081	0.0101	0.0122	0.0306	0.0451
0.0480	0.0509	0.0538	0.0567	0.0596
0.0624	0.0653	0.0682	0.0711	0.0740
0.0769	0.0798	0.0826	0.0855	0.0884
0.0913	0.0942	0.0971	0.1000	0.1028
0.1057	0.1086	0.1115	0.1144	0.1183
0.1257	0.1299	0.1341	0.1376	0.1408
0.1441	0.1477	0.1514	0.1570	0.1672
0.1915	0.3021	0.4635	0.5623	0.6043
0.6608	0.7310	0.7861	0.9344	1.0000

Transect 6650.9

Area:

0.0011	0.0029	0.0053	0.0103	0.0201
0.0299	0.0397	0.0496	0.0595	0.0694
0.0793	0.0892	0.0992	0.1092	0.1192
0.1294	0.1396	0.1498	0.1601	0.1704
0.1808	0.1913	0.2018	0.2123	0.2230
0.2337	0.2445	0.2555	0.2665	0.2776
0.2889	0.3003	0.3117	0.3234	0.3351
0.3471	0.3591	0.3714	0.3840	0.3969
0.4127	0.4408	0.4781	0.5185	0.5633
0.6167	0.6840	0.7657	0.8778	1.0000

Hrad:

0.0567	0.1002	0.1402	0.0813	0.1512
0.2208	0.2882	0.3533	0.4163	0.4774
0.5366	0.5941	0.6498	0.7036	0.7541
0.8053	0.8553	0.9039	0.9514	0.9977
1.0429	1.0871	1.1303	1.1727	1.2127
1.2518	1.2905	1.3286	1.3661	1.4029
1.4392	1.4750	1.5085	1.5415	1.5742
1.6066	1.6376	1.6582	1.6800	1.7060
1.6434	1.5644	1.4760	1.4180	1.3796
1.3283	1.2512	1.1791	1.0780	1.0000

Width:

0.0114	0.0167	0.0221	0.0757	0.0780
0.0782	0.0784	0.0786	0.0788	0.0789
0.0791	0.0793	0.0795	0.0798	0.0806
0.0810	0.0814	0.0818	0.0822	0.0826
0.0830	0.0834	0.0839	0.0843	0.0851
0.0859	0.0867	0.0876	0.0884	0.0892
0.0901	0.0909	0.0921	0.0933	0.0944
0.0956	0.0969	0.0992	0.1015	0.1034
0.1426	0.2769	0.3098	0.3333	0.3887
0.4879	0.5875	0.8025	0.9317	1.0000

Transect 7026.4

Area:

0.0007	0.0016	0.0029	0.0061	0.0103
0.0148	0.0195	0.0246	0.0300	0.0357
0.0417	0.0480	0.0546	0.0614	0.0686
0.0761	0.0839	0.0920	0.1004	0.1091
0.1181	0.1275	0.1371	0.1470	0.1572
0.1677	0.1785	0.1897	0.2014	0.2136
0.2262	0.2393	0.2529	0.2669	0.2813
0.2962	0.3115	0.3272	0.3436	0.3606
0.3810	0.4090	0.4445	0.4975	0.5637
0.6362	0.7162	0.8071	0.9031	1.0000

Hrad:

0.0591	0.1042	0.1097	0.1073	0.1667
0.2225	0.2751	0.3254	0.3736	0.4200
0.4651	0.5089	0.5516	0.5935	0.6345
0.6749	0.7146	0.7538	0.7925	0.8308
0.8686	0.9062	0.9434	0.9803	1.0170
1.0534	1.0896	1.1446	1.2066	1.2649
1.3197	1.3716	1.4209	1.4677	1.5124
1.5549	1.5955	1.6340	1.6696	1.7013
1.7096	1.6681	1.6116	1.4833	1.3588
1.2553	1.1718	1.0908	1.0365	1.0000

Width:

0.0084	0.0109	0.0182	0.0412	0.0443
0.0474	0.0504	0.0535	0.0566	0.0597
0.0628	0.0659	0.0690	0.0721	0.0752
0.0783	0.0814	0.0845	0.0876	0.0907
0.0938	0.0969	0.1000	0.1031	0.1061
0.1092	0.1123	0.1172	0.1218	0.1270
0.1320	0.1364	0.1410	0.1455	0.1499
0.1545	0.1591	0.1639	0.1703	0.1787
0.2476	0.3219	0.4319	0.6563	0.6917
0.7754	0.8381	0.9672	0.9872	1.0000

Transect 7157.8

Area:

0.0008	0.0019	0.0032	0.0064	0.0112
0.0163	0.0217	0.0274	0.0335	0.0399
0.0466	0.0537	0.0611	0.0688	0.0769
0.0852	0.0940	0.1030	0.1124	0.1221
0.1321	0.1425	0.1532	0.1642	0.1756
0.1873	0.1993	0.2117	0.2243	0.2375
0.2513	0.2656	0.2804	0.2955	0.3110
0.3268	0.3430	0.3595	0.3764	0.3937
0.4117	0.4333	0.4595	0.5043	0.5719
0.6444	0.7189	0.7993	0.8934	1.0000

Hrad:

0.0539	0.0953	0.1315	0.0892	0.1439
0.1951	0.2436	0.2899	0.3342	0.3770
0.4184	0.4586	0.4979	0.5363	0.5739
0.6109	0.6473	0.6831	0.7185	0.7535
0.7881	0.8224	0.8564	0.8900	0.9235
0.9567	0.9897	1.0225	1.0551	1.1126
1.1670	1.2185	1.2678	1.3153	1.3613
1.4061	1.4495	1.4914	1.5321	1.5706
1.6050	1.6193	1.6147	1.5326	1.3785
1.2772	1.2021	1.1389	1.0631	1.0000

Width:

0.0083	0.0106	0.0129	0.0403	0.0432
0.0462	0.0491	0.0520	0.0549	0.0578
0.0607	0.0636	0.0665	0.0694	0.0723
0.0752	0.0781	0.0810	0.0840	0.0869
0.0898	0.0927	0.0956	0.0985	0.1014
0.1043	0.1072	0.1101	0.1130	0.1189
0.1238	0.1279	0.1315	0.1348	0.1378
0.1405	0.1437	0.1470	0.1502	0.1548
0.1637	0.2168	0.2845	0.4889	0.6316
0.6455	0.6661	0.7593	0.8961	1.0000

Transect 7307

Area:

0.0011	0.0047	0.0102	0.0163	0.0228
0.0297	0.0370	0.0447	0.0527	0.0611
0.0699	0.0790	0.0884	0.0982	0.1082
0.1186	0.1294	0.1405	0.1520	0.1639
0.1762	0.1888	0.2018	0.2151	0.2287
0.2427	0.2570	0.2718	0.2870	0.3026
0.3187	0.3353	0.3525	0.3704	0.3888
0.4076	0.4269	0.4466	0.4668	0.4874
0.5084	0.5297	0.5513	0.5734	0.5964
0.6226	0.6733	0.7527	0.8690	1.0000

Hrad:

0.0290	0.0550	0.0963	0.1439	0.1894
0.2313	0.2732	0.3129	0.3512	0.3891
0.4253	0.4626	0.4988	0.5346	0.5692
0.6024	0.6338	0.6637	0.6943	0.7245
0.7549	0.7861	0.8170	0.8481	0.8793
0.9079	0.9338	0.9606	0.9886	1.0078
1.0308	1.0478	1.0642	1.0834	1.1084
1.1336	1.1590	1.1844	1.2119	1.2417
1.2732	1.3042	1.3335	1.3625	1.3891

1.4039	1.3431	1.2231	1.1006	1.0000

Width:

0.0157	0.0345	0.0422	0.0451	0.0477
0.0506	0.0532	0.0558	0.0585	0.0610
0.0636	0.0659	0.0682	0.0705	0.0728
0.0752	0.0779	0.0807	0.0833	0.0860
0.0886	0.0910	0.0934	0.0958	0.0981
0.1007	0.1037	0.1065	0.1092	0.1130
0.1163	0.1205	0.1249	0.1290	0.1323
0.1356	0.1389	0.1422	0.1452	0.1479
0.1503	0.1528	0.1554	0.1581	0.1725
0.2251	0.4567	0.6945	0.8780	1.0000

Transect 7357.6

Area:

0.0009	0.0020	0.0035	0.0064	0.0115
0.0170	0.0227	0.0289	0.0353	0.0422
0.0493	0.0568	0.0647	0.0729	0.0814
0.0903	0.0995	0.1091	0.1190	0.1293
0.1399	0.1508	0.1621	0.1738	0.1858
0.1981	0.2107	0.2238	0.2371	0.2508
0.2651	0.2803	0.2961	0.3124	0.3292
0.3464	0.3639	0.3817	0.3999	0.4185
0.4375	0.4569	0.4770	0.4981	0.5294
0.5686	0.6484	0.7583	0.8781	1.0000

Hrad:

0.0523	0.0928	0.1281	0.0814	0.1336
0.1837	0.2312	0.2765	0.3199	0.3618
0.4023	0.4416	0.4800	0.5175	0.5543
0.5904	0.6259	0.6609	0.6954	0.7295
0.7632	0.7965	0.8296	0.8624	0.8949
0.9272	0.9592	0.9911	1.0228	1.0543
1.1023	1.1536	1.2019	1.2481	1.2925
1.3357	1.3777	1.4187	1.4585	1.4971
1.5343	1.5700	1.6028	1.6268	1.6035
1.5539	1.3806	1.2096	1.0844	1.0000

Width:

0.0082	0.0104	0.0126	0.0392	0.0426
0.0454	0.0482	0.0510	0.0538	0.0565
0.0593	0.0621	0.0649	0.0677	0.0705
0.0732	0.0760	0.0788	0.0816	0.0844
0.0872	0.0899	0.0927	0.0955	0.0983
0.1011	0.1039	0.1067	0.1094	0.1122
0.1200	0.1258	0.1300	0.1340	0.1373
0.1400	0.1429	0.1458	0.1486	0.1519
0.1554	0.1594	0.1655	0.1847	0.2807
0.4407	0.8419	0.9456	0.9801	1.0000

Transect 7549.2

Area:

0.0009	0.0022	0.0037	0.0062	0.0114
0.0172	0.0233	0.0297	0.0365	0.0437
0.0511	0.0590	0.0672	0.0757	0.0846
0.0939	0.1034	0.1134	0.1237	0.1343
0.1453	0.1566	0.1683	0.1803	0.1927
0.2054	0.2185	0.2319	0.2457	0.2598
0.2743	0.2891	0.3043	0.3198	0.3357
0.3521	0.3689	0.3860	0.4035	0.4215
0.4399	0.4587	0.4779	0.4987	0.5457
0.6124	0.6889	0.7707	0.8736	1.0000

Hrad:

0.0502	0.0893	0.1234	0.0845	0.1192
0.1679	0.2140	0.2579	0.3001	0.3407
0.3800	0.4181	0.4553	0.4916	0.5272
0.5621	0.5964	0.6302	0.6635	0.6964
0.7289	0.7611	0.7929	0.8245	0.8557
0.8868	0.9176	0.9482	0.9787	1.0089
1.0390	1.0690	1.1172	1.1706	1.2219
1.2712	1.3186	1.3646	1.4091	1.4521
1.4936	1.5337	1.5723	1.6039	1.5255
1.4010	1.2894	1.2007	1.1003	1.0000

Width:

0.0081	0.0102	0.0122	0.0317	0.0418
0.0444	0.0470	0.0496	0.0522	0.0549
0.0575	0.0601	0.0627	0.0653	0.0679
0.0706	0.0732	0.0758	0.0784	0.0810
0.0836	0.0863	0.0889	0.0915	0.0941
0.0967	0.0993	0.1019	0.1046	0.1072
0.1098	0.1124	0.1148	0.1177	0.1209

0.1242	0.1273	0.1300	0.1331	0.1362
0.1392	0.1424	0.1460	0.1998	0.4496
0.5522	0.5928	0.6553	0.8901	1.0000

Transect 7681.8

Area:

0.0009	0.0022	0.0037	0.0060	0.0112
0.0169	0.0230	0.0295	0.0363	0.0435
0.0510	0.0589	0.0671	0.0757	0.0846
0.0939	0.1035	0.1135	0.1238	0.1345
0.1455	0.1569	0.1687	0.1808	0.1932
0.2060	0.2191	0.2326	0.2465	0.2607
0.2752	0.2901	0.3054	0.3210	0.3370
0.3534	0.3701	0.3873	0.4048	0.4227
0.4410	0.4598	0.4792	0.5003	0.5248
0.5691	0.6584	0.7577	0.8715	1.0000

Hrad:

0.0506	0.0900	0.1244	0.0882	0.1167
0.1659	0.2123	0.2567	0.2991	0.3401
0.3797	0.4181	0.4556	0.4922	0.5280
0.5631	0.5977	0.6317	0.6653	0.6984
0.7311	0.7635	0.7955	0.8273	0.8588
0.8900	0.9210	0.9519	0.9825	1.0129
1.0432	1.0734	1.1188	1.1726	1.2243
1.2743	1.3227	1.3695	1.4150	1.4591
1.5017	1.5426	1.5805	1.6111	1.6238
1.5608	1.3660	1.2235	1.0994	1.0000

Width:

0.0081	0.0102	0.0123	0.0296	0.0421
0.0447	0.0474	0.0500	0.0527	0.0553
0.0580	0.0606	0.0633	0.0659	0.0686
0.0712	0.0738	0.0765	0.0791	0.0818
0.0844	0.0871	0.0897	0.0924	0.0950
0.0977	0.1003	0.1029	0.1056	0.1082
0.1109	0.1135	0.1161	0.1188	0.1222
0.1249	0.1277	0.1307	0.1334	0.1363
0.1394	0.1434	0.1498	0.1676	0.2160
0.5845	0.7207	0.7792	0.9272	1.0000

Transect 7747.7

Area:

0.0011	0.0024	0.0041	0.0064	0.0120
0.0184	0.0253	0.0326	0.0402	0.0482
0.0567	0.0654	0.0746	0.0842	0.0941
0.1045	0.1152	0.1263	0.1378	0.1497
0.1619	0.1746	0.1876	0.2010	0.2148
0.2290	0.2436	0.2586	0.2739	0.2896
0.3057	0.3222	0.3391	0.3564	0.3740
0.3919	0.4101	0.4287	0.4477	0.4671
0.4872	0.5078	0.5289	0.5547	0.5960
0.6500	0.7086	0.7794	0.8667	1.0000

Hrad:

0.0452	0.0806	0.1114	0.0867	0.0989
0.1430	0.1849	0.2248	0.2630	0.2999
0.3355	0.3701	0.4038	0.4367	0.4689
0.5005	0.5315	0.5621	0.5922	0.6219
0.6512	0.6802	0.7089	0.7374	0.7656
0.7936	0.8214	0.8489	0.8763	0.9036
0.9307	0.9576	0.9844	1.0184	1.0669
1.1142	1.1604	1.2052	1.2487	1.2904
1.3304	1.3686	1.4054	1.4249	1.3931
1.3322	1.2791	1.2081	1.1278	1.0000

Width:

0.0080	0.0099	0.0119	0.0247	0.0411
0.0436	0.0461	0.0486	0.0511	0.0536
0.0561	0.0586	0.0612	0.0637	0.0662
0.0687	0.0712	0.0737	0.0762	0.0787
0.0813	0.0838	0.0863	0.0888	0.0913
0.0938	0.0963	0.0988	0.1013	0.1039
0.1064	0.1089	0.1114	0.1138	0.1158
0.1178	0.1200	0.1224	0.1253	0.1289
0.1325	0.1362	0.1395	0.2234	0.3169
0.3706	0.4137	0.5039	0.7051	1.0000

Transect 7885.5

Area:

0.0011	0.0025	0.0041	0.0067	0.0125
0.0190	0.0259	0.0330	0.0406	0.0484
0.0567	0.0652	0.0741	0.0834	0.0930

0.1030	0.1133	0.1239	0.1349	0.1462
0.1579	0.1700	0.1823	0.1951	0.2081
0.2216	0.2353	0.2494	0.2639	0.2787
0.2938	0.3093	0.3253	0.3423	0.3600
0.3784	0.3974	0.4170	0.4372	0.4578
0.4791	0.5009	0.5232	0.5462	0.5709
0.6056	0.6554	0.7485	0.8608	1.0000

Hrad:

0.0484	0.0862	0.1191	0.0860	0.1111
0.1589	0.2043	0.2475	0.2890	0.3290
0.3677	0.4052	0.4417	0.4773	0.5121
0.5462	0.5797	0.6126	0.6450	0.6770
0.7085	0.7397	0.7705	0.8010	0.8312
0.8611	0.8908	0.9203	0.9496	0.9786
1.0075	1.0362	1.0730	1.1203	1.1646
1.2064	1.2462	1.2841	1.3206	1.3555
1.3889	1.4210	1.4517	1.4808	1.5041
1.4809	1.4197	1.2681	1.1373	1.0000

Width:

0.0080	0.0101	0.0121	0.0284	0.0413
0.0436	0.0458	0.0481	0.0504	0.0527
0.0549	0.0572	0.0595	0.0617	0.0640
0.0663	0.0685	0.0708	0.0731	0.0753
0.0776	0.0799	0.0821	0.0844	0.0867
0.0889	0.0912	0.0935	0.0957	0.0980
0.1003	0.1025	0.1072	0.1140	0.1184
0.1225	0.1264	0.1300	0.1335	0.1371
0.1408	0.1445	0.1483	0.1527	0.1758
0.2854	0.4538	0.6553	0.8021	1.0000

Transect 8086

Area:

0.0008	0.0020	0.0035	0.0057	0.0109
0.0170	0.0234	0.0302	0.0374	0.0449
0.0527	0.0610	0.0696	0.0785	0.0878
0.0975	0.1075	0.1179	0.1287	0.1398
0.1513	0.1631	0.1753	0.1879	0.2008
0.2141	0.2277	0.2417	0.2561	0.2708
0.2859	0.3014	0.3172	0.3335	0.3505
0.3683	0.3868	0.4060	0.4256	0.4458
0.4665	0.4878	0.5098	0.5325	0.5579
0.5984	0.6639	0.7571	0.8693	1.0000

Hrad:

0.0459	0.0807	0.1116	0.0853	0.1049
0.1528	0.1981	0.2413	0.2827	0.3226
0.3611	0.3985	0.4350	0.4705	0.5053
0.5394	0.5729	0.6059	0.6384	0.6704
0.7021	0.7334	0.7644	0.7951	0.8255
0.8557	0.8857	0.9154	0.9450	0.9744
1.0036	1.0326	1.0616	1.1064	1.1555
1.2015	1.2447	1.2856	1.3250	1.3629
1.3991	1.4337	1.4663	1.4964	1.5166
1.4795	1.3817	1.2369	1.1103	1.0000

Width:

0.0069	0.0093	0.0117	0.0260	0.0413
0.0438	0.0464	0.0489	0.0514	0.0540
0.0565	0.0590	0.0616	0.0641	0.0666
0.0692	0.0717	0.0742	0.0768	0.0793
0.0818	0.0844	0.0869	0.0894	0.0920
0.0945	0.0970	0.0996	0.1021	0.1046
0.1072	0.1097	0.1122	0.1173	0.1222
0.1273	0.1323	0.1362	0.1398	0.1434
0.1474	0.1517	0.1564	0.1629	0.2055
0.4023	0.5460	0.7357	0.8190	1.0000

Transect 8285.6

Area:

0.0009	0.0021	0.0035	0.0055	0.0103
0.0159	0.0218	0.0281	0.0347	0.0416
0.0489	0.0564	0.0644	0.0726	0.0812
0.0901	0.0994	0.1089	0.1188	0.1291
0.1396	0.1505	0.1618	0.1733	0.1852
0.1974	0.2100	0.2228	0.2361	0.2496
0.2635	0.2777	0.2922	0.3071	0.3229
0.3397	0.3571	0.3752	0.3938	0.4132
0.4332	0.4580	0.4873	0.5184	0.5529
0.6002	0.6681	0.7644	0.8740	1.0000

Hrad:

0.0536	0.0956	0.1322	0.1036	0.1166

	0.1691	0.2188	0.2662	0.3116	0.3554
	0.3978	0.4389	0.4789	0.5180	0.5562
	0.5938	0.6306	0.6669	0.7026	0.7379
	0.7728	0.8072	0.8413	0.8751	0.9086
	0.9418	0.9748	1.0075	1.0400	1.0724
	1.1045	1.1365	1.1683	1.2056	1.2595
	1.3089	1.3550	1.3986	1.4400	1.4790
	1.5151	1.5251	1.5244	1.5209	1.5094
	1.4446	1.3472	1.2110	1.0983	1.0000
Width:					
	0.0079	0.0099	0.0118	0.0244	0.0411
	0.0436	0.0461	0.0486	0.0511	0.0536
	0.0561	0.0586	0.0611	0.0636	0.0661
	0.0686	0.0711	0.0736	0.0761	0.0786
	0.0811	0.0836	0.0861	0.0886	0.0911
	0.0936	0.0961	0.0986	0.1011	0.1036
	0.1061	0.1086	0.1111	0.1153	0.1234
	0.1294	0.1344	0.1389	0.1435	0.1484
	0.1552	0.2157	0.2279	0.2432	0.2990
	0.4517	0.6309	0.7755	0.9016	1.0000

Transect 8485.6

Area:					
	0.0010	0.0022	0.0037	0.0058	0.0108
	0.0167	0.0230	0.0296	0.0366	0.0439
	0.0515	0.0596	0.0679	0.0766	0.0857
	0.0951	0.1049	0.1150	0.1255	0.1363
	0.1474	0.1589	0.1708	0.1830	0.1956
	0.2085	0.2217	0.2353	0.2493	0.2636
	0.2782	0.2932	0.3086	0.3243	0.3412
	0.3588	0.3770	0.3959	0.4155	0.4358
	0.4570	0.4791	0.5080	0.5475	0.5907
	0.6359	0.6905	0.7704	0.8690	1.0000
Hrad:					
	0.0509	0.0907	0.1255	0.1003	0.1097
	0.1595	0.2067	0.2517	0.2948	0.3363
	0.3765	0.4155	0.4535	0.4906	0.5269
	0.5625	0.5974	0.6318	0.6658	0.6992
	0.7323	0.7650	0.7973	0.8293	0.8611
	0.8926	0.9239	0.9549	0.9858	1.0164
	1.0469	1.0773	1.1074	1.1374	1.1880
	1.2357	1.2808	1.3232	1.3632	1.4007
	1.4351	1.4664	1.4670	1.4317	1.4024
	1.3761	1.3314	1.2405	1.1324	1.0000
Width:					
	0.0079	0.0099	0.0118	0.0237	0.0409
	0.0434	0.0459	0.0484	0.0509	0.0534
	0.0559	0.0584	0.0608	0.0633	0.0658
	0.0683	0.0708	0.0733	0.0758	0.0783
	0.0807	0.0832	0.0857	0.0882	0.0907
	0.0932	0.0957	0.0982	0.1007	0.1031
	0.1056	0.1081	0.1106	0.1179	0.1225
	0.1277	0.1322	0.1371	0.1421	0.1475
	0.1542	0.1616	0.2651	0.3023	0.3133
	0.3367	0.4699	0.6336	0.7954	1.0000

Transect 8681.6

Area:					
	0.0010	0.0022	0.0038	0.0059	0.0110
	0.0170	0.0233	0.0300	0.0371	0.0445
	0.0522	0.0603	0.0688	0.0776	0.0868
	0.0963	0.1062	0.1164	0.1270	0.1379
	0.1492	0.1609	0.1729	0.1853	0.1980
	0.2111	0.2245	0.2383	0.2524	0.2669
	0.2818	0.2970	0.3125	0.3285	0.3453
	0.3631	0.3817	0.4010	0.4209	0.4416
	0.4630	0.4881	0.5190	0.5510	0.5864
	0.6278	0.6817	0.7626	0.8686	1.0000
Hrad:					
	0.0496	0.0884	0.1222	0.0946	0.1087
	0.1571	0.2030	0.2468	0.2887	0.3291
	0.3682	0.4061	0.4431	0.4791	0.5145
	0.5491	0.5831	0.6166	0.6496	0.6822
	0.7144	0.7462	0.7777	0.8089	0.8398
	0.8705	0.9010	0.9312	0.9613	0.9912
	1.0209	1.0504	1.0799	1.1182	1.1686
	1.2145	1.2571	1.2974	1.3355	1.3714
	1.4047	1.4195	1.4199	1.4208	1.4096
	1.3870	1.3301	1.2280	1.1167	1.0000

Width:

0.0080	0.0099	0.0119	0.0249	0.0411
0.0436	0.0461	0.0486	0.0511	0.0537
0.0562	0.0587	0.0612	0.0637	0.0662
0.0688	0.0713	0.0738	0.0763	0.0788
0.0813	0.0839	0.0864	0.0889	0.0914
0.0939	0.0964	0.0989	0.1015	0.1040
0.1065	0.1090	0.1115	0.1157	0.1224
0.1293	0.1345	0.1390	0.1435	0.1489
0.1552	0.2137	0.2229	0.2319	0.2797
0.3286	0.4553	0.6711	0.8424	1.0000

Transect 8768.8
Area:

0.0010	0.0023	0.0039	0.0059	0.0096
0.0152	0.0211	0.0274	0.0340	0.0409
0.0481	0.0557	0.0637	0.0719	0.0805
0.0894	0.0987	0.1083	0.1182	0.1285
0.1391	0.1500	0.1613	0.1729	0.1848
0.1971	0.2097	0.2227	0.2359	0.2495
0.2635	0.2778	0.2924	0.3073	0.3227
0.3390	0.3559	0.3733	0.3913	0.4097
0.4286	0.4480	0.4683	0.4978	0.5428
0.5956	0.6639	0.7573	0.8737	1.0000

Hrad:

0.0529	0.0942	0.1307	0.1646	0.1118
0.1635	0.2138	0.2617	0.3075	0.3517
0.3943	0.4357	0.4759	0.5152	0.5537
0.5913	0.6283	0.6648	0.7006	0.7360
0.7710	0.8055	0.8398	0.8736	0.9072
0.9405	0.9736	1.0064	1.0390	1.0714
1.1036	1.1357	1.1676	1.1993	1.2385
1.2926	1.3437	1.3922	1.4386	1.4832
1.5262	1.5673	1.6045	1.5940	1.5287
1.4620	1.3680	1.2298	1.1040	1.0000

Width:

0.0085	0.0110	0.0135	0.0160	0.0396
0.0427	0.0451	0.0476	0.0501	0.0526
0.0551	0.0575	0.0600	0.0625	0.0650
0.0675	0.0699	0.0724	0.0749	0.0774
0.0798	0.0823	0.0848	0.0873	0.0898
0.0922	0.0947	0.0972	0.0997	0.1022
0.1046	0.1071	0.1096	0.1121	0.1180
0.1230	0.1273	0.1314	0.1351	0.1384
0.1419	0.1462	0.1541	0.2852	0.3782
0.4398	0.5665	0.8030	0.8956	1.0000

Transect 8858.2
Area:

0.0010	0.0024	0.0039	0.0058	0.0093
0.0155	0.0221	0.0291	0.0365	0.0442
0.0523	0.0608	0.0696	0.0788	0.0884
0.0984	0.1087	0.1194	0.1305	0.1419
0.1537	0.1659	0.1784	0.1913	0.2046
0.2183	0.2323	0.2467	0.2614	0.2766
0.2921	0.3080	0.3242	0.3408	0.3578
0.3753	0.3941	0.4136	0.4335	0.4540
0.4749	0.4962	0.5181	0.5438	0.5817
0.6283	0.6794	0.7532	0.8603	1.0000

Hrad:

0.0483	0.0864	0.1194	0.1496	0.0912
0.1312	0.1765	0.2196	0.2609	0.3006
0.3391	0.3763	0.4125	0.4479	0.4824
0.5163	0.5496	0.5823	0.6145	0.6463
0.6777	0.7087	0.7393	0.7697	0.7998
0.8297	0.8593	0.8887	0.9179	0.9469
0.9757	1.0044	1.0330	1.0614	1.0896
1.1292	1.1753	1.2193	1.2617	1.3026
1.3422	1.3805	1.4172	1.4397	1.4150
1.3780	1.3396	1.2567	1.1324	1.0000

Width:

0.0077	0.0094	0.0111	0.0128	0.0363
0.0422	0.0446	0.0471	0.0495	0.0519
0.0544	0.0568	0.0592	0.0616	0.0641
0.0665	0.0689	0.0713	0.0738	0.0762
0.0786	0.0810	0.0835	0.0859	0.0883
0.0907	0.0932	0.0956	0.0980	0.1005
0.1029	0.1053	0.1077	0.1102	0.1126
0.1193	0.1257	0.1291	0.1324	0.1356

0.1386	0.1418	0.1457	0.2100	0.2869
0.3161	0.3522	0.6705	0.7538	1.0000

Transect 9005.1

Area:

0.0005	0.0019	0.0043	0.0077	0.0120
0.0170	0.0224	0.0282	0.0344	0.0411
0.0482	0.0557	0.0637	0.0720	0.0808
0.0901	0.0997	0.1098	0.1204	0.1313
0.1427	0.1545	0.1667	0.1794	0.1925
0.2062	0.2205	0.2354	0.2509	0.2670
0.2836	0.3009	0.3187	0.3372	0.3559
0.3748	0.3937	0.4127	0.4319	0.4511
0.4704	0.4919	0.5284	0.5772	0.6324
0.6905	0.7553	0.8304	0.9106	1.0000

Hrad:

0.0486	0.0973	0.1459	0.1945	0.2467
0.3170	0.3831	0.4459	0.5061	0.5643
0.6207	0.6758	0.7297	0.7827	0.8348
0.8862	0.9370	0.9872	1.0370	1.0863
1.1353	1.1840	1.2324	1.2805	1.3188
1.3544	1.3909	1.4282	1.4662	1.5048
1.5440	1.5836	1.6238	1.6649	1.7365
1.8068	1.8759	1.9438	2.0106	2.0763
2.1410	2.1915	2.1450	2.0450	1.9178
1.8106	1.1257	1.1903	1.2518	1.0000

Width:

0.0093	0.0187	0.0280	0.0374	0.0460
0.0501	0.0543	0.0584	0.0626	0.0667
0.0709	0.0750	0.0792	0.0833	0.0875
0.0917	0.0958	0.1000	0.1041	0.1083
0.1124	0.1166	0.1207	0.1249	0.1302
0.1359	0.1416	0.1473	0.1530	0.1587
0.1644	0.1701	0.1759	0.1815	0.1824
0.1833	0.1842	0.1851	0.1860	0.1869
0.1878	0.2771	0.4257	0.5078	0.5505
0.5879	0.6705	0.7588	0.7973	1.0000

Transect 9058.4

Area:

0.0003	0.0013	0.0028	0.0051	0.0079
0.0112	0.0148	0.0187	0.0229	0.0273
0.0320	0.0371	0.0423	0.0479	0.0538
0.0599	0.0663	0.0730	0.0800	0.0872
0.0948	0.1026	0.1107	0.1191	0.1277
0.1367	0.1460	0.1558	0.1659	0.1764
0.1873	0.1986	0.2102	0.2223	0.2347
0.2476	0.2610	0.2749	0.2892	0.3039
0.3190	0.3346	0.3570	0.3845	0.4324
0.5202	0.6267	0.7436	0.8679	1.0000

Hrad:

0.0700	0.1401	0.2101	0.2802	0.3502
0.4509	0.5475	0.6393	0.7272	0.8120
0.8943	0.9746	1.0530	1.1300	1.2058
1.2805	1.3542	1.4271	1.4993	1.5708
1.6418	1.7123	1.7824	1.8520	1.9213
1.9771	2.0283	2.0807	2.1343	2.1888
2.2442	2.3004	2.3573	2.4149	2.4731
2.5161	2.5499	2.6017	2.6639	2.7269
2.7867	2.8457	2.8279	2.7806	2.5720
2.2115	1.9267	0.8880	1.0024	1.0000

Width:

0.0044	0.0089	0.0133	0.0178	0.0222
0.0244	0.0263	0.0283	0.0303	0.0323
0.0342	0.0362	0.0382	0.0402	0.0421
0.0441	0.0461	0.0481	0.0500	0.0520
0.0540	0.0560	0.0579	0.0599	0.0619
0.0644	0.0671	0.0698	0.0725	0.0753
0.0780	0.0807	0.0834	0.0861	0.0888
0.0922	0.0961	0.0992	0.1020	0.1047
0.1076	0.1180	0.1772	0.2178	0.4911
0.7071	0.7837	0.8588	0.8936	1.0000

Transect 9090.7

Area:

0.0002	0.0009	0.0021	0.0038	0.0059
0.0082	0.0108	0.0136	0.0166	0.0198
0.0233	0.0269	0.0307	0.0348	0.0390
0.0435	0.0482	0.0531	0.0582	0.0635

	0.0690	0.0747	0.0806	0.0867	0.0931
	0.0998	0.1068	0.1141	0.1216	0.1295
	0.1376	0.1460	0.1547	0.1637	0.1731
	0.1834	0.2001	0.2245	0.2552	0.2907
	0.3354	0.3930	0.4560	0.5228	0.5925
	0.6655	0.7423	0.8219	0.9066	1.0000
Hrad:					
	0.0424	0.0848	0.1272	0.1696	0.2176
	0.2783	0.3354	0.3897	0.4418	0.4921
	0.5410	0.5887	0.6355	0.6814	0.7265
	0.7711	0.8152	0.8588	0.9020	0.9449
	0.9875	1.0298	1.0718	1.1098	1.1406
	1.1721	1.2044	1.2374	1.2709	1.3049
	1.3394	1.3743	1.4096	1.4364	1.4679
	1.5074	1.4822	1.4094	1.3237	1.2464
	1.1602	1.0611	1.0048	0.9806	0.9769
	0.9767	0.9787	0.9987	1.0140	1.0000
Width:					
	0.0048	0.0095	0.0143	0.0190	0.0231
	0.0252	0.0273	0.0294	0.0315	0.0336
	0.0357	0.0378	0.0400	0.0421	0.0442
	0.0463	0.0484	0.0505	0.0526	0.0547
	0.0569	0.0590	0.0611	0.0634	0.0664
	0.0693	0.0722	0.0751	0.0780	0.0809
	0.0838	0.0867	0.0896	0.0931	0.0963
	0.1266	0.2095	0.2777	0.3398	0.3798
	0.5529	0.6091	0.6602	0.6949	0.7185
	0.7586	0.7996	0.8176	0.9061	1.0000

Transect 9140.7

Area:					
	0.0002	0.0008	0.0018	0.0032	0.0050
	0.0070	0.0092	0.0116	0.0142	0.0169
	0.0199	0.0230	0.0262	0.0297	0.0333
	0.0371	0.0411	0.0453	0.0496	0.0541
	0.0588	0.0637	0.0688	0.0740	0.0794
	0.0851	0.0911	0.0973	0.1037	0.1104
	0.1173	0.1244	0.1332	0.1451	0.1619
	0.1878	0.2230	0.2643	0.3109	0.3610
	0.4136	0.4678	0.5232	0.5802	0.6397
	0.7046	0.7722	0.8434	0.9195	1.0000
Hrad:					
	0.0447	0.0895	0.1342	0.1790	0.2291
	0.2933	0.3537	0.4111	0.4662	0.5194
	0.5710	0.6215	0.6709	0.7194	0.7671
	0.8142	0.8608	0.9069	0.9525	0.9978
	1.0428	1.0874	1.1318	1.1737	1.2059
	1.2391	1.2731	1.3078	1.3430	1.3789
	1.4152	1.4520	1.4683	1.4627	1.4128
	1.2957	1.1578	1.0429	0.9640	0.7522
	0.7446	0.7770	0.8059	0.8398	0.8663
	0.9086	0.9496	0.9863	1.0115	1.0000
Width:					
	0.0048	0.0095	0.0143	0.0190	0.0232
	0.0253	0.0274	0.0295	0.0316	0.0337
	0.0359	0.0380	0.0401	0.0422	0.0443
	0.0464	0.0486	0.0507	0.0528	0.0549
	0.0570	0.0591	0.0613	0.0635	0.0664
	0.0693	0.0722	0.0752	0.0781	0.0810
	0.0839	0.0868	0.1351	0.1468	0.2581
	0.3763	0.4528	0.5299	0.5861	0.6123
	0.6383	0.6522	0.6702	0.6882	0.7499
	0.7880	0.8271	0.8793	0.9265	1.0000

Transect 9235.2

Area:					
	0.0002	0.0009	0.0021	0.0038	0.0059
	0.0085	0.0116	0.0151	0.0192	0.0237
	0.0286	0.0341	0.0400	0.0464	0.0531
	0.0599	0.0670	0.0742	0.0817	0.0894
	0.0972	0.1053	0.1135	0.1219	0.1306
	0.1394	0.1485	0.1577	0.1672	0.1769
	0.1867	0.1968	0.2071	0.2177	0.2284
	0.2394	0.2507	0.2623	0.2744	0.2870
	0.3003	0.3171	0.3611	0.4219	0.4963
	0.5802	0.6726	0.7738	0.8850	1.0000
Hrad:					
	0.0391	0.0781	0.1172	0.1563	0.1953
	0.2344	0.2735	0.3125	0.3516	0.3907

0.4298	0.4688	0.5079	0.5501	0.6062
0.6604	0.7128	0.7636	0.8132	0.8615
0.9086	0.9548	1.0001	1.0446	1.0882
1.1308	1.1727	1.2141	1.2544	1.2942
1.3335	1.3725	1.4111	1.4494	1.4847
1.5163	1.5481	1.5672	1.5739	1.5829
1.6013	1.5834	1.4214	1.2815	1.1815
1.1098	1.0575	1.0159	0.9998	1.0000

Width:

0.0040	0.0081	0.0121	0.0162	0.0202
0.0243	0.0283	0.0324	0.0364	0.0405
0.0445	0.0486	0.0526	0.0563	0.0579
0.0596	0.0613	0.0629	0.0646	0.0663
0.0680	0.0697	0.0714	0.0731	0.0748
0.0765	0.0783	0.0800	0.0818	0.0836
0.0854	0.0873	0.0891	0.0909	0.0930
0.0954	0.0978	0.1012	0.1059	0.1107
0.1158	0.2458	0.4585	0.5911	0.6812
0.7576	0.8320	0.9159	0.9696	1.0000

Transect 9294.7

Area:

0.0007	0.0030	0.0067	0.0112	0.0160
0.0211	0.0265	0.0323	0.0383	0.0447
0.0513	0.0583	0.0656	0.0731	0.0810
0.0892	0.0977	0.1066	0.1157	0.1251
0.1349	0.1449	0.1553	0.1660	0.1769
0.1882	0.1998	0.2117	0.2240	0.2365
0.2493	0.2625	0.2759	0.2897	0.3037
0.3181	0.3328	0.3478	0.3630	0.3784
0.4016	0.4301	0.4626	0.5004	0.5532
0.6157	0.6837	0.7708	0.8751	1.0000

Hrad:

0.0348	0.0696	0.1076	0.1653	0.2189
0.2691	0.3165	0.3618	0.4052	0.4471
0.4876	0.5270	0.5655	0.6031	0.6399
0.6762	0.7118	0.7470	0.7817	0.8159
0.8499	0.8835	0.9168	0.9498	0.9826
1.0152	1.0476	1.0797	1.1117	1.1436
1.1753	1.2068	1.2382	1.2696	1.3008
1.3319	1.3680	1.4116	1.4546	1.4968
1.5135	1.5112	1.4985	1.4735	1.3976
1.3286	1.2681	1.1861	1.1019	1.0000

Width:

0.0113	0.0226	0.0328	0.0351	0.0374
0.0398	0.0421	0.0444	0.0468	0.0491
0.0514	0.0538	0.0561	0.0584	0.0608
0.0631	0.0654	0.0678	0.0701	0.0724
0.0748	0.0771	0.0794	0.0818	0.0841
0.0864	0.0888	0.0911	0.0934	0.0958
0.0981	0.1004	0.1028	0.1051	0.1074
0.1098	0.1119	0.1138	0.1157	0.1179
0.2023	0.2274	0.2668	0.3144	0.4553
0.4867	0.5814	0.7145	0.8482	1.0000

Transect 9338.7

Area:

0.0007	0.0029	0.0064	0.0112	0.0161
0.0210	0.0261	0.0314	0.0370	0.0432
0.0497	0.0567	0.0640	0.0717	0.0798
0.0885	0.0977	0.1075	0.1178	0.1286
0.1400	0.1520	0.1647	0.1779	0.1917
0.2061	0.2210	0.2365	0.2525	0.2694
0.2871	0.3054	0.3245	0.3449	0.3670
0.3902	0.4147	0.4407	0.4682	0.4985
0.5324	0.5684	0.6060	0.6451	0.6855
0.7282	0.7777	0.8374	0.9067	1.0000

Hrad:

0.0253	0.0505	0.0758	0.1140	0.1565
0.1961	0.2331	0.2614	0.2849	0.3058
0.3326	0.3589	0.3845	0.4095	0.4293
0.4489	0.4675	0.4871	0.5077	0.5288
0.5463	0.5648	0.5842	0.6052	0.6271
0.6492	0.6708	0.6915	0.7111	0.7210
0.7405	0.7626	0.7681	0.8002	0.8300
0.8580	0.8838	0.9166	0.9480	0.9733
0.9920	1.0092	1.0268	1.0441	1.0614
1.0735	1.0762	1.0637	1.0522	1.0000

Width:

0.0135	0.0271	0.0406	0.0459	0.0468
0.0477	0.0486	0.0515	0.0556	0.0605
0.0640	0.0675	0.0710	0.0746	0.0794
0.0844	0.0898	0.0950	0.1000	0.1050
0.1110	0.1168	0.1225	0.1279	0.1332
0.1384	0.1437	0.1494	0.1554	0.1641
0.1705	0.1763	0.1866	0.1995	0.2147
0.2251	0.2386	0.2535	0.2677	0.3094
0.3317	0.3495	0.3630	0.3760	0.3912
0.4312	0.4927	0.6179	0.7534	1.0000

Transect 9370.6

Area:

0.0007	0.0030	0.0066	0.0118	0.0177
0.0237	0.0296	0.0357	0.0417	0.0478
0.0552	0.0635	0.0723	0.0815	0.0912
0.1015	0.1124	0.1239	0.1362	0.1492
0.1636	0.1790	0.1952	0.2120	0.2294
0.2474	0.2664	0.2867	0.3076	0.3289
0.3507	0.3729	0.3955	0.4185	0.4419
0.4657	0.4899	0.5146	0.5398	0.5656
0.5932	0.6231	0.6543	0.6863	0.7192
0.7550	0.8012	0.8610	0.9268	1.0000

Hrad:

0.0215	0.0429	0.0644	0.0861	0.1250
0.1616	0.1963	0.2291	0.2602	0.2898
0.2613	0.2852	0.3090	0.3311	0.3507
0.3695	0.3887	0.4065	0.4218	0.4304
0.4316	0.4486	0.4685	0.4929	0.5179
0.5339	0.5432	0.5758	0.6073	0.6381
0.6682	0.6978	0.7270	0.7552	0.7831
0.8104	0.8359	0.8603	0.8832	0.9181
0.9494	0.9761	1.0016	1.0264	1.0502
1.0690	1.0667	1.0466	1.0309	1.0000

Width:

0.0160	0.0319	0.0479	0.0636	0.0640
0.0644	0.0647	0.0651	0.0655	0.0658
0.0871	0.0920	0.0968	0.1020	0.1081
0.1147	0.1211	0.1281	0.1361	0.1470
0.1618	0.1708	0.1787	0.1846	0.1902
0.1994	0.2127	0.2235	0.2277	0.2329
0.2380	0.2422	0.2463	0.2506	0.2548
0.2591	0.2640	0.2693	0.2751	0.2827
0.3150	0.3311	0.3413	0.3503	0.3617
0.4378	0.5869	0.6953	0.7232	1.0000

Transect 9528.4

Area:

0.0015	0.0056	0.0100	0.0147	0.0197
0.0248	0.0302	0.0358	0.0417	0.0477
0.0541	0.0606	0.0674	0.0744	0.0816
0.0891	0.0969	0.1050	0.1134	0.1221
0.1312	0.1408	0.1507	0.1611	0.1720
0.1835	0.1954	0.2077	0.2205	0.2337
0.2473	0.2613	0.2758	0.2907	0.3060
0.3218	0.3389	0.3608	0.3866	0.4195
0.4605	0.5088	0.5612	0.6174	0.6775
0.7408	0.8051	0.8698	0.9348	1.0000

Hrad:

0.0297	0.0756	0.1277	0.1766	0.2227
0.2666	0.3086	0.3489	0.3877	0.4253
0.4617	0.4972	0.5318	0.5657	0.5975
0.6282	0.6574	0.6848	0.7120	0.7361
0.7580	0.7787	0.7994	0.8150	0.8314
0.8525	0.8751	0.8987	0.9230	0.9475
0.9724	0.9983	1.0231	1.0483	1.0722
1.0965	1.1145	1.1217	1.1398	1.1349
1.1100	1.0779	1.0494	1.0255	1.0035
0.9882	0.9835	0.9848	0.9907	1.0000

Width:

0.0473	0.0664	0.0700	0.0735	0.0771
0.0806	0.0841	0.0877	0.0912	0.0947
0.0983	0.1018	0.1054	0.1089	0.1128
0.1169	0.1212	0.1260	0.1308	0.1362
0.1423	0.1487	0.1553	0.1632	0.1713
0.1784	0.1852	0.1919	0.1984	0.2050
0.2115	0.2178	0.2244	0.2309	0.2378
0.2447	0.2982	0.3640	0.4275	0.5725
0.6880	0.7659	0.8299	0.8870	0.9474

0.9824	0.9866	0.9908	0.9952	1.0000

Transect 9581

Area:

0.0016	0.0063	0.0118	0.0176	0.0236
0.0299	0.0364	0.0431	0.0500	0.0571
0.0645	0.0721	0.0800	0.0880	0.0963
0.1048	0.1136	0.1225	0.1318	0.1413
0.1513	0.1616	0.1723	0.1832	0.1943
0.2057	0.2175	0.2297	0.2424	0.2557
0.2696	0.2841	0.2992	0.3147	0.3306
0.3471	0.3640	0.3814	0.4006	0.4249
0.4563	0.4944	0.5390	0.5893	0.6501
0.7145	0.7810	0.8503	0.9229	1.0000

Hrad:

0.0304	0.0695	0.1249	0.1774	0.2274
0.2752	0.3211	0.3653	0.4081	0.4495
0.4896	0.5288	0.5669	0.6042	0.6407
0.6765	0.7116	0.7452	0.7754	0.8007
0.8226	0.8501	0.8828	0.9152	0.9473
0.9770	1.0014	1.0137	1.0272	1.0402
1.0502	1.0692	1.0904	1.1124	1.1364
1.1604	1.1836	1.2074	1.2227	1.2194
1.1968	1.1614	1.1203	1.0854	1.0386
1.0114	1.0021	1.0003	1.0002	1.0000

Width:

0.0409	0.0695	0.0724	0.0753	0.0781
0.0810	0.0839	0.0868	0.0897	0.0926
0.0955	0.0984	0.1013	0.1042	0.1070
0.1099	0.1128	0.1159	0.1196	0.1242
0.1296	0.1339	0.1372	0.1404	0.1436
0.1473	0.1520	0.1589	0.1659	0.1732
0.1814	0.1881	0.1944	0.2007	0.2066
0.2125	0.2187	0.2249	0.2676	0.3633
0.4364	0.5328	0.5994	0.7104	0.8062
0.8310	0.8673	0.9069	0.9567	1.0000

Transect 9802

Area:

0.0016	0.0062	0.0141	0.0250	0.0383
0.0520	0.0660	0.0801	0.0944	0.1090
0.1237	0.1387	0.1538	0.1692	0.1848
0.2005	0.2165	0.2327	0.2491	0.2657
0.2825	0.2995	0.3167	0.3341	0.3517
0.3696	0.3876	0.4058	0.4243	0.4429
0.4618	0.4808	0.5001	0.5196	0.5392
0.5591	0.5792	0.5995	0.6200	0.6407
0.6616	0.6827	0.7040	0.7255	0.7472
0.7692	0.7913	0.8203	0.9000	1.0000

Hrad:

0.0181	0.0362	0.0543	0.0725	0.1015
0.1350	0.1677	0.1996	0.2308	0.2613
0.2912	0.3204	0.3491	0.3772	0.4048
0.4319	0.4585	0.4847	0.5105	0.5358
0.5608	0.5854	0.6096	0.6335	0.6571
0.6804	0.7034	0.7261	0.7485	0.7707
0.7927	0.8143	0.8358	0.8571	0.8781
0.8989	0.9195	0.9400	0.9603	0.9803
1.0003	1.0200	1.0396	1.0591	1.0824
1.1101	1.1381	1.1545	1.0804	1.0000

Width:

0.0301	0.0602	0.0904	0.1205	0.1313
0.1333	0.1353	0.1372	0.1392	0.1412
0.1432	0.1451	0.1471	0.1491	0.1511
0.1531	0.1550	0.1570	0.1590	0.1610
0.1630	0.1649	0.1669	0.1689	0.1709
0.1728	0.1748	0.1768	0.1788	0.1808
0.1827	0.1847	0.1867	0.1887	0.1906
0.1926	0.1946	0.1966	0.1986	0.2005
0.2025	0.2045	0.2065	0.2084	0.2105
0.2125	0.2149	0.4658	0.9051	1.0000

Transect 9829.2

Area:

0.0007	0.0027	0.0059	0.0096	0.0137
0.0181	0.0228	0.0278	0.0331	0.0388
0.0449	0.0514	0.0583	0.0655	0.0730
0.0808	0.0888	0.0970	0.1055	0.1141
0.1230	0.1320	0.1413	0.1508	0.1605

	0.1705	0.1806	0.1910	0.2015	0.2123
	0.2232	0.2344	0.2458	0.2575	0.2694
	0.2816	0.2941	0.3070	0.3202	0.3340
	0.3484	0.3634	0.3805	0.4199	0.4842
	0.5707	0.6670	0.7720	0.8853	1.0000
Hrad:					
	0.0405	0.0811	0.1327	0.1971	0.2566
	0.3124	0.3654	0.4160	0.4647	0.5100
	0.5485	0.5869	0.6294	0.6784	0.7261
	0.7734	0.8214	0.8701	0.9189	0.9668
	1.0138	1.0595	1.1021	1.1443	1.1860
	1.2293	1.2726	1.3154	1.3577	1.3994
	1.4387	1.4760	1.5131	1.5500	1.5873
	1.6195	1.6410	1.6634	1.6842	1.6969
	1.6924	1.7024	1.7066	1.6238	1.4741
	1.3082	1.1893	1.0968	1.0353	1.0000
Width:					
	0.0115	0.0230	0.0311	0.0339	0.0367
	0.0395	0.0423	0.0451	0.0479	0.0509
	0.0546	0.0583	0.0616	0.0639	0.0663
	0.0686	0.0707	0.0726	0.0743	0.0760
	0.0778	0.0795	0.0816	0.0836	0.0856
	0.0873	0.0891	0.0908	0.0925	0.0942
	0.0961	0.0982	0.1003	0.1024	0.1045
	0.1069	0.1103	0.1138	0.1174	0.1218
	0.1280	0.1332	0.2109	0.4745	0.6770
	0.8044	0.8719	0.9726	0.9937	1.0000

Transect 9843.1

Area:					
	0.0006	0.0026	0.0057	0.0092	0.0131
	0.0174	0.0219	0.0268	0.0320	0.0375
	0.0435	0.0500	0.0572	0.0649	0.0733
	0.0822	0.0916	0.1015	0.1116	0.1221
	0.1328	0.1439	0.1552	0.1668	0.1786
	0.1908	0.2033	0.2160	0.2290	0.2422
	0.2558	0.2696	0.2837	0.2981	0.3127
	0.3277	0.3429	0.3585	0.3746	0.3913
	0.4084	0.4276	0.4593	0.4974	0.5471
	0.6140	0.6926	0.7828	0.8821	1.0000
Hrad:					
	0.0338	0.0676	0.1111	0.1633	0.2113
	0.2560	0.2983	0.3386	0.3774	0.4149
	0.4371	0.4607	0.4857	0.5117	0.5385
	0.5660	0.6011	0.6392	0.6811	0.7221
	0.7624	0.8019	0.8404	0.8778	0.9146
	0.9524	0.9900	1.0266	1.0624	1.0978
	1.1333	1.1683	1.2030	1.2374	1.2712
	1.3029	1.3330	1.3563	1.3749	1.3941
	1.4007	1.3801	1.3717	1.3490	1.3056
	1.2185	1.1537	1.0924	1.0448	1.0000
Width:					
	0.0094	0.0187	0.0251	0.0275	0.0298
	0.0322	0.0346	0.0369	0.0393	0.0417
	0.0459	0.0503	0.0546	0.0589	0.0632
	0.0676	0.0708	0.0736	0.0756	0.0777
	0.0798	0.0819	0.0840	0.0861	0.0883
	0.0903	0.0922	0.0943	0.0963	0.0984
	0.1004	0.1024	0.1044	0.1064	0.1084
	0.1107	0.1131	0.1163	0.1201	0.1238
	0.1290	0.1841	0.2555	0.3328	0.4119
	0.5525	0.6197	0.6989	0.7691	1.0000

Transect 9881.6

Area:					
	0.0005	0.0021	0.0047	0.0081	0.0123
	0.0172	0.0227	0.0286	0.0349	0.0416
	0.0488	0.0563	0.0641	0.0721	0.0803
	0.0885	0.0969	0.1055	0.1141	0.1230
	0.1319	0.1410	0.1503	0.1597	0.1692
	0.1789	0.1888	0.1988	0.2090	0.2194
	0.2299	0.2408	0.2520	0.2635	0.2754
	0.2877	0.3004	0.3136	0.3273	0.3419
	0.3574	0.3740	0.3967	0.4464	0.5168
	0.5983	0.6912	0.7894	0.8938	1.0000
Hrad:					
	0.0325	0.0651	0.1009	0.1375	0.1726
	0.2114	0.2573	0.3010	0.3429	0.3822
	0.4204	0.4627	0.5087	0.5567	0.6039

	0.6499	0.6945	0.7380	0.7802	0.8214
	0.8617	0.9007	0.9390	0.9765	1.0134
	1.0491	1.0842	1.1191	1.1535	1.1848
	1.2118	1.2324	1.2534	1.2707	1.2886
	1.3062	1.3240	1.3329	1.3279	1.3207
	1.2938	1.2868	1.2439	1.1324	1.0618
	1.0146	0.9845	0.9749	0.9796	1.0000
Width:					
	0.0097	0.0195	0.0280	0.0355	0.0430
	0.0493	0.0531	0.0569	0.0608	0.0648
	0.0689	0.0719	0.0740	0.0754	0.0767
	0.0779	0.0792	0.0804	0.0818	0.0831
	0.0844	0.0858	0.0872	0.0886	0.0900
	0.0915	0.0930	0.0944	0.0959	0.0977
	0.0999	0.1030	0.1060	0.1096	0.1132
	0.1169	0.1206	0.1255	0.1322	0.1397
	0.1502	0.1614	0.3062	0.5718	0.7087
	0.8246	0.8919	0.9498	0.9870	1.0000

Transect 9902.3

Area:					
	0.0024	0.0092	0.0176	0.0260	0.0344
	0.0429	0.0514	0.0600	0.0686	0.0773
	0.0860	0.0948	0.1037	0.1125	0.1215
	0.1304	0.1395	0.1486	0.1579	0.1675
	0.1773	0.1874	0.1977	0.2082	0.2189
	0.2299	0.2412	0.2526	0.2643	0.2762
	0.2884	0.3008	0.3134	0.3263	0.3393
	0.3527	0.3662	0.3800	0.3940	0.4083
	0.4238	0.4539	0.5046	0.5587	0.6173
	0.6844	0.7545	0.8287	0.9119	1.0000
Hrad:					
	0.0314	0.0701	0.1308	0.1897	0.2467
	0.3020	0.3557	0.4078	0.4585	0.5078
	0.5558	0.6026	0.6481	0.6925	0.7359
	0.7782	0.8195	0.8536	0.8849	0.9159
	0.9466	0.9772	1.0076	1.0378	1.0679
	1.0978	1.1275	1.1571	1.1866	1.2160
	1.2453	1.2744	1.3035	1.3325	1.3613
	1.3901	1.4188	1.4474	1.4760	1.5045
	1.5278	1.4816	1.3719	1.2991	1.2357
	1.1717	1.1217	1.0788	1.0357	1.0000
Width:					
	0.0525	0.0917	0.0922	0.0928	0.0933
	0.0938	0.0944	0.0949	0.0955	0.0960
	0.0966	0.0971	0.0977	0.0982	0.0987
	0.0993	0.0998	0.1018	0.1044	0.1070
	0.1096	0.1121	0.1147	0.1173	0.1199
	0.1225	0.1250	0.1276	0.1302	0.1328
	0.1354	0.1379	0.1405	0.1431	0.1457
	0.1483	0.1508	0.1534	0.1560	0.1586
	0.2449	0.4580	0.5776	0.6154	0.7003
	0.7593	0.7901	0.8655	0.9505	1.0000

Transect 9923.8

Area:					
	0.0008	0.0032	0.0072	0.0129	0.0192
	0.0257	0.0324	0.0392	0.0463	0.0536
	0.0611	0.0687	0.0766	0.0846	0.0929
	0.1014	0.1101	0.1190	0.1282	0.1377
	0.1475	0.1576	0.1681	0.1789	0.1900
	0.2015	0.2133	0.2256	0.2383	0.2514
	0.2648	0.2787	0.2929	0.3076	0.3228
	0.3385	0.3548	0.3716	0.3891	0.4071
	0.4259	0.4457	0.4664	0.4887	0.5287
	0.5902	0.6640	0.7484	0.8662	1.0000
Hrad:					
	0.0366	0.0732	0.1098	0.1513	0.2155
	0.2764	0.3344	0.3897	0.4427	0.4937
	0.5429	0.5904	0.6364	0.6810	0.7239
	0.7645	0.8042	0.8432	0.8774	0.9098
	0.9420	0.9742	1.0059	1.0372	1.0677
	1.0947	1.1214	1.1484	1.1756	1.2048
	1.2341	1.2613	1.2880	1.3126	1.3377
	1.3573	1.3744	1.3926	1.4142	1.4334
	1.4286	1.4364	1.4454	1.4375	1.4042
	1.3218	1.2493	1.1905	1.0887	1.0000
Width:					
	0.0118	0.0236	0.0354	0.0455	0.0470

0.0484	0.0498	0.0512	0.0527	0.0541
0.0555	0.0569	0.0583	0.0598	0.0613
0.0630	0.0647	0.0663	0.0685	0.0708
0.0732	0.0755	0.0779	0.0803	0.0828
0.0857	0.0886	0.0916	0.0945	0.0973
0.1001	0.1031	0.1062	0.1096	0.1130
0.1171	0.1215	0.1259	0.1300	0.1346
0.1420	0.1484	0.1549	0.2077	0.3907
0.4750	0.5848	0.7004	0.9653	1.0000

Transect 9966.3

Area:

0.0006	0.0024	0.0054	0.0095	0.0143
0.0195	0.0251	0.0310	0.0372	0.0438
0.0507	0.0580	0.0656	0.0735	0.0817
0.0902	0.0989	0.1078	0.1169	0.1263
0.1358	0.1456	0.1557	0.1659	0.1764
0.1872	0.1982	0.2094	0.2209	0.2326
0.2445	0.2568	0.2693	0.2820	0.2951
0.3085	0.3224	0.3366	0.3514	0.3666
0.3823	0.4063	0.4527	0.5067	0.5670
0.6358	0.7109	0.7943	0.8945	1.0000

Hrad:

0.0332	0.0664	0.0996	0.1390	0.1861
0.2368	0.2847	0.3304	0.3743	0.4165
0.4574	0.4973	0.5361	0.5754	0.6158
0.6583	0.7002	0.7411	0.7811	0.8204
0.8588	0.8957	0.9321	0.9682	1.0041
1.0387	1.0730	1.1069	1.1405	1.1738
1.2060	1.2368	1.2674	1.2963	1.3236
1.3462	1.3643	1.3815	1.3996	1.4184
1.4328	1.3945	1.2826	1.1774	1.0960
1.0675	1.0495	1.0296	1.0046	1.0000

Width:

0.0111	0.0223	0.0334	0.0423	0.0473
0.0505	0.0536	0.0567	0.0599	0.0630
0.0662	0.0694	0.0725	0.0755	0.0781
0.0802	0.0823	0.0844	0.0864	0.0885
0.0906	0.0928	0.0950	0.0972	0.0993
0.1016	0.1039	0.1061	0.1084	0.1106
0.1130	0.1156	0.1181	0.1208	0.1238
0.1273	0.1314	0.1357	0.1401	0.1444
0.1494	0.3351	0.4902	0.5247	0.6121
0.6792	0.7182	0.8428	0.9756	1.0000

```
*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... MODIFIED_HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/17/2019 00:00:00
Ending Date .............. 03/19/2019 00:00:00
Antecedent Dry Days ...... 7.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 00:15:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 6
Head Tolerance ........... 0.001500 m
```

**************************	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	205.960	81.584
Evaporation Loss	0.000	0.000
Infiltration Loss	38.784	15.363
Surface Runoff	149.616	59.265
Final Storage	19.641	7.780
Continuity Error (%)	-1.010	

**************************	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	149.612	1496.135
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.001
External Outflow	141.113	1411.140
Flooding Loss	1.468	14.682
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.389	3.890
Final Stored Volume	7.209	72.093
Continuity Error (%)	0.141	

****
Highest Continuity Errors
****
Node J35 (4.04%)
Node J8 (3.40%)
Node J23 (1.28%)
Node J61 (1.10%)
Node J44 (1.08%)

****
Time-Step Critical Elements
****
Link CJ12418 (77.17%)
Link CJ12160.9 (19.49%)
Link Central_Pond_600CSP (1.27%)

****
Highest Flow Instability Indexes
****
Link C13 (6)
Link GMPS_P1 (5)
Link CJ6318.4 (2)
Link CJ9243.4 (2)
Link CJ9294.7 (2)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.14 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.14
Percent Not Converging	:	1.66

****
Subcatchment Runoff Summary
****

	Total	Total	Total	Total	Imperv	Perv	Total	Total	Peak	Runoff
	Precip	Runon	Evap	Infil	Runoff	Runoff	Runoff	Runoff	Runoff	Coeff

Subcatchment	mm	mm	mm	mm	mm	mm	mm	10^6 ltr	CMS	
S101	81.58	0.00	0.00	9.07	53.82	25.23	65.59	57.72	5.49	0.804
S101B	81.58	0.00	0.00	14.51	40.37	29.53	59.81	24.99	2.94	0.733
S102	81.58	0.00	0.00	16.62	35.16	32.22	58.60	53.60	7.54	0.718
S102B	81.58	0.00	0.00	16.63	34.97	30.10	56.33	32.46	3.70	0.690
S103	81.58	0.00	0.00	16.61	35.30	33.84	60.32	31.19	5.13	0.739
S104	81.58	0.00	0.00	12.99	44.43	30.31	63.63	54.86	8.07	0.780
S105	81.58	0.00	0.00	0.62	75.39	19.83	76.37	56.40	7.78	0.936
S106	81.58	0.00	0.00	18.23	30.47	39.57	62.42	16.14	3.39	0.765
S107	81.58	0.00	0.00	12.08	46.70	28.39	63.41	33.10	3.86	0.777
S108A	81.58	0.00	0.00	21.43	19.49	45.29	59.91	7.19	1.23	0.734
S108B	81.58	0.00	0.00	21.16	23.58	35.88	53.57	8.20	1.14	0.657
S109	81.58	0.00	0.00	16.00	36.88	33.74	61.40	34.57	5.92	0.753
S110	81.58	0.00	0.00	9.97	51.48	25.29	63.90	63.90	5.81	0.783
S111	81.58	0.00	0.00	19.36	34.77	26.48	54.63	40.28	6.81	0.670
S112	81.58	0.00	0.00	16.64	42.19	27.22	62.60	24.24	6.16	0.767
S113	81.58	0.00	0.00	18.15	37.24	24.30	55.46	40.45	6.43	0.680
S114	81.58	0.00	0.00	14.51	40.18	27.73	57.87	48.49	4.78	0.709
S115	81.58	0.00	0.00	29.65	1.54	35.25	36.40	10.92	0.26	0.446
S116A	81.58	0.00	0.00	14.20	41.32	29.44	60.43	26.59	3.14	0.741
S116B	81.58	0.00	0.00	16.62	35.21	32.73	59.13	5.84	0.86	0.725
S117	81.58	0.00	0.00	12.71	43.94	34.61	67.56	13.14	3.40	0.828
S118	81.58	0.00	0.00	14.81	39.65	30.03	59.76	60.53	7.45	0.733
S119	81.58	0.00	0.00	6.65	60.59	25.83	71.27	34.32	5.22	0.874
S121	81.58	0.00	0.00	22.67	19.67	36.69	51.44	19.59	2.52	0.630
S201	81.58	0.00	0.00	18.11	31.47	36.69	60.29	5.05	0.92	0.739
S202	81.58	0.00	0.00	21.16	23.58	35.52	53.21	23.94	3.26	0.652
S203	81.58	0.00	0.00	16.62	35.16	32.22	58.60	24.33	3.42	0.718
S204A	81.58	0.00	0.00	29.65	1.54	45.35	46.51	9.99	0.46	0.570
S204B	81.58	0.00	0.00	28.73	3.85	46.53	49.42	4.41	0.25	0.606
S205	81.58	0.00	0.00	29.65	1.54	37.11	38.27	8.96	0.23	0.469
S206	81.58	0.00	0.00	19.05	28.76	27.73	49.30	47.88	5.12	0.604
S207	81.58	0.00	0.00	16.61	35.35	34.47	60.98	18.33	3.19	0.748
S208	81.58	0.00	0.00	17.22	33.62	32.55	57.77	17.31	2.42	0.708
S209	81.58	0.00	0.00	18.74	29.79	33.91	56.25	21.92	3.14	0.690
S301	81.58	0.00	0.00	9.06	54.38	27.50	68.28	86.00	12.27	0.837
S302A	81.58	0.00	0.00	29.34	2.31	43.11	44.84	8.20	0.32	0.550
S302B	81.58	0.00	0.00	17.22	33.62	32.55	57.77	22.89	3.20	0.708

S303	81.58	0.00	0.00	16.92	34.54	32.43	58.33	26.20	3.68	0.715
S304	81.58	0.00	0.00	16.92	34.49	31.95	57.82	25.60	3.44	0.709
S305	81.58	0.00	0.00	13.89	42.33	31.13	62.88	15.85	2.40	0.771
S306	81.58	0.00	0.00	13.59	43.24	31.81	64.24	44.97	7.72	0.787
S307	81.58	0.00	0.00	18.13	31.40	30.91	54.46	20.69	2.80	0.667
S308	81.58	0.00	0.00	18.14	31.06	29.53	52.82	44.37	4.58	0.647
S309	81.58	0.00	0.00	15.11	38.81	29.47	58.58	22.85	2.58	0.718
S310	81.58	0.00	0.00	15.10	39.20	32.83	62.23	14.94	2.51	0.763
S311	81.58	0.00	0.00	16.62	34.98	30.10	56.33	31.55	3.59	0.690
S312A	81.58	0.00	0.00	15.13	43.19	18.66	57.19	29.55	3.56	0.701
S312B	81.58	0.00	0.00	10.88	49.32	26.37	63.36	38.01	3.80	0.777
S313	81.58	0.00	0.00	8.79	55.06	29.77	71.07	8.80	2.26	0.871
S314A	81.58	0.00	0.00	16.61	35.36	32.77	59.28	14.82	2.19	0.727
S314B	81.58	0.00	0.00	18.73	29.88	33.37	55.78	7.10	0.98	0.684
S315	81.58	0.00	0.00	15.11	39.05	30.22	59.50	21.60	2.67	0.729
S316	81.58	0.00	0.00	18.14	31.14	28.87	52.22	31.33	3.66	0.640

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min	Reported Max Depth Meters
J1	JUNCTION	1.04	2.27	184.21	0	04:50	2.27
J10	JUNCTION	0.74	3.77	184.22	0	05:00	3.77
J10016.1	JUNCTION	1.14	3.11	183.71	0	02:53	3.11
J10066.1	JUNCTION	1.16	3.14	183.74	0	02:54	3.14
J10094.5	JUNCTION	0.91	2.89	183.74	0	02:54	2.89
J101	JUNCTION	0.43	2.89	183.19	0	05:00	2.89
J10144.4	JUNCTION	1.90	3.91	183.78	0	02:55	3.91
J101B	JUNCTION	2.49	3.72	184.22	0	05:01	3.72
J102	JUNCTION	0.73	2.48	184.88	0	03:10	2.48
J10244.4	JUNCTION	1.86	3.88	183.79	0	02:56	3.88
J102B	JUNCTION	0.10	0.63	186.43	0	01:36	0.63
J103	JUNCTION	2.80	4.63	187.78	0	02:46	4.63
J10344.4	JUNCTION	1.81	3.84	183.81	0	02:56	3.84
J103B	JUNCTION	0.20	0.84	186.46	0	03:56	0.84
J10444.3	JUNCTION	1.64	3.67	183.82	0	02:56	3.67
J10475.3	JUNCTION	1.64	3.67	183.82	0	02:56	3.67
J105	JUNCTION	0.59	2.33	184.56	0	02:40	2.33
J10500	JUNCTION	1.99	3.77	183.87	0	02:57	3.77
J10614.5	JUNCTION	2.00	3.78	183.88	0	02:57	3.78
J10679.3	JUNCTION	2.60	4.38	183.88	0	02:57	4.38
J10694.8	JUNCTION	2.55	4.38	183.93	0	02:57	4.38
J107	JUNCTION	0.13	0.80	184.12	0	02:47	0.80
J10749	JUNCTION	1.96	3.79	183.94	0	02:57	3.79
J10848.5	JUNCTION	1.92	3.75	183.95	0	02:57	3.75
J109	JUNCTION	0.50	3.79	186.52	0	01:51	3.79
J11	JUNCTION	2.48	3.71	184.22	0	05:00	3.71
J110	JUNCTION	0.51	3.06	185.02	0	01:59	3.05
J11048.5	JUNCTION	1.83	3.68	183.98	0	02:56	3.68
J112	JUNCTION	1.87	3.62	183.90	0	01:25	3.62
J11248.4	JUNCTION	1.74	3.61	184.01	0	02:55	3.61
J113	JUNCTION	0.33	4.66	187.00	0	01:28	4.66
J11448.4	JUNCTION	1.65	3.53	184.03	0	02:55	3.53
J1145	JUNCTION	0.30	3.00	188.30	0	01:56	3.00
J11648.4	JUNCTION	1.42	3.31	184.06	0	02:54	3.31
J116A	JUNCTION	0.49	2.91	184.99	0	02:54	2.91
J116B	JUNCTION	0.21	2.02	183.80	0	01:49	1.67

J11748.1	JUNCTION	1.08	2.96	184.06	0	02:54	2.96
J118	JUNCTION	0.43	1.96	184.56	0	01:55	1.96
J11848.1	JUNCTION	0.79	2.67	184.07	0	02:54	2.67
J11881.3	JUNCTION	0.73	2.59	184.07	0	02:54	2.59
J11896.4	JUNCTION	1.81	3.67	184.07	0	02:54	3.67
J11913.3	JUNCTION	1.81	3.69	184.09	0	02:53	3.69
J11919.8	JUNCTION	1.51	3.39	184.09	0	02:53	3.39
J11939.6	JUNCTION	1.31	3.19	184.09	0	02:53	3.19
J11972.5	JUNCTION	1.29	3.18	184.10	0	02:53	3.18
J12	JUNCTION	0.00	0.00	183.19	0	00:00	0.00
J12011.7	JUNCTION	1.28	3.16	184.10	0	02:53	3.16
J12037.2	JUNCTION	1.18	3.18	184.24	0	02:51	3.18
J12067.5	JUNCTION	1.17	3.17	184.24	0	02:51	3.17
J12091.1	JUNCTION	1.16	3.16	184.24	0	02:51	3.16
J12117.3	JUNCTION	1.15	3.15	184.24	0	02:51	3.15
J12152.8	JUNCTION	1.14	3.15	184.25	0	02:51	3.15
J12160.9	JUNCTION	1.30	2.99	184.49	0	02:48	2.99
J12177.5	JUNCTION	1.31	3.02	184.52	0	02:48	3.02
J12213.2	JUNCTION	1.27	2.98	184.52	0	02:48	2.98
J12263.1	JUNCTION	1.27	2.98	184.52	0	02:49	2.98
J12330.4	JUNCTION	1.21	2.92	184.52	0	02:49	2.92
J12340	JUNCTION	1.22	2.92	184.52	0	02:49	2.92
J12359.8	JUNCTION	1.09	2.79	184.52	0	02:49	2.79
J12390.7	JUNCTION	1.05	2.75	184.52	0	02:49	2.75
J12415.2	JUNCTION	0.84	2.54	184.52	0	02:49	2.54
J12418	JUNCTION	1.06	2.81	184.58	0	02:54	2.81
J12442.1	JUNCTION	1.03	2.78	184.58	0	02:54	2.78
J12491.9	JUNCTION	1.01	2.77	184.59	0	02:54	2.77
J12524.2	JUNCTION	1.00	2.75	184.59	0	02:54	2.75
J12591.8	JUNCTION	0.98	2.73	184.59	0	02:54	2.73
J12613.3	JUNCTION	0.94	2.69	184.59	0	02:54	2.69
J12627.6	JUNCTION	0.74	2.49	184.59	0	02:54	2.49
J12641.2	JUNCTION	0.71	2.46	184.62	0	02:55	2.46
J12676.2	JUNCTION	0.62	2.32	184.62	0	02:56	2.32
J12795	JUNCTION	0.68	2.29	184.62	0	02:56	2.29
J12955.5	JUNCTION	2.34	3.91	184.63	0	02:56	3.91
J13	JUNCTION	1.58	4.13	184.70	0	01:25	3.83
J18	JUNCTION	0.18	2.49	181.49	0	01:29	1.33
J19	JUNCTION	0.61	2.71	183.31	0	02:39	2.71
J2	JUNCTION	0.39	4.86	186.90	0	01:27	4.60
J20	JUNCTION	0.11	0.74	181.04	0	01:30	0.74
J201	JUNCTION	0.06	0.49	180.78	0	01:35	0.49
J203	JUNCTION	0.24	1.18	182.03	0	01:36	1.18
J204A	JUNCTION	0.38	3.16	184.90	0	02:55	3.16
J204B	JUNCTION	0.16	0.44	183.29	0	02:46	0.44
J205	JUNCTION	0.16	0.42	183.32	0	02:54	0.42
J207	JUNCTION	0.46	3.51	184.89	0	01:48	3.51
J208	JUNCTION	0.11	0.88	180.36	0	01:44	0.88
J209	JUNCTION	0.42	2.63	179.53	0	01:58	2.63
J21	JUNCTION	0.18	2.60	183.10	0	01:33	2.60
J22	JUNCTION	0.24	4.00	186.41	0	01:34	1.88
J23	JUNCTION	0.33	3.36	185.62	0	02:21	3.36
J3	JUNCTION	0.45	4.85	186.60	0	01:26	4.51
J301	JUNCTION	0.50	5.05	186.22	0	02:09	5.05
J302B	JUNCTION	0.13	0.82	181.21	0	01:32	0.82
J31	JUNCTION	0.15	2.40	182.90	0	01:30	2.40
J314A	JUNCTION	0.14	0.96	182.31	0	01:35	0.96
J314B	JUNCTION	0.12	3.50	185.45	0	01:28	2.34
J315	JUNCTION	0.34	3.53	184.43	0	02:06	3.53
J32	JUNCTION	0.27	1.87	183.41	0	02:41	1.87
J33	JUNCTION	0.04	0.61	183.61	0	01:30	0.61
J34	JUNCTION	0.34	1.36	185.86	0	01:36	1.36
J35	JUNCTION	0.95	4.45	183.80	0	01:55	4.45
J36	JUNCTION	0.18	0.98	185.57	0	01:38	0.98
J37	JUNCTION	0.08	0.45	181.95	0	01:45	0.45
J4	JUNCTION	0.72	5.04	186.50	0	01:26	4.38
J44	JUNCTION	0.28	3.00	183.65	0	02:29	3.00
J45	JUNCTION	0.14	0.37	183.17	0	02:51	0.37
J46	JUNCTION	0.25	1.06	181.74	0	01:39	1.06
J47	JUNCTION	0.17	1.57	180.29	0	01:48	1.57
J48	JUNCTION	0.32	2.30	180.22	0	01:51	2.30
J5	JUNCTION	1.01	4.74	185.90	0	01:25	4.22
J50	JUNCTION	0.25	1.45	180.35	0	01:47	1.45
J53	JUNCTION	0.43	0.43	188.03	0	02:30	0.43
J56	JUNCTION	0.13	2.70	183.20	0	01:24	2.43
J57	JUNCTION	0.00	0.00	0.00	0	00:00	0.00
J58	JUNCTION	0.16	1.80	183.30	0	01:26	1.64
J59	JUNCTION	0.08	0.68	181.38	0	01:30	0.68
J6	JUNCTION	0.18	1.95	182.20	0	01:40	1.95

J61	JUNCTION	0.65	2.20	185.30	0	02:10	2.20
J6318.4	JUNCTION	1.11	3.30	178.91	0	02:18	3.30
J6357.5	JUNCTION	1.06	3.26	178.93	0	02:17	3.26
J64	JUNCTION	0.27	2.95	185.45	0	01:48	2.95
J65	JUNCTION	0.42	1.93	184.49	0	01:55	1.93
J6507.5	JUNCTION	0.97	3.13	178.96	0	02:17	3.13
J66	JUNCTION	0.42	1.89	184.41	0	01:56	1.89
J6653.2	JUNCTION	0.87	3.01	178.98	0	02:17	3.01
J67	JUNCTION	0.42	1.85	184.33	0	01:56	1.85
J68	JUNCTION	0.41	1.80	184.23	0	01:56	1.80
J6801	JUNCTION	0.79	2.97	179.10	0	02:16	2.97
J69	JUNCTION	0.40	1.73	184.12	0	01:57	1.73
J7	JUNCTION	0.12	0.15	186.88	0	01:19	0.15
J70	JUNCTION	0.39	1.64	183.99	0	01:57	1.64
J7040.9	JUNCTION	0.82	2.76	179.16	0	02:16	2.76
J7055.4	JUNCTION	0.79	2.85	179.35	0	02:16	2.85
J71	JUNCTION	0.37	1.48	183.79	0	01:57	1.48
J7157.8	JUNCTION	0.81	2.78	179.38	0	02:15	2.78
J7307	JUNCTION	0.72	2.66	179.41	0	02:15	2.66
J7357.6	JUNCTION	0.76	2.64	179.44	0	02:15	2.64
J7564	JUNCTION	0.80	2.56	179.54	0	02:14	2.56
J7578.9	JUNCTION	0.86	2.78	179.77	0	02:14	2.78
J7681.8	JUNCTION	0.84	2.73	179.80	0	02:13	2.73
J77	JUNCTION	0.24	2.50	185.01	0	01:34	2.35
J7762.1	JUNCTION	0.83	2.69	179.83	0	02:13	2.69
J7784.1	JUNCTION	0.89	2.89	180.04	0	02:13	2.89
J78	JUNCTION	0.24	3.27	185.76	0	01:34	2.24
J7885.5	JUNCTION	0.86	2.84	180.07	0	02:13	2.84
J79	JUNCTION	0.24	4.00	186.47	0	01:34	2.34
J8	JUNCTION	0.22	0.23	186.31	1	17:06	0.23
J80	JUNCTION	0.24	4.69	187.14	0	01:34	2.59
J8086	JUNCTION	0.85	2.75	180.13	0	02:12	2.75
J81	JUNCTION	0.25	4.35	186.78	0	01:34	2.59
J82	JUNCTION	0.52	2.97	184.86	0	02:11	2.96
J8285.6	JUNCTION	0.83	2.66	180.19	0	02:11	2.66
J83	JUNCTION	0.53	2.90	184.72	0	02:18	2.90
J84	JUNCTION	0.54	2.84	184.59	0	02:21	2.83
J8485.6	JUNCTION	0.82	2.60	180.27	0	02:10	2.60
J85	JUNCTION	0.57	2.78	184.46	0	02:21	2.78
J86	JUNCTION	0.61	2.73	184.34	0	02:20	2.72
J8696.4	JUNCTION	0.81	2.55	180.36	0	02:18	2.55
J87	JUNCTION	0.66	2.67	184.21	0	02:20	2.67
J8716.3	JUNCTION	0.87	2.74	180.55	0	02:10	2.74
J8768.8	JUNCTION	0.86	2.72	180.56	0	02:09	2.71
J88	JUNCTION	0.72	2.66	184.13	0	02:38	2.65
J8872.8	JUNCTION	0.85	2.66	180.57	0	02:09	2.66
J8915.1	JUNCTION	0.84	2.70	180.63	0	02:09	2.70
J9	JUNCTION	1.30	4.33	185.20	0	01:25	4.04
J9023.5	JUNCTION	0.68	1.99	180.87	0	02:08	1.99
J9036.3	JUNCTION	0.71	2.11	181.00	0	02:08	2.10
J9058.4	JUNCTION	0.73	2.13	181.13	0	02:08	2.12
J9090.7	JUNCTION	0.72	2.11	181.31	0	02:08	2.11
J9204.3	JUNCTION	0.94	2.51	181.81	0	02:08	2.51
J9223.6	JUNCTION	1.12	2.70	182.03	0	02:35	2.70
J9243.4	JUNCTION	1.10	2.70	182.07	0	02:35	2.69
J9283.1	JUNCTION	1.26	3.28	182.67	0	02:39	3.28
J9294.7	JUNCTION	0.67	2.43	182.68	0	02:39	2.43
J9313.3	JUNCTION	0.77	2.84	183.14	0	02:40	2.84
J9338.7	JUNCTION	0.84	2.88	183.16	0	02:40	2.88
J9385.8	JUNCTION	1.08	3.09	183.18	0	02:40	3.09
J9499.8	JUNCTION	2.83	4.95	183.29	0	02:41	4.95
J9528.4	JUNCTION	2.82	4.94	183.29	0	02:41	4.94
J9563	JUNCTION	2.81	4.94	183.30	0	02:41	4.93
J9597.4	JUNCTION	2.80	4.92	183.29	0	02:40	4.92
J97	JUNCTION	1.26	3.13	184.05	0	03:21	3.13
J9789.2	JUNCTION	0.96	3.14	183.39	0	02:44	3.14
J9802	JUNCTION	0.90	3.08	183.39	0	02:44	3.08
J9812.9	JUNCTION	0.83	3.07	183.47	0	02:45	3.07
J9829.2	JUNCTION	0.82	3.04	183.47	0	02:45	3.04
J9843.1	JUNCTION	0.83	3.01	183.48	0	02:45	3.01
J9881.6	JUNCTION	0.83	2.96	183.50	0	02:46	2.96
J9902.3	JUNCTION	0.85	2.98	183.51	0	02:46	2.98
J9912	JUNCTION	1.12	3.08	183.65	0	02:51	3.08
J9923.8	JUNCTION	1.10	3.06	183.66	0	02:51	3.06
J9966.3	JUNCTION	1.12	3.08	183.68	0	02:52	3.08
J6291.6	OUTFALL	1.06	3.25	178.90	0	02:18	3.25
SU102	STORAGE	1.18	2.97	184.97	0	03:13	2.97
SU104	STORAGE	3.35	3.65	188.25	0	18:42	3.65
SU108A	STORAGE	0.33	2.43	184.52	0	02:55	2.43

SU108B	STORAGE	0.27	1.79	184.02	0	02:56	1.79

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	0.000	3.857	0	01:31	0	56.6	0.029
J10	JUNCTION	5.488	5.488	0	01:45	57.7	57.7	0.002
J10016.1	JUNCTION	0.000	21.278	0	03:26	0	544	0.018
J10066.1	JUNCTION	0.000	20.088	0	03:24	0	518	0.016
J10094.5	JUNCTION	0.000	20.057	0	03:24	0	518	0.010
J101	JUNCTION	0.000	0.896	0	01:17	0	26	-0.001
J10144.4	JUNCTION	0.000	19.982	0	03:23	0	518	0.104
J101B	JUNCTION	2.942	7.626	0	01:45	25	56.7	0.059
J102	JUNCTION	0.000	3.144	0	03:45	0	86.9	0.041
J10244.4	JUNCTION	0.000	19.900	0	03:22	0	518	0.133
J102B	JUNCTION	3.696	3.696	0	01:30	32.5	32.5	-0.225
J103	JUNCTION	5.129	5.129	0	01:30	31.2	31.9	0.000
J10344.4	JUNCTION	0.000	19.781	0	03:17	0	518	0.126
J103B	JUNCTION	0.000	1.435	0	01:18	0	31.9	-0.429
J10444.3	JUNCTION	3.397	19.847	0	02:28	13.1	519	0.091
J10475.3	JUNCTION	0.000	19.118	0	03:19	0	506	0.036
J105	JUNCTION	7.776	7.776	0	01:45	56.4	62.1	0.061
J10500	JUNCTION	0.000	19.606	0	02:27	0	506	0.118
J10614.5	JUNCTION	0.000	21.116	0	02:27	0	507	0.185
J10679.3	JUNCTION	0.000	22.456	0	02:27	0	508	0.081
J10694.8	JUNCTION	0.000	21.571	0	02:27	0	481	-0.286
J107	JUNCTION	3.864	3.864	0	01:30	33.1	33.1	0.056
J10749	JUNCTION	0.000	19.761	0	02:21	0	482	0.174
J10848.5	JUNCTION	0.000	20.262	0	02:22	0	483	0.309
J109	JUNCTION	5.916	5.916	0	01:30	34.6	34.6	0.541
J11	JUNCTION	0.000	4.858	0	01:45	0	31.7	0.069
J110	JUNCTION	5.806	6.386	0	01:45	63.9	70.7	-0.028
J11048.5	JUNCTION	0.000	21.418	0	01:49	0	487	0.312
J112	JUNCTION	0.000	7.079	0	01:29	0	40	0.395
J11248.4	JUNCTION	0.000	17.289	0	02:34	0	425	0.362
J113	JUNCTION	6.428	6.428	0	01:30	40.4	40.4	-0.007
J11448.4	JUNCTION	0.000	17.817	0	01:49	0	416	0.346
J1145	JUNCTION	4.987	4.987	0	01:45	59.4	59.4	0.129
J11648.4	JUNCTION	0.000	18.923	0	01:49	0	416	0.149
J116A	JUNCTION	3.138	3.138	0	01:30	26.6	26.6	0.024
J116B	JUNCTION	0.863	0.863	0	01:30	5.84	5.84	-0.016
J11748.1	JUNCTION	0.000	12.415	0	02:22	0	319	0.116
J118	JUNCTION	12.673	13.558	0	01:45	94.8	154	-0.398
J11848.1	JUNCTION	0.000	12.536	0	02:23	0	319	0.015
J11881.3	JUNCTION	0.000	12.646	0	02:02	0	319	0.004
J11896.4	JUNCTION	0.000	12.686	0	02:02	0	319	0.019
J11913.3	JUNCTION	0.000	12.703	0	02:02	0	319	0.026
J11919.8	JUNCTION	0.000	12.792	0	01:59	0	320	0.017
J11939.6	JUNCTION	0.000	10.545	0	02:42	0	287	0.026
J11972.5	JUNCTION	0.000	10.555	0	02:43	0	287	0.041
J12	JUNCTION	0.000	0.000	0	00:00	0	0	0.000 ltr
J12011.7	JUNCTION	0.000	10.561	0	02:43	0	287	0.035
J12037.2	JUNCTION	0.000	10.640	0	02:19	0	290	-0.007
J12067.5	JUNCTION	0.000	9.678	0	02:50	0	279	0.023
J12091.1	JUNCTION	0.000	9.679	0	02:47	0	279	0.024
J12117.3	JUNCTION	0.000	9.690	0	02:45	0	279	0.030
J12152.8	JUNCTION	0.000	9.700	0	02:44	0	279	0.015
J12160.9	JUNCTION	0.000	9.701	0	02:44	0	279	0.011
J12177.5	JUNCTION	0.000	9.709	0	02:28	0	286	0.020
J12213.2	JUNCTION	0.000	6.992	0	05:57	0	225	0.069
J12263.1	JUNCTION	0.000	6.954	0	05:57	0	224	0.083
J12330.4	JUNCTION	0.000	6.932	0	05:56	0	223	0.044
J12340	JUNCTION	0.000	6.924	0	05:56	0	223	0.019
J12359.8	JUNCTION	0.000	6.903	0	05:56	0	223	0.025
J12390.7	JUNCTION	0.000	6.881	0	05:56	0	223	0.026
J12415.2	JUNCTION	0.000	6.873	0	05:56	0	223	0.007
J12418	JUNCTION	0.000	6.865	0	05:56	0	223	0.009
J12442.1	JUNCTION	0.000	6.839	0	05:56	0	223	0.033
J12491.9	JUNCTION	0.000	6.811	0	05:56	0	223	0.034
J12524.2	JUNCTION	0.000	6.779	0	05:55	0	223	0.033
J12591.8	JUNCTION	0.000	6.751	0	05:55	0	223	0.025

J12613.3	JUNCTION	0.000	6.741	0	05:55	0	223	0.009	
J12627.6	JUNCTION	0.000	6.736	0	05:55	0	223	0.004	
J12641.2	JUNCTION	0.000	6.726	0	05:55	0	223	-0.007	
J12676.2	JUNCTION	0.000	6.693	0	05:36	0	224	0.008	
J12795	JUNCTION	0.000	5.393	0	03:26	0	141	0.207	
J12955.5	JUNCTION	3.390	3.879	0	03:19	16.1	111	0.088	
J13	JUNCTION	0.000	7.078	0	01:29	0	40.2	0.476	
J18	JUNCTION	4.576	4.576	0	01:30	44.4	44.4	0.064	
J19	JUNCTION	0.000	12.747	0	01:58	0	154	0.061	
J2	JUNCTION	0.000	7.071	0	01:29	0	40.4	-0.018	
J20	JUNCTION	2.582	2.582	0	01:30	22.8	22.8	-0.000	
J201	JUNCTION	0.919	0.919	0	01:30	5.05	5.05	-0.451	
J203	JUNCTION	3.425	3.435	0	01:30	24.3	37.7	-0.122	
J204A	JUNCTION	0.458	1.985	0	01:23	9.99	11.9	0.027	
J204B	JUNCTION	0.246	0.457	0	02:36	4.41	13.4	-0.018	
J205	JUNCTION	0.227	0.227	0	03:30	8.96	8.96	0.008	
J207	JUNCTION	3.193	3.193	0	01:30	18.3	30.2	0.399	
J208	JUNCTION	2.423	2.423	0	01:30	17.3	17.3	-0.049	
J209	JUNCTION	3.138	15.207	0	01:43	21.9	182	0.594	
J21	JUNCTION	3.684	3.684	0	01:30	26.2	26.2	0.049	
J22	JUNCTION	0.000	0.355	0	01:44	0	2.87	-0.072	
J23	JUNCTION	0.000	2.815	0	01:25	0	14.9	1.296	
J3	JUNCTION	0.000	7.071	0	01:29	0	40.4	-0.020	
J301	JUNCTION	12.272	12.272	0	01:30	86	86	0.049	
J302B	JUNCTION	3.203	3.203	0	01:30	22.9	22.9	0.858	
J31	JUNCTION	3.440	3.440	0	01:30	25.6	25.6	0.002	
J314A	JUNCTION	2.194	3.170	0	01:30	14.8	21.9	-0.178	
J314B	JUNCTION	0.975	0.975	0	01:30	7.1	7.1	0.043	
J315	JUNCTION	2.670	2.670	0	01:30	21.6	21.6	0.079	
J32	JUNCTION	2.520	3.382	0	01:30	19.6	25.4	0.147	
J33	JUNCTION	2.262	2.262	0	01:30	8.8	8.8	0.022	
J34	JUNCTION	3.660	3.660	0	01:30	31.3	31.3	0.002	
J35	JUNCTION	3.562	6.873	0	01:40	29.6	61.1	4.211	
J36	JUNCTION	0.000	3.668	0	01:30	0	31.3	-0.779	
J37	JUNCTION	3.798	3.798	0	01:45	38	38	0.062	
J4	JUNCTION	0.000	7.071	0	01:29	0	40.4	0.067	
J44	JUNCTION	0.317	9.688	0	01:29	8.2	94.2	1.096	
J45	JUNCTION	0.000	0.456	0	02:45	0	13.4	0.387	
J46	JUNCTION	0.000	4.517	0	01:36	0	65.9	0.001	
J47	JUNCTION	0.000	7.326	0	01:34	0	89.6	-0.149	
J48	JUNCTION	5.120	13.934	0	01:39	47.9	160	0.027	
J5	JUNCTION	0.000	7.071	0	01:29	0	40.4	0.193	
J50	JUNCTION	3.262	3.262	0	01:30	23.9	23.9	0.837	
J53	JUNCTION	0.000	0.050	0	00:46	0	8.55	0.505	
J56	JUNCTION	2.398	2.398	0	01:30	15.8	15.8	-0.002	
J57	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J58	JUNCTION	3.585	3.585	0	01:30	31.5	31.5	-0.002	
J59	JUNCTION	2.509	2.509	0	01:30	14.9	14.9	-0.000	
J6	JUNCTION	2.803	2.803	0	01:30	20.7	20.7	0.035	
J61	JUNCTION	0.000	5.401	0	01:34	0	59.6	1.115	
J6318.4	JUNCTION	0.000	73.814	0	02:17	0	1.41e+03	0.001	
J6357.5	JUNCTION	0.000	73.838	0	02:17	0	1.41e+03	0.003	
J64	JUNCTION	6.158	6.158	0	01:30	24.2	24.2	0.099	
J65	JUNCTION	0.000	12.834	0	01:52	0	154	0.005	
J6507.5	JUNCTION	0.000	73.904	0	02:16	0	1.41e+03	-0.063	
J66	JUNCTION	0.000	12.806	0	01:53	0	154	0.005	
J6653.2	JUNCTION	0.000	61.948	0	02:16	0	1.21e+03	0.006	
J67	JUNCTION	0.000	12.785	0	01:54	0	154	0.005	
J68	JUNCTION	0.000	12.770	0	01:55	0	154	0.005	
J6801	JUNCTION	0.000	61.995	0	02:16	0	1.21e+03	0.002	
J69	JUNCTION	0.000	12.759	0	01:56	0	154	0.005	
J7	JUNCTION	0.000	0.051	0	01:17	0	8.51	0.150	
J70	JUNCTION	0.000	12.753	0	01:56	0	154	0.004	
J7040.9	JUNCTION	0.000	60.430	0	02:15	0	1.18e+03	0.002	
J7055.4	JUNCTION	0.000	58.911	0	02:15	0	1.16e+03	0.000	
J71	JUNCTION	0.000	12.749	0	01:57	0	154	0.108	
J7157.8	JUNCTION	0.000	58.980	0	02:15	0	1.16e+03	0.005	
J7307	JUNCTION	0.000	59.039	0	02:14	0	1.16e+03	0.002	
J7357.6	JUNCTION	0.000	59.143	0	02:14	0	1.16e+03	-0.002	
J7564	JUNCTION	0.000	56.587	0	02:13	0	1.11e+03	0.004	
J7578.9	JUNCTION	0.000	53.945	0	02:13	0	1.07e+03	0.009	
J7681.8	JUNCTION	0.000	54.011	0	02:13	0	1.07e+03	0.002	
J77	JUNCTION	0.000	0.389	0	01:27	0	3.11	-0.053	
J7762.1	JUNCTION	0.000	54.046	0	02:13	0	1.07e+03	0.001	
J7784.1	JUNCTION	0.000	54.094	0	02:12	0	1.07e+03	0.002	
J78	JUNCTION	0.000	0.373	0	01:29	0	3.03	-0.013	
J7885.5	JUNCTION	0.000	54.266	0	02:12	0	1.07e+03	0.005	
J79	JUNCTION	0.000	0.370	0	01:30	0	2.97	-0.016	
J8	JUNCTION	0.000	0.052	0	01:32	0	8.49	3.525	

J80	JUNCTION	0.000	0.357	0	01:32	0	2.92	-0.026
J8086	JUNCTION	0.000	52.855	0	02:11	0	1.05e+03	0.002
J81	JUNCTION	0.000	0.355	0	01:44	0	2.88	0.058
J82	JUNCTION	0.000	6.031	0	01:45	0	68.6	-0.004
J8285.6	JUNCTION	0.000	52.109	0	02:10	0	1.04e+03	0.008
J83	JUNCTION	0.000	6.031	0	01:45	0	68.6	-0.003
J84	JUNCTION	0.000	6.031	0	01:45	0	68.6	-0.003
J8485.6	JUNCTION	0.000	50.845	0	02:10	0	1.02e+03	0.000
J85	JUNCTION	0.000	6.031	0	01:45	0	68.6	0.004
J86	JUNCTION	0.000	6.027	0	01:44	0	68.6	0.014
J8696.4	JUNCTION	0.000	48.974	0	02:09	0	985	0.002
J87	JUNCTION	0.000	6.034	0	01:44	0	68.6	0.027
J8716.3	JUNCTION	0.000	49.104	0	02:09	0	984	-0.097
J8768.8	JUNCTION	0.000	39.373	0	02:09	0	868	0.002
J88	JUNCTION	0.000	6.060	0	01:44	0	68.6	0.171
J8872.8	JUNCTION	0.000	39.419	0	02:08	0	868	0.002
J8915.1	JUNCTION	0.000	39.539	0	02:08	0	868	-0.002
J9	JUNCTION	0.000	7.073	0	01:29	0	40.3	0.335
J9023.5	JUNCTION	0.000	37.811	0	02:08	0	845	0.003
J9036.3	JUNCTION	0.000	37.824	0	02:08	0	845	0.001
J9058.4	JUNCTION	0.000	37.833	0	02:08	0	845	0.001
J9090.7	JUNCTION	0.000	37.900	0	02:08	0	845	-0.001
J9204.3	JUNCTION	7.716	37.874	0	02:23	45	830	0.004
J9223.6	JUNCTION	0.000	31.063	0	02:39	0	726	0.000
J9243.4	JUNCTION	0.000	31.007	0	02:40	0	726	0.003
J9283.1	JUNCTION	0.000	31.012	0	02:40	0	726	0.009
J9294.7	JUNCTION	0.000	31.014	0	02:40	0	726	0.002
J9313.3	JUNCTION	0.000	31.015	0	02:40	0	727	-0.000
J9338.7	JUNCTION	0.000	30.454	0	02:41	0	719	0.009
J9385.8	JUNCTION	0.000	30.486	0	02:39	0	719	0.068
J9499.8	JUNCTION	0.000	31.287	0	02:37	0	719	0.091
J9528.4	JUNCTION	0.000	30.947	0	02:35	0	720	0.116
J9563	JUNCTION	0.000	31.211	0	02:37	0	720	0.125
J9597.4	JUNCTION	0.000	30.498	0	02:34	0	721	0.049
J97	JUNCTION	6.814	6.814	0	01:30	40.3	40.3	0.212
J9789.2	JUNCTION	0.000	22.241	0	03:24	0	568	0.151
J9802	JUNCTION	0.000	21.408	0	03:28	0	542	0.003
J9812.9	JUNCTION	0.000	21.401	0	03:28	0	542	0.001
J9829.2	JUNCTION	0.000	21.392	0	03:27	0	542	0.001
J9843.1	JUNCTION	0.000	21.375	0	03:27	0	542	0.002
J9881.6	JUNCTION	0.000	21.356	0	03:27	0	542	0.004
J9902.3	JUNCTION	0.000	21.347	0	03:27	0	542	0.002
J9912	JUNCTION	0.000	21.343	0	03:27	0	543	0.003
J9923.8	JUNCTION	0.000	21.329	0	03:27	0	543	0.011
J9966.3	JUNCTION	0.000	21.306	0	03:26	0	543	0.019
J6291.6	OUTFALL	0.000	73.813	0	02:18	0	1.41e+03	0.000
SU102	STORAGE	7.545	11.018	0	01:33	53.6	90	0.360
SU104	STORAGE	8.074	8.074	0	01:30	54.9	54.9	0.010
SU108A	STORAGE	1.231	1.231	0	01:30	7.19	7.19	0.136
SU108B	STORAGE	1.137	1.410	0	01:44	8.2	8.37	0.153

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J1	JUNCTION	8.11	0.554	1.924
J10	JUNCTION	6.08	2.226	0.230
J101	JUNCTION	5.81	1.387	0.113
J101B	JUNCTION	46.94	2.166	0.000
J103	JUNCTION	4.69	1.461	0.000
J109	JUNCTION	0.97	1.163	0.000
J11	JUNCTION	46.93	2.133	0.291
J110	JUNCTION	2.94	1.110	3.580
J112	JUNCTION	8.70	1.504	0.000
J113	JUNCTION	1.02	2.864	0.000
J1145	JUNCTION	0.78	1.502	0.000
J116A	JUNCTION	5.63	2.233	0.000
J116B	JUNCTION	4.29	1.346	0.000
J13	JUNCTION	8.77	2.326	0.000
J18	JUNCTION	0.22	1.289	1.511
J2	JUNCTION	3.00	3.057	0.000
J204A	JUNCTION	3.54	1.959	0.000

J207	JUNCTION	3.50	2.264	0.000
J209	JUNCTION	0.68	0.205	2.370
J21	JUNCTION	0.59	1.550	0.000
J22	JUNCTION	5.95	3.325	0.000
J23	JUNCTION	0.81	0.657	1.144
J3	JUNCTION	3.61	3.051	0.000
J301	JUNCTION	1.56	3.221	0.000
J31	JUNCTION	0.41	1.350	0.000
J314B	JUNCTION	0.53	2.750	0.000
J315	JUNCTION	1.41	2.482	0.000
J32	JUNCTION	2.41	0.366	0.489
J34	JUNCTION	0.47	0.164	1.444
J35	JUNCTION	2.06	1.953	0.000
J4	JUNCTION	4.31	3.245	0.000
J44	JUNCTION	1.09	1.015	0.000
J5	JUNCTION	5.32	2.938	0.000
J56	JUNCTION	0.63	1.800	0.000
J57	JUNCTION	48.00	0.000	0.000
J58	JUNCTION	0.48	0.750	0.000
J6	JUNCTION	0.46	0.904	0.000
J64	JUNCTION	4.06	2.047	0.000
J77	JUNCTION	5.23	1.830	3.224
J78	JUNCTION	5.33	2.599	2.109
J79	JUNCTION	5.45	3.328	1.034
J80	JUNCTION	5.61	4.017	0.000
J81	JUNCTION	5.82	3.671	0.000
J82	JUNCTION	3.08	1.019	3.341
J83	JUNCTION	3.18	0.951	3.079
J84	JUNCTION	3.29	0.891	2.809
J85	JUNCTION	3.41	0.832	2.538
J86	JUNCTION	3.53	0.779	2.261
J87	JUNCTION	3.67	0.724	1.986
J88	JUNCTION	3.84	0.710	1.670
J9	JUNCTION	7.02	2.532	0.000
J97	JUNCTION	9.77	1.934	0.000

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

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days	hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J101B	8.08	7.565	0	01:45	41.634	0.320
J103	4.61	3.693	0	01:30	6.620	0.130
J109	0.94	1.666	0	01:30	1.308	0.023
J112	2.82	4.562	0	01:29	14.659	0.300
J113	0.05	1.948	0	01:27	0.054	0.001
J1145	0.69	0.953	0	01:30	0.298	0.002
J116A	3.94	1.641	0	01:30	4.165	0.095
J116B	0.01	0.061	0	01:49	0.000	0.000
J13	0.01	0.140	0	01:26	0.000	0.300
J2	0.01	2.503	0	01:27	0.009	0.000
J204A	3.54	1.947	0	01:23	3.194	0.159
J207	3.40	1.007	0	01:24	1.355	0.013
J21	0.26	0.324	0	01:42	0.049	0.000
J22	0.01	0.137	0	01:34	0.000	0.000
J3	0.01	2.329	0	01:26	0.008	0.000
J301	1.56	4.184	0	01:30	5.840	0.046
J31	0.05	0.279	0	01:28	0.010	0.000
J314B	0.01	0.161	0	01:28	0.002	0.000
J315	1.40	1.555	0	01:29	1.302	0.032
J35	0.59	2.511	0	01:38	0.451	0.003
J4	0.01	1.742	0	01:26	0.003	0.000
J44	0.74	1.039	0	01:30	0.328	0.000
J5	0.01	1.376	0	01:26	0.003	0.000
J56	0.01	0.071	0	01:24	0.000	0.000
J6	0.42	0.429	0	01:30	0.169	0.004
J64	1.10	2.674	0	01:30	1.826	0.047
J80	0.01	0.033	0	01:34	0.000	0.000
J81	0.01	0.026	0	01:34	0.000	0.000
J9	0.01	0.400	0	01:25	0.002	0.000
J97	3.30	1.224	0	04:38	3.524	0.047

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU102	9.119	25	0	0	29.197	81	0 03:13	3.144
SU104	46.173	82	0	0	50.789	90	0 18:42	0.050
SU108A	0.326	8	0	0	2.432	61	0 02:55	0.542
SU108B	0.268	7	0	0	1.786	45	0 02:56	0.937

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
J6291.6	99.63	10.157	73.813	1411.134
System	99.63	10.157	73.813	1411.134

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C100	CONDUIT	2.515	0 01:30	4.23	0.76	0.65
C101	CONDUIT	3.585	0 01:30	4.17	1.46	0.97
C103A	CONDUIT	1.350	0 01:18	3.80	26.40	1.00
C107	CONDUIT	3.861	0 01:30	3.38	0.46	0.77
C11_1	CONDUIT	3.857	0 01:31	2.18	0.23	1.00
C11_2	CONDUIT	3.857	0 01:31	4.48	2.27	1.00
C110_1	CONDUIT	6.031	0 01:45	2.02	1.75	1.00
C110_2	CONDUIT	6.031	0 01:45	2.02	1.75	1.00
C110_3	CONDUIT	6.031	0 01:45	2.02	1.75	1.00
C110_4	CONDUIT	6.031	0 01:45	2.02	1.75	1.00
C110_5	CONDUIT	6.027	0 01:44	2.02	1.75	1.00
C110_6	CONDUIT	6.034	0 01:44	2.02	1.75	1.00
C110_7	CONDUIT	6.060	0 01:44	2.03	1.76	1.00
C110_8	CONDUIT	5.996	0 01:46	2.16	1.74	1.00
C113_1	CONDUIT	7.071	0 01:29	2.78	1.18	1.00
C113_2	CONDUIT	7.071	0 01:29	2.78	1.18	1.00
C113_3	CONDUIT	7.071	0 01:29	2.78	1.18	1.00
C113_4	CONDUIT	7.071	0 01:29	2.78	1.18	1.00
C113_5	CONDUIT	7.073	0 01:29	2.78	1.18	1.00
C113_6	CONDUIT	7.078	0 01:29	2.78	1.18	1.00
C113_7	CONDUIT	7.079	0 01:29	2.78	1.18	1.00
C13	CONDUIT	0.896	0 01:17	8.29	3.76	1.00
C14	CONDUIT	4.858	0 01:45	2.75	1.60	1.00
C15	CONDUIT	4.859	0 01:45	2.75	0.93	1.00
C16	CONDUIT	0.000	0 00:00	0.00	0.00	0.50
C25	CONDUIT	2.532	0 01:35	3.01	3.14	1.00
C26	CONDUIT	12.683	0 01:58	2.56	0.60	1.00
C27	CONDUIT	4.295	0 01:40	2.53	0.70	1.00
C28	CONDUIT	0.467	0 01:49	1.30	0.61	1.00
C29	CONDUIT	3.297	0 01:50	2.68	0.69	1.00
C30	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C31	CONDUIT	0.838	0 01:33	1.32	2.94	1.00
C32_1	CONDUIT	0.389	0 01:27	1.09	3.66	1.00
C32_2	CONDUIT	0.373	0 01:29	1.09	3.51	1.00
C32_3	CONDUIT	0.370	0 01:30	1.09	3.48	1.00
C32_4	CONDUIT	0.357	0 01:32	1.11	3.27	1.00
C32_5	CONDUIT	0.355	0 01:44	1.10	3.34	1.00
C32_6	CONDUIT	0.355	0 01:44	0.99	3.34	1.00
C33	CONDUIT	0.355	0 01:44	0.99	0.52	1.00
C34	CONDUIT	1.713	0 01:33	2.69	2.03	1.00

C35	CONDUIT	2.043	0	01:32	3.25	3.49	1.00
C36	CONDUIT	1.517	0	01:51	2.91	7.22	1.00
C38	CONDUIT	0.710	0	01:31	4.46	1.78	1.00
C39	CONDUIT	0.937	0	01:37	2.31	0.45	1.00
C4_1	CONDUIT	5.118	0	01:37	3.12	1.40	1.00
C4_2	CONDUIT	3.634	0	02:11	0.35	0.54	0.69
C40	CONDUIT	0.542	0	01:30	2.13	1.01	1.00
C44	CONDUIT	1.511	0	01:50	4.22	6.90	1.00
C46	CONDUIT	0.863	0	01:30	1.21	1.37	1.00
C47	CONDUIT	3.348	0	01:30	2.42	0.43	1.00
C48	CONDUIT	2.266	0	01:30	5.00	0.79	0.67
C49	CONDUIT	6.733	0	01:38	7.78	7.47	1.00
C50	CONDUIT	3.668	0	01:30	3.53	1.78	0.91
C51	CONDUIT	3.368	0	01:38	0.64	0.12	0.70
C52	CONDUIT	1.551	0	01:45	3.27	0.24	0.66
C53	CONDUIT	2.245	0	01:45	5.03	0.19	0.51
C54	CONDUIT	1.038	0	01:28	2.35	1.96	1.00
C55	CONDUIT	2.883	0	01:35	1.86	0.74	0.82
C56	CONDUIT	1.661	0	02:06	2.12	1.82	0.85
C57	CONDUIT	9.410	0	01:29	3.70	3.34	1.00
C61_4	CONDUIT	5.940	0	01:30	5.25	2.49	1.00
C62	CONDUIT	9.063	0	01:30	3.64	1.25	1.00
C63	CONDUIT	3.071	0	01:32	2.04	0.32	0.64
C64	CONDUIT	1.794	0	01:23	1.59	1.17	1.00
C65	CONDUIT	0.229	0	03:45	0.19	0.16	0.43
C67	CONDUIT	1.457	0	01:28	2.36	2.34	1.00
C7_1	CONDUIT	12.834	0	01:52	0.81	0.75	0.78
C7_2	CONDUIT	12.806	0	01:53	0.82	0.76	0.77
C7_3	CONDUIT	12.785	0	01:54	0.84	0.75	0.75
C7_4	CONDUIT	12.770	0	01:55	0.87	0.76	0.73
C7_5	CONDUIT	12.759	0	01:56	0.91	0.75	0.71
C7_6	CONDUIT	12.753	0	01:56	0.98	0.75	0.67
C7_7	CONDUIT	12.749	0	01:57	1.10	0.75	0.62
C7_8	CONDUIT	12.747	0	01:58	1.66	0.75	0.48
C71	CONDUIT	2.382	0	01:31	2.15	0.49	0.79
C76	CONDUIT	0.797	0	01:35	0.64	0.23	0.66
C85	CONDUIT	0.456	0	02:45	0.46	0.27	0.41
C89	CONDUIT	3.497	0	01:37	5.50	1.81	1.00
C94	CONDUIT	2.376	0	01:40	2.86	1.58	0.91
C95	CONDUIT	4.579	0	01:30	4.10	1.14	0.96
C96	CONDUIT	2.591	0	01:30	4.16	0.90	0.74
C97	CONDUIT	3.527	0	01:33	4.11	2.14	0.97
C98	CONDUIT	3.672	0	01:30	4.27	1.71	0.97
C99	CONDUIT	2.398	0	01:30	3.80	1.99	0.97
Central_Deziel	CONDUIT	0.051	0	01:17	0.43	0.04	0.28
Central_ECR	CONDUIT	0.050	1	17:47	0.28	0.00	0.17
Central_ECR_Cul	CONDUIT	0.052	0	01:32	0.80	0.02	0.16
Central_NServRoad	CONDUIT	3.571	0	01:36	0.91	0.27	0.76
Central_Pond_600CSP	CONDUIT	0.844	0	10:33	1.91	1.98	1.00
Central_Pond_600HDPE	CONDUIT	0.934	0	04:26	2.26	0.41	1.00
Central_Pond_900	CONDUIT	1.365	0	04:53	2.15	0.44	1.00
CJ10016.1	CHANNEL	21.306	0	03:26	0.95	2.52	0.71
CJ10066.1	CHANNEL	20.119	0	03:24	0.85	1.77	0.66
CJ10094.5	CHANNEL	20.088	0	03:24	0.62	0.04	0.70
CJ10144.4	CHANNEL	20.057	0	03:24	0.76	0.01	0.61
CJ10244.4	CHANNEL	19.982	0	03:23	0.49	0.13	0.72
CJ10344.4	CHANNEL	19.900	0	03:22	0.63	0.04	0.58
CJ10444.3	CHANNEL	19.781	0	03:17	0.71	0.06	0.71
CJ10475.3	CHANNEL	19.146	0	03:19	0.34	0.75	0.76
CJ10500	CONDUIT	9.561	0	03:23	2.16	0.13	0.93
CJ10500_2	CONDUIT	9.559	0	03:17	2.18	0.13	0.93
CJ10614.5	CHANNEL	19.606	0	02:27	0.85	0.99	0.71
CJ10679.3	CHANNEL	21.116	0	02:27	0.92	0.44	0.87
CJ10694.8	CONDUIT	21.859	0	02:27	1.25	3.59	1.00
CJ10749	CHANNEL	21.571	0	02:27	0.76	0.21	0.68
CJ10848.5	CHANNEL	19.761	0	02:21	0.69	0.13	0.63
CJ11048.5	CHANNEL	20.262	0	02:22	0.80	0.38	0.66
CJ11248.4	CHANNEL	17.033	0	02:35	0.63	0.11	0.63
CJ11448.4	CHANNEL	17.000	0	02:23	0.71	0.08	0.61
CJ11648.4	CHANNEL	17.817	0	01:49	0.86	0.09	0.65
CJ11748.1	CHANNEL	12.247	0	02:35	0.51	0.04	0.60
CJ11848.1	CHANNEL	12.415	0	02:22	1.21	0.01	0.48
CJ11881.3	CHANNEL	12.536	0	02:23	1.29	0.01	0.44
CJ11896.4	CHANNEL	12.646	0	02:02	1.51	0.02	0.39
CJ11913.3	CONDUIT	12.686	0	02:02	1.02	1.76	0.92
CJ11919.8	CHANNEL	12.703	0	02:02	0.78	0.13	0.54
CJ11939.6	CHANNEL	10.538	0	02:42	0.65	0.01	0.53
CJ11972.5	CHANNEL	10.545	0	02:42	0.70	0.05	0.59
CJ12011.7	CHANNEL	10.555	0	02:43	0.60	0.08	0.60

CJ12037.2	CONDUIT	10.561	0	02:43	1.76	0.61	1.00
CJ12067.5	CHANNEL	9.679	0	02:54	0.67	0.09	0.71
CJ12091.1	CHANNEL	9.678	0	02:50	0.70	0.10	0.75
CJ12117.3	CHANNEL	9.679	0	02:47	0.64	0.03	0.49
CJ12152.8	CHANNEL	9.690	0	02:45	0.69	0.04	0.57
CJ12160.9	CONDUIT	9.700	0	02:44	3.32	0.38	0.88
CJ12177.5	CONDUIT	9.701	0	02:44	0.96	0.22	0.60
CJ12213.2	CHANNEL	7.023	0	05:57	0.50	0.02	0.48
CJ12263.1	CHANNEL	6.992	0	05:57	0.43	0.02	0.50
CJ12330.4	CHANNEL	6.954	0	05:57	0.46	0.02	0.50
CJ12340	CONDUIT	6.932	0	05:56	0.65	0.16	0.97
CJ12359.8	CHANNEL	6.924	0	05:56	0.45	0.01	0.51
CJ12390.7	CHANNEL	6.903	0	05:56	0.36	0.01	0.49
CJ12415.2	CHANNEL	6.881	0	05:56	0.92	0.02	0.69
CJ12418	CONDUIT	6.873	0	05:56	1.31	0.87	1.00
CJ12442.1	CHANNEL	6.865	0	05:56	0.53	0.02	0.47
CJ12491.9	CHANNEL	6.839	0	05:56	0.53	0.10	0.73
CJ12524.2	CHANNEL	6.811	0	05:56	0.82	0.02	0.52
CJ12591.8	CHANNEL	6.779	0	05:55	0.89	0.02	0.50
CJ12613.3	CHANNEL	6.751	0	05:55	0.96	0.01	0.50
CJ12627.6	CHANNEL	6.741	0	05:55	1.14	0.00	0.51
CJ12641.2	CONDUIT	6.736	0	05:55	1.68	0.35	0.81
CJ12676.2	CHANNEL	6.726	0	05:55	0.97	0.01	0.48
CJ12795	CHANNEL	5.533	0	03:33	0.57	0.02	0.44
CJ12894.8	CHANNEL	3.958	0	03:26	0.55	0.08	0.60
CJ6318.4	CHANNEL	73.813	0	02:18	1.93	0.12	0.44
CJ6357.5	CHANNEL	73.814	0	02:17	1.93	0.17	0.45
CJ6507.5	CHANNEL	73.838	0	02:17	1.99	0.08	0.44
CJ6653.2	CHANNEL	61.944	0	02:17	1.47	0.08	0.42
CJ6801	CONDUIT	61.948	0	02:16	1.50	0.36	0.73
CJ7026.4	CHANNEL	60.418	0	02:16	2.01	0.05	0.37
CJ7055.4	CONDUIT	58.889	0	02:15	2.03	0.14	0.64
CJ7157.8	CHANNEL	58.911	0	02:15	2.00	0.07	0.39
CJ7307	CHANNEL	58.980	0	02:15	1.76	0.10	0.45
CJ7357.6	CHANNEL	59.039	0	02:14	2.38	0.07	0.38
CJ7564	CHANNEL	56.553	0	02:14	2.19	0.09	0.40
CJ7578.9	CONDUIT	53.910	0	02:13	2.01	0.38	0.58
CJ7681.8	CHANNEL	53.945	0	02:13	1.92	0.10	0.42
CJ7762.1	CHANNEL	54.011	0	02:13	1.95	0.10	0.43
CJ7784.1	CONDUIT	54.046	0	02:13	1.94	0.53	0.63
CJ7885.5	CHANNEL	54.094	0	02:12	1.86	0.10	0.44
CJ8086	CHANNEL	52.605	0	02:12	1.81	0.10	0.44
CJ8285.6	CHANNEL	51.773	0	02:11	1.87	0.10	0.43
CJ8485.6	CHANNEL	50.575	0	02:10	1.92	0.10	0.42
CJ8696.4	CHANNEL	48.719	0	02:10	1.91	0.10	0.41
CJ8716.3	CONDUIT	48.974	0	02:09	1.85	2.70	0.61
CJ8768.8	CHANNEL	39.316	0	02:09	1.49	0.09	0.44
CJ8872.8	CHANNEL	39.373	0	02:09	1.54	0.08	0.44
CJ8915.1	CONDUIT	39.419	0	02:08	1.15	0.32	0.65
CJ9023.5	CHANNEL	37.777	0	02:08	2.42	0.12	0.45
CJ9036.3	CONDUIT	37.811	0	02:08	1.52	0.57	0.50
CJ9058.4	CHANNEL	37.824	0	02:08	2.79	0.15	0.43
CJ9090.7	CHANNEL	37.833	0	02:08	2.78	0.06	0.40
CJ9204.3	CHANNEL	36.671	0	02:08	2.33	0.14	0.44
CJ9223.6	CONDUIT	31.128	0	02:40	2.08	0.50	0.68
CJ9243.4	CHANNEL	31.063	0	02:39	2.16	0.26	0.67
CJ9283.1	CONDUIT	31.007	0	02:40	2.90	1.67	0.66
CJ9294.7	CHANNEL	31.012	0	02:40	1.75	0.07	0.37
CJ9313.3	CONDUIT	31.014	0	02:40	2.66	1.03	0.73
CJ9338.7	CHANNEL	30.461	0	02:40	1.39	0.10	0.44
CJ9385.8	CHANNEL	30.454	0	02:41	1.09	0.05	0.43
CJ9499.8	CONDUIT	30.486	0	02:39	1.00	1.28	1.00
CJ9528.4	CHANNEL	31.287	0	02:37	0.48	0.03	0.52
CJ9563	CHANNEL	30.947	0	02:35	0.57	0.07	0.66
CJ9597.4	CHANNEL	31.211	0	02:37	0.49	0.07	0.66
CJ9789.2	CONDUIT	22.307	0	03:26	0.84	1.02	1.00
CJ9802	CHANNEL	21.417	0	03:28	0.49	0.06	0.87
CJ9812.9	CONDUIT	21.408	0	03:28	1.48	0.18	1.00
CJ9829.2	CHANNEL	21.401	0	03:28	1.19	0.23	0.80
CJ9843.1	CHANNEL	21.392	0	03:27	1.32	0.25	0.78
CJ9881.6	CHANNEL	21.375	0	03:27	1.11	0.20	0.73
CJ9902.3	CHANNEL	21.356	0	03:27	0.75	2.45	0.70
CJ9912	CONDUIT	21.347	0	03:27	1.93	0.66	0.96
CJ9923.8	CHANNEL	21.343	0	03:27	1.10	0.29	0.78
CJ9966.3	CHANNEL	21.329	0	03:27	0.95	3.53	0.73
GMD_CassenCul	CONDUIT	3.152	0	03:46	0.88	1.20	1.00
Northway_Cleary	CONDUIT	4.482	0	01:39	2.50	0.45	0.58
Northway_Mark1	CONDUIT	3.194	0	01:36	2.07	1.00	0.68
Northway_Mark2	CONDUIT	0.455	0	02:51	0.71	0.11	0.43

Northway_Trunk1	CONDUIT	14.894	0	01:49	2.93	1.33	1.00
Northway_Trunk2	CONDUIT	12.936	0	01:47	2.33	1.11	0.97
Northway_Trunk3	CONDUIT	6.366	0	01:39	1.33	0.41	0.87
Northway_Trunk4	CONDUIT	3.159	0	01:32	1.94	1.08	0.76
Temple_Open	CONDUIT	1.435	0	03:56	0.59	0.27	0.78
Central_SWMP1	PUMP	0.010	0	01:22		1.00	
GMPS_P1	PUMP	0.631	0	01:16		1.00	
GMPS_P2	PUMP	0.000	0	00:00		0.00	
P5	PUMP	0.085	0	00:56		1.00	
Rhodes_SWMP1	PUMP	0.050	0	00:46		1.00	
W1	WEIR	0.950	0	03:16			0.87

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
		---------- Fraction of Time in Flow Class ----------								
C100	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C101	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C103A	1.00	0.00	0.00	0.00	0.40	0.00	0.60	0.00	0.00	0.00
C107	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.90	0.00
C11_1	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C11_2	1.00	0.01	0.00	0.00	0.41	0.00	0.00	0.59	0.00	0.00
C110_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00
C110_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00
C110_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.49	0.00
C110_4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
C110_5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C110_6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C110_7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C110_8	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
C113_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.81	0.00
C113_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.78	0.00
C113_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.70	0.00
C113_4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C113_5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C113_6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C113_7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
C13	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00	0.09	0.00
C14	1.00	0.00	0.00	0.00	0.85	0.00	0.00	0.15	0.00	0.00
C15	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C25	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.01	0.00	0.00
C26	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.01	0.20	0.00
C27	1.00	0.01	0.60	0.00	0.38	0.00	0.00	0.00	0.12	0.00
C28	1.00	0.70	0.09	0.00	0.20	0.00	0.00	0.00	0.00	0.00
C29	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.17	0.00
C30	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.46	0.29	0.00	0.25	0.00	0.00	0.00	0.78	0.00
C32_1	1.00	0.62	0.12	0.00	0.22	0.00	0.05	0.00	0.00	0.00
C32_2	1.00	0.59	0.03	0.00	0.38	0.00	0.00	0.00	0.76	0.00
C32_3	1.00	0.56	0.03	0.00	0.41	0.00	0.00	0.00	0.76	0.00
C32_4	1.00	0.53	0.04	0.00	0.44	0.00	0.00	0.00	0.75	0.00
C32_5	1.00	0.01	0.52	0.00	0.47	0.00	0.00	0.00	0.73	0.00
C32_6	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C33	1.00	0.01	0.47	0.00	0.52	0.00	0.00	0.00	0.78	0.00
C34	1.00	0.01	0.45	0.00	0.53	0.00	0.00	0.01	0.77	0.00
C35	1.00	0.90	0.00	0.00	0.04	0.00	0.00	0.06	0.00	0.00
C36	1.00	0.00	0.00	0.00	0.12	0.00	0.88	0.00	0.00	0.00
C38	1.00	0.95	0.01	0.00	0.04	0.00	0.00	0.01	0.95	0.00
C39	1.00	0.00	0.00	0.00	0.43	0.03	0.00	0.55	0.19	0.00
C4_1	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.94	0.00
C4_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
C40	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.77	0.00
C44	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.80	0.00	0.00
C46	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.59	0.00
C47	1.00	0.00	0.00	0.00	0.98	0.00	0.00	0.02	0.79	0.00
C48	1.00	0.00	0.00	0.00	0.06	0.02	0.00	0.92	0.05	0.00
C49	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C50	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
C51	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C52	1.00	0.00	0.00	0.00	0.28	0.04	0.00	0.68	0.25	0.00
C53	1.00	0.00	0.00	0.00	0.09	0.04	0.00	0.88	0.10	0.00
C54	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00

C55	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
C56	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C57	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00	0.00
C61_4	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
C62	1.00	0.00	0.00	0.00	0.47	0.00	0.00	0.53	0.34	0.00
C63	1.00	0.00	0.00	0.00	0.52	0.00	0.00	0.48	0.40	0.00
C64	1.00	0.00	0.00	0.00	0.53	0.00	0.00	0.47	0.28	0.00
C65	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.16	0.00
C67	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.84	0.00
C7_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.00
C7_6	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.15	0.00
C7_7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.07	0.00
C7_8	1.00	0.01	0.00	0.00	0.08	0.00	0.00	0.91	0.00	0.00
C71	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.96	0.00
C76	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
C85	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.00
C89	1.00	0.00	0.00	0.00	0.98	0.00	0.00	0.02	0.81	0.00
C94	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C95	1.00	0.00	0.00	0.00	0.08	0.03	0.00	0.90	0.07	0.00
C96	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C97	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C98	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C99	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Central_Deziel	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Central_ECR	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.08	0.00
Central_ECR_Cul	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Central_NServRoad	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
Central_Pond_600CSP	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Central_Pond_600HDPE	1.00	0.38	0.50	0.00	0.12	0.00	0.00	0.00	0.89	0.00
Central_Pond_900	1.00	0.00	0.74	0.00	0.25	0.00	0.01	0.00	0.81	0.00
CJ10016.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10066.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10094.5	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10144.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10244.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10344.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10444.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10475.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10500	1.00	0.01	0.00	0.00	0.41	0.15	0.00	0.43	0.10	0.00
CJ10500_2	1.00	0.01	0.00	0.00	0.40	0.14	0.00	0.45	0.09	0.00
CJ10614.5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10679.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10694.8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10749	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
CJ10848.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11048.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11248.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11448.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ11648.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11748.1	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11848.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11881.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11896.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11913.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11919.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11939.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11972.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12011.7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12037.2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12067.5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12091.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12117.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12152.8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12160.9	1.00	0.01	0.00	0.00	0.15	0.01	0.83	0.00	0.00	0.00
CJ12177.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12213.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12263.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12330.4	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12340	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12359.8	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12390.7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12415.2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12418	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12442.1	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12491.9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

CJ12524.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12591.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12613.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12627.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ12641.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ12676.2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.56	0.00
CJ12795	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12894.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ6318.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
CJ6357.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ6507.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.20	0.00
CJ6653.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
CJ6801	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.17	0.00
CJ7026.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.00
CJ7055.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
CJ7157.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7307	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.37	0.00
CJ7357.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7564	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
CJ7578.9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7681.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7762.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7784.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7885.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.00
CJ8086	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.00
CJ8285.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.43	0.00
CJ8485.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
CJ8696.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.16	0.00
CJ8716.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ8768.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ8872.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.09	0.00
CJ8915.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9023.5	1.00	0.00	0.00	0.00	0.83	0.00	0.00	0.17	0.60	0.00
CJ9036.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9058.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.00
CJ9090.7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.64	0.00
CJ9204.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9223.6	1.00	0.01	0.00	0.00	0.45	0.00	0.00	0.54	0.00	0.00
CJ9243.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9283.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9294.7	1.00	0.00	0.00	0.00	0.28	0.00	0.00	0.72	0.00	0.00
CJ9313.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ9338.7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9385.8	1.00	0.00	0.00	0.00	0.98	0.00	0.01	0.00	0.30	0.00
CJ9499.8	1.00	0.00	0.00	0.00	0.98	0.00	0.01	0.00	0.00	0.00
CJ9528.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9563	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9597.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9789.2	1.00	0.00	0.00	0.00	0.98	0.00	0.00	0.01	0.00	0.00
CJ9802	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9812.9	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9829.2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9843.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9881.6	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9902.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9912	1.00	0.01	0.00	0.00	0.26	0.00	0.00	0.73	0.00	0.00
CJ9923.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9966.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
GMD_CassenCul	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Northway_Cleary	1.00	0.00	0.00	0.00	0.18	0.82	0.00	0.00	0.03	0.00
Northway_Mark1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.00
Northway_Mark2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
Northway_Trunk1	1.00	0.00	0.00	0.00	0.61	0.00	0.00	0.39	0.27	0.00
Northway_Trunk2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.91	0.00
Northway_Trunk3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Northway_Trunk4	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.00	0.00
Temple_Open	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C101	0.01	0.48	0.01	0.61	0.01

C103A	4.62	4.69	4.62	9.85	4.62
C107	0.01	0.01	8.40	0.01	0.01
C11_1	8.22	8.22	46.94	0.01	0.01
C11_2	7.93	8.11	7.94	4.34	4.12
C110_1	2.92	2.94	3.08	1.28	1.13
C110_2	3.06	3.08	3.18	1.27	1.11
C110_3	3.16	3.18	3.29	1.26	1.09
C110_4	3.27	3.29	3.41	1.24	1.06
C110_5	3.37	3.41	3.53	1.23	1.02
C110_6	3.50	3.53	3.67	1.22	0.99
C110_7	3.62	3.67	3.84	1.21	0.94
C110_8	3.77	3.84	3.97	1.19	0.87
C113_1	1.02	1.02	3.00	0.12	0.10
C113_2	3.00	3.00	3.61	0.12	0.11
C113_3	3.61	3.61	4.31	0.12	0.11
C113_4	4.31	4.31	5.32	0.12	0.11
C113_5	5.32	5.32	7.02	0.11	0.11
C113_6	7.02	7.02	8.77	0.11	0.11
C113_7	8.77	8.77	9.78	0.11	0.11
C13	5.99	8.67	5.99	10.66	5.99
C14	6.08	46.94	6.08	1.05	0.31
C15	46.93	46.93	46.94	0.01	0.01
C25	8.49	8.70	9.05	1.03	0.81
C26	2.03	2.03	2.35	0.01	0.01
C27	2.80	2.80	4.68	0.01	0.01
C28	4.68	4.68	7.96	0.01	0.01
C29	4.55	4.55	6.43	0.01	0.01
C31	4.74	4.74	5.57	0.95	0.01
C32_1	5.10	5.13	5.23	2.03	1.91
C32_2	5.20	5.23	5.33	2.00	1.88
C32_3	5.30	5.33	5.45	1.96	1.85
C32_4	5.43	5.45	5.61	1.89	1.78
C32_5	5.61	5.61	5.82	1.89	1.81
C32_6	5.79	5.82	5.95	1.85	1.79
C33	5.95	5.95	9.23	0.01	0.01
C34	5.48	5.57	8.52	1.13	1.03
C35	0.81	1.16	0.81	2.04	0.81
C36	2.92	2.92	5.32	7.89	0.01
C38	0.97	0.97	0.99	0.97	0.97
C39	3.96	3.96	6.18	0.01	0.01
C4_1	0.63	0.78	2.94	0.71	0.55
C40	8.12	8.12	10.37	0.01	0.01
C44	5.43	5.63	5.43	7.09	5.43
C46	4.27	4.29	5.16	0.35	0.20
C47	2.41	2.41	5.91	0.01	0.01
C49	11.20	11.20	11.66	4.26	4.23
C50	0.01	0.01	0.47	0.73	0.01
C51	0.01	0.01	2.06	0.01	0.01
C52	0.01	0.01	1.35	0.01	0.01
C54	0.50	0.53	0.50	0.63	0.50
C55	0.01	0.01	6.06	0.01	0.01
C56	0.01	1.41	0.01	1.51	0.01
C57	1.09	1.56	1.09	2.69	1.09
C61_4	9.69	9.77	46.56	0.81	0.75
C62	1.11	1.47	1.84	1.50	0.82
C63	0.01	0.01	0.24	0.01	0.01
C64	3.48	3.54	3.50	0.01	0.07
C67	0.85	3.79	0.85	4.02	0.85
C71	0.01	0.01	1.43	0.01	0.01
C76	0.01	0.01	1.43	0.01	0.01
C89	4.05	4.06	8.52	1.16	1.14
C94	0.01	0.46	0.01	0.64	0.01
C95	0.01	0.22	0.59	0.35	0.01
C97	0.01	0.59	0.01	0.87	0.01
C98	0.01	0.41	0.01	0.56	0.01
C99	0.01	0.63	0.01	0.81	0.01
Central_NServRoad	0.01	0.01	12.13	0.01	0.01
Central_Pond_600CSP	11.46	12.13	11.60	11.70	9.37
Central_Pond_600HDPE	0.86	0.86	46.12	0.01	0.01
Central_Pond_900	4.23	4.23	9.26	0.01	0.01
CJ10016.1	0.01	0.01	0.01	7.51	0.01
CJ10066.1	0.01	0.01	0.01	5.10	0.01
CJ10500	0.01	0.01	0.77	0.01	0.01
CJ10500_2	0.01	0.01	0.62	0.01	0.01
CJ10694.8	4.28	4.37	4.28	8.38	4.20
CJ11913.3	0.01	0.01	0.01	5.42	0.01
CJ12037.2	6.09	6.13	6.09	0.01	6.09
CJ12418	8.64	8.64	8.67	0.01	7.57
CJ8716.3	0.01	0.01	0.01	5.24	0.01

CJ9283.1	0.01	0.01	0.01	3.94	0.01
CJ9313.3	0.01	0.01	0.01	0.76	0.01
CJ9499.8	3.56	3.58	3.56	2.83	3.56
CJ9789.2	3.32	3.32	3.36	1.06	2.70
CJ9812.9	0.90	0.90	0.99	0.01	0.01
CJ9902.3	0.01	0.01	0.01	7.26	0.01
CJ9966.3	0.01	0.01	0.01	8.75	0.01
GMD_CassenCul	2.33	2.54	2.43	2.66	1.83
Northway_Trunk1	0.54	0.68	1.13	0.63	0.25
Northway_Trunk2	0.01	0.01	0.68	0.32	0.01
Northway_Trunk3	0.01	0.01	0.59	0.01	0.01
Northway_Trunk4	0.01	0.01	0.01	0.07	0.01
Temple_Open	0.01	0.01	5.78	0.01	0.01

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Pumping Summary
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Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	% Time Off Pump Curve High
Central_SWMP1	49.91	1	0.00	0.01	0.01	0.862	0.18	0.0	0.0
GMPS_P1	99.96	1	0.00	0.18	0.63	26.026	136.51	0.0	0.0
GMPS_P2	0.00	0	0.00	0.00	0.00	0.000	0.00	0.0	0.0
P5	99.99	1	0.00	0.04	0.09	5.971	5.83	0.0	97.9
Rhodes_SWMP1	100.00	1	0.00	0.05	0.05	8.548	6.50	0.0	96.3

Analysis begun on: Mon Mar 16 15:58:45 2020
Analysis ended on: Mon Mar 16 15:59:08 2020
Total elapsed time: 00:00:23

Dillon 100-Year Existing Conditions

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

Hydrologic Model for the Grand Marais Drain - Dillon Updated - Fixed Sub Catchment Areas

WARNING 04: minimum elevation drop used for Conduit C103A
WARNING 03: negative offset ignored for Link C107
WARNING 03: negative offset ignored for Link C50
WARNING 03: negative offset ignored for Link C55
WARNING 04: minimum elevation drop used for Conduit CJ10016.1
WARNING 04: minimum elevation drop used for Conduit CJ10066.1
WARNING 04: minimum elevation drop used for Conduit CJ10475.3
WARNING 03: negative offset ignored for Link CJ10614.5
WARNING 04: minimum elevation drop used for Conduit CJ10614.5
WARNING 04: minimum elevation drop used for Conduit CJ10694.8
WARNING 04: minimum elevation drop used for Conduit CJ11913.3
WARNING 04: minimum elevation drop used for Conduit CJ11919.8
WARNING 03: negative offset ignored for Link CJ12415.2
WARNING 03: negative offset ignored for Link CJ12627.6
WARNING 03: negative offset ignored for Link CJ7026.4
WARNING 03: negative offset ignored for Link CJ8696.4
WARNING 04: minimum elevation drop used for Conduit CJ8716.3
WARNING 04: minimum elevation drop used for Conduit CJ9902.3
WARNING 04: minimum elevation drop used for Conduit CJ9966.3
WARNING 03: negative offset ignored for Link Temple_Open
WARNING 02: maximum depth increased for Node J10016.1
WARNING 02: maximum depth increased for Node J10066.1
WARNING 02: maximum depth increased for Node J10094.5
WARNING 02: maximum depth increased for Node J10144.4
WARNING 02: maximum depth increased for Node J10244.4
WARNING 02: maximum depth increased for Node J10344.4
WARNING 02: maximum depth increased for Node J10614.5
WARNING 02: maximum depth increased for Node J10694.8
WARNING 02: maximum depth increased for Node J10749
WARNING 02: maximum depth increased for Node J11048.5
WARNING 02: maximum depth increased for Node J11248.4
WARNING 02: maximum depth increased for Node J11648.4
WARNING 02: maximum depth increased for Node J11748.1
WARNING 02: maximum depth increased for Node J118
WARNING 02: maximum depth increased for Node J11848.1
WARNING 02: maximum depth increased for Node J11881.3
WARNING 02: maximum depth increased for Node J11896.4
WARNING 02: maximum depth increased for Node J11913.3
WARNING 02: maximum depth increased for Node J11919.8
WARNING 02: maximum depth increased for Node J12091.1
WARNING 02: maximum depth increased for Node J12177.5
WARNING 02: maximum depth increased for Node J12213.2
WARNING 02: maximum depth increased for Node J12263.1
WARNING 02: maximum depth increased for Node J12359.8
WARNING 02: maximum depth increased for Node J12390.7
WARNING 02: maximum depth increased for Node J12418
WARNING 02: maximum depth increased for Node J12442.1
WARNING 02: maximum depth increased for Node J12491.9
WARNING 02: maximum depth increased for Node J12524.2
WARNING 02: maximum depth increased for Node J12613.3
WARNING 02: maximum depth increased for Node J12641.2
WARNING 02: maximum depth increased for Node J12676.2
WARNING 02: maximum depth increased for Node J201
WARNING 02: maximum depth increased for Node J6318.4
WARNING 02: maximum depth increased for Node J6357.5
WARNING 02: maximum depth increased for Node J6507.5
WARNING 02: maximum depth increased for Node J6653.2
WARNING 02: maximum depth increased for Node J6801
WARNING 02: maximum depth increased for Node J7040.9
WARNING 02: maximum depth increased for Node J7055.4
WARNING 02: maximum depth increased for Node J7157.8
WARNING 02: maximum depth increased for Node J7307
WARNING 02: maximum depth increased for Node J7564
WARNING 02: maximum depth increased for Node J7578.9
WARNING 02: maximum depth increased for Node J7681.8
WARNING 02: maximum depth increased for Node J7762.1
WARNING 02: maximum depth increased for Node J7885.5
WARNING 02: maximum depth increased for Node J8086
WARNING 02: maximum depth increased for Node J8485.6
WARNING 02: maximum depth increased for Node J8696.4
WARNING 02: maximum depth increased for Node J8716.3
WARNING 02: maximum depth increased for Node J8768.8
WARNING 02: maximum depth increased for Node J8872.8
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WARNING 02: maximum depth increased for Node J9058.4
WARNING 02: maximum depth increased for Node J9090.7
WARNING 02: maximum depth increased for Node J9204.3
WARNING 02: maximum depth increased for Node J9294.7
WARNING 02: maximum depth increased for Node J9313.3
WARNING 02: maximum depth increased for Node J9812.9
WARNING 02: maximum depth increased for Node J9829.2
WARNING 02: maximum depth increased for Node J9843.1
WARNING 02: maximum depth increased for Node J9881.6
WARNING 02: maximum depth increased for Node J9902.3
WARNING 02: maximum depth increased for Node J9923.8
WARNING 02: maximum depth increased for Node J9966.3

*************
Element Count
*************
Number of rain gages ...... 21
Number of subcatchments ... 49
Number of nodes ........... 185
Number of links ........... 194
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                              Data       Recording
Name                 Data Source                              Type       Interval
------------------------------------------------------------------------
00-Dillon_100Yr      Dillon_100YR                             INTENSITY   15 min.
00-Dillon_5YR        Dillon_5YR                               INTENSITY   15 min.
00-Dillon_CC         Dillon_CC                                INTENSITY   15 min.
Chicago_100yr_12hr_t1hr Chicago_100yr_12hr_t1hr                  INTENSITY   60 min.
Chicago_100yr_4h     Chicago_100yr_4h                         INTENSITY   15 min.
Chicago_100yr_6hrDuation_1hrTimesteps Chicago_100yr_6hrDuation_1hrTimesteps INTENSITY   60 min.
Chicago_12h          Chicago_12h                              INTENSITY   15 min.
Chicago_25yr_4h      Chicago_25yr_4h                          INTENSITY   15 min.
Chicago_3h           Chicago_3h                               INTENSITY    1 min.
Chicago_5yr_4h       Chicago_5yr_4h                           INTENSITY    5 min.
GrandMaraisAug2017   GMAug2017                                INTENSITY   15 min.
GrandMaraisNov2017   GrandMaraisNov2017                       INTENSITY   15 min.
HowardAug2017        HowardAug2017                            INTENSITY   15 min.
HowardNov2017        HowardNov2017                            INTENSITY   15 min.
HuronEstatesAug2017  HuronEstateAug2017                       INTENSITY   15 min.
HuronEstatesNov2017  HuronEstatesNov2017                      INTENSITY   15 min.
June17,18-2014       June17,18-2014                           VOLUME      15 min.
May25-27,2011        May25-27,2011                            INTENSITY   60 min.
May27,28-2014        May27,28-2014                            VOLUME      15 min.
October1995          Oct3-6,1995                              INTENSITY   60 min.
Sept10-12,2000       Sept10-12,2000                           INTENSITY   15 min.


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Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
S103                      52.80    738.72     45.00    0.2000 00-Dillon_100Yr      J103
S104                      86.20    907.41     57.00    0.2000 00-Dillon_100Yr      SU104
S105                      43.53    492.32     98.00    0.2000 00-Dillon_100Yr      J105
S106                      15.30   1292.97     39.00    0.2000 00-Dillon_100Yr      J12955.5
S107                      52.20    372.86     60.00    0.2000 00-Dillon_100Yr      J107
S108A                     12.00    342.97     25.00    0.2000 00-Dillon_100Yr      SU108A
S108B                     15.31    191.33     30.00    0.2000 00-Dillon_100Yr      SU108B
S109                      56.30    866.17     47.00    0.2000 00-Dillon_100Yr      J109
S110                     100.00    416.67     67.00    0.2000 00-Dillon_100Yr      J110
S111                      73.73    670.29     36.00    0.2000 00-Dillon_100Yr      J97
S112                      38.72    968.05     45.00    0.2000 00-Dillon_100Yr      J64
S113                      72.92    560.94     40.00    0.2000 00-Dillon_100Yr      J113
S114                      83.80    419.00     52.00    0.2000 00-Dillon_100Yr      J1145
S115                      30.00    300.00      2.00    0.2000 00-Dillon_100Yr      J1145
S116A                     52.08    314.29     53.00    0.2000 00-Dillon_100Yr      J116A
S117                      17.36    972.73     56.00    0.2000 00-Dillon_100Yr      J10444.3
S118                     101.28    779.06     51.00    0.2000 00-Dillon_100Yr      J118
S119                      48.15    535.03     78.00    0.2000 00-Dillon_100Yr      J118
S121                      33.33    476.04     25.00    0.2000 00-Dillon_100Yr      J32
S201                       8.38    186.27     40.00    0.2000 00-Dillon_100Yr      J201
S202                      45.00    529.41     30.00    0.2000 00-Dillon_100Yr      J50
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S203	41.53	415.28	45.00	0.2000	00-Dillon_100Yr	J203
S204A	21.48	536.98	2.00	0.2000	00-Dillon_100Yr	J204A
S204B	8.93	297.62	5.00	0.2000	00-Dillon_100Yr	J204B
S205	45.26	212.77	2.00	0.2000	00-Dillon_100Yr	J205
S206	97.12	539.53	37.00	0.2000	00-Dillon_100Yr	J48
S207	30.05	500.91	45.00	0.2000	00-Dillon_100Yr	J207
S208	29.97	299.74	43.00	0.2000	00-Dillon_100Yr	J208
S209	38.97	433.04	38.00	0.2000	00-Dillon_100Yr	J209
S301	3.88	150.00	70.00	0.2000	00-Dillon_100Yr	J301
S302A	7.42	457.45	3.00	0.2000	00-Dillon_100Yr	J44
S302B	40.95	396.21	43.00	0.2000	00-Dillon_100Yr	J302B
S303	44.91	449.09	44.00	0.2000	00-Dillon_100Yr	J21
S304	44.27	402.44	44.00	0.2000	00-Dillon_100Yr	J31
S305	25.20	280.02	54.00	0.2000	00-Dillon_100Yr	J56
S306_1	23.76	500.00	55.00	0.2000	00-Dillon_100Yr	J9204.3
S306_2	54.76	930.00	55.00	0.2000	00-Dillon_100Yr	J01
S307	38.00	345.45	40.00	0.2000	00-Dillon_100Yr	J6
S308	84.00	466.67	40.00	0.2000	00-Dillon_100Yr	J18
S309	39.00	260.00	50.00	0.2000	00-Dillon_100Yr	J20
S310	24.00	342.86	50.00	0.2000	00-Dillon_100Yr	J59
S311	56.00	373.33	45.00	0.2000	00-Dillon_100Yr	J58
S312A	51.68	234.91	50.00	0.2000	00-Dillon_100Yr	J35
S312B	60.00	300.00	64.00	0.2000	00-Dillon_100Yr	J37
S313	12.39	412.94	70.00	0.2000	00-Dillon_100Yr	J33
S314A	25.00	277.78	45.00	0.2000	00-Dillon_100Yr	J314A
S314B	12.73	127.31	38.00	0.2000	00-Dillon_100Yr	J314B
S315	36.30	279.23	50.00	0.2000	00-Dillon_100Yr	J315
S316	60.00	400.00	40.00	0.2000	00-Dillon_100Yr	J34

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J01	JUNCTION	179.24	4.42	0.0	
J10016.1	JUNCTION	180.60	4.71	0.0	
J10066.1	JUNCTION	180.60	4.71	0.0	
J10094.5	JUNCTION	180.85	5.62	0.0	
J10144.4	JUNCTION	179.87	5.62	0.0	
J10244.4	JUNCTION	179.91	6.63	0.0	
J103	JUNCTION	183.15	4.50	51000.0	
J10344.4	JUNCTION	179.97	6.63	0.0	
J103B	JUNCTION	185.62	2.00	0.0	
J10444.3	JUNCTION	180.15	5.32	0.0	
J10475.3	JUNCTION	180.15	5.20	0.0	
J105	JUNCTION	182.23	4.00	0.0	
J10500	JUNCTION	180.10	5.51	0.0	
J10614.5	JUNCTION	180.10	5.30	0.0	
J10679.3	JUNCTION	179.50	5.19	0.0	
J10694.8	JUNCTION	179.55	6.16	0.0	
J107	JUNCTION	183.32	4.88	52000.0	
J10749	JUNCTION	180.15	6.02	0.0	
J10848.5	JUNCTION	180.20	6.02	0.0	
J109	JUNCTION	182.73	3.77	56000.0	
J110	JUNCTION	181.96	6.64	90000.0	
J11048.5	JUNCTION	180.30	5.77	0.0	
J112	JUNCTION	180.28	3.32	72923.0	
J11248.4	JUNCTION	180.40	5.85	0.0	
J113	JUNCTION	182.34	4.66	73000.0	
J11448.4	JUNCTION	180.50	5.85	0.0	
J1145	JUNCTION	185.30	3.00	113000.0	
J11648.4	JUNCTION	180.75	5.24	0.0	
J116A	JUNCTION	182.09	2.81	44000.0	
J11748.1	JUNCTION	181.10	5.92	0.0	
J118	JUNCTION	182.60	3.00	263000.0	
J11848.1	JUNCTION	181.40	5.96	0.0	
J11881.3	JUNCTION	181.48	6.61	0.0	
J11896.4	JUNCTION	180.40	7.71	0.0	
J11913.3	JUNCTION	180.40	6.62	0.0	
J11919.8	JUNCTION	180.70	6.32	0.0	
J11939.6	JUNCTION	180.90	6.23	0.0	
J11972.5	JUNCTION	180.92	5.45	0.0	
J12011.7	JUNCTION	180.94	5.31	0.0	
J12037.2	JUNCTION	181.06	6.26	0.0	
J12067.5	JUNCTION	181.07	4.54	0.0	
J12091.1	JUNCTION	181.08	6.45	0.0	
J12117.3	JUNCTION	181.09	6.49	0.0	

J12152.8	JUNCTION	181.10	6.47	0.0	
J12160.9	JUNCTION	181.50	6.04	0.0	
J12177.5	JUNCTION	181.50	6.28	0.0	
J12213.2	JUNCTION	181.54	6.27	0.0	
J12263.1	JUNCTION	181.54	5.91	0.0	
J12330.4	JUNCTION	181.60	5.84	0.0	
J12340	JUNCTION	181.60	5.84	0.0	
J12359.8	JUNCTION	181.73	5.72	0.0	
J12390.7	JUNCTION	181.77	5.72	0.0	
J12415.2	JUNCTION	181.98	5.15	0.0	Yes
J12418	JUNCTION	181.77	5.95	0.0	
J12442.1	JUNCTION	181.80	5.95	0.0	
J12491.9	JUNCTION	181.82	5.33	0.0	
J12524.2	JUNCTION	181.84	5.43	0.0	Yes
J12591.8	JUNCTION	181.86	5.43	0.0	
J12613.3	JUNCTION	181.90	5.39	0.0	
J12627.6	JUNCTION	182.10	5.03	0.0	
J12641.2	JUNCTION	182.15	4.99	0.0	
J12676.2	JUNCTION	182.30	5.23	0.0	Yes
J12795	JUNCTION	182.33	5.23	0.0	
J12955.5	JUNCTION	180.72	8.31	0.0	Yes
J13	JUNCTION	180.57	3.83	72923.0	
J18	JUNCTION	179.00	4.00	84000.0	
J19	JUNCTION	180.60	4.40	0.0	
J2	JUNCTION	182.04	4.86	72923.0	
J20	JUNCTION	180.30	2.70	40000.0	
J201	JUNCTION	180.29	1.50	8000.0	
J203	JUNCTION	180.85	3.00	74000.0	
J204A	JUNCTION	181.75	3.00	20000.0	
J204B	JUNCTION	182.85	1.00	32000.0	
J205	JUNCTION	182.90	2.00	0.0	
J207	JUNCTION	181.37	3.50	50000.0	
J208	JUNCTION	179.49	3.67	30000.0	
J209	JUNCTION	176.90	5.00	344000.0	
J21	JUNCTION	180.50	2.60	45000.0	
J22	JUNCTION	182.41	4.00	100000.0	
J23	JUNCTION	182.26	4.50	156000.0	
J3	JUNCTION	181.75	4.85	72923.0	
J301	JUNCTION	181.17	5.00	125000.0	
J302B	JUNCTION	180.39	2.97	40000.0	
J31	JUNCTION	180.50	2.40	44000.0	
J314A	JUNCTION	181.35	3.50	30000.0	
J314B	JUNCTION	181.94	3.50	12000.0	
J315	JUNCTION	180.90	3.50	40000.0	
J32	JUNCTION	181.54	2.35	0.0	
J33	JUNCTION	183.00	3.50	12000.0	
J34	JUNCTION	184.49	2.81	60000.0	
J35	JUNCTION	179.35	4.45	111000.0	
J36	JUNCTION	184.59	2.71	0.0	
J37	JUNCTION	181.50	2.20	70000.0	
J4	JUNCTION	181.46	5.04	72923.0	
J44	JUNCTION	180.65	3.00	144000.0	
J45	JUNCTION	182.80	2.30	0.0	
J46	JUNCTION	180.68	3.10	0.0	
J47	JUNCTION	178.72	4.43	0.0	
J48	JUNCTION	177.92	4.00	305000.0	
J5	JUNCTION	181.16	4.74	72923.0	
J50	JUNCTION	178.90	4.30	0.0	
J53	JUNCTION	187.60	1.50	0.0	
J56	JUNCTION	180.50	2.70	25000.0	
J58	JUNCTION	181.50	1.80	56000.0	
J59	JUNCTION	180.70	2.70	24000.0	
J6	JUNCTION	180.25	1.95	38000.0	
J61	JUNCTION	183.10	5.20	0.0	
J6318.4	JUNCTION	175.61	7.45	0.0	
J6357.5	JUNCTION	175.67	7.21	0.0	
J64	JUNCTION	182.50	2.90	39000.0	
J65	JUNCTION	182.56	3.04	0.0	
J6507.5	JUNCTION	175.83	7.29	0.0	
J66	JUNCTION	182.52	2.78	0.0	
J6653.2	JUNCTION	175.97	7.29	0.0	
J67	JUNCTION	182.47	2.73	0.0	
J68	JUNCTION	182.43	2.77	0.0	
J6801	JUNCTION	176.13	7.72	0.0	
J69	JUNCTION	182.39	2.81	0.0	
J7	JUNCTION	186.73	1.12	0.0	
J70	JUNCTION	182.35	2.85	0.0	
J7040.9	JUNCTION	176.40	7.72	0.0	
J7055.4	JUNCTION	176.50	7.27	0.0	

J71	JUNCTION	182.31	2.79	0.0	
J7157.8	JUNCTION	176.60	7.27	0.0	
J7307	JUNCTION	176.75	6.96	0.0	
J7357.6	JUNCTION	176.80	6.96	0.0	
J7564	JUNCTION	176.98	6.54	0.0	
J7578.9	JUNCTION	176.99	6.54	0.0	
J7681.8	JUNCTION	177.07	6.53	0.0	
J77	JUNCTION	182.51	5.73	0.0	
J7762.1	JUNCTION	177.14	6.28	0.0	
J7784.1	JUNCTION	177.15	6.50	0.0	
J78	JUNCTION	182.49	5.38	0.0	
J7885.5	JUNCTION	177.23	6.48	0.0	
J79	JUNCTION	182.47	5.04	0.0	
J8	JUNCTION	186.08	2.25	0.0	
J80	JUNCTION	182.45	4.69	100000.0	
J8086	JUNCTION	177.38	6.35	0.0	
J81	JUNCTION	182.43	4.35	100000.0	
J82	JUNCTION	181.89	6.31	0.0	
J8285.6	JUNCTION	177.53	6.26	0.0	
J83	JUNCTION	181.82	5.98	0.0	
J84	JUNCTION	181.75	5.65	0.0	
J8485.6	JUNCTION	177.67	6.29	0.0	
J85	JUNCTION	181.68	5.32	0.0	
J86	JUNCTION	181.61	4.99	0.0	
J8696.4	JUNCTION	177.81	6.29	0.0	
J87	JUNCTION	181.54	4.66	0.0	
J8716.3	JUNCTION	177.81	6.17	0.0	Yes
J8768.8	JUNCTION	177.84	6.17	0.0	
J88	JUNCTION	181.47	4.33	0.0	
J8872.8	JUNCTION	177.91	6.05	0.0	
J8915.1	JUNCTION	177.94	6.40	0.0	
J9	JUNCTION	180.87	4.33	72923.0	
J9023.5	JUNCTION	178.88	5.42	0.0	
J9036.3	JUNCTION	178.89	5.43	0.0	
J9058.4	JUNCTION	179.00	5.28	0.0	
J9090.7	JUNCTION	179.20	5.28	0.0	
J9204.3	JUNCTION	179.30	5.25	0.0	
J9223.6	JUNCTION	179.33	4.37	0.0	
J9243.4	JUNCTION	179.37	4.63	0.0	
J9283.1	JUNCTION	179.39	7.61	0.0	
J9294.7	JUNCTION	180.25	6.61	0.0	
J9313.3	JUNCTION	180.30	6.57	0.0	
J9338.7	JUNCTION	180.28	6.72	0.0	
J9385.8	JUNCTION	180.09	8.41	0.0	
J9499.8	JUNCTION	178.34	10.16	0.0	
J9528.4	JUNCTION	178.35	9.54	0.0	
J9563	JUNCTION	178.36	8.63	0.0	
J9597.4	JUNCTION	178.37	7.73	0.0	
J97	JUNCTION	180.91	3.09	73000.0	
J9789.2	JUNCTION	180.25	4.34	0.0	Yes
J9802	JUNCTION	180.31	3.58	0.0	
J9812.9	JUNCTION	180.40	3.84	0.0	
J9829.2	JUNCTION	180.43	3.89	0.0	
J9843.1	JUNCTION	180.47	4.06	0.0	
J9881.6	JUNCTION	180.54	4.25	0.0	
J9902.3	JUNCTION	180.53	4.26	0.0	
J9912	JUNCTION	180.57	4.01	0.0	
J9923.8	JUNCTION	180.60	4.18	0.0	
J9966.3	JUNCTION	180.60	4.36	0.0	
J6291.6	OUTFALL	175.65	7.40	0.0	
SU104	STORAGE	184.60	4.00	0.0	
SU108A	STORAGE	182.08	4.00	0.0	
SU108B	STORAGE	182.23	4.00	0.0	

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C100	J59	J8086	CONDUIT	45.7	1.4873	0.0130
C101	J58	J8485.6	CONDUIT	71.0	0.8062	0.0130
C103A	J103	J103B	CONDUIT	10.0	0.0030	0.0130
C107	J107	J11919.8	CONDUIT	158.5	1.3929	0.0130
C110_1	J110	J82	CONDUIT	119.1	0.0588	0.0130
C110_2	J82	J83	CONDUIT	119.1	0.0588	0.0130
C110_3	J83	J84	CONDUIT	119.1	0.0588	0.0130
C110_4	J84	J85	CONDUIT	119.1	0.0588	0.0130
C110_5	J85	J86	CONDUIT	119.1	0.0588	0.0130

C110_6	J86	J87	CONDUIT	119.1	0.0588	0.0130
C110_7	J87	J88	CONDUIT	119.1	0.0588	0.0130
C110_8	J88	J11648.4	CONDUIT	119.1	0.0588	0.0130
C113_1	J113	J2	CONDUIT	108.3	0.2715	0.0130
C113_2	J2	J3	CONDUIT	108.3	0.2715	0.0130
C113_3	J3	J4	CONDUIT	108.3	0.2715	0.0130
C113_4	J4	J5	CONDUIT	108.3	0.2706	0.0130
C113_5	J5	J9	CONDUIT	108.3	0.2715	0.0130
C113_6	J9	J13	CONDUIT	108.3	0.2715	0.0130
C113_7	J13	J112	CONDUIT	108.3	0.2716	0.0130
C25	J112	J10679.3	CONDUIT	66.1	0.2965	0.0240
C26	J19	J9597.4	CONDUIT	83.4	0.0959	0.0130
C27	J105	J12177.5	CONDUIT	47.0	0.7447	0.0130
C28	J105	J12177.5	CONDUIT	46.0	0.8196	0.0130
C29	J105	J12177.5	CONDUIT	65.0	0.4508	0.0130
C30	J105	J12177.5	CONDUIT	39.0	0.8975	0.0130
C31	J110	J23	CONDUIT	563.6	0.0248	0.0130
C32_1	J110	J77	CONDUIT	118.8	0.0160	0.0130
C32_2	J77	J78	CONDUIT	118.8	0.0160	0.0130
C32_3	J78	J79	CONDUIT	118.8	0.0160	0.0130
C32_4	J79	J80	CONDUIT	118.8	0.0168	0.0130
C32_5	J80	J81	CONDUIT	118.8	0.0160	0.0130
C32_6	J81	J22	CONDUIT	118.8	0.0160	0.0130
C33	J22	J12037.2	CONDUIT	107.2	0.6623	0.0130
C34	J23	J12037.2	CONDUIT	257.3	0.2177	0.0130
C35	J109	J23	CONDUIT	134.3	0.1042	0.0130
C36	J109	J11648.4	CONDUIT	308.1	-0.0214	0.0130
C38	J109	J23	CONDUIT	27.0	1.9448	0.0130
C39	SU108B	J11248.4	CONDUIT	75.0	0.5867	0.0130
C4_1	J1145	J61	CONDUIT	828.5	0.2655	0.0130
C4_2	J61	J118	CONDUIT	1169.5	0.0428	0.0800
C40	SU108A	J11648.4	CONDUIT	84.0	0.7631	0.0130
C44	J116A	J10016.1	CONDUIT	69.2	0.0679	0.0130
C47	J32	J9789.2	CONDUIT	83.2	1.1960	0.0240
C48	J33	J9313.3	CONDUIT	20.0	2.5008	0.0130
C49	J35	J9204.3	CONDUIT	45.8	0.1091	0.0130
C50	J34	J36	CONDUIT	35.2	-0.2784	0.0130
C51	J36	J35	CONDUIT	733.5	0.7144	0.0400
C52	J37	J9090.7	CONDUIT	109.2	1.5017	0.0130
C53	J37	J8915.1	CONDUIT	74.0	2.6900	0.0130
C54	J314B	J314A	CONDUIT	262.8	0.2253	0.0130
C55	J314A	J8285.6	CONDUIT	1249.7	0.3059	0.0130
C56	J315	J7885.5	CONDUIT	1072.5	0.1117	0.0130
C57	J301	J44	CONDUIT	659.7	0.0558	0.0130
C61_4	J97	J11048.5	CONDUIT	97.0	0.3743	0.0130
C62_1	J44	J01	CONDUIT	372.3	0.3782	0.0130
C62_2	J01	J8716.3	CONDUIT	219.5	0.3785	0.0130
C63	J302B	J8716.3	CONDUIT	676.2	0.2934	0.0130
C64	J204A	J207	CONDUIT	207.2	0.1559	0.0130
C65	J205	J204B	CONDUIT	226.5	0.0221	0.0300
C67	J207	J46	CONDUIT	589.5	0.1184	0.0130
C7_1	J118	J65	CONDUIT	55.3	0.0759	0.0500
C7_2	J65	J66	CONDUIT	55.3	0.0741	0.0500
C7_3	J66	J67	CONDUIT	55.3	0.0759	0.0500
C7_4	J67	J68	CONDUIT	55.3	0.0741	0.0500
C7_5	J68	J69	CONDUIT	55.3	0.0759	0.0500
C7_6	J69	J70	CONDUIT	55.3	0.0741	0.0500
C7_7	J70	J71	CONDUIT	55.3	0.0741	0.0500
C7_8	J71	J19	CONDUIT	55.3	0.0759	0.0500
C71	J208	J48	CONDUIT	329.0	0.4763	0.0130
C76	J201	J48	CONDUIT	999.1	0.2368	0.0130
C85	J204B	J45	CONDUIT	162.1	0.0309	0.0300
C89	J64	J11048.5	CONDUIT	78.8	1.1427	0.0130
C94	J6	J6507.5	CONDUIT	247.6	0.3029	0.0130
C95	J18	J7357.6	CONDUIT	77.5	1.0694	0.0130
C96	J20	J7564	CONDUIT	68.9	1.4538	0.0130
C97	J21	J6801	CONDUIT	128.5	0.3643	0.0130
C98	J31	J7040.9	CONDUIT	111.0	0.6209	0.0130
C99	J56	J7564	CONDUIT	121.8	0.4443	0.0130
Central_Deziel	J53	J7	CONDUIT	380.0	0.2289	0.0300
Central_ECR	J8	J12955.5	CONDUIT	1019.8	0.2040	0.0400
Central_ECR_Cul	J7	J8	CONDUIT	129.2	0.5031	0.0240
CJ10016.1	J10016.1	J9966.3	CONDUIT	49.9	0.0006	0.0420
CJ10066.1	J10066.1	J10016.1	CONDUIT	50.0	0.0006	0.0420
CJ10094.5	J10094.5	J10066.1	CONDUIT	28.3	0.8828	0.0390
CJ10144.4	J10144.4	J10094.5	CONDUIT	49.9	-1.9631	0.0380
CJ10244.4	J10244.4	J10144.4	CONDUIT	100.0	0.0400	0.0430
CJ10344.4	J10344.4	J10244.4	CONDUIT	100.0	0.0600	0.0400
CJ10444.3	J10444.3	J10344.4	CONDUIT	99.9	0.1802	0.0390

CJ10475.3	J10475.3	J10444.3	CONDUIT	30.5	0.0010	0.0390
CJ10500	J10500	J10475.3	CONDUIT	24.7	1.7831	0.0130
CJ10500_2	J10500	J10475.3	CONDUIT	24.7	1.7430	0.0130
CJ10614.5	J10614.5	J10500	CONDUIT	114.4	0.0003	0.0300
CJ10679.3	J10679.3	J10614.5	CONDUIT	64.8	0.0154	0.0300
CJ10694.8	J10694.8	J10679.3	CONDUIT	15.5	0.0020	0.0130
CJ10749	J10749	J10694.8	CONDUIT	54.2	0.0184	0.0410
CJ10848.5	J10848.5	J10749	CONDUIT	99.5	0.0503	0.0410
CJ11048.5	J11048.5	J10848.5	CONDUIT	200.0	0.0500	0.0400
CJ11248.4	J11248.4	J11048.5	CONDUIT	200.0	0.0500	0.0420
CJ11448.4	J11448.4	J11248.4	CONDUIT	200.0	0.0500	0.0380
CJ11648.4	J11648.4	J11448.4	CONDUIT	200.0	0.1250	0.0390
CJ11748.1	J11748.1	J11648.4	CONDUIT	99.7	0.3509	0.0400
CJ11848.1	J11848.1	J11748.1	CONDUIT	100.0	0.2999	0.0300
CJ11881.3	J11881.3	J11848.1	CONDUIT	33.2	0.2413	0.0300
CJ11896.4	J11896.4	J11881.3	CONDUIT	15.1	0.1327	0.0300
CJ11913.3	J11913.3	J11896.4	CONDUIT	17.0	0.0018	0.0110
CJ11919.8	J11919.8	J11913.3	CONDUIT	6.5	0.0047	0.0300
CJ11939.6	J11939.6	J11919.8	CONDUIT	19.7	1.0137	0.0300
CJ11972.5	J11972.5	J11939.6	CONDUIT	32.9	0.0608	0.0300
CJ12011.7	J12011.7	J11972.5	CONDUIT	39.4	0.0508	0.0300
CJ12037.2	J12037.2	J12011.7	CONDUIT	25.5	0.1963	0.0110
CJ12067.5	J12067.5	J12037.2	CONDUIT	30.3	0.0330	0.0250
CJ12091.1	J12091.1	J12067.5	CONDUIT	23.6	0.0423	0.0250
CJ12117.3	J12117.3	J12091.1	CONDUIT	26.2	0.0381	0.0250
CJ12152.8	J12152.8	J12117.3	CONDUIT	35.2	0.0284	0.0250
CJ12160.9	J12160.9	J12152.8	CONDUIT	8.1	-0.6163	0.0110
CJ12177.5	J12177.5	J12160.9	CONDUIT	16.7	0.0600	0.0110
CJ12213.2	J12213.2	J12177.5	CONDUIT	35.6	0.0842	0.0250
CJ12263.1	J12263.1	J12213.2	CONDUIT	49.9	0.0601	0.0250
CJ12330.4	J12330.4	J12263.1	CONDUIT	67.2	0.1042	0.0250
CJ12340	J12340	J12330.4	CONDUIT	9.6	0.1043	0.0110
CJ12359.8	J12359.8	J12340	CONDUIT	19.9	0.6543	0.0250
CJ12390.7	J12390.7	J12359.8	CONDUIT	31.0	0.1292	0.0250
CJ12415.2	J12415.2	J12390.7	CONDUIT	24.3	0.8639	0.0250
CJ12418	J12418	J12415.2	CONDUIT	2.8	0.7097	0.0250
CJ12442.1	J12442.1	J12418	CONDUIT	24.3	0.1237	0.0250
CJ12491.9	J12491.9	J12442.1	CONDUIT	49.9	0.0401	0.0250
CJ12524.2	J12524.2	J12491.9	CONDUIT	32.3	0.0619	0.0250
CJ12591.8	J12591.8	J12524.2	CONDUIT	67.5	0.0296	0.0250
CJ12613.3	J12613.3	J12591.8	CONDUIT	21.5	0.1861	0.0250
CJ12627.6	J12627.6	J12613.3	CONDUIT	14.4	1.3940	0.0250
CJ12641.2	J12641.2	J12627.6	CONDUIT	13.5	0.3921	0.0250
CJ12676.2	J12676.2	J12641.2	CONDUIT	35.1	0.3992	0.0300
CJ12795	J12795	J12676.2	CONDUIT	118.8	0.0253	0.0300
CJ12894.8	J12955.5	J12795	CONDUIT	99.8	0.0601	0.0300
CJ6318.4	J6318.4	J6291.6	CONDUIT	26.8	0.0374	0.0150
CJ6357.5	J6357.5	J6318.4	CONDUIT	39.1	0.0256	0.0150
CJ6507.5	J6507.5	J6357.5	CONDUIT	149.8	0.1068	0.0150
CJ6653.2	J6653.2	J6507.5	CONDUIT	145.7	0.0961	0.0150
CJ6801	J6801	J6653.2	CONDUIT	147.7	0.1097	0.0150
CJ7026.4	J7040.9	J6801	CONDUIT	239.9	0.1117	0.0150
CJ7055.4	J7055.4	J7040.9	CONDUIT	14.6	0.6870	0.0150
CJ7157.8	J7157.8	J7055.4	CONDUIT	102.4	0.0977	0.0150
CJ7307	J7307	J7157.8	CONDUIT	149.0	0.1007	0.0150
CJ7357.6	J7357.6	J7307	CONDUIT	50.8	0.0984	0.0150
CJ7564	J7564	J7357.6	CONDUIT	206.4	0.0872	0.0150
CJ7578.9	J7578.9	J7564	CONDUIT	14.8	0.0674	0.0150
CJ7681.8	J7681.8	J7578.9	CONDUIT	103.0	0.0680	0.0150
CJ7762.1	J7762.1	J7681.8	CONDUIT	80.3	0.0872	0.0150
CJ7784.1	J7784.1	J7762.1	CONDUIT	22.0	0.0455	0.0150
CJ7885.5	J7885.5	J7784.1	CONDUIT	101.5	0.0789	0.0150
CJ8086	J8086	J7885.5	CONDUIT	200.3	0.0749	0.0150
CJ8285.6	J8285.6	J8086	CONDUIT	199.7	0.0751	0.0150
CJ8485.6	J8485.6	J8285.6	CONDUIT	200.0	0.0700	0.0150
CJ8696.4	J8696.4	J8485.6	CONDUIT	210.8	0.0664	0.0150
CJ8716.3	J8716.3	J8696.4	CONDUIT	20.0	0.0015	0.0150
CJ8768.8	J8768.8	J8716.3	CONDUIT	52.5	0.0571	0.0150
CJ8872.8	J8872.8	J8768.8	CONDUIT	104.0	0.0865	0.0150
CJ8915.1	J8915.1	J8872.8	CONDUIT	42.3	0.0638	0.0150
CJ9023.5	J9023.5	J8915.1	CONDUIT	108.4	0.8489	0.0300
CJ9036.3	J9036.3	J9023.5	CONDUIT	12.8	0.0781	0.0300
CJ9058.4	J9058.4	J9036.3	CONDUIT	22.1	0.4983	0.0300
CJ9090.7	J9090.7	J9058.4	CONDUIT	32.2	0.6204	0.0300
CJ9204.3	J9204.3	J9090.7	CONDUIT	113.6	0.0880	0.0300
CJ9223.6	J9223.6	J9204.3	CONDUIT	19.3	0.2595	0.0200
CJ9243.4	J9243.4	J9223.6	CONDUIT	19.8	0.2015	0.0250
CJ9283.1	J9283.1	J9243.4	CONDUIT	39.7	0.0504	0.0200
CJ9294.7	J9294.7	J9283.1	CONDUIT	11.5	0.1733	0.0250

CJ9313.3	J9313.3	J9294.7	CONDUIT	18.6	0.2685	0.0250
CJ9338.7	J9338.7	J9313.3	CONDUIT	19.3	-0.1036	0.0300
CJ9385.8	J9385.8	J9338.7	CONDUIT	47.1	0.2547	0.0300
CJ9499.8	J9499.8	J9385.8	CONDUIT	114.0	0.0368	0.0250
CJ9528.4	J9528.4	J9499.8	CONDUIT	28.6	0.0349	0.0180
CJ9563	J9563	J9528.4	CONDUIT	34.4	0.0290	0.0180
CJ9597.4	J9597.4	J9563	CONDUIT	34.4	0.0290	0.0180
CJ9789.2	J9789.2	J9597.4	CONDUIT	185.9	0.0409	0.0250
CJ9802	J9802	J9789.2	CONDUIT	12.9	0.4668	0.0200
CJ9812.9	J9812.9	J9802	CONDUIT	10.9	0.8260	0.0110
CJ9829.2	J9829.2	J9812.9	CONDUIT	16.4	0.1834	0.0290
CJ9843.1	J9843.1	J9829.2	CONDUIT	13.9	0.2880	0.0390
CJ9881.6	J9881.6	J9843.1	CONDUIT	38.5	0.1819	0.0350
CJ9902.3	J9902.3	J9881.6	CONDUIT	20.8	0.0015	0.0500
CJ9912	J9912	J9902.3	CONDUIT	9.7	0.1032	0.0110
CJ9923.8	J9923.8	J9912	CONDUIT	11.8	0.2542	0.0400
CJ9966.3	J9966.3	J9923.8	CONDUIT	42.4	0.0007	0.0400
Northway_Cleary	J46	J47	CONDUIT	874.8	0.2235	0.0130
Northway_Mark1	J203	J46	CONDUIT	139.7	0.1231	0.0130
Northway_Mark2	J45	J203	CONDUIT	962.1	0.2030	0.0130
Northway_Trunk1	J209	J6507.5	CONDUIT	456.6	0.1187	0.0130
Northway_Trunk2	J48	J209	CONDUIT	792.6	0.1287	0.0130
Northway_Trunk3	J47	J48	CONDUIT	407.6	0.1963	0.0130
Northway_Trunk4	J50	J47	CONDUIT	283.4	0.0424	0.0130
Temple_Open	J103B	J12795	CONDUIT	468.4	0.7030	0.0800
P5	J103	J103B	TYPE2 PUMP			
Rhodes_SWMP1	SU104	J53	TYPE1 PUMP			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C100	CIRCULAR	1.05	0.87	0.26	1.05	1	3.33
C101	CIRCULAR	1.05	0.87	0.26	1.05	1	2.45
C103A	CIRCULAR	0.70	0.38	0.17	0.70	1	0.05
C107	CIRCULAR	1.50	1.77	0.38	1.50	1	8.34
C110_1	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_2	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_3	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_4	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_5	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_6	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_7	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C110_8	CIRCULAR	1.95	2.99	0.49	1.95	1	3.45
C113_1	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_2	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_3	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_4	CIRCULAR	1.80	2.54	0.45	1.80	1	5.98
C113_5	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_6	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C113_7	CIRCULAR	1.80	2.54	0.45	1.80	1	5.99
C25	CIRCULAR	1.05	0.87	0.26	1.05	1	0.81
C26	RECT_CLOSED	2.44	10.42	0.78	4.27	1	20.97
C27	CIRCULAR	1.50	1.77	0.38	1.50	1	6.10
C28	CIRCULAR	0.68	0.36	0.17	0.68	1	0.76
C29	CIRCULAR	1.50	1.77	0.38	1.50	1	4.75
C30	CIRCULAR	0.45	0.16	0.11	0.45	1	0.27
C31	CIRCULAR	0.90	0.64	0.23	0.90	1	0.29
C32_1	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_2	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_3	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_4	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_5	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C32_6	CIRCULAR	0.68	0.36	0.17	0.68	1	0.11
C33	CIRCULAR	0.68	0.36	0.17	0.68	1	0.68
C34	CIRCULAR	0.90	0.64	0.23	0.90	1	0.84
C35	CIRCULAR	0.90	0.64	0.23	0.90	1	0.58
C36	CIRCULAR	0.82	0.53	0.21	0.82	1	0.21
C38	CIRCULAR	0.45	0.16	0.11	0.45	1	0.40
C39	CIRCULAR	1.05	0.87	0.26	1.05	1	2.09
C4_1	CIRCULAR	1.50	1.77	0.38	1.50	1	3.64
C4_2	TRAPEZOIDAL	3.00	19.50	1.52	11.00	1	6.67
C40	CIRCULAR	0.60	0.28	0.15	0.60	1	0.54
C44	CIRCULAR	0.68	0.36	0.17	0.68	1	0.22
C47	HORIZ_ELLIPSE	1.50	2.86	0.46	2.10	1	7.75
C48	CIRCULAR	0.90	0.64	0.23	0.90	1	2.86

C49	CIRCULAR	1.05	0.87	0.26	1.05	1	0.90
C50	CIRCULAR	1.20	1.13	0.30	1.20	1	2.06
C51	TRAPEZOIDAL	2.50	11.87	1.19	8.50	1	28.12
C52	CIRCULAR	1.35	1.43	0.34	1.35	1	6.54
C53	CIRCULAR	1.50	1.77	0.38	1.50	1	11.60
C54	CIRCULAR	0.75	0.44	0.19	0.75	1	0.53
C55	CIRCULAR	1.50	1.77	0.38	1.50	1	3.91
C56	CIRCULAR	1.05	0.87	0.26	1.05	1	0.91
C57	CIRCULAR	1.82	2.62	0.46	1.82	1	2.82
C61_4	CIRCULAR	1.20	1.13	0.30	1.20	1	2.39
C62_1	CIRCULAR	1.82	2.62	0.46	1.82	1	7.34
C62_2	CIRCULAR	1.82	2.62	0.46	1.82	1	7.34
C63	CIRCULAR	2.13	3.55	0.53	2.13	1	9.69
C64	CIRCULAR	1.20	1.13	0.30	1.20	1	1.54
C65	TRAPEZOIDAL	1.00	4.00	0.62	6.00	1	1.44
C67	CIRCULAR	0.90	0.64	0.23	0.90	1	0.62
C7_1	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_2	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_3	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_4	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_5	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C7_6	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_7	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	16.90
C7_8	TRAPEZOIDAL	2.50	24.37	1.44	16.00	1	17.10
C71	CIRCULAR	1.50	1.77	0.38	1.50	1	4.88
C76	CIRCULAR	1.50	1.77	0.38	1.50	1	3.44
C85	TRAPEZOIDAL	1.00	4.00	0.62	6.00	1	1.70
C89	CIRCULAR	0.90	0.64	0.23	0.90	1	1.94
C94	CIRCULAR	1.05	0.87	0.26	1.05	1	1.50
C95	CIRCULAR	1.20	1.13	0.30	1.20	1	4.03
C96	CIRCULAR	1.00	0.79	0.25	1.00	1	2.89
C97	CIRCULAR	1.05	0.87	0.26	1.05	1	1.65
C98	CIRCULAR	1.05	0.87	0.26	1.05	1	2.15
C99	CIRCULAR	0.90	0.64	0.23	0.90	1	1.21
Central_Deziel	TRIANGULAR	1.00	1.50	0.42	3.00	1	1.33
Central_ECR	TRAPEZOIDAL	2.25	9.84	1.08	7.75	1	11.70
Central_ECR_Cul	HORIZ_ELLIPSE	1.12	1.59	0.34	1.83	1	2.31
CJ10016.1	10016.1	4.36	148.70	0.95	200.00	1	8.44
CJ10066.1	10066.1	4.71	141.51	1.59	115.56	1	11.35
CJ10094.5	10094.5	4.32	145.13	1.63	118.63	1	483.80
CJ10144.4	10144.4	5.62	330.22	1.79	200.00	1	1796.91
CJ10244.4	10244.4	5.42	237.44	1.58	200.00	1	149.59
CJ10344.4	10344.4	6.63	616.11	1.56	400.00	1	506.41
CJ10444.3	10444.3	5.32	208.72	1.68	200.00	1	321.34
CJ10475.3	10461.3	4.85	170.86	2.49	100.00	1	25.42
CJ10500	ARCH	2.50	8.67	0.75	4.40	1	73.35
CJ10500_2	ARCH	2.50	8.67	0.75	4.40	1	72.52
CJ10614.5	10614.5	5.30	295.95	1.35	200.00	1	19.71
CJ10679.3	10664.7	4.33	81.94	1.67	75.09	1	47.83
CJ10694.8	RECT_CLOSED	3.50	17.50	1.03	5.00	1	6.08
CJ10749	10749	5.57	200.08	1.92	134.91	1	102.34
CJ10848.5	10848.5	6.02	172.15	2.10	200.00	1	154.20
CJ11048.5	11048.5	5.60	129.26	0.63	200.00	1	53.20
CJ11248.4	11248.4	5.77	168.37	2.28	119.70	1	155.51
CJ11448.4	11448.4	5.85	214.70	2.10	119.27	1	207.25
CJ11648.4	11648.4	5.24	167.95	1.53	200.00	1	202.13
CJ11748.1	11748.1	5.22	219.15	1.07	200.00	1	339.91
CJ11848.1	11848.1	5.92	298.19	2.15	200.00	1	905.74
CJ11881.3	11881.3	5.96	327.52	2.18	200.00	1	902.49
CJ11896.4	11896.4	6.61	271.64	2.14	113.20	1	547.34
CJ11913.3	RECT_CLOSED	4.00	18.00	1.06	4.50	1	7.21
CJ11919.8	11919.8	6.32	282.12	1.77	200.00	1	94.39
CJ11939.6	11939.6	6.23	261.81	1.86	121.22	1	1327.51
CJ11972.5	11972.5	5.42	209.98	1.22	200.00	1	196.54
CJ12011.7	12006.2	5.25	115.35	1.86	114.39	1	130.92
CJ12037.2	RECT_CLOSED	2.00	6.00	0.60	3.00	1	17.19
CJ12067.5	12067.5	4.49	122.44	1.37	99.81	1	109.80
CJ12091.1	12091.1	4.22	99.14	1.27	99.99	1	95.73
CJ12117.3	12117.3	6.45	358.99	1.61	153.08	1	385.36
CJ12152.8	12148.1	5.51	289.19	1.45	131.29	1	249.71
CJ12160.9	CIRCULAR	2.50	4.91	0.63	2.50	1	25.61
CJ12177.5	MODBASKETHANDLE	5.00	18.28	1.12	4.00	1	43.99
CJ12213.2	12213.2	6.27	182.18	2.35	99.93	1	374.09
CJ12263.1	12263.1	5.88	248.68	1.61	200.00	1	334.78
CJ12330.4	12314	5.80	178.35	1.52	200.00	1	305.00
CJ12340	RECT_CLOSED	3.00	15.00	0.94	5.00	1	42.20
CJ12359.8	12359.8	5.60	224.51	1.44	200.00	1	928.49
CJ12390.7	12390.7	5.72	296.57	1.67	200.00	1	601.13
CJ12415.2	12415.2	3.82	93.78	1.40	66.08	1	435.86

CJ12418	12417	1.05	5.23	0.30	8.59	1	7.90
CJ12442.1	12442.1	5.95	115.92	2.72	31.01	1	318.08
CJ12491.9	12491.9	3.80	53.86	1.96	27.26	1	67.65
CJ12524.2	12524.2	5.33	248.92	1.54	151.89	1	330.50
CJ12591.8	12591.8	5.43	352.26	1.24	200.00	1	280.60
CJ12613.3	12613.3	5.39	354.08	1.24	199.65	1	705.19
CJ12627.6	12627.6	5.03	313.81	0.94	199.68	1	1420.68
CJ12641.2	RECT_CLOSED	3.05	9.30	0.76	3.05	1	19.45
CJ12676.2	12676.2	4.98	370.24	1.49	200.00	1	1015.96
CJ12795	12795	5.23	353.85	1.36	200.00	1	229.70
CJ12894.8	12894.8	3.78	60.29	1.07	109.60	1	51.41
CJ6318.4	6318.4	7.40	318.35	1.94	200.00	1	637.51
CJ6357.5	6357.5	7.17	214.32	2.55	194.96	1	426.87
CJ6507.5	6507.5	7.21	269.82	2.11	200.00	1	967.19
CJ6653.2	6650.9	7.29	231.92	1.93	199.63	1	741.92
CJ6801	6727.3	4.12	58.25	1.55	15.54	1	172.38
CJ7026.4	7026.4	7.72	315.30	2.11	199.45	1	1156.43
CJ7055.4	7048.6	4.39	60.25	1.36	21.19	1	407.74
CJ7157.8	7157.8	7.27	255.82	2.20	199.99	1	902.51
CJ7307	7307	6.08	173.18	2.15	200.00	1	609.73
CJ7357.6	7357.6	6.96	225.17	2.19	200.00	1	793.29
CJ7564	7549.2	6.54	196.07	2.16	200.00	1	645.15
CJ7578.9	7571	4.59	64.07	1.46	20.77	1	142.60
CJ7681.8	7681.8	6.53	194.21	2.14	197.45	1	561.22
CJ7762.1	7747.7	6.28	163.88	2.32	200.00	1	565.38
CJ7784.1	7772.9	4.46	57.37	1.39	19.45	1	101.59
CJ7885.5	7885.5	6.48	169.61	2.22	200.01	1	541.06
CJ8086	8086	6.35	178.27	2.17	200.00	1	545.99
CJ8285.6	8285.6	6.26	189.31	1.95	200.00	1	540.08
CJ8485.6	8485.6	6.22	177.24	2.04	200.00	1	503.70
CJ8696.4	8681.6	6.29	178.29	2.12	200.00	1	505.28
CJ8716.3	8706.5	4.30	58.06	1.32	21.07	1	18.16
CJ8768.8	8768.8	6.17	181.91	1.92	198.78	1	447.48
CJ8872.8	8858.2	6.03	157.22	2.11	198.82	1	506.76
CJ8915.1	8894.2	4.12	54.75	1.53	14.63	1	122.60
CJ9023.5	9005.1	5.15	99.10	1.03	99.20	1	310.38
CJ9036.3	9030.1	4.08	54.11	1.50	14.61	1	66.13
CJ9058.4	9058.4	4.94	138.98	0.69	200.00	1	254.34
CJ9090.7	9090.7	5.28	213.96	1.21	200.00	1	638.22
CJ9204.3	9140.7	5.25	248.37	1.14	198.52	1	268.20
CJ9223.6	9214.6	3.00	22.87	1.10	8.00	1	61.93
CJ9243.4	9235.2	4.05	69.30	0.96	100.00	1	121.01
CJ9283.1	9263.1	4.53	15.95	1.06	4.88	1	18.61
CJ9294.7	9294.7	6.61	164.81	1.87	165.09	1	416.96
CJ9313.3	9303.7	3.62	14.39	1.02	4.88	1	30.17
CJ9338.7	9338.7	6.57	156.36	2.56	125.74	1	313.98
CJ9385.8	9370.6	6.52	172.92	3.00	122.77	1	604.87
CJ9499.8	9442.9	2.42	30.47	1.02	12.80	1	23.78
CJ9528.4	9528.4	9.54	444.72	3.20	152.45	1	1002.56
CJ9563	9581	7.45	270.31	2.44	142.38	1	463.84
CJ9597.4	9581	7.45	270.31	2.44	142.38	1	463.84
CJ9789.2	9680.9	2.47	26.69	1.02	10.97	1	21.81
CJ9802	9802	3.58	69.03	1.97	100.00	1	370.13
CJ9812.9	RECT_CLOSED	3.00	15.00	0.94	5.00	1	118.74
CJ9829.2	9829.2	3.84	66.74	0.94	100.00	1	94.25
CJ9843.1	9843.1	3.89	56.89	1.13	99.70	1	84.92
CJ9881.6	9881.6	4.06	75.90	1.23	100.00	1	105.94
CJ9902.3	9902.3	4.25	93.74	1.34	100.00	1	8.72
CJ9912	RECT_CLOSED	2.50	12.50	0.83	5.00	1	32.33
CJ9923.8	9923.8	3.91	56.97	1.05	99.32	1	74.40
CJ9966.3	9966.3	4.18	78.17	1.24	100.00	1	6.04
Northway_Cleary	CIRCULAR	2.25	3.98	0.56	2.25	1	9.85
Northway_Mark1	CIRCULAR	1.65	2.14	0.41	1.65	1	3.20
Northway_Mark2	CIRCULAR	1.65	2.14	0.41	1.65	1	4.11
Northway_Trunk1	RECT_CLOSED	2.42	5.88	0.61	2.42	1	11.17
Northway_Trunk2	RECT_CLOSED	2.42	5.88	0.61	2.42	1	11.63
Northway_Trunk3	RECT_CLOSED	2.10	6.30	0.62	3.00	1	15.57
Northway_Trunk4	CIRCULAR	1.95	2.99	0.49	1.95	1	2.93
Temple_Open	TRAPEZOIDAL	1.50	6.00	0.78	7.00	1	5.32

****
Shape Summary
****

Shape 12417
Area:

0.0006	0.0025	0.0057	0.0101	0.0158
0.0227	0.0309	0.0403	0.0511	0.0630

0.0761	0.0903	0.1056	0.1218	0.1387
0.1565	0.1751	0.1945	0.2146	0.2352
0.2564	0.2780	0.3001	0.3225	0.3454
0.3686	0.3923	0.4168	0.4420	0.4678
0.4945	0.5218	0.5498	0.5787	0.6084
0.6388	0.6700	0.7017	0.7338	0.7664
0.7993	0.8328	0.8666	0.9008	0.9313
0.9561	0.9753	0.9890	0.9973	1.0000

Hrad:

0.0346	0.0692	0.1038	0.1383	0.1729
0.2075	0.2421	0.2767	0.3113	0.3478
0.3861	0.4238	0.4620	0.5069	0.5509
0.5940	0.6363	0.6780	0.7263	0.7751
0.8232	0.8731	0.9249	0.9761	1.0265
1.0755	1.1130	1.1479	1.1827	1.2176
1.2523	1.2870	1.3196	1.3506	1.3818
1.4143	1.4538	1.5008	1.5473	1.5934
1.6392	1.6846	1.7297	1.7235	1.5419
1.3958	1.2770	1.1739	1.0825	1.0000

Width:

0.0366	0.0732	0.1099	0.1465	0.1831
0.2197	0.2564	0.2930	0.3296	0.3641
0.3959	0.4278	0.4588	0.4819	0.5051
0.5282	0.5514	0.5746	0.5912	0.6066
0.6221	0.6354	0.6465	0.6577	0.6689
0.6806	0.6998	0.7207	0.7416	0.7624
0.7833	0.8042	0.8265	0.8499	0.8733
0.8960	0.9139	0.9265	0.9392	0.9519
0.9645	0.9772	0.9899	0.9670	0.8023
0.6383	0.4787	0.3191	0.1596	0.0000

Shape 1616.8
Area:

0.0153	0.0308	0.0467	0.0630	0.0795
0.0964	0.1135	0.1310	0.1488	0.1670
0.1854	0.2042	0.2233	0.2427	0.2624
0.2825	0.3028	0.3235	0.3445	0.3657
0.3868	0.4079	0.4291	0.4502	0.4714
0.4925	0.5137	0.5348	0.5560	0.5771
0.5982	0.6194	0.6405	0.6617	0.6828
0.7040	0.7251	0.7463	0.7674	0.7886
0.8097	0.8308	0.8520	0.8731	0.8943
0.9154	0.9366	0.9577	0.9789	1.0000

Hrad:

0.0454	0.0899	0.1334	0.1760	0.2177
0.2587	0.2989	0.3385	0.3774	0.4156
0.4533	0.4904	0.5270	0.5630	0.5986
0.6338	0.6685	0.7028	0.7371	0.7784
0.8194	0.8599	0.9000	0.9397	0.9791
1.0181	1.0566	1.0949	1.1327	1.1702
1.2073	1.2441	1.2806	1.3167	1.3524
1.3879	1.4230	1.4578	1.4923	1.5264
1.5603	1.5938	1.6271	1.6600	1.6927
1.7251	1.7571	1.7889	1.8205	1.0000

Width:

0.7293	0.7444	0.7595	0.7746	0.7897
0.8047	0.8198	0.8349	0.8500	0.8650
0.8801	0.8952	0.9103	0.9254	0.9404
0.9555	0.9706	0.9857	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 2244_1
Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0512	0.1012	0.1500	0.1978	0.2445
0.2902	0.3348	0.3785	0.4213	0.4632
0.5042	0.5444	0.5837	0.6223	0.6600
0.6971	0.7334	0.7690	0.8039	0.8381
0.8717	0.9047	0.9370	0.9688	1.0000
1.0306	1.0607	1.0902	1.1193	1.1478
1.1758	1.2034	1.2305	1.2571	1.2833
1.3090	1.3343	1.3593	1.3838	1.4079
1.4316	1.4550	1.4780	1.5006	1.5229
1.5449	1.5665	1.5878	1.6088	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 2244_2
Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0512	0.1012	0.1500	0.1978	0.2445
0.2902	0.3348	0.3785	0.4213	0.4632
0.5042	0.5444	0.5837	0.6223	0.6600
0.6971	0.7334	0.7690	0.8039	0.8381
0.8717	0.9047	0.9370	0.9688	1.0000
1.0306	1.0607	1.0902	1.1193	1.1478
1.1758	1.2034	1.2305	1.2571	1.2833
1.3090	1.3343	1.3593	1.3838	1.4079
1.4316	1.4550	1.4780	1.5006	1.5229
1.5449	1.5665	1.5878	1.6088	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 3279
Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0460	0.0915	0.1363	0.1807	0.2244
0.2677	0.3104	0.3526	0.3944	0.4356
0.4763	0.5166	0.5563	0.5957	0.6345
0.6730	0.7110	0.7485	0.7856	0.8224
0.8587	0.8946	0.9301	0.9652	0.9999
1.0343	1.0683	1.1019	1.1352	1.1681
1.2007	1.2329	1.2648	1.2963	1.3276
1.3585	1.3891	1.4194	1.4493	1.4790
1.5084	1.5375	1.5663	1.5948	1.6230

1.6510	1.6786	1.7061	1.7332	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9999	0.9999
0.9999	0.9999	0.9999	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9998
0.9998	0.9998	0.9998	0.9998	0.9997
0.9997	0.9997	0.9997	0.9997	0.9997
0.9997	0.9997	0.9997	0.9997	0.9997

Shape 6231.8

Area:

0.0015	0.0033	0.0054	0.0077	0.0103
0.0133	0.0246	0.0471	0.0697	0.0924
0.1153	0.1383	0.1615	0.1847	0.2081
0.2317	0.2553	0.2791	0.3028	0.3266
0.3503	0.3741	0.3978	0.4216	0.4453
0.4691	0.4928	0.5165	0.5403	0.5640
0.5878	0.6115	0.6353	0.6590	0.6828
0.7065	0.7303	0.7540	0.7778	0.8011
0.8234	0.8451	0.8664	0.8871	0.9072
0.9269	0.9460	0.9645	0.9825	1.0000

Hrad:

0.0464	0.0859	0.1211	0.1536	0.1840
0.1556	0.0559	0.1061	0.1558	0.2050
0.2536	0.3018	0.3495	0.3968	0.4436
0.4900	0.5359	0.5825	0.6286	0.6744
0.7196	0.7643	0.8086	0.8524	0.8958
0.9387	0.9812	1.0232	1.0649	1.1061
1.1469	1.1872	1.2272	1.2668	1.3060
1.3448	1.3833	1.4213	1.4590	1.4371
1.4492	1.4599	1.4693	1.4774	1.4844
1.4903	1.4951	1.4989	1.5018	1.0000

Width:

0.0701	0.0813	0.0924	0.1035	0.1146
0.1775	0.9436	0.9492	0.9548	0.9604
0.9659	0.9715	0.9771	0.9827	0.9883
0.9939	0.9994	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	0.9507
0.9281	0.9055	0.8829	0.8603	0.8377
0.8151	0.7925	0.7699	0.7473	0.7247

Shape 6727.3

Area:

0.0015	0.0062	0.0127	0.0213	0.0335
0.0491	0.0683	0.0894	0.1108	0.1324
0.1541	0.1761	0.1981	0.2200	0.2420
0.2640	0.2860	0.3079	0.3299	0.3519
0.3738	0.3958	0.4178	0.4398	0.4617
0.4837	0.5057	0.5277	0.5496	0.5716
0.5936	0.6155	0.6375	0.6595	0.6815
0.7034	0.7254	0.7474	0.7693	0.7913
0.8133	0.8353	0.8572	0.8792	0.9012
0.9232	0.9451	0.9671	0.9866	1.0000

Hrad:

0.0265	0.0529	0.0973	0.1079	0.1266
0.1484	0.1743	0.2208	0.2696	0.3176
0.3648	0.4119	0.4586	0.5043	0.5491
0.5931	0.6362	0.6784	0.7199	0.7606
0.8005	0.8396	0.8781	0.9158	0.9529
0.9892	1.0250	1.0601	1.0946	1.1285
1.1618	1.1945	1.2267	1.2584	1.2895
1.3202	1.3503	1.3799	1.4091	1.4377
1.4660	1.4938	1.5211	1.5481	1.5746
1.6007	1.6264	1.6518	1.4305	1.0000

Width:

0.1403	0.2806	0.3109	0.4720	0.6331
0.7942	0.9399	0.9680	0.9774	0.9868
0.9962	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.7495	0.4711

Shape 7048.6

Area:

0.0019	0.0043	0.0070	0.0102	0.0138
0.0204	0.0317	0.0439	0.0566	0.0698
0.0835	0.0977	0.1125	0.1278	0.1435
0.1598	0.1766	0.1939	0.2118	0.2301
0.2489	0.2683	0.2882	0.3085	0.3294
0.3508	0.3728	0.3952	0.4181	0.4416
0.4655	0.4900	0.5150	0.5405	0.5665
0.5930	0.6201	0.6476	0.6757	0.7042
0.7333	0.7629	0.7930	0.8236	0.8545
0.8850	0.9148	0.9439	0.9723	1.0000

Hrad:

0.0567	0.1029	0.1434	0.1805	0.2153
0.1354	0.1662	0.2200	0.2716	0.3215
0.3697	0.4165	0.4619	0.5063	0.5495
0.5919	0.6334	0.6741	0.7141	0.7535
0.7923	0.8306	0.8684	0.9057	0.9426
0.9791	1.0152	1.0511	1.0865	1.1217
1.1567	1.1914	1.2258	1.2600	1.2940
1.3278	1.3614	1.3948	1.4281	1.4612
1.4942	1.5270	1.5597	1.5951	1.6396
1.6638	1.6837	1.7014	1.7172	1.0000

Width:

0.0694	0.0827	0.0960	0.1093	0.1226
0.3041	0.3866	0.4031	0.4197	0.4363
0.4529	0.4694	0.4860	0.5026	0.5192
0.5357	0.5523	0.5689	0.5855	0.6020
0.6186	0.6352	0.6518	0.6683	0.6849
0.7015	0.7180	0.7346	0.7512	0.7678
0.7843	0.8009	0.8175	0.8341	0.8506
0.8672	0.8838	0.9004	0.9169	0.9335
0.9501	0.9666	0.9832	0.9974	0.9971
0.9764	0.9539	0.9313	0.9088	0.8863

Shape 7571

Area:

0.0019	0.0043	0.0070	0.0102	0.0139
0.0218	0.0334	0.0456	0.0583	0.0715
0.0853	0.0995	0.1143	0.1297	0.1455
0.1619	0.1788	0.1962	0.2142	0.2327
0.2517	0.2712	0.2913	0.3119	0.3330
0.3546	0.3768	0.3995	0.4227	0.4464
0.4707	0.4955	0.5208	0.5467	0.5730
0.5999	0.6273	0.6553	0.6838	0.7127
0.7420	0.7715	0.8012	0.8307	0.8597
0.8885	0.9169	0.9449	0.9726	1.0000

Hrad:

0.0549	0.0994	0.1384	0.1741	0.1661
0.1224	0.1705	0.2221	0.2716	0.3193
0.3655	0.4102	0.4538	0.4962	0.5377
0.5783	0.6180	0.6571	0.6955	0.7332
0.7705	0.8072	0.8435	0.8793	0.9147
0.9498	0.9846	1.0190	1.0531	1.0870
1.1206	1.1540	1.1871	1.2201	1.2528
1.2854	1.3178	1.3500	1.3821	1.4187
1.4597	1.5003	1.5407	1.5764	1.6106
1.6433	1.6745	1.7044	1.7329	1.0000

Width:

0.0717	0.0858	0.0998	0.1138	0.1650
0.3644	0.4002	0.4179	0.4356	0.4532
0.4709	0.4886	0.5063	0.5239	0.5416
0.5593	0.5769	0.5946	0.6123	0.6300
0.6476	0.6653	0.6830	0.7007	0.7183
0.7360	0.7537	0.7713	0.7890	0.8067
0.8244	0.8420	0.8597	0.8774	0.8951
0.9127	0.9304	0.9481	0.9657	0.9790
0.9880	0.9969	0.9946	0.9831	0.9716
0.9600	0.9485	0.9369	0.9254	0.9138

Shape 7772.9

Area:

0.0021	0.0046	0.0075	0.0109	0.0147
0.0216	0.0336	0.0465	0.0599	0.0738
0.0882	0.1031	0.1185	0.1343	0.1507

0.1675	0.1848	0.2026	0.2208	0.2396
0.2588	0.2786	0.2988	0.3195	0.3407
0.3623	0.3845	0.4071	0.4303	0.4539
0.4780	0.5025	0.5276	0.5532	0.5792
0.6057	0.6327	0.6602	0.6882	0.7166
0.7455	0.7747	0.8041	0.8338	0.8637
0.8939	0.9236	0.9527	0.9806	1.0000

Hrad:

0.0562	0.1021	0.1422	0.1790	0.2134
0.1338	0.1637	0.2177	0.2695	0.3196
0.3681	0.4151	0.4608	0.5053	0.5488
0.5914	0.6330	0.6739	0.7140	0.7535
0.7923	0.8306	0.8684	0.9056	0.9424
0.9788	1.0148	1.0505	1.0858	1.1208
1.1554	1.1898	1.2240	1.2579	1.2915
1.3250	1.3582	1.3912	1.4241	1.4567
1.4940	1.5348	1.5751	1.6150	1.6545
1.6908	1.7095	1.7224	1.6999	1.0000

Width:

0.0760	0.0902	0.1045	0.1187	0.1330
0.3284	0.4199	0.4360	0.4520	0.4681
0.4841	0.5001	0.5162	0.5322	0.5482
0.5643	0.5803	0.5964	0.6124	0.6284
0.6445	0.6605	0.6766	0.6926	0.7086
0.7247	0.7407	0.7567	0.7728	0.7888
0.8049	0.8209	0.8369	0.8530	0.8690
0.8851	0.9011	0.9171	0.9332	0.9492
0.9609	0.9689	0.9770	0.9851	0.9931
0.9966	0.9736	0.9480	0.8985	0.0000

Shape 8

Area:

0.0200	0.0400	0.0600	0.0800	0.1000
0.1200	0.1400	0.1600	0.1800	0.2000
0.2200	0.2400	0.2600	0.2800	0.3000
0.3200	0.3400	0.3600	0.3800	0.4000
0.4200	0.4400	0.4600	0.4800	0.5000
0.5200	0.5400	0.5600	0.5800	0.6000
0.6200	0.6400	0.6600	0.6800	0.7000
0.7200	0.7400	0.7600	0.7800	0.8000
0.8200	0.8400	0.8600	0.8800	0.9000
0.9200	0.9400	0.9600	0.9800	1.0000

Hrad:

0.0440	0.0877	0.1309	0.1739	0.2164
0.2587	0.3005	0.3421	0.3833	0.4241
0.4647	0.5049	0.5448	0.5844	0.6237
0.6626	0.7013	0.7396	0.7777	0.8155
0.8529	0.8901	0.9270	0.9637	1.0000
1.0361	1.0719	1.1074	1.1427	1.1777
1.2124	1.2469	1.2811	1.3151	1.3488
1.3823	1.4155	1.4485	1.4813	1.5138
1.5461	1.5782	1.6100	1.6416	1.6730
1.7042	1.7351	1.7659	1.7964	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 8706.5

Area:

0.0020	0.0043	0.0071	0.0103	0.0138
0.0193	0.0299	0.0422	0.0549	0.0682
0.0820	0.0963	0.1111	0.1264	0.1422
0.1586	0.1754	0.1927	0.2106	0.2290
0.2479	0.2672	0.2871	0.3076	0.3285
0.3499	0.3718	0.3943	0.4172	0.4407
0.4647	0.4892	0.5142	0.5397	0.5657
0.5922	0.6193	0.6468	0.6749	0.7034
0.7325	0.7621	0.7922	0.8228	0.8538
0.8848	0.9153	0.9453	0.9737	1.0000

Hrad:

0.0574	0.1045	0.1458	0.1835	0.2189

	0.1479	0.1575	0.2122	0.2648	0.3156
	0.3646	0.4122	0.4585	0.5035	0.5476
	0.5906	0.6328	0.6742	0.7149	0.7549
	0.7943	0.8332	0.8715	0.9094	0.9469
	0.9839	1.0206	1.0569	1.0929	1.1286
	1.1640	1.1992	1.2341	1.2688	1.3032
	1.3375	1.3715	1.4054	1.4391	1.4727
	1.5060	1.5393	1.5724	1.6054	1.6407
	1.6772	1.7120	1.7209	1.6737	1.0000
Width:					
	0.0696	0.0823	0.0950	0.1076	0.1203
	0.2602	0.3845	0.4008	0.4172	0.4335
	0.4498	0.4662	0.4825	0.4988	0.5151
	0.5315	0.5478	0.5641	0.5805	0.5968
	0.6131	0.6295	0.6458	0.6621	0.6785
	0.6948	0.7111	0.7275	0.7438	0.7601
	0.7765	0.7928	0.8091	0.8255	0.8418
	0.8581	0.8744	0.8908	0.9071	0.9234
	0.9398	0.9561	0.9724	0.9888	0.9969
	0.9844	0.9720	0.9430	0.8756	0.8082

Shape 8894.2

Area:					
	0.0015	0.0062	0.0126	0.0211	0.0332
	0.0489	0.0680	0.0891	0.1105	0.1321
	0.1539	0.1759	0.1979	0.2199	0.2418
	0.2638	0.2858	0.3078	0.3298	0.3518
	0.3738	0.3958	0.4178	0.4397	0.4617
	0.4837	0.5057	0.5277	0.5497	0.5717
	0.5937	0.6157	0.6376	0.6596	0.6816
	0.7036	0.7256	0.7476	0.7696	0.7916
	0.8135	0.8355	0.8575	0.8795	0.9015
	0.9235	0.9455	0.9675	0.9870	1.0000
Hrad:					
	0.0268	0.0535	0.0991	0.1088	0.1273
	0.1492	0.1755	0.2231	0.2720	0.3201
	0.3672	0.4149	0.4617	0.5076	0.5525
	0.5964	0.6395	0.6816	0.7230	0.7635
	0.8031	0.8421	0.8802	0.9176	0.9543
	0.9904	1.0257	1.0604	1.0945	1.1279
	1.1607	1.1930	1.2246	1.2558	1.2864
	1.3164	1.3459	1.3750	1.4035	1.4316
	1.4592	1.4864	1.5131	1.5394	1.5652
	1.5907	1.6158	1.6404	1.4174	1.0000
Width:					
	0.1405	0.2810	0.3060	0.4690	0.6320
	0.7950	0.9406	0.9649	0.9762	0.9875
	0.9989	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	0.7415	0.4374

Shape 9030.1

Area:					
	0.0012	0.0050	0.0110	0.0182	0.0291
	0.0439	0.0625	0.0841	0.1061	0.1281
	0.1501	0.1721	0.1941	0.2161	0.2381
	0.2601	0.2821	0.3041	0.3261	0.3481
	0.3702	0.3922	0.4142	0.4362	0.4582
	0.4802	0.5022	0.5242	0.5462	0.5682
	0.5902	0.6122	0.6342	0.6562	0.6782
	0.7003	0.7223	0.7443	0.7663	0.7883
	0.8103	0.8323	0.8543	0.8763	0.8983
	0.9203	0.9423	0.9643	0.9858	1.0000
Hrad:					
	0.0270	0.0540	0.0911	0.1095	0.1219
	0.1411	0.1655	0.2048	0.2556	0.3053
	0.3540	0.4016	0.4482	0.4938	0.5386
	0.5824	0.6253	0.6674	0.7086	0.7491
	0.7888	0.8277	0.8658	0.9033	0.9401
	0.9761	1.0116	1.0464	1.0805	1.1141
	1.1471	1.1795	1.2113	1.2426	1.2733
	1.3036	1.3333	1.3626	1.3913	1.4196
	1.4474	1.4748	1.5018	1.5283	1.5544
	1.5801	1.6054	1.6304	1.5084	1.0000

Width:

0.1130	0.2261	0.2935	0.4049	0.5827
0.7604	0.9247	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.8543	0.4381

Shape 9214.6

Area:

0.0048	0.0185	0.0347	0.0514	0.0685
0.0862	0.1044	0.1231	0.1422	0.1619
0.1821	0.2026	0.2233	0.2443	0.2653
0.2863	0.3073	0.3283	0.3493	0.3703
0.3913	0.4123	0.4332	0.4542	0.4752
0.4962	0.5172	0.5382	0.5592	0.5802
0.6012	0.6222	0.6432	0.6641	0.6851
0.7061	0.7271	0.7481	0.7691	0.7901
0.8111	0.8321	0.8531	0.8741	0.8950
0.9160	0.9370	0.9580	0.9790	1.0000

Hrad:

0.0274	0.0636	0.1148	0.1640	0.2116
0.2575	0.3021	0.3453	0.3873	0.4283
0.4701	0.5123	0.5536	0.5966	0.6389
0.6800	0.7200	0.7590	0.7969	0.8338
0.8699	0.9050	0.9392	0.9726	1.0051
1.0369	1.0679	1.0982	1.1278	1.1568
1.1850	1.2127	1.2397	1.2661	1.2919
1.3172	1.3420	1.3662	1.3900	1.4132
1.4360	1.4583	1.4802	1.5016	1.5227
1.5433	1.5635	1.5833	1.6028	1.0000

Width:

0.4545	0.7583	0.7822	0.8061	0.8300
0.8539	0.8778	0.9017	0.9256	0.9495
0.9684	0.9831	0.9978	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Shape 9263.1

Area:

0.0008	0.0031	0.0069	0.0123	0.0193
0.0277	0.0378	0.0493	0.0624	0.0771
0.0933	0.1110	0.1303	0.1511	0.1750
0.2027	0.2304	0.2581	0.2858	0.3135
0.3412	0.3689	0.3966	0.4243	0.4520
0.4797	0.5074	0.5351	0.5628	0.5905
0.6182	0.6459	0.6736	0.7010	0.7277
0.7536	0.7787	0.8031	0.8268	0.8496
0.8718	0.8931	0.9135	0.9323	0.9495
0.9652	0.9792	0.9901	0.9974	1.0000

Hrad:

0.0355	0.0711	0.1066	0.1421	0.1777
0.2132	0.2487	0.2843	0.3198	0.3554
0.3909	0.4264	0.4620	0.4975	0.4590
0.5154	0.5684	0.6184	0.6656	0.7102
0.7524	0.7925	0.8305	0.8667	0.9011
0.9339	0.9652	0.9952	1.0238	1.0511
1.0774	1.1025	1.1267	1.1447	1.1599
1.1733	1.1848	1.1948	1.2031	1.2101
1.2157	1.2200	1.2142	1.2040	1.1923
1.1793	1.1553	1.1128	1.0626	1.0000

Width:

0.0557	0.1113	0.1670	0.2226	0.2783
0.3340	0.3896	0.4453	0.5009	0.5566
0.6122	0.6679	0.7236	0.7792	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.9767	0.9493
0.9218	0.8944	0.8670	0.8396	0.8122

0.7847	0.7573	0.7078	0.6508	0.5939
0.5370	0.4563	0.3316	0.1855	0.0000

Shape 9303.7

Area:

0.0027	0.0110	0.0247	0.0438	0.0659
0.0882	0.1108	0.1336	0.1566	0.1800
0.2038	0.2280	0.2524	0.2769	0.3015
0.3260	0.3505	0.3751	0.3996	0.4242
0.4487	0.4733	0.4978	0.5223	0.5469
0.5714	0.5960	0.6205	0.6450	0.6693
0.6930	0.7161	0.7388	0.7608	0.7824
0.8034	0.8238	0.8437	0.8631	0.8819
0.9001	0.9171	0.9331	0.9479	0.9616
0.9742	0.9848	0.9928	0.9982	1.0000

Hrad:

0.0352	0.0704	0.1057	0.1409	0.2046
0.2650	0.3222	0.3767	0.4287	0.4777
0.5236	0.5695	0.6142	0.6575	0.6988
0.7381	0.7757	0.8117	0.8460	0.8789
0.9105	0.9407	0.9698	0.9977	1.0246
1.0504	1.0753	1.0993	1.1222	1.1391
1.1543	1.1681	1.1804	1.1914	1.2012
1.2097	1.2171	1.2235	1.2288	1.2332
1.2295	1.2216	1.2126	1.2026	1.1917
1.1750	1.1382	1.1016	1.0527	1.0000

Width:

0.2233	0.4467	0.6700	0.8933	0.9037
0.9141	0.9245	0.9349	0.9453	0.9588
0.9793	0.9909	0.9996	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.9989	0.9768
0.9548	0.9327	0.9107	0.8886	0.8665
0.8445	0.8224	0.8004	0.7783	0.7562
0.7179	0.6725	0.6271	0.5817	0.5363
0.4800	0.3798	0.2797	0.1468	0.0000

Shape 9442.9

Area:

0.0204	0.0407	0.0611	0.0815	0.1019
0.1222	0.1426	0.1630	0.1834	0.2037
0.2241	0.2445	0.2649	0.2852	0.3056
0.3260	0.3464	0.3667	0.3871	0.4075
0.4279	0.4482	0.4686	0.4890	0.5094
0.5297	0.5501	0.5705	0.5909	0.6112
0.6316	0.6520	0.6724	0.6927	0.7131
0.7335	0.7538	0.7742	0.7946	0.8150
0.8353	0.8556	0.8755	0.8948	0.9136
0.9319	0.9497	0.9670	0.9837	1.0000

Hrad:

0.0470	0.0933	0.1389	0.1838	0.2280
0.2717	0.3147	0.3570	0.3988	0.4400
0.4806	0.5207	0.5602	0.5991	0.6376
0.6755	0.7129	0.7498	0.7862	0.8221
0.8576	0.8926	0.9271	0.9612	0.9949
1.0281	1.0610	1.0934	1.1254	1.1570
1.1882	1.2191	1.2496	1.2797	1.3094
1.3388	1.3679	1.3966	1.4249	1.4530
1.4807	1.4960	1.5012	1.5054	1.5085
1.5108	1.5121	1.5126	1.5123	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	0.9855	0.9606	0.9356	0.9107
0.8857	0.8608	0.8358	0.8109	0.7859

Shape 9680.9

Area:

0.0203	0.0406	0.0609	0.0811	0.1014
0.1217	0.1420	0.1623	0.1826	0.2028
0.2231	0.2434	0.2637	0.2840	0.3043
0.3245	0.3448	0.3651	0.3854	0.4057

0.4260	0.4463	0.4665	0.4868	0.5071
0.5274	0.5477	0.5680	0.5882	0.6085
0.6288	0.6491	0.6694	0.6897	0.7100
0.7302	0.7505	0.7708	0.7911	0.8114
0.8317	0.8519	0.8722	0.8921	0.9115
0.9303	0.9485	0.9662	0.9834	1.0000

Hrad:

0.0482	0.0955	0.1419	0.1876	0.2325
0.2766	0.3200	0.3626	0.4046	0.4458
0.4864	0.5263	0.5655	0.6042	0.6422
0.6796	0.7165	0.7527	0.7885	0.8236
0.8583	0.8924	0.9260	0.9591	0.9918
1.0239	1.0556	1.0868	1.1176	1.1480
1.1779	1.2074	1.2365	1.2652	1.2935
1.3214	1.3489	1.3761	1.4029	1.4294
1.4555	1.4813	1.5024	1.5059	1.5082
1.5096	1.5101	1.5097	1.5085	1.0000

Width:

1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	0.9946	0.9676	0.9405
0.9135	0.8864	0.8594	0.8323	0.8053

****
Transect Summary
****

Transect 10016.1

Area:

0.0003	0.0014	0.0031	0.0054	0.0080
0.0107	0.0136	0.0165	0.0196	0.0231
0.0270	0.0311	0.0353	0.0397	0.0442
0.0489	0.0536	0.0585	0.0635	0.0687
0.0739	0.0793	0.0848	0.0904	0.0961
0.1019	0.1079	0.1141	0.1203	0.1267
0.1333	0.1401	0.1470	0.1541	0.1614
0.1691	0.1778	0.1895	0.2067	0.2260
0.2472	0.2806	0.3323	0.3995	0.4779
0.5644	0.6609	0.7711	0.8844	1.0000

Hrad:

0.0453	0.0907	0.1360	0.1940	0.2622
0.3329	0.3993	0.4619	0.4961	0.5302
0.5678	0.6240	0.6830	0.7411	0.7992
0.8566	0.9127	0.9676	1.0214	1.0742
1.1261	1.1770	1.2271	1.2760	1.3243
1.3714	1.4159	1.4599	1.5037	1.5454
1.5833	1.6213	1.6593	1.6905	1.7067
1.7223	1.7256	1.6982	1.6124	1.5304
1.4634	1.3352	1.1877	1.0607	0.9637
0.9413	0.9219	0.9178	0.9599	1.0000

Width:

0.0058	0.0116	0.0174	0.0212	0.0229
0.0237	0.0246	0.0254	0.0282	0.0312
0.0341	0.0356	0.0369	0.0380	0.0391
0.0401	0.0412	0.0422	0.0432	0.0442
0.0452	0.0463	0.0473	0.0483	0.0494
0.0505	0.0516	0.0528	0.0540	0.0553
0.0568	0.0583	0.0597	0.0615	0.0641
0.0668	0.0833	0.1290	0.1565	0.1719
0.1923	0.3848	0.4917	0.6273	0.7026
0.7627	0.8966	0.9580	0.9788	1.0000

Transect 10066.1

Area:

0.0003	0.0013	0.0028	0.0050	0.0078
0.0112	0.0149	0.0188	0.0231	0.0276
0.0324	0.0373	0.0424	0.0478	0.0533
0.0590	0.0649	0.0710	0.0772	0.0836
0.0902	0.0969	0.1039	0.1110	0.1182
0.1257	0.1333	0.1411	0.1492	0.1576
0.1663	0.1753	0.1849	0.1970	0.2106

0.2276	0.2519	0.2916	0.3379	0.3907
0.4459	0.5024	0.5607	0.6199	0.6796
0.7401	0.8012	0.8637	0.9292	1.0000

Hrad:

0.0289	0.0577	0.0866	0.1154	0.1443
0.1827	0.2230	0.2593	0.2955	0.3342
0.3739	0.4123	0.4496	0.4858	0.5212
0.5558	0.5901	0.6253	0.6601	0.6942
0.7270	0.7588	0.7901	0.8210	0.8515
0.8817	0.9116	0.9376	0.9579	0.9751
0.9936	1.0131	0.9602	0.9895	1.0013
0.9974	0.9342	0.8395	0.7819	0.7421
0.7270	0.7322	0.7638	0.7995	0.8378
0.8784	0.9204	0.9593	0.9768	1.0000

Width:

0.0082	0.0163	0.0245	0.0326	0.0408
0.0458	0.0494	0.0535	0.0574	0.0604
0.0630	0.0655	0.0680	0.0705	0.0730
0.0755	0.0780	0.0801	0.0822	0.0843
0.0865	0.0888	0.0911	0.0934	0.0958
0.0981	0.1004	0.1032	0.1069	0.1110
0.1151	0.1191	0.1466	0.1665	0.1884
0.2464	0.4460	0.5675	0.6345	0.7113
0.7250	0.7475	0.7663	0.7731	0.7816
0.7900	0.7988	0.8281	0.8866	1.0000

Transect 10094.5

Area:

0.0004	0.0015	0.0034	0.0059	0.0090
0.0127	0.0170	0.0219	0.0274	0.0332
0.0393	0.0456	0.0522	0.0590	0.0660
0.0733	0.0807	0.0884	0.0963	0.1044
0.1127	0.1212	0.1299	0.1389	0.1482
0.1577	0.1676	0.1778	0.1884	0.1995
0.2112	0.2246	0.2400	0.2583	0.2773
0.2968	0.3190	0.3437	0.3733	0.4084
0.4493	0.4947	0.5503	0.6092	0.6701
0.7322	0.7963	0.8626	0.9302	1.0000

Hrad:

0.0262	0.0524	0.0818	0.1109	0.1389
0.1663	0.1934	0.2202	0.2525	0.2897
0.3284	0.3662	0.4030	0.4389	0.4746
0.5105	0.5457	0.5803	0.6142	0.6475
0.6805	0.7117	0.7415	0.7706	0.7981
0.8234	0.8434	0.8620	0.8801	0.8870
0.8789	0.8520	0.8675	0.8698	0.8757
0.8949	0.9268	0.9525	0.9649	0.9658
0.9618	0.9562	0.9302	0.9256	0.9291
0.9381	0.9494	0.9639	0.9811	1.0000

Width:

0.0109	0.0218	0.0311	0.0396	0.0481
0.0566	0.0651	0.0736	0.0800	0.0844
0.0878	0.0912	0.0946	0.0980	0.1012
0.1042	0.1072	0.1101	0.1131	0.1161
0.1190	0.1222	0.1256	0.1291	0.1329
0.1370	0.1422	0.1476	0.1533	0.1612
0.1727	0.2035	0.2431	0.2656	0.2733
0.2870	0.3283	0.3673	0.4706	0.5431
0.6084	0.6926	0.8241	0.8493	0.8704
0.8931	0.9222	0.9490	0.9746	1.0000

Transect 10144.4

Area:

0.0003	0.0012	0.0024	0.0038	0.0054
0.0071	0.0090	0.0111	0.0134	0.0158
0.0184	0.0212	0.0241	0.0274	0.0309
0.0346	0.0385	0.0425	0.0467	0.0511
0.0557	0.0605	0.0655	0.0708	0.0763
0.0821	0.0881	0.0943	0.1008	0.1076
0.1148	0.1235	0.1343	0.1489	0.1703
0.2001	0.2394	0.2829	0.3296	0.3786
0.4303	0.4866	0.5471	0.6087	0.6716
0.7354	0.8001	0.8655	0.9322	1.0000

Hrad:

0.0310	0.0665	0.1141	0.1569	0.1965
0.2339	0.2697	0.3043	0.3380	0.3709
0.4033	0.4351	0.4588	0.4780	0.5041
0.5384	0.5721	0.6054	0.6376	0.6681
0.6963	0.7184	0.7425	0.7676	0.7945

0.8225	0.8497	0.8733	0.8970	0.9085
0.8765	0.9101	0.9416	0.9479	0.9129
0.8540	0.7910	0.7583	0.7471	0.7480
0.7530	0.7611	0.7720	0.7957	0.8245
0.8566	0.8912	0.9278	0.9607	1.0000

Width:

0.0090	0.0166	0.0191	0.0217	0.0242
0.0268	0.0293	0.0319	0.0344	0.0370
0.0395	0.0420	0.0455	0.0496	0.0531
0.0556	0.0580	0.0605	0.0631	0.0658
0.0688	0.0725	0.0761	0.0796	0.0829
0.0861	0.0895	0.0933	0.0971	0.1026
0.1140	0.1387	0.1898	0.2529	0.3660
0.4947	0.6168	0.6612	0.7065	0.7385
0.7985	0.8794	0.8944	0.9159	0.9305
0.9438	0.9557	0.9668	0.9911	1.0000

Transect 10244.4

Area:

0.0004	0.0016	0.0032	0.0051	0.0071
0.0095	0.0121	0.0149	0.0179	0.0212
0.0247	0.0285	0.0325	0.0368	0.0413
0.0461	0.0512	0.0565	0.0620	0.0678
0.0739	0.0802	0.0867	0.0936	0.1007
0.1081	0.1158	0.1237	0.1319	0.1403
0.1491	0.1580	0.1673	0.1768	0.1869
0.1977	0.2096	0.2231	0.2389	0.2618
0.2967	0.3456	0.4166	0.4946	0.5740
0.6548	0.7373	0.8221	0.9099	1.0000

Hrad:

0.0340	0.0714	0.1235	0.1703	0.2137
0.2547	0.2939	0.3318	0.3688	0.4049
0.4404	0.4754	0.5082	0.5408	0.5730
0.6051	0.6377	0.6719	0.7053	0.7383
0.7717	0.8038	0.8335	0.8632	0.8932
0.9253	0.9569	0.9886	1.0203	1.0521
1.0843	1.1165	1.1487	1.1664	1.1638
1.1399	1.0822	1.0252	0.9319	0.9528
0.9491	0.9116	0.8476	0.8275	0.8361
0.8582	0.8897	0.9214	0.9591	1.0000

Width:

0.0087	0.0164	0.0190	0.0216	0.0243
0.0269	0.0295	0.0321	0.0347	0.0373
0.0399	0.0426	0.0454	0.0482	0.0511
0.0540	0.0568	0.0594	0.0621	0.0649
0.0676	0.0704	0.0734	0.0765	0.0796
0.0824	0.0853	0.0882	0.0911	0.0940
0.0969	0.0998	0.1026	0.1070	0.1136
0.1232	0.1383	0.1563	0.1948	0.3276
0.4123	0.6720	0.8319	0.8643	0.8759
0.8943	0.9120	0.9466	0.9739	1.0000

Transect 10344.4

Area:

0.0002	0.0009	0.0017	0.0026	0.0036
0.0048	0.0061	0.0075	0.0090	0.0106
0.0124	0.0143	0.0164	0.0187	0.0211
0.0237	0.0264	0.0293	0.0323	0.0355
0.0388	0.0423	0.0460	0.0498	0.0539
0.0582	0.0626	0.0674	0.0726	0.0787
0.0858	0.0942	0.1061	0.1199	0.1358
0.1539	0.1732	0.1951	0.2218	0.2599
0.3141	0.3791	0.4487	0.5201	0.5952
0.6720	0.7500	0.8299	0.9143	1.0000

Hrad:

0.0421	0.0976	0.1601	0.2164	0.2685
0.3177	0.3649	0.4106	0.4550	0.4984
0.5341	0.5640	0.5937	0.6314	0.6717
0.7119	0.7515	0.7900	0.8285	0.8669
0.9043	0.9400	0.9725	1.0027	1.0338
1.0666	1.0940	1.0827	1.1229	1.1687
1.2000	1.2152	1.1908	1.1683	1.1295
1.1152	1.1143	1.1076	1.0142	0.8933
0.7750	0.7405	0.7492	0.7704	0.6460
0.7217	0.7910	0.8532	0.9261	1.0000

Width:

0.0053	0.0087	0.0100	0.0114	0.0128
0.0141	0.0155	0.0169	0.0183	0.0196
0.0214	0.0234	0.0255	0.0274	0.0290

0.0307	0.0324	0.0342	0.0360	0.0378
0.0396	0.0416	0.0437	0.0460	0.0483
0.0506	0.0532	0.0580	0.0644	0.0765
0.0880	0.1198	0.1527	0.1692	0.2039
0.2166	0.2333	0.2704	0.4001	0.5070
0.7144	0.7971	0.8180	0.8459	0.8881
0.8970	0.9131	0.9636	0.9912	1.0000

Transect 10444.3

Area:

0.0004	0.0017	0.0036	0.0057	0.0081
0.0108	0.0139	0.0172	0.0209	0.0248
0.0291	0.0336	0.0385	0.0437	0.0492
0.0549	0.0608	0.0669	0.0733	0.0799
0.0868	0.0939	0.1013	0.1090	0.1170
0.1253	0.1339	0.1428	0.1522	0.1619
0.1722	0.1832	0.1957	0.2132	0.2369
0.2654	0.2999	0.3362	0.3736	0.4128
0.4533	0.4956	0.5401	0.5884	0.6405
0.6949	0.7572	0.8291	0.9066	1.0000

Hrad:

0.0313	0.0648	0.1114	0.1533	0.1921
0.2289	0.2643	0.2987	0.3322	0.3651
0.3971	0.4288	0.4603	0.4931	0.5290
0.5660	0.6024	0.6382	0.6726	0.7053
0.7368	0.7671	0.7971	0.8258	0.8547
0.8800	0.9070	0.9280	0.9489	0.9643
0.9742	0.9445	0.9319	0.8742	0.8770
0.8691	0.8538	0.8482	0.8513	0.8580
0.8682	0.8788	0.8867	0.8851	0.8968
0.9131	0.9249	0.9488	0.9809	1.0000

Width:

0.0085	0.0164	0.0193	0.0223	0.0253
0.0283	0.0313	0.0343	0.0373	0.0403
0.0433	0.0464	0.0494	0.0523	0.0547
0.0569	0.0591	0.0614	0.0637	0.0661
0.0686	0.0713	0.0740	0.0768	0.0797
0.0829	0.0859	0.0897	0.0935	0.0980
0.1033	0.1139	0.1380	0.2140	0.2421
0.3150	0.3522	0.3605	0.3748	0.3901
0.4051	0.4237	0.4497	0.4944	0.5210
0.5576	0.6658	0.7361	0.7884	1.0000

Transect 10461.3

Area:

0.0013	0.0051	0.0105	0.0166	0.0232
0.0305	0.0383	0.0467	0.0556	0.0652
0.0755	0.0861	0.0970	0.1081	0.1193
0.1308	0.1425	0.1544	0.1666	0.1790
0.1916	0.2045	0.2178	0.2313	0.2452
0.2594	0.2740	0.2888	0.3041	0.3197
0.3361	0.3536	0.3733	0.3991	0.4272
0.4563	0.4883	0.5241	0.5603	0.5967
0.6332	0.6699	0.7069	0.7441	0.7815
0.8192	0.8571	0.8979	0.9464	1.0000

Hrad:

0.0194	0.0388	0.0708	0.1011	0.1295
0.1564	0.1821	0.2070	0.2308	0.2534
0.2764	0.3074	0.3384	0.3695	0.3999
0.4298	0.4592	0.4869	0.5142	0.5411
0.5663	0.5899	0.6128	0.6355	0.6578
0.6797	0.7003	0.7213	0.7422	0.7532
0.7655	0.7936	0.8153	0.8204	0.8246
0.8295	0.8294	0.8261	0.8298	0.8369
0.8458	0.8559	0.8679	0.8816	0.9034
0.9280	0.9529	0.9744	0.9884	1.0000

Width:

0.0446	0.0891	0.1016	0.1119	0.1222
0.1325	0.1427	0.1530	0.1636	0.1746
0.1851	0.1895	0.1934	0.1970	0.2005
0.2041	0.2077	0.2119	0.2161	0.2202
0.2251	0.2305	0.2361	0.2417	0.2473
0.2531	0.2594	0.2654	0.2714	0.2812
0.2953	0.3253	0.3862	0.4827	0.5036
0.5282	0.6037	0.6358	0.6388	0.6419
0.6454	0.6494	0.6533	0.6572	0.6612
0.6659	0.6707	0.7965	0.8934	1.0000

Transect 10614.5

Area:

0.0003	0.0014	0.0027	0.0043	0.0060
0.0078	0.0098	0.0119	0.0142	0.0167
0.0193	0.0221	0.0250	0.0280	0.0313
0.0349	0.0387	0.0427	0.0468	0.0511
0.0556	0.0604	0.0653	0.0705	0.0758
0.0814	0.0873	0.0933	0.0996	0.1060
0.1128	0.1199	0.1273	0.1370	0.1559
0.1836	0.2170	0.2554	0.3005	0.3555
0.4147	0.4746	0.5352	0.5963	0.6590
0.7236	0.7901	0.8592	0.9290	1.0000

Hrad:

0.0387	0.0807	0.1438	0.2010	0.2541
0.3039	0.3514	0.3971	0.4412	0.4842
0.5262	0.5673	0.6078	0.6450	0.6671
0.6846	0.7261	0.7669	0.8065	0.8435
0.8765	0.9082	0.9422	0.9745	1.0065
1.0389	1.0736	1.1067	1.1384	1.1718
1.1947	1.2111	1.2134	1.1515	1.0976
1.0274	0.9628	0.9146	0.8699	0.8142
0.8006	0.8038	0.8188	0.8401	0.8592
0.8850	0.9061	0.9359	0.9684	1.0000

Width:

0.0095	0.0182	0.0203	0.0225	0.0246
0.0268	0.0289	0.0310	0.0332	0.0353
0.0375	0.0396	0.0417	0.0441	0.0477
0.0519	0.0542	0.0565	0.0589	0.0615
0.0644	0.0675	0.0704	0.0735	0.0766
0.0798	0.0827	0.0858	0.0891	0.0922
0.0963	0.1012	0.1076	0.2114	0.3287
0.4310	0.5002	0.5695	0.6983	0.8213
0.8309	0.8426	0.8488	0.8598	0.8940
0.9124	0.9537	0.9694	0.9816	1.0000

Transect 10664.7

Area:

0.0007	0.0029	0.0064	0.0104	0.0149
0.0200	0.0257	0.0318	0.0386	0.0458
0.0536	0.0619	0.0707	0.0802	0.0901
0.1007	0.1117	0.1232	0.1350	0.1472
0.1598	0.1728	0.1861	0.1998	0.2139
0.2284	0.2433	0.2586	0.2744	0.2906
0.3073	0.3244	0.3419	0.3599	0.3783
0.3972	0.4166	0.4365	0.4572	0.4789
0.5023	0.5275	0.5608	0.6055	0.6623
0.7217	0.7830	0.8511	0.9238	1.0000

Hrad:

0.0256	0.0512	0.0864	0.1227	0.1562
0.1879	0.2182	0.2475	0.2760	0.3039
0.3314	0.3584	0.3850	0.4111	0.4361
0.4588	0.4908	0.5222	0.5531	0.5836
0.6139	0.6436	0.6730	0.7018	0.7303
0.7582	0.7831	0.8082	0.8332	0.8582
0.8834	0.9095	0.9355	0.9587	0.9826
1.0065	1.0283	1.0451	1.0466	1.0414
1.0121	1.0358	1.0463	1.0220	1.0115
1.0064	1.0069	1.0030	1.0009	1.0000

Width:

0.0185	0.0369	0.0473	0.0541	0.0608
0.0676	0.0744	0.0811	0.0879	0.0947
0.1014	0.1082	0.1150	0.1219	0.1290
0.1370	0.1418	0.1466	0.1514	0.1562
0.1609	0.1656	0.1704	0.1752	0.1800
0.1849	0.1905	0.1961	0.2018	0.2074
0.2129	0.2181	0.2234	0.2294	0.2352
0.2410	0.2474	0.2552	0.2674	0.2821
0.3055	0.3354	0.4736	0.7033	0.7281
0.7580	0.7959	0.9061	0.9306	1.0000

Transect 10664.7(orig)

Area:

0.0004	0.0016	0.0034	0.0056	0.0081
0.0108	0.0139	0.0172	0.0208	0.0247
0.0289	0.0334	0.0382	0.0433	0.0487
0.0544	0.0604	0.0666	0.0729	0.0795
0.0863	0.0933	0.1005	0.1080	0.1156
0.1234	0.1314	0.1465	0.1708	0.1966
0.2228	0.2494	0.2765	0.3039	0.3316
0.3598	0.3884	0.4174	0.4469	0.4772

0.5084	0.5408	0.5778	0.6211	0.6712
0.7236	0.7826	0.8499	0.9229	1.0000

Hrad:

0.0363	0.0727	0.1227	0.1742	0.2218
0.2667	0.3097	0.3513	0.3918	0.4315
0.4704	0.5088	0.5465	0.5836	0.6191
0.6513	0.6968	0.7414	0.7852	0.8284
0.8714	0.9137	0.9553	0.9963	1.0368
1.0762	1.1117	1.0749	0.9876	0.9365
0.9120	0.9046	0.9084	0.9178	0.9337
0.9539	0.9758	0.9967	1.0095	1.0200
1.0164	1.0495	1.0771	1.0846	1.0998
1.1046	1.0823	0.9965	1.0040	1.0000

Width:

0.0098	0.0196	0.0251	0.0287	0.0323
0.0359	0.0395	0.0430	0.0466	0.0502
0.0538	0.0574	0.0610	0.0647	0.0685
0.0727	0.0752	0.0778	0.0803	0.0829
0.0854	0.0879	0.0904	0.0929	0.0955
0.0981	0.1011	0.2611	0.3165	0.3217
0.3269	0.3321	0.3366	0.3415	0.3462
0.3509	0.3560	0.3618	0.3700	0.3795
0.3937	0.4117	0.4873	0.6114	0.6291
0.6872	0.7693	0.8868	0.9223	1.0000

Transect 10749

Area:

0.0005	0.0020	0.0039	0.0061	0.0086
0.0113	0.0142	0.0174	0.0209	0.0246
0.0285	0.0327	0.0373	0.0421	0.0472
0.0525	0.0582	0.0641	0.0704	0.0770
0.0840	0.0914	0.0991	0.1073	0.1158
0.1247	0.1340	0.1436	0.1537	0.1641
0.1751	0.1867	0.1993	0.2178	0.2494
0.2849	0.3221	0.3609	0.4009	0.4425
0.4865	0.5322	0.5798	0.6296	0.6808
0.7340	0.7902	0.8505	0.9249	1.0000

Hrad:

0.0287	0.0615	0.1066	0.1473	0.1849
0.2203	0.2540	0.2865	0.3181	0.3489
0.3785	0.4049	0.4320	0.4576	0.4845
0.5135	0.5410	0.5660	0.5873	0.6078
0.6292	0.6515	0.6739	0.6971	0.7189
0.7415	0.7654	0.7906	0.8140	0.8335
0.8498	0.8492	0.8238	0.8073	0.7786
0.7577	0.7681	0.7862	0.8093	0.8350
0.8611	0.8875	0.9144	0.9368	0.9678
0.9921	1.0166	0.9856	0.9624	1.0000

Width:

0.0132	0.0244	0.0277	0.0310	0.0343
0.0376	0.0409	0.0442	0.0476	0.0509
0.0543	0.0582	0.0620	0.0660	0.0698
0.0733	0.0769	0.0810	0.0858	0.0908
0.0958	0.1007	0.1057	0.1107	0.1159
0.1211	0.1262	0.1310	0.1362	0.1422
0.1490	0.1595	0.1779	0.3515	0.4528
0.4864	0.5060	0.5234	0.5428	0.5678
0.5998	0.6184	0.6509	0.6723	0.6930
0.7287	0.7571	0.9183	1.0000	1.0000

Transect 10749(orig)

Area:

0.0004	0.0015	0.0030	0.0047	0.0066
0.0087	0.0110	0.0134	0.0161	0.0189
0.0220	0.0252	0.0287	0.0324	0.0363
0.0405	0.0448	0.0494	0.0542	0.0593
0.0647	0.0704	0.0764	0.0826	0.0892
0.0961	0.1032	0.1107	0.1184	0.1265
0.1354	0.1451	0.1559	0.1714	0.1983
0.2318	0.2679	0.3056	0.3451	0.3866
0.4310	0.4784	0.5285	0.5826	0.6393
0.6993	0.7644	0.8341	0.9159	1.0000

Hrad:

0.0328	0.0703	0.1218	0.1683	0.2113
0.2517	0.2903	0.3274	0.3635	0.3986
0.4325	0.4627	0.4936	0.5229	0.5537
0.5868	0.6182	0.6467	0.6711	0.6946
0.7189	0.7444	0.7700	0.7966	0.8215
0.8473	0.8746	0.9034	0.9301	0.9522

0.9664	0.9601	0.9258	0.9027	0.8600
0.8156	0.8147	0.8263	0.8450	0.8667
0.8871	0.9083	0.9274	0.9439	0.9713
0.9871	1.0041	0.9802	0.9700	1.0000

Width:

0.0089	0.0165	0.0188	0.0210	0.0232
0.0255	0.0277	0.0300	0.0322	0.0344
0.0367	0.0394	0.0419	0.0447	0.0473
0.0496	0.0521	0.0548	0.0581	0.0615
0.0648	0.0682	0.0716	0.0749	0.0785
0.0820	0.0854	0.0887	0.0922	0.0982
0.1088	0.1187	0.1340	0.2545	0.3546
0.4118	0.4320	0.4507	0.4722	0.5004
0.5390	0.5680	0.6133	0.6487	0.6781
0.7306	0.7761	0.9028	0.9670	1.0000

Transect 10848.5

Area:

0.0007	0.0026	0.0053	0.0085	0.0122
0.0164	0.0211	0.0263	0.0320	0.0383
0.0449	0.0520	0.0594	0.0671	0.0751
0.0834	0.0920	0.1010	0.1103	0.1200
0.1301	0.1407	0.1517	0.1632	0.1753
0.1878	0.2007	0.2142	0.2281	0.2425
0.2574	0.2728	0.2888	0.3056	0.3233
0.3433	0.3647	0.3876	0.4121	0.4385
0.4674	0.5018	0.5401	0.5847	0.6329
0.6908	0.7555	0.8331	0.9139	1.0000

Hrad:

0.0284	0.0621	0.1022	0.1383	0.1720
0.2042	0.2353	0.2657	0.2956	0.3275
0.3605	0.3931	0.4288	0.4645	0.4987
0.5323	0.5652	0.5962	0.6243	0.6498
0.6759	0.7004	0.7229	0.7447	0.7681
0.7928	0.8172	0.8414	0.8656	0.8905
0.9152	0.9387	0.9498	0.9557	0.9638
0.9970	1.0218	1.0438	1.0461	1.0627
1.0969	1.1175	1.1284	1.1334	1.1424
1.1381	1.1309	1.1077	1.1065	1.0000

Width:

0.0096	0.0172	0.0209	0.0245	0.0282
0.0318	0.0355	0.0392	0.0428	0.0460
0.0489	0.0518	0.0541	0.0562	0.0584
0.0606	0.0628	0.0652	0.0679	0.0710
0.0739	0.0771	0.0806	0.0842	0.0877
0.0910	0.0944	0.0978	0.1013	0.1047
0.1081	0.1117	0.1171	0.1234	0.1313
0.1489	0.1579	0.1686	0.1821	0.1965
0.2166	0.2647	0.2933	0.3291	0.3805
0.4331	0.4941	0.5713	0.5841	1.0000

Transect 10848.5(orig)

Area:

0.0004	0.0017	0.0033	0.0053	0.0076
0.0103	0.0132	0.0165	0.0201	0.0240
0.0282	0.0326	0.0372	0.0420	0.0471
0.0523	0.0577	0.0633	0.0691	0.0752
0.0816	0.0882	0.0951	0.1023	0.1099
0.1177	0.1258	0.1343	0.1430	0.1520
0.1615	0.1751	0.1911	0.2083	0.2271
0.2502	0.2772	0.3085	0.3435	0.3810
0.4207	0.4646	0.5121	0.5682	0.6270
0.6919	0.7610	0.8382	0.9175	1.0000

Hrad:

0.0293	0.0642	0.1055	0.1428	0.1777
0.2109	0.2431	0.2745	0.3054	0.3383
0.3724	0.4061	0.4430	0.4798	0.5151
0.5498	0.5838	0.6159	0.6448	0.6712
0.6982	0.7235	0.7467	0.7693	0.7934
0.8189	0.8441	0.8692	0.8941	0.9198
0.9444	0.9398	0.9206	0.9026	0.8877
0.8835	0.8762	0.8602	0.8403	0.8456
0.8674	0.8843	0.8834	0.8746	0.8996
0.9208	0.9423	0.9559	0.9824	1.0000

Width:

0.0096	0.0172	0.0209	0.0245	0.0282
0.0318	0.0355	0.0392	0.0428	0.0460
0.0489	0.0518	0.0541	0.0562	0.0584
0.0606	0.0628	0.0652	0.0679	0.0710

0.0739	0.0771	0.0806	0.0842	0.0877
0.0910	0.0944	0.0978	0.1013	0.1047
0.1217	0.1761	0.1892	0.2035	0.2279
0.2893	0.3243	0.3807	0.4191	0.4383
0.4665	0.5243	0.5937	0.6549	0.7063
0.7589	0.8199	0.8971	0.9099	1.0000

Transect 11048.5
Area:

0.0008	0.0031	0.0062	0.0098	0.0139
0.0184	0.0235	0.0290	0.0350	0.0415
0.0484	0.0557	0.0636	0.0720	0.0808
0.0903	0.1003	0.1107	0.1215	0.1328
0.1445	0.1566	0.1692	0.1823	0.1958
0.2100	0.2247	0.2401	0.2561	0.2727
0.2908	0.3113	0.3319	0.3527	0.3736
0.3946	0.4160	0.4388	0.4636	0.4926
0.5235	0.5578	0.5954	0.6361	0.6828
0.7343	0.7887	0.8476	0.9137	1.0000

Hrad:

0.0876	0.1872	0.3195	0.4384	0.5488
0.6532	0.7533	0.8505	0.9483	1.0432
1.1364	1.2268	1.3117	1.3963	1.4720
1.5491	1.6435	1.7371	1.8293	1.9204
2.0104	2.0984	2.1859	2.2730	2.3476
2.4078	2.4689	2.5383	2.6088	2.6802
2.3977	2.5217	2.6564	2.7913	2.9240
3.0548	3.0808	3.0334	2.7624	2.7063
2.6844	2.5423	2.5419	2.5433	2.6367
2.7184	2.7627	2.7138	2.6096	1.0000

Width:

0.0090	0.0166	0.0194	0.0222	0.0249
0.0277	0.0305	0.0333	0.0359	0.0385
0.0412	0.0439	0.0468	0.0497	0.0530
0.0562	0.0587	0.0612	0.0638	0.0663
0.0688	0.0714	0.0740	0.0766	0.0797
0.0834	0.0871	0.0906	0.0941	0.0975
0.1172	0.1187	0.1195	0.1202	0.1209
0.1215	0.1269	0.1361	0.1591	0.1730
0.1857	0.2100	0.2245	0.2401	0.2882
0.3057	0.3251	0.3576	0.4370	1.0000

Transect 11048.5(orig)
Area:

0.0003	0.0013	0.0026	0.0042	0.0059
0.0078	0.0100	0.0123	0.0149	0.0176
0.0206	0.0237	0.0271	0.0306	0.0344
0.0384	0.0427	0.0471	0.0517	0.0565
0.0615	0.0667	0.0720	0.0776	0.0834
0.0894	0.0957	0.1037	0.1198	0.1398
0.1636	0.1917	0.2220	0.2531	0.2848
0.3193	0.3550	0.3916	0.4294	0.4701
0.5127	0.5575	0.6047	0.6538	0.7056
0.7594	0.8144	0.8714	0.9314	1.0000

Hrad:

0.0369	0.0789	0.1346	0.1847	0.2312
0.2752	0.3174	0.3584	0.3996	0.4396
0.4788	0.5169	0.5527	0.5884	0.6203
0.6527	0.6925	0.7320	0.7708	0.8092
0.8472	0.8842	0.9211	0.9578	0.9892
1.0146	1.0403	1.0484	0.9766	0.9160
0.4495	0.4753	0.5271	0.5919	0.6530
0.6602	0.7212	0.7746	0.7967	0.8281
0.8660	0.8871	0.9211	0.9698	1.0332
1.0944	1.1492	1.1867	1.2099	1.0000

Width:

0.0090	0.0166	0.0194	0.0222	0.0249
0.0277	0.0305	0.0333	0.0359	0.0385
0.0412	0.0439	0.0468	0.0497	0.0530
0.0562	0.0587	0.0612	0.0638	0.0663
0.0688	0.0714	0.0740	0.0766	0.0797
0.0834	0.0871	0.1807	0.2564	0.2881
0.3605	0.4003	0.4180	0.4243	0.4420
0.4804	0.4889	0.5022	0.5359	0.5649
0.5894	0.6260	0.6543	0.6722	0.7203
0.7378	0.7572	0.7897	0.8691	1.0000

Transect 11248.4
Area:

0.0006	0.0025	0.0050	0.0078	0.0111
0.0147	0.0186	0.0230	0.0277	0.0328
0.0383	0.0441	0.0503	0.0569	0.0639
0.0713	0.0791	0.0873	0.0960	0.1051
0.1146	0.1245	0.1349	0.1457	0.1569
0.1686	0.1808	0.1934	0.2066	0.2203
0.2348	0.2501	0.2664	0.2847	0.3066
0.3334	0.3629	0.3944	0.4284	0.4655
0.5047	0.5462	0.5889	0.6333	0.6820
0.7350	0.7950	0.8585	0.9256	1.0000

Hrad:

0.0250	0.0542	0.0919	0.1259	0.1573
0.1871	0.2156	0.2432	0.2701	0.2965
0.3224	0.3480	0.3728	0.3974	0.4219
0.4451	0.4674	0.4898	0.5124	0.5351
0.5576	0.5802	0.6029	0.6251	0.6474
0.6698	0.6912	0.7107	0.7280	0.7440
0.7498	0.7575	0.7373	0.7473	0.7825
0.8057	0.8268	0.8470	0.8635	0.8812
0.8970	0.9163	0.9375	0.9576	0.9655
0.9813	0.9927	1.0052	1.0043	1.0000

Width:

0.0154	0.0279	0.0325	0.0371	0.0416
0.0462	0.0507	0.0553	0.0598	0.0644
0.0690	0.0735	0.0782	0.0829	0.0875
0.0925	0.0977	0.1029	0.1081	0.1133
0.1185	0.1238	0.1290	0.1344	0.1398
0.1452	0.1509	0.1571	0.1639	0.1712
0.1815	0.1917	0.2106	0.2356	0.2973
0.3528	0.3687	0.3974	0.4443	0.4636
0.4978	0.5135	0.5291	0.5520	0.6110
0.7105	0.7520	0.7903	0.8641	1.0000

Transect 11248.4(orig)

Area:

0.0004	0.0014	0.0028	0.0044	0.0062
0.0082	0.0104	0.0128	0.0154	0.0182
0.0213	0.0245	0.0280	0.0317	0.0356
0.0397	0.0440	0.0486	0.0534	0.0584
0.0637	0.0693	0.0750	0.0810	0.0873
0.0938	0.1006	0.1076	0.1149	0.1225
0.1306	0.1391	0.1482	0.1642	0.1886
0.2253	0.2672	0.3109	0.3569	0.4051
0.4549	0.5076	0.5613	0.6160	0.6731
0.7326	0.7960	0.8613	0.9286	1.0000

Hrad:

0.0272	0.0592	0.1003	0.1373	0.1716
0.2041	0.2352	0.2653	0.2947	0.3234
0.3517	0.3796	0.4067	0.4335	0.4602
0.4856	0.5099	0.5344	0.5590	0.5838
0.6083	0.6330	0.6577	0.6819	0.7063
0.7307	0.7541	0.7753	0.7942	0.8117
0.8180	0.8264	0.8039	0.7778	0.7575
0.7044	0.6815	0.6773	0.6837	0.7007
0.7209	0.7400	0.7731	0.8080	0.8382
0.8744	0.9094	0.9454	0.9737	1.0000

Width:

0.0093	0.0169	0.0196	0.0224	0.0251
0.0279	0.0306	0.0334	0.0361	0.0389
0.0416	0.0444	0.0472	0.0500	0.0528
0.0558	0.0589	0.0621	0.0652	0.0683
0.0715	0.0747	0.0779	0.0811	0.0844
0.0876	0.0910	0.0948	0.0989	0.1033
0.1095	0.1157	0.1356	0.2588	0.3931
0.5456	0.5623	0.5925	0.6300	0.6470
0.6756	0.7065	0.7159	0.7297	0.7653
0.8253	0.8504	0.8734	0.9180	1.0000

Transect 11448.4

Area:

0.0005	0.0020	0.0041	0.0065	0.0093
0.0125	0.0161	0.0201	0.0243	0.0287
0.0333	0.0381	0.0431	0.0483	0.0537
0.0593	0.0652	0.0713	0.0776	0.0842
0.0910	0.0982	0.1056	0.1133	0.1214
0.1298	0.1386	0.1477	0.1571	0.1669
0.1772	0.1882	0.2017	0.2214	0.2520
0.2887	0.3294	0.3715	0.4144	0.4584
0.5034	0.5493	0.5970	0.6470	0.6998

	0.7564	0.8145	0.8742	0.9363	1.0000
Hrad:					
	0.0275	0.0596	0.0987	0.1340	0.1670
	0.1984	0.2288	0.2620	0.3003	0.3369
	0.3722	0.4063	0.4395	0.4718	0.5029
	0.5327	0.5608	0.5883	0.6155	0.6415
	0.6658	0.6887	0.7112	0.7321	0.7527
	0.7737	0.7946	0.8155	0.8368	0.8569
	0.8602	0.8812	0.9121	0.9155	0.8771
	0.8419	0.8194	0.8140	0.8187	0.8299
	0.8463	0.8678	0.8901	0.9130	0.9348
	0.9558	0.9789	1.0031	0.9750	1.0000
Width:					
	0.0157	0.0286	0.0345	0.0404	0.0464
	0.0523	0.0583	0.0631	0.0662	0.0692
	0.0723	0.0754	0.0785	0.0816	0.0849
	0.0883	0.0919	0.0956	0.0993	0.1032
	0.1074	0.1120	0.1166	0.1217	0.1268
	0.1320	0.1373	0.1427	0.1480	0.1537
	0.1630	0.1756	0.2655	0.3709	0.5280
	0.5998	0.6392	0.6533	0.6687	0.6847
	0.6996	0.7105	0.7548	0.7883	0.8563
	0.8822	0.9072	0.9316	0.9710	1.0000

Transect 11448.4(orig)

Area:					
	0.0004	0.0014	0.0028	0.0045	0.0065
	0.0087	0.0112	0.0139	0.0169	0.0199
	0.0231	0.0264	0.0299	0.0335	0.0373
	0.0412	0.0452	0.0495	0.0539	0.0584
	0.0632	0.0681	0.0733	0.0787	0.0843
	0.0901	0.0962	0.1025	0.1091	0.1159
	0.1230	0.1306	0.1400	0.1537	0.1752
	0.2013	0.2338	0.2707	0.3126	0.3574
	0.4069	0.4622	0.5208	0.5817	0.6453
	0.7123	0.7811	0.8521	0.9254	1.0000
Hrad:					
	0.0326	0.0706	0.1171	0.1589	0.1980
	0.2353	0.2712	0.3107	0.3561	0.3995
	0.4413	0.4818	0.5211	0.5595	0.5963
	0.6316	0.6650	0.6976	0.7299	0.7606
	0.7894	0.8166	0.8433	0.8680	0.8925
	0.9174	0.9422	0.9670	0.9922	1.0160
	1.0200	1.0449	1.0815	1.0855	1.0384
	0.9928	0.9418	0.9077	0.8807	0.8679
	0.8553	0.8465	0.8573	0.8743	0.8942
	0.9177	0.9434	0.9700	0.9623	1.0000
Width:					
	0.0094	0.0171	0.0206	0.0242	0.0277
	0.0313	0.0348	0.0377	0.0396	0.0414
	0.0432	0.0451	0.0469	0.0488	0.0507
	0.0528	0.0549	0.0572	0.0594	0.0617
	0.0642	0.0670	0.0697	0.0728	0.0758
	0.0789	0.0821	0.0853	0.0885	0.0919
	0.0975	0.1050	0.1587	0.2218	0.3220
	0.3721	0.4609	0.5308	0.5766	0.6163
	0.6891	0.7590	0.7933	0.8230	0.8749
	0.8988	0.9258	0.9552	0.9827	1.0000

Transect 11648.4

Area:					
	0.0005	0.0021	0.0043	0.0068	0.0096
	0.0128	0.0163	0.0201	0.0242	0.0286
	0.0334	0.0385	0.0439	0.0497	0.0558
	0.0623	0.0691	0.0763	0.0838	0.0917
	0.0998	0.1083	0.1172	0.1263	0.1358
	0.1456	0.1557	0.1661	0.1768	0.1879
	0.1994	0.2114	0.2240	0.2393	0.2612
	0.2868	0.3166	0.3500	0.3857	0.4221
	0.4589	0.4973	0.5439	0.5947	0.6480
	0.7048	0.7661	0.8360	0.9127	1.0000
Hrad:					
	0.0339	0.0698	0.1221	0.1691	0.2126
	0.2538	0.2932	0.3313	0.3683	0.4046
	0.4403	0.4749	0.5078	0.5404	0.5729
	0.6059	0.6390	0.6721	0.7050	0.7382
	0.7716	0.8056	0.8363	0.8715	0.9068
	0.9416	0.9756	1.0083	1.0382	1.0666
	1.0914	1.1104	1.1460	1.1782	1.1753

1.1641	1.1470	1.1250	1.1174	1.1223
1.1056	1.1408	1.1575	1.1733	1.1919
1.2078	1.2222	1.2228	1.2293	1.0000

Width:

0.0084	0.0162	0.0188	0.0214	0.0240
0.0266	0.0292	0.0317	0.0343	0.0369
0.0395	0.0422	0.0449	0.0478	0.0506
0.0533	0.0560	0.0588	0.0615	0.0642
0.0668	0.0694	0.0723	0.0747	0.0771
0.0796	0.0821	0.0847	0.0875	0.0906
0.0940	0.0980	0.1057	0.1562	0.1885
0.2232	0.2575	0.2823	0.2890	0.2926
0.2996	0.3175	0.3943	0.4178	0.4370
0.4748	0.5119	0.5934	0.6447	1.0000

Transect 11648.4(orig)

Area:

0.0004	0.0016	0.0034	0.0053	0.0076
0.0101	0.0128	0.0158	0.0190	0.0225
0.0263	0.0303	0.0346	0.0391	0.0439
0.0490	0.0544	0.0601	0.0660	0.0721
0.0786	0.0853	0.0922	0.0994	0.1069
0.1146	0.1225	0.1307	0.1392	0.1479
0.1570	0.1664	0.1763	0.1883	0.2056
0.2261	0.2506	0.2784	0.3084	0.3395
0.3722	0.4099	0.4655	0.5295	0.5960
0.6659	0.7396	0.8201	0.9058	1.0000

Hrad:

0.0325	0.0669	0.1171	0.1622	0.2040
0.2435	0.2813	0.3178	0.3534	0.3882
0.4224	0.4556	0.4871	0.5184	0.5496
0.5812	0.6131	0.6448	0.6764	0.7082
0.7403	0.7729	0.8024	0.8361	0.8700
0.9033	0.9359	0.9673	0.9960	1.0232
1.0470	1.0652	1.0994	1.1303	1.1275
1.1145	1.0928	1.0661	1.0535	1.0507
1.0224	1.0014	0.9400	0.9327	0.9374
0.9456	0.9620	0.9731	0.9919	1.0000

Width:

0.0084	0.0162	0.0188	0.0214	0.0240
0.0266	0.0292	0.0317	0.0343	0.0369
0.0395	0.0422	0.0449	0.0478	0.0506
0.0533	0.0560	0.0588	0.0615	0.0642
0.0668	0.0694	0.0723	0.0747	0.0771
0.0796	0.0821	0.0847	0.0875	0.0906
0.0940	0.0980	0.1057	0.1562	0.1885
0.2306	0.2709	0.2998	0.3105	0.3227
0.3491	0.4498	0.6375	0.6654	0.6891
0.7339	0.7710	0.8525	0.9038	1.0000

Transect 11748.1

Area:

0.0008	0.0025	0.0048	0.0076	0.0109
0.0147	0.0189	0.0234	0.0281	0.0331
0.0383	0.0438	0.0495	0.0555	0.0617
0.0683	0.0750	0.0820	0.0892	0.0966
0.1042	0.1121	0.1201	0.1285	0.1370
0.1459	0.1549	0.1643	0.1739	0.1839
0.1944	0.2074	0.2235	0.2420	0.2617
0.2827	0.3059	0.3320	0.3633	0.4035
0.4478	0.4957	0.5468	0.6031	0.6677
0.7341	0.8006	0.8671	0.9335	1.0000

Hrad:

0.0497	0.1208	0.1821	0.2387	0.2927
0.3494	0.4167	0.4842	0.5494	0.6136
0.6761	0.7370	0.7969	0.8500	0.9016
0.9573	1.0185	1.0787	1.1355	1.1906
1.2465	1.3004	1.3533	1.4027	1.4525
1.5016	1.5479	1.5922	1.6366	1.6598
1.6202	1.3589	1.1995	1.1807	1.2258
1.2050	1.1804	1.1775	1.0039	0.9300
0.9566	1.0074	1.0468	1.0904	0.9567
1.0503	1.1438	1.2369	1.3298	1.0000

Width:

0.0157	0.0212	0.0266	0.0321	0.0375
0.0424	0.0455	0.0482	0.0509	0.0535
0.0561	0.0587	0.0612	0.0642	0.0672
0.0699	0.0720	0.0742	0.0765	0.0789
0.0812	0.0836	0.0860	0.0887	0.0913

0.0939	0.0968	0.0997	0.1027	0.1071
0.1164	0.1495	0.1838	0.2026	0.2113
0.2327	0.2577	0.2878	0.3793	0.4541
0.4897	0.5206	0.5546	0.6327	0.6976
0.6976	0.6976	0.6976	0.6976	1.0000

Transect 11748.1(orig)

Area:

0.0006	0.0020	0.0037	0.0059	0.0084
0.0114	0.0146	0.0181	0.0217	0.0256
0.0296	0.0338	0.0382	0.0429	0.0477
0.0527	0.0580	0.0634	0.0689	0.0746
0.0805	0.0866	0.0928	0.0992	0.1059
0.1127	0.1197	0.1269	0.1344	0.1421
0.1504	0.1611	0.1745	0.1903	0.2084
0.2290	0.2542	0.2867	0.3249	0.3702
0.4187	0.4702	0.5244	0.5833	0.6496
0.7177	0.7867	0.8566	0.9276	1.0000

Hrad:

0.0382	0.0928	0.1400	0.1836	0.2251
0.2686	0.3204	0.3723	0.4224	0.4718
0.5198	0.5666	0.6127	0.6535	0.6932
0.7360	0.7831	0.8294	0.8730	0.9154
0.9584	0.9998	1.0405	1.0785	1.1168
1.1545	1.1901	1.2242	1.2583	1.2762
1.2435	1.0381	0.9113	0.8903	0.9126
0.8797	0.8415	0.6064	0.5865	0.5894
0.6306	0.6808	0.7249	0.7546	0.7046
0.7737	0.8343	0.8952	0.9525	1.0000

Width:

0.0157	0.0212	0.0266	0.0321	0.0375
0.0424	0.0455	0.0482	0.0509	0.0535
0.0561	0.0587	0.0612	0.0642	0.0672
0.0699	0.0720	0.0742	0.0765	0.0789
0.0812	0.0836	0.0860	0.0887	0.0913
0.0939	0.0968	0.0997	0.1027	0.1071
0.1224	0.1609	0.1995	0.2332	0.2570
0.3166	0.3769	0.4788	0.5717	0.6480
0.6851	0.7185	0.7550	0.8509	0.9236
0.9288	0.9437	0.9574	0.9740	1.0000

Transect 11848.1

Area:

0.0003	0.0012	0.0028	0.0050	0.0078
0.0109	0.0144	0.0180	0.0219	0.0261
0.0304	0.0350	0.0399	0.0452	0.0507
0.0565	0.0627	0.0692	0.0761	0.0832
0.0906	0.0984	0.1064	0.1147	0.1233
0.1323	0.1417	0.1515	0.1631	0.1784
0.1949	0.2160	0.2440	0.2747	0.3066
0.3396	0.3769	0.4235	0.4704	0.5176
0.5653	0.6136	0.6619	0.7102	0.7585
0.8068	0.8551	0.9034	0.9517	1.0000

Hrad:

0.0272	0.0543	0.0815	0.1035	0.1408
0.1776	0.2181	0.2563	0.2924	0.3272
0.3609	0.3906	0.4186	0.4465	0.4730
0.4975	0.5226	0.5486	0.5761	0.6043
0.6328	0.6613	0.6891	0.7156	0.7395
0.7620	0.7813	0.7935	0.7766	0.7945
0.8106	0.8061	0.7789	0.7641	0.7579
0.7563	0.7189	0.7089	0.7085	0.7106
0.7236	0.7491	0.7769	0.8063	0.8371
0.8689	0.9015	0.9348	0.9686	1.0000

Width:

0.0077	0.0154	0.0231	0.0329	0.0377
0.0419	0.0447	0.0475	0.0505	0.0534
0.0564	0.0600	0.0637	0.0675	0.0715
0.0758	0.0801	0.0842	0.0880	0.0918
0.0954	0.0990	0.1027	0.1066	0.1110
0.1156	0.1208	0.1273	0.1857	0.1987
0.2406	0.2979	0.3803	0.3933	0.4077
0.4226	0.5854	0.5885	0.5918	0.5967
0.6082	0.6082	0.6082	0.6082	0.6082
0.6082	0.6082	0.6082	0.6082	1.0000

Transect 11848.1(orig)

Area:

0.0002	0.0009	0.0020	0.0037	0.0057

0.0081	0.0106	0.0133	0.0161	0.0192
0.0224	0.0258	0.0294	0.0332	0.0373
0.0416	0.0462	0.0510	0.0560	0.0612
0.0667	0.0724	0.0783	0.0844	0.0908
0.0974	0.1053	0.1146	0.1274	0.1439
0.1616	0.1833	0.2104	0.2400	0.2712
0.3036	0.3399	0.3836	0.4283	0.4747
0.5234	0.5737	0.6245	0.6756	0.7272
0.7796	0.8332	0.8875	0.9429	1.0000

Hrad:

0.0327	0.0654	0.0981	0.1246	0.1695
0.2138	0.2626	0.3085	0.3520	0.3939
0.4344	0.4703	0.5039	0.5376	0.5694
0.5989	0.6291	0.6605	0.6935	0.7275
0.7618	0.7961	0.8296	0.8615	0.8903
0.9173	0.9286	0.9228	0.8681	0.8606
0.8571	0.8398	0.8074	0.7895	0.7817
0.7799	0.7457	0.7392	0.7399	0.7349
0.7401	0.7679	0.7980	0.8302	0.8625
0.8901	0.9205	0.9521	0.9823	1.0000

Width:

0.0077	0.0154	0.0231	0.0329	0.0377
0.0419	0.0447	0.0475	0.0505	0.0534
0.0564	0.0600	0.0637	0.0675	0.0715
0.0758	0.0801	0.0842	0.0880	0.0918
0.0954	0.0990	0.1027	0.1066	0.1110
0.1156	0.1491	0.1731	0.2696	0.2914
0.3411	0.4059	0.4955	0.5189	0.5434
0.5676	0.7413	0.7562	0.7750	0.8153
0.8571	0.8650	0.8723	0.8783	0.8870
0.9076	0.9232	0.9369	0.9542	1.0000

Transect 11881.3

Area:

0.0002	0.0010	0.0023	0.0046	0.0075
0.0106	0.0139	0.0174	0.0212	0.0251
0.0293	0.0338	0.0385	0.0434	0.0487
0.0541	0.0599	0.0659	0.0721	0.0786
0.0853	0.0922	0.0995	0.1070	0.1148
0.1230	0.1324	0.1460	0.1627	0.1822
0.2053	0.2304	0.2584	0.2990	0.3411
0.3834	0.4259	0.4685	0.5114	0.5545
0.5979	0.6421	0.6868	0.7315	0.7763
0.8210	0.8658	0.9105	0.9553	1.0000

Hrad:

0.0268	0.0535	0.0695	0.0935	0.1347
0.1761	0.2159	0.2540	0.2898	0.3239
0.3569	0.3890	0.4197	0.4481	0.4767
0.5061	0.5342	0.5635	0.5928	0.6220
0.6503	0.6784	0.7055	0.7282	0.7509
0.7804	0.8101	0.8109	0.7982	0.7818
0.7586	0.7437	0.7231	0.6664	0.6525
0.6504	0.6560	0.6673	0.6803	0.6969
0.7107	0.7396	0.7705	0.8024	0.8350
0.8681	0.9017	0.9357	0.9700	1.0000

Width:

0.0066	0.0132	0.0245	0.0366	0.0409
0.0440	0.0470	0.0499	0.0530	0.0562
0.0595	0.0627	0.0661	0.0699	0.0735
0.0770	0.0806	0.0840	0.0873	0.0906
0.0940	0.0974	0.1010	0.1052	0.1095
0.1178	0.1680	0.1996	0.2564	0.2853
0.3355	0.3582	0.4843	0.5779	0.5800
0.5822	0.5846	0.5871	0.5905	0.5938
0.5990	0.6147	0.6147	0.6147	0.6147
0.6147	0.6147	0.6147	0.6147	1.0000

Transect 11881.3(orig)

Area:

0.0002	0.0007	0.0017	0.0034	0.0055
0.0078	0.0103	0.0129	0.0156	0.0186
0.0217	0.0250	0.0284	0.0321	0.0359
0.0400	0.0442	0.0486	0.0532	0.0580
0.0630	0.0681	0.0735	0.0790	0.0848
0.0914	0.1015	0.1161	0.1335	0.1533
0.1762	0.2011	0.2285	0.2658	0.3047
0.3443	0.3849	0.4263	0.4687	0.5119
0.5560	0.6016	0.6483	0.6958	0.7440
0.7930	0.8434	0.8947	0.9468	1.0000

Hrad:

0.0317	0.0634	0.0824	0.1108	0.1596
0.2086	0.2558	0.3009	0.3432	0.3836
0.4228	0.4608	0.4971	0.5308	0.5647
0.5995	0.6328	0.6675	0.7023	0.7368
0.7704	0.8037	0.8357	0.8626	0.8895
0.9164	0.9137	0.8775	0.8391	0.8067
0.7751	0.7563	0.7343	0.6839	0.6744
0.6745	0.6810	0.6923	0.7061	0.7235
0.7383	0.7584	0.7924	0.8204	0.8540
0.8808	0.9103	0.9410	0.9717	1.0000

Width:

0.0066	0.0132	0.0245	0.0366	0.0409
0.0440	0.0470	0.0499	0.0530	0.0562
0.0595	0.0627	0.0661	0.0699	0.0735
0.0770	0.0806	0.0840	0.0873	0.0906
0.0940	0.0974	0.1010	0.1052	0.1095
0.1598	0.2479	0.2893	0.3543	0.3906
0.4485	0.4787	0.6150	0.7189	0.7303
0.7450	0.7617	0.7797	0.7962	0.8118
0.8299	0.8657	0.8711	0.8926	0.9014
0.9267	0.9457	0.9619	0.9782	1.0000

Transect 11896.4
Area:

0.0020	0.0043	0.0066	0.0092	0.0120
0.0149	0.0180	0.0213	0.0248	0.0284
0.0322	0.0362	0.0404	0.0448	0.0495
0.0544	0.0596	0.0651	0.0708	0.0769
0.0832	0.0899	0.0968	0.1041	0.1117
0.1196	0.1280	0.1367	0.1459	0.1555
0.1661	0.1799	0.1993	0.2221	0.2503
0.2831	0.3183	0.3564	0.3987	0.4491
0.5042	0.5593	0.6144	0.6695	0.7245
0.7796	0.8347	0.8898	0.9449	1.0000

Hrad:

0.0579	0.1097	0.1570	0.2008	0.2419
0.2808	0.3180	0.3537	0.3883	0.4218
0.4544	0.4864	0.5171	0.5430	0.5656
0.5883	0.6122	0.6356	0.6596	0.6830
0.7067	0.7301	0.7529	0.7739	0.7938
0.8147	0.8326	0.8510	0.8712	0.8730
0.8837	0.9139	0.9171	0.9104	0.8850
0.8647	0.8490	0.8358	0.8196	0.7908
0.7842	0.7925	0.8076	0.8275	0.8511
0.8774	0.9059	0.9360	0.9675	1.0000

Width:

0.0386	0.0418	0.0451	0.0483	0.0516
0.0548	0.0581	0.0613	0.0646	0.0678
0.0711	0.0743	0.0777	0.0819	0.0869
0.0920	0.0969	0.1020	0.1071	0.1124
0.1177	0.1231	0.1288	0.1349	0.1415
0.1480	0.1553	0.1627	0.1699	0.1816
0.2013	0.3168	0.3875	0.4393	0.5791
0.6140	0.6679	0.7295	0.8312	0.9731
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 11896.4(orig)
Area:

0.0014	0.0028	0.0045	0.0062	0.0080
0.0100	0.0121	0.0143	0.0166	0.0190
0.0216	0.0243	0.0271	0.0300	0.0331
0.0364	0.0399	0.0436	0.0475	0.0515
0.0558	0.0602	0.0649	0.0697	0.0748
0.0802	0.0858	0.0916	0.0980	0.1062
0.1185	0.1395	0.1662	0.1954	0.2284
0.2645	0.3024	0.3424	0.3853	0.4338
0.4855	0.5375	0.5896	0.6426	0.6980
0.7569	0.8163	0.8761	0.9364	1.0000

Hrad:

0.0710	0.1346	0.1926	0.2464	0.2968
0.3445	0.3901	0.4340	0.4763	0.5174
0.5575	0.5966	0.6343	0.6662	0.6938
0.7217	0.7511	0.7797	0.8092	0.8379
0.8670	0.8957	0.9236	0.9494	0.9738
0.9995	1.0214	1.0440	1.0650	1.0437
0.9972	0.9335	0.8765	0.8413	0.8115
0.7985	0.7954	0.7980	0.8008	0.7955

0.8076	0.8304	0.8576	0.8856	0.9040
0.8906	0.9262	0.9632	0.9878	1.0000

Width:

0.0218	0.0237	0.0255	0.0274	0.0292
0.0310	0.0329	0.0347	0.0366	0.0384
0.0402	0.0421	0.0440	0.0464	0.0492
0.0521	0.0549	0.0578	0.0606	0.0636
0.0666	0.0697	0.0729	0.0764	0.0801
0.0838	0.0879	0.0921	0.1137	0.1443
0.2407	0.3877	0.4309	0.4634	0.5446
0.5664	0.5987	0.6352	0.6945	0.7772
0.7949	0.7979	0.8025	0.8274	0.8838
0.9093	0.9137	0.9181	0.9478	1.0000

Transect 11919.8

Area:

0.0006	0.0024	0.0045	0.0067	0.0091
0.0115	0.0141	0.0168	0.0196	0.0226
0.0257	0.0291	0.0327	0.0367	0.0409
0.0453	0.0501	0.0551	0.0604	0.0660
0.0718	0.0779	0.0843	0.0909	0.0977
0.1048	0.1122	0.1198	0.1278	0.1364
0.1462	0.1644	0.1908	0.2218	0.2571
0.2936	0.3319	0.3715	0.4126	0.4560
0.5051	0.5566	0.6110	0.6666	0.7222
0.7777	0.8333	0.8889	0.9444	1.0000

Hrad:

0.0355	0.0832	0.1440	0.2000	0.2521
0.3010	0.3473	0.3913	0.4336	0.4742
0.5003	0.5231	0.5473	0.5734	0.6004
0.6278	0.6559	0.6842	0.7130	0.7422
0.7737	0.8067	0.8390	0.8707	0.9022
0.9341	0.9652	0.9939	1.0016	0.9848
1.0020	0.9916	0.9449	0.8980	0.8668
0.8548	0.8497	0.8553	0.8620	0.8680
0.8605	0.8756	0.8736	0.8991	0.9282
0.9600	0.9938	1.0294	1.0662	1.0000

Width:

0.0140	0.0227	0.0241	0.0254	0.0268
0.0281	0.0295	0.0308	0.0322	0.0335
0.0362	0.0393	0.0424	0.0454	0.0485
0.0515	0.0546	0.0576	0.0607	0.0638
0.0667	0.0694	0.0721	0.0750	0.0778
0.0807	0.0836	0.0868	0.0922	0.1007
0.1276	0.2751	0.3175	0.3813	0.4022
0.4140	0.4354	0.4483	0.4696	0.4981
0.5669	0.5817	0.6201	0.6201	0.6201
0.6201	0.6201	0.6201	0.6201	1.0000

Transect 11919.8(orig)

Area:

0.0005	0.0019	0.0035	0.0052	0.0070
0.0089	0.0109	0.0129	0.0151	0.0174
0.0198	0.0224	0.0252	0.0282	0.0315
0.0349	0.0386	0.0425	0.0465	0.0508
0.0553	0.0600	0.0649	0.0700	0.0753
0.0807	0.0864	0.0923	0.0985	0.1052
0.1144	0.1327	0.1607	0.1947	0.2322
0.2708	0.3111	0.3524	0.3952	0.4398
0.4891	0.5404	0.5942	0.6490	0.7041
0.7596	0.8154	0.8722	0.9323	1.0000

Hrad:

0.0387	0.0908	0.1571	0.2182	0.2750
0.3284	0.3789	0.4270	0.4730	0.5174
0.5459	0.5707	0.5972	0.6256	0.6550
0.6850	0.7156	0.7464	0.7779	0.8098
0.8442	0.8801	0.9154	0.9500	0.9844
1.0191	1.0531	1.0844	1.0928	1.0725
1.0696	1.0203	0.9225	0.8466	0.8060
0.7922	0.7899	0.7994	0.8119	0.8252
0.8289	0.8520	0.8609	0.8917	0.9253
0.9599	0.9941	1.0161	1.0170	1.0000

Width:

0.0140	0.0227	0.0241	0.0254	0.0268
0.0281	0.0295	0.0308	0.0322	0.0335
0.0362	0.0393	0.0424	0.0454	0.0485
0.0515	0.0546	0.0576	0.0607	0.0638
0.0667	0.0694	0.0721	0.0750	0.0778
0.0807	0.0836	0.0868	0.0922	0.1101

0.1826	0.3508	0.4636	0.5299	0.5532
0.5673	0.5914	0.6073	0.6316	0.6628
0.7342	0.7514	0.7927	0.7966	0.8005
0.8057	0.8133	0.8366	0.9338	1.0000

Transect 11939.6

Area:

0.0003	0.0013	0.0028	0.0044	0.0062
0.0080	0.0099	0.0121	0.0148	0.0177
0.0210	0.0244	0.0281	0.0320	0.0361
0.0404	0.0449	0.0497	0.0547	0.0599
0.0653	0.0710	0.0770	0.0833	0.0899
0.0969	0.1044	0.1123	0.1210	0.1308
0.1446	0.1636	0.1870	0.2130	0.2423
0.2765	0.3137	0.3525	0.3927	0.4359
0.4839	0.5385	0.5962	0.6539	0.7115
0.7692	0.8269	0.8846	0.9423	1.0000

Hrad:

0.0329	0.0658	0.1157	0.1661	0.2118
0.2540	0.2865	0.2947	0.3160	0.3449
0.3782	0.4127	0.4464	0.4796	0.5129
0.5450	0.5770	0.6090	0.6408	0.6716
0.7019	0.7259	0.7503	0.7725	0.7922
0.8113	0.8273	0.8252	0.8484	0.8698
0.8737	0.8661	0.8489	0.8353	0.8165
0.7969	0.7913	0.7933	0.7975	0.8001
0.7951	0.7838	0.7869	0.8096	0.8361
0.8655	0.8969	0.9301	0.9645	1.0000

Width:

0.0115	0.0230	0.0271	0.0289	0.0306
0.0324	0.0352	0.0426	0.0487	0.0537
0.0578	0.0616	0.0654	0.0692	0.0729
0.0768	0.0807	0.0844	0.0882	0.0922
0.0962	0.1013	0.1065	0.1121	0.1184
0.1249	0.1323	0.1436	0.1576	0.1925
0.2769	0.3767	0.4271	0.4714	0.5530
0.6283	0.6567	0.6824	0.7305	0.7692
0.8859	0.9840	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 11939.6(orig)

Area:

0.0002	0.0009	0.0020	0.0032	0.0044
0.0057	0.0071	0.0086	0.0105	0.0126
0.0149	0.0174	0.0200	0.0228	0.0257
0.0288	0.0320	0.0354	0.0389	0.0427
0.0465	0.0506	0.0549	0.0593	0.0641
0.0691	0.0744	0.0800	0.0862	0.0932
0.1030	0.1178	0.1385	0.1634	0.1946
0.2319	0.2719	0.3140	0.3574	0.4031
0.4525	0.5068	0.5634	0.6202	0.6773
0.7391	0.8032	0.8678	0.9333	1.0000

Hrad:

0.0379	0.0758	0.1334	0.1915	0.2442
0.2928	0.3303	0.3397	0.3643	0.3976
0.4360	0.4757	0.5146	0.5528	0.5912
0.6282	0.6651	0.7021	0.7387	0.7741
0.8091	0.8368	0.8649	0.8905	0.9132
0.9352	0.9537	0.9512	0.9780	1.0027
1.0070	0.9836	0.9316	0.8788	0.8179
0.7722	0.7540	0.7495	0.7547	0.7627
0.7677	0.7698	0.7845	0.8151	0.8493
0.8785	0.9077	0.9381	0.9685	1.0000

Width:

0.0070	0.0140	0.0165	0.0176	0.0187
0.0197	0.0215	0.0259	0.0297	0.0327
0.0352	0.0375	0.0398	0.0422	0.0444
0.0468	0.0491	0.0514	0.0538	0.0562
0.0586	0.0617	0.0649	0.0683	0.0721
0.0761	0.0806	0.0875	0.0960	0.1173
0.1711	0.2678	0.3281	0.4105	0.5216
0.5802	0.6065	0.6332	0.6653	0.6920
0.7658	0.8283	0.8411	0.8447	0.8517
0.9460	0.9534	0.9637	0.9779	1.0000

Transect 11972.5

Area:

0.0005	0.0020	0.0037	0.0055	0.0074
0.0094	0.0114	0.0136	0.0163	0.0193

	0.0226	0.0261	0.0298	0.0337	0.0378
	0.0420	0.0465	0.0511	0.0560	0.0611
	0.0663	0.0718	0.0776	0.0836	0.0898
	0.0964	0.1032	0.1102	0.1175	0.1250
	0.1330	0.1413	0.1503	0.1620	0.1756
	0.1906	0.2084	0.2280	0.2491	0.2755
	0.3155	0.3734	0.4375	0.5054	0.5783
	0.6540	0.7325	0.8160	0.9045	1.0000
Hrad:					
	0.0442	0.1041	0.1789	0.2469	0.3093
	0.3672	0.4214	0.4364	0.4551	0.4782
	0.5242	0.5709	0.6167	0.6636	0.7112
	0.7579	0.8029	0.8443	0.8851	0.9249
	0.9658	1.0029	1.0381	1.0736	1.1058
	1.1417	1.1804	1.2192	1.2548	1.2794
	1.3047	1.3159	1.3081	1.3539	1.3916
	1.4208	1.4317	1.4388	1.4445	1.4201
	1.2991	1.1743	1.0967	1.0561	1.0237
	1.0158	1.0178	1.0134	1.0120	1.0000
Width:					
	0.0102	0.0163	0.0171	0.0178	0.0186
	0.0193	0.0201	0.0235	0.0272	0.0309
	0.0330	0.0350	0.0369	0.0388	0.0405
	0.0422	0.0440	0.0460	0.0480	0.0501
	0.0522	0.0544	0.0569	0.0593	0.0620
	0.0645	0.0669	0.0692	0.0717	0.0751
	0.0785	0.0831	0.0949	0.1258	0.1365
	0.1590	0.1831	0.1968	0.2150	0.2931
	0.5043	0.5939	0.6416	0.6815	0.7227
	0.7461	0.7705	0.8300	0.8881	1.0000

Transect 12006.2

Area:					
	0.0009	0.0035	0.0068	0.0106	0.0149
	0.0196	0.0248	0.0304	0.0366	0.0432
	0.0503	0.0578	0.0657	0.0739	0.0825
	0.0913	0.1003	0.1096	0.1192	0.1290
	0.1391	0.1493	0.1599	0.1706	0.1816
	0.1929	0.2046	0.2167	0.2294	0.2429
	0.2593	0.2800	0.3012	0.3228	0.3448
	0.3676	0.3913	0.4169	0.4441	0.4744
	0.5096	0.5483	0.5894	0.6329	0.6772
	0.7242	0.7833	0.8465	0.9164	1.0000
Hrad:					
	0.0280	0.0632	0.1061	0.1449	0.1809
	0.2149	0.2476	0.2791	0.3080	0.3384
	0.3692	0.3995	0.4338	0.4672	0.5021
	0.5375	0.5716	0.6049	0.6376	0.6706
	0.7031	0.7350	0.7666	0.7980	0.8258
	0.8493	0.8728	0.9198	0.9662	1.0076
	1.0335	1.0425	1.0560	1.0724	1.0903
	1.1085	1.1249	1.1375	1.1482	1.1505
	1.1413	1.1355	1.1278	1.1252	1.1265
	1.1264	1.0800	1.0675	1.0418	1.0000
Width:					
	0.0173	0.0297	0.0341	0.0386	0.0431
	0.0476	0.0520	0.0565	0.0614	0.0659
	0.0701	0.0743	0.0775	0.0806	0.0833
	0.0857	0.0882	0.0906	0.0931	0.0954
	0.0977	0.0999	0.1022	0.1043	0.1070
	0.1105	0.1139	0.1188	0.1243	0.1364
	0.1901	0.2012	0.2050	0.2095	0.2149
	0.2223	0.2360	0.2535	0.2715	0.3061
	0.3625	0.3804	0.4097	0.4212	0.4306
	0.4929	0.5917	0.6501	0.7050	1.0000

Transect 12006.2(orig)

Area:					
	0.0003	0.0010	0.0019	0.0030	0.0043
	0.0066	0.0105	0.0153	0.0211	0.0281
	0.0360	0.0452	0.0555	0.0670	0.0792
	0.0922	0.1060	0.1204	0.1355	0.1513
	0.1677	0.1846	0.2022	0.2202	0.2391
	0.2599	0.2818	0.3042	0.3270	0.3506
	0.3760	0.4036	0.4315	0.4594	0.4875
	0.5158	0.5444	0.5735	0.6030	0.6334
	0.6652	0.6979	0.7314	0.7655	0.7998
	0.8349	0.8734	0.9131	0.9546	1.0000
Hrad:					

0.0251	0.0567	0.0952	0.1301	0.1575
0.1586	0.1508	0.1574	0.1649	0.1760
0.1899	0.2029	0.2135	0.2323	0.2490
0.2654	0.2828	0.3029	0.3215	0.3409
0.3622	0.3852	0.4041	0.4232	0.4423
0.4292	0.4511	0.4792	0.5059	0.5233
0.5328	0.5274	0.5591	0.5909	0.6226
0.6541	0.6851	0.7156	0.7456	0.7742
0.8009	0.8277	0.8538	0.8802	0.9070
0.9331	0.9485	0.9704	0.9880	1.0000

Width:

0.0099	0.0170	0.0195	0.0221	0.0331
0.0596	0.0854	0.1036	0.1249	0.1454
0.1687	0.1902	0.2158	0.2303	0.2469
0.2627	0.2759	0.2883	0.3025	0.3158
0.3263	0.3348	0.3481	0.3607	0.3802
0.4237	0.4340	0.4418	0.4513	0.4741
0.5278	0.5431	0.5453	0.5479	0.5510
0.5552	0.5630	0.5730	0.5833	0.6031
0.6354	0.6456	0.6624	0.6689	0.6744
0.7100	0.7665	0.7999	0.8313	1.0000

Transect 12067.5
Area:

0.0005	0.0020	0.0041	0.0066	0.0094
0.0126	0.0161	0.0200	0.0243	0.0289
0.0339	0.0392	0.0450	0.0510	0.0575
0.0642	0.0714	0.0789	0.0869	0.0950
0.1035	0.1122	0.1211	0.1304	0.1399
0.1498	0.1599	0.1704	0.1813	0.1927
0.2047	0.2173	0.2307	0.2452	0.2628
0.2837	0.3077	0.3354	0.3691	0.4069
0.4486	0.4955	0.5459	0.5995	0.6594
0.7227	0.7885	0.8573	0.9280	1.0000

Hrad:

0.0324	0.0690	0.1165	0.1592	0.1989
0.2367	0.2730	0.3082	0.3428	0.3767
0.4101	0.4432	0.4760	0.5086	0.5409
0.5730	0.6051	0.6333	0.6689	0.7083
0.7467	0.7838	0.8189	0.8533	0.8874
0.9213	0.9516	0.9756	0.9989	1.0181
1.0284	1.0356	1.0232	1.0025	1.0067
1.0035	1.0338	1.0517	1.0520	1.0463
1.0393	1.0230	1.0141	1.0057	0.9871
0.9844	0.9826	0.9835	0.9909	1.0000

Width:

0.0141	0.0261	0.0311	0.0360	0.0409
0.0459	0.0508	0.0558	0.0607	0.0656
0.0706	0.0755	0.0804	0.0854	0.0903
0.0953	0.1002	0.1058	0.1100	0.1135
0.1169	0.1205	0.1244	0.1284	0.1324
0.1363	0.1409	0.1465	0.1524	0.1590
0.1675	0.1769	0.1907	0.2077	0.2630
0.3051	0.3520	0.4065	0.4913	0.5461
0.5903	0.6703	0.7086	0.7582	0.8533
0.8734	0.9162	0.9566	0.9747	1.0000

Transect 12091.1
Area:

0.0006	0.0022	0.0046	0.0074	0.0105
0.0141	0.0180	0.0224	0.0271	0.0322
0.0377	0.0437	0.0500	0.0567	0.0638
0.0713	0.0792	0.0874	0.0960	0.1047
0.1135	0.1224	0.1317	0.1415	0.1516
0.1621	0.1731	0.1844	0.1961	0.2082
0.2208	0.2339	0.2475	0.2618	0.2767
0.2922	0.3088	0.3356	0.3710	0.4122
0.4555	0.5007	0.5479	0.5984	0.6522
0.7089	0.7688	0.8367	0.9161	1.0000

Hrad:

0.0328	0.0677	0.1168	0.1609	0.2018
0.2406	0.2778	0.3140	0.3493	0.3840
0.4182	0.4520	0.4854	0.5186	0.5515
0.5842	0.6168	0.6492	0.6959	0.7436
0.7902	0.8259	0.8507	0.8761	0.9019
0.9279	0.9564	0.9852	1.0141	1.0423
1.0623	1.0818	1.0958	1.1131	1.1311
1.1405	1.1396	1.1222	1.1053	1.0875
1.0766	1.0715	1.0677	1.0635	1.0595

1.0585	1.0547	1.0373	1.0194	1.0000

Width:

0.0132	0.0255	0.0301	0.0348	0.0394
0.0440	0.0487	0.0533	0.0579	0.0626
0.0672	0.0718	0.0765	0.0811	0.0857
0.0904	0.0950	0.0996	0.1013	0.1027
0.1040	0.1069	0.1118	0.1166	0.1215
0.1263	0.1309	0.1354	0.1399	0.1445
0.1505	0.1568	0.1641	0.1711	0.1782
0.1870	0.2238	0.3506	0.4701	0.4989
0.5199	0.5433	0.5749	0.6141	0.6509
0.6811	0.7286	0.8774	0.9668	1.0000

Transect 12117.3

Area:

0.0004	0.0017	0.0036	0.0055	0.0075
0.0095	0.0115	0.0135	0.0156	0.0179
0.0203	0.0229	0.0256	0.0286	0.0317
0.0350	0.0385	0.0422	0.0461	0.0503
0.0549	0.0598	0.0660	0.0733	0.0824
0.0935	0.1064	0.1206	0.1365	0.1539
0.1740	0.1966	0.2225	0.2515	0.2830
0.3162	0.3546	0.4005	0.4485	0.4965
0.5446	0.5929	0.6412	0.6901	0.7400
0.7907	0.8419	0.8936	0.9460	1.0000

Hrad:

0.0396	0.0793	0.1435	0.2108	0.2730
0.3307	0.3845	0.4349	0.4662	0.4991
0.5377	0.5697	0.5995	0.6282	0.6578
0.6880	0.7197	0.7441	0.7662	0.7901
0.8036	0.8214	0.8695	0.9035	0.9144
0.9083	0.8972	0.8867	0.8768	0.8629
0.8510	0.8336	0.8092	0.7973	0.7847
0.7852	0.7747	0.7241	0.7322	0.7472
0.7666	0.7896	0.8150	0.8303	0.8548
0.8834	0.9127	0.9429	0.9729	1.0000

Width:

0.0154	0.0308	0.0350	0.0354	0.0359
0.0364	0.0368	0.0373	0.0402	0.0429
0.0450	0.0480	0.0513	0.0548	0.0583
0.0618	0.0652	0.0696	0.0744	0.0792
0.0856	0.0968	0.1254	0.1435	0.1849
0.2181	0.2460	0.2736	0.3023	0.3484
0.3799	0.4409	0.5032	0.5406	0.5915
0.6147	0.8016	0.8708	0.8724	0.8740
0.8761	0.8782	0.8805	0.8999	0.9147
0.9266	0.9352	0.9438	0.9693	1.0000

Transect 12148.1

Area:

0.0004	0.0015	0.0031	0.0046	0.0062
0.0080	0.0099	0.0120	0.0142	0.0165
0.0189	0.0214	0.0241	0.0268	0.0297
0.0327	0.0359	0.0393	0.0429	0.0468
0.0510	0.0555	0.0606	0.0665	0.0734
0.0818	0.0924	0.1074	0.1264	0.1503
0.1770	0.2045	0.2329	0.2618	0.2928
0.3323	0.3786	0.4252	0.4720	0.5189
0.5660	0.6133	0.6609	0.7088	0.7569
0.8052	0.8536	0.9022	0.9509	1.0000

Hrad:

0.0376	0.0754	0.1431	0.2046	0.2452
0.2839	0.3212	0.3630	0.4074	0.4506
0.4920	0.5302	0.5667	0.6025	0.6358
0.6642	0.6910	0.7184	0.7344	0.7494
0.7594	0.7665	0.7536	0.7957	0.8289
0.8446	0.8412	0.8005	0.7653	0.7137
0.6898	0.6832	0.6865	0.6981	0.7089
0.6673	0.6345	0.6492	0.6691	0.6927
0.7188	0.7465	0.7755	0.8059	0.8372
0.8694	0.9021	0.9352	0.9687	1.0000

Width:

0.0153	0.0305	0.0307	0.0310	0.0338
0.0373	0.0408	0.0434	0.0452	0.0470
0.0488	0.0510	0.0535	0.0561	0.0589
0.0623	0.0660	0.0697	0.0749	0.0806
0.0872	0.0950	0.1067	0.1285	0.1516
0.1892	0.2277	0.3325	0.4352	0.5136
0.5426	0.5587	0.5737	0.5835	0.6446

0.9011	0.9311	0.9338	0.9364	0.9389
0.9428	0.9488	0.9560	0.9596	0.9632
0.9661	0.9691	0.9725	0.9760	1.0000

Transect 12213.2

Area:

0.0011	0.0038	0.0069	0.0102	0.0138
0.0176	0.0217	0.0260	0.0306	0.0356
0.0414	0.0476	0.0543	0.0614	0.0689
0.0768	0.0852	0.0940	0.1041	0.1159
0.1283	0.1413	0.1549	0.1690	0.1837
0.2001	0.2180	0.2367	0.2561	0.2761
0.2968	0.3181	0.3399	0.3623	0.3853
0.4089	0.4330	0.4578	0.4832	0.5095
0.5369	0.5654	0.5977	0.6380	0.6870
0.7418	0.8029	0.8674	0.9329	1.0000

Hrad:

0.0265	0.0679	0.1110	0.1505	0.1873
0.2219	0.2547	0.2862	0.3138	0.3245
0.3388	0.3635	0.3884	0.4133	0.4393
0.4654	0.4882	0.5114	0.5261	0.4774
0.5070	0.5400	0.5729	0.6062	0.6386
0.6654	0.6885	0.7133	0.7491	0.7835
0.8165	0.8486	0.8797	0.9099	0.9394
0.9675	0.9950	1.0219	1.0469	1.0701
1.0909	1.1102	1.1205	1.1155	1.0860
1.0638	1.0248	1.0131	1.0063	1.0000

Width:

0.0314	0.0427	0.0464	0.0501	0.0537
0.0574	0.0611	0.0648	0.0692	0.0784
0.0875	0.0938	0.1001	0.1064	0.1123
0.1181	0.1249	0.1317	0.1660	0.1763
0.1838	0.1928	0.2018	0.2097	0.2240
0.2499	0.2664	0.2771	0.2866	0.2961
0.3052	0.3135	0.3217	0.3299	0.3379
0.3472	0.3560	0.3641	0.3757	0.3892
0.4064	0.4242	0.5323	0.6098	0.7735
0.8218	0.9300	0.9454	0.9610	1.0000

Transect 12263.1

Area:

0.0009	0.0024	0.0042	0.0063	0.0087
0.0114	0.0144	0.0177	0.0213	0.0253
0.0295	0.0341	0.0392	0.0445	0.0500
0.0558	0.0619	0.0684	0.0752	0.0824
0.0899	0.0979	0.1062	0.1149	0.1240
0.1335	0.1434	0.1536	0.1641	0.1758
0.1955	0.2187	0.2432	0.2688	0.2954
0.3230	0.3518	0.3817	0.4134	0.4471
0.4819	0.5179	0.5559	0.5948	0.6345
0.6775	0.7378	0.8208	0.9077	1.0000

Hrad:

0.0498	0.1050	0.1533	0.1976	0.2395
0.2797	0.3187	0.3568	0.3943	0.4314
0.4680	0.5031	0.5222	0.5642	0.6068
0.6480	0.6800	0.7096	0.7397	0.7699
0.8000	0.8309	0.8614	0.8905	0.9213
0.9539	0.9881	1.0226	1.0547	1.0799
1.0390	1.0241	1.0166	1.0152	1.0191
1.0323	1.0526	1.0727	1.0887	1.1044
1.1215	1.1295	1.1430	1.1638	1.1857
1.2018	1.1777	1.1247	1.0587	1.0000

Width:

0.0141	0.0173	0.0205	0.0238	0.0270
0.0302	0.0334	0.0367	0.0399	0.0431
0.0464	0.0516	0.0549	0.0576	0.0601
0.0626	0.0662	0.0701	0.0740	0.0779
0.0819	0.0859	0.0900	0.0942	0.0984
0.1023	0.1061	0.1098	0.1139	0.1519
0.2374	0.2529	0.2650	0.2764	0.2866
0.2972	0.3100	0.3248	0.3485	0.3630
0.3725	0.3929	0.4077	0.4154	0.4231
0.4913	0.8310	0.8903	0.9484	1.0000

Transect 12314

Area:

0.0006	0.0022	0.0043	0.0068	0.0097
0.0131	0.0168	0.0210	0.0255	0.0305
0.0359	0.0417	0.0480	0.0546	0.0616

0.0689	0.0764	0.0843	0.0925	0.1011
0.1100	0.1192	0.1288	0.1388	0.1491
0.1598	0.1709	0.1824	0.1942	0.2064
0.2190	0.2321	0.2456	0.2596	0.2742
0.2894	0.3052	0.3215	0.3384	0.3559
0.3739	0.3924	0.4126	0.4376	0.4750
0.5359	0.6353	0.7506	0.8729	1.0000

Hrad:

0.0376	0.0876	0.1386	0.1847	0.2279
0.2694	0.3095	0.3488	0.3875	0.4257
0.4635	0.5009	0.5382	0.5759	0.6229
0.6688	0.7087	0.7466	0.7848	0.8234
0.8618	0.8992	0.9361	0.9733	1.0058
1.0385	1.0745	1.1107	1.1451	1.1785
1.2110	1.2395	1.2669	1.2902	1.3056
1.3292	1.3535	1.3792	1.4049	1.4329
1.4635	1.4870	1.5011	1.5355	1.5251
1.4362	1.2685	1.1415	1.0593	1.0000

Width:

0.0091	0.0145	0.0177	0.0208	0.0240
0.0272	0.0304	0.0336	0.0368	0.0399
0.0431	0.0463	0.0495	0.0526	0.0546
0.0567	0.0592	0.0620	0.0646	0.0672
0.0698	0.0724	0.0751	0.0778	0.0808
0.0839	0.0867	0.0895	0.0924	0.0954
0.0985	0.1020	0.1057	0.1098	0.1148
0.1191	0.1235	0.1278	0.1321	0.1363
0.1403	0.1450	0.1662	0.2344	0.3626
0.6001	0.8558	0.9242	0.9553	1.0000

Transect 12359.8

Area:

0.0004	0.0017	0.0032	0.0051	0.0073
0.0098	0.0126	0.0157	0.0191	0.0228
0.0269	0.0312	0.0359	0.0409	0.0467
0.0532	0.0601	0.0673	0.0748	0.0827
0.0909	0.0994	0.1083	0.1175	0.1271
0.1370	0.1473	0.1580	0.1691	0.1806
0.1925	0.2048	0.2174	0.2305	0.2438
0.2575	0.2732	0.2922	0.3174	0.3518
0.3899	0.4300	0.4739	0.5202	0.5694
0.6331	0.7111	0.8033	0.9007	1.0000

Hrad:

0.0383	0.0884	0.1408	0.1882	0.2326
0.2751	0.3163	0.3565	0.3960	0.4350
0.4736	0.5119	0.5499	0.5579	0.5594
0.5877	0.6309	0.6745	0.7195	0.7631
0.8052	0.8448	0.8836	0.9236	0.9618
1.0000	1.0363	1.0710	1.1053	1.1404
1.1768	1.2146	1.2534	1.2925	1.3303
1.3683	1.3946	1.3922	1.3746	1.3328
1.2986	1.2734	1.2405	1.2144	1.1739
1.1255	1.0855	1.0390	1.0117	1.0000

Width:

0.0088	0.0143	0.0173	0.0204	0.0235
0.0266	0.0296	0.0327	0.0358	0.0388
0.0419	0.0450	0.0481	0.0541	0.0620
0.0672	0.0707	0.0741	0.0771	0.0803
0.0836	0.0871	0.0907	0.0942	0.0978
0.1014	0.1053	0.1093	0.1134	0.1174
0.1212	0.1250	0.1286	0.1321	0.1358
0.1395	0.1716	0.2101	0.2984	0.3766
0.3877	0.4252	0.4521	0.4766	0.5575
0.7255	0.8413	0.9660	0.9861	1.0000

Transect 12390.7

Area:

0.0003	0.0013	0.0027	0.0046	0.0068
0.0094	0.0124	0.0158	0.0197	0.0239
0.0286	0.0336	0.0391	0.0449	0.0512
0.0578	0.0647	0.0719	0.0795	0.0873
0.0954	0.1039	0.1126	0.1217	0.1311
0.1407	0.1507	0.1608	0.1730	0.1882
0.2065	0.2298	0.2583	0.2878	0.3178
0.3480	0.3785	0.4092	0.4402	0.4714
0.5029	0.5376	0.5755	0.6165	0.6646
0.7219	0.7836	0.8513	0.9241	1.0000

Hrad:

0.0338	0.0740	0.1140	0.1512	0.1871

0.2223	0.2569	0.2913	0.3254	0.3594
0.3932	0.4270	0.4607	0.4943	0.5304
0.5677	0.6071	0.6464	0.6865	0.7269
0.7639	0.8017	0.8386	0.8751	0.9125
0.9506	0.9905	1.0299	1.0539	1.0501
1.0273	0.9904	0.9670	0.9573	0.9577
0.9654	0.9795	0.9978	1.0188	1.0414
1.0692	1.0951	1.1154	1.1310	1.1330
1.1194	1.1114	1.0266	1.0114	1.0000

Width:

0.0089	0.0156	0.0209	0.0261	0.0314
0.0366	0.0418	0.0471	0.0523	0.0575
0.0628	0.0680	0.0733	0.0785	0.0833
0.0878	0.0919	0.0959	0.0997	0.1034
0.1075	0.1114	0.1154	0.1194	0.1233
0.1270	0.1304	0.1357	0.1759	0.2171
0.2596	0.3497	0.3787	0.3858	0.3899
0.3937	0.3970	0.3999	0.4029	0.4060
0.4091	0.4765	0.5017	0.5924	0.6546
0.7956	0.8100	0.9275	0.9622	1.0000

Transect 12415.2

Area:

0.0005	0.0019	0.0042	0.0073	0.0111
0.0154	0.0200	0.0249	0.0304	0.0364
0.0430	0.0498	0.0570	0.0646	0.0727
0.0813	0.0904	0.0999	0.1097	0.1198
0.1301	0.1407	0.1517	0.1630	0.1745
0.1864	0.1985	0.2110	0.2237	0.2367
0.2504	0.2668	0.2856	0.3074	0.3312
0.3560	0.3818	0.4095	0.4436	0.4882
0.5384	0.5888	0.6394	0.6902	0.7412
0.7923	0.8437	0.8954	0.9473	1.0000

Hrad:

0.0270	0.0540	0.0821	0.1140	0.1473
0.1852	0.2248	0.2540	0.2808	0.3059
0.3415	0.3767	0.4084	0.4363	0.4584
0.4827	0.5118	0.5472	0.5901	0.6333
0.6751	0.7229	0.7696	0.8146	0.8581
0.9005	0.9417	0.9819	1.0208	1.0587
1.0932	1.1120	1.1207	1.1188	1.1150
1.1134	1.1135	1.1107	1.0843	1.0261
0.9897	0.9705	0.9603	0.9569	0.9585
0.9639	0.9719	0.9825	0.9943	1.0000

Width:

0.0174	0.0348	0.0513	0.0645	0.0754
0.0825	0.0878	0.0969	0.1069	0.1177
0.1240	0.1301	0.1370	0.1453	0.1556
0.1653	0.1734	0.1789	0.1842	0.1895
0.1949	0.2007	0.2064	0.2121	0.2181
0.2229	0.2281	0.2332	0.2389	0.2445
0.2862	0.3260	0.3768	0.4273	0.4519
0.4707	0.4886	0.5816	0.6924	0.9203
0.9354	0.9386	0.9418	0.9449	0.9481
0.9520	0.9571	0.9622	0.9694	1.0000

Transect 12442.1

Area:

0.0010	0.0036	0.0069	0.0109	0.0156
0.0209	0.0270	0.0337	0.0410	0.0491
0.0578	0.0671	0.0772	0.0884	0.1006
0.1136	0.1273	0.1418	0.1570	0.1730
0.1897	0.2073	0.2257	0.2450	0.2650
0.2859	0.3076	0.3302	0.3539	0.3793
0.4054	0.4322	0.4595	0.4906	0.5225
0.5543	0.5862	0.6180	0.6498	0.6817
0.7135	0.7453	0.7772	0.8090	0.8408
0.8727	0.9045	0.9363	0.9682	1.0000

Hrad:

0.0216	0.0506	0.0796	0.1058	0.1305
0.1542	0.1771	0.1996	0.2217	0.2435
0.2652	0.2866	0.3107	0.3473	0.3798
0.4098	0.4377	0.4639	0.4886	0.5117
0.5335	0.5540	0.5734	0.5921	0.6100
0.6270	0.6430	0.6583	0.6713	0.6801
0.6947	0.7093	0.7221	0.7173	0.7310
0.7459	0.7618	0.7784	0.7955	0.8132
0.8311	0.8494	0.8679	0.8865	0.9053
0.9242	0.9431	0.9621	0.9810	1.0000

Width:

0.0600	0.0944	0.1155	0.1366	0.1576
0.1787	0.1997	0.2208	0.2419	0.2629
0.2840	0.3051	0.3300	0.3689	0.3966
0.4195	0.4430	0.4665	0.4900	0.5145
0.5395	0.5653	0.5918	0.6168	0.6419
0.6684	0.6965	0.7252	0.7626	0.8156
0.8310	0.8476	0.8746	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 12442.1(orig)

Area:

0.0004	0.0015	0.0029	0.0045	0.0065
0.0087	0.0112	0.0139	0.0170	0.0203
0.0239	0.0278	0.0320	0.0366	0.0416
0.0470	0.0527	0.0587	0.0650	0.0716
0.0785	0.0859	0.0955	0.1089	0.1250
0.1443	0.1702	0.1987	0.2294	0.2621
0.2955	0.3292	0.3633	0.3991	0.4353
0.4716	0.5079	0.5444	0.5810	0.6176
0.6544	0.6913	0.7282	0.7653	0.8024
0.8397	0.8770	0.9144	0.9533	1.0000

Hrad:

0.0315	0.0739	0.1162	0.1546	0.1906
0.2251	0.2587	0.2915	0.3238	0.3557
0.3873	0.4186	0.4538	0.5072	0.5547
0.5985	0.6393	0.6775	0.7135	0.7473
0.7791	0.8082	0.8128	0.7870	0.7577
0.7206	0.6649	0.6316	0.6085	0.5921
0.5953	0.6046	0.6169	0.6225	0.6420
0.6634	0.6863	0.7104	0.7353	0.7608
0.7870	0.8136	0.8405	0.8677	0.8953
0.9230	0.9508	0.9788	1.0045	1.0000

Width:

0.0159	0.0250	0.0306	0.0361	0.0417
0.0473	0.0529	0.0584	0.0640	0.0696
0.0752	0.0807	0.0874	0.0976	0.1050
0.1110	0.1172	0.1235	0.1297	0.1362
0.1428	0.1640	0.2246	0.3050	0.3359
0.4675	0.5496	0.5933	0.6373	0.6676
0.6748	0.6813	0.6904	0.7256	0.7276
0.7296	0.7315	0.7335	0.7355	0.7375
0.7394	0.7414	0.7433	0.7452	0.7470
0.7487	0.7504	0.7521	0.8684	1.0000

Transect 12491.9

Area:

0.0038	0.0082	0.0132	0.0188	0.0250
0.0318	0.0391	0.0471	0.0556	0.0647
0.0744	0.0847	0.0956	0.1071	0.1191
0.1318	0.1450	0.1589	0.1739	0.1900
0.2069	0.2245	0.2428	0.2617	0.2812
0.3013	0.3220	0.3434	0.3654	0.3880
0.4113	0.4352	0.4597	0.4849	0.5108
0.5372	0.5643	0.5921	0.6204	0.6493
0.6789	0.7093	0.7406	0.7728	0.8086
0.8461	0.8846	0.9231	0.9615	1.0000

Hrad:

0.0355	0.0664	0.0944	0.1203	0.1448
0.1681	0.1906	0.2125	0.2339	0.2549
0.2755	0.2958	0.3159	0.3358	0.3555
0.3751	0.3945	0.4138	0.4470	0.4774
0.5059	0.5330	0.5589	0.5838	0.6079
0.6311	0.6535	0.6751	0.6960	0.7163
0.7360	0.7551	0.7737	0.7917	0.8094
0.8266	0.8435	0.8601	0.8764	0.8924
0.9077	0.9214	0.9342	0.9468	0.9408
0.9439	0.9569	0.9706	0.9850	1.0000

Width:

0.1070	0.1223	0.1376	0.1529	0.1682
0.1835	0.1988	0.2141	0.2294	0.2447
0.2600	0.2753	0.2907	0.3060	0.3213
0.3366	0.3519	0.3672	0.4066	0.4310
0.4486	0.4662	0.4829	0.4993	0.5149
0.5307	0.5471	0.5636	0.5803	0.5968
0.6130	0.6299	0.6465	0.6631	0.6797
0.6964	0.7126	0.7286	0.7446	0.7606

0.7785	0.8010	0.8254	0.8637	0.9478
1.0000	1.0000	1.0000	1.0000	1.0000

Transect 12491.9(orig)

Area:

0.0018	0.0039	0.0063	0.0089	0.0119
0.0151	0.0186	0.0224	0.0264	0.0307
0.0353	0.0402	0.0454	0.0509	0.0566
0.0626	0.0689	0.0755	0.0826	0.0903
0.0983	0.1067	0.1153	0.1243	0.1336
0.1431	0.1530	0.1631	0.1736	0.1843
0.1954	0.2067	0.2184	0.2303	0.2430
0.2579	0.2752	0.2967	0.3225	0.3537
0.3986	0.4513	0.5109	0.5737	0.6404
0.7094	0.7801	0.8521	0.9253	1.0000

Hrad:

0.0699	0.1309	0.1860	0.2370	0.2852
0.3313	0.3757	0.4188	0.4609	0.5022
0.5428	0.5829	0.6225	0.6616	0.7005
0.7391	0.7774	0.8155	0.8809	0.9406
0.9968	1.0502	1.1013	1.1504	1.1978
1.2436	1.2877	1.3304	1.3715	1.4115
1.4503	1.4879	1.5245	1.5601	1.5914
1.6053	1.6030	1.5775	1.5346	1.4681
1.3646	1.2578	1.1754	1.1148	1.0419
1.0119	1.0008	0.9955	0.9959	1.0000

Width:

0.0259	0.0296	0.0333	0.0370	0.0408
0.0445	0.0482	0.0519	0.0556	0.0593
0.0630	0.0667	0.0704	0.0741	0.0778
0.0815	0.0852	0.0890	0.0985	0.1044
0.1087	0.1130	0.1170	0.1210	0.1247
0.1286	0.1325	0.1365	0.1406	0.1446
0.1485	0.1526	0.1566	0.1607	0.1821
0.2119	0.2583	0.3091	0.3650	0.5151
0.6477	0.7701	0.8130	0.8580	0.9006
0.9290	0.9443	0.9636	0.9815	1.0000

Transect 12524.2

Area:

0.0004	0.0014	0.0027	0.0043	0.0061
0.0081	0.0104	0.0131	0.0161	0.0193
0.0228	0.0266	0.0307	0.0350	0.0395
0.0444	0.0495	0.0550	0.0607	0.0668
0.0731	0.0797	0.0866	0.0937	0.1012
0.1091	0.1176	0.1277	0.1394	0.1532
0.1701	0.1916	0.2220	0.2572	0.2925
0.3281	0.3638	0.3996	0.4356	0.4718
0.5082	0.5458	0.5869	0.6344	0.6883
0.7479	0.8100	0.8727	0.9359	1.0000

Hrad:

0.0342	0.0779	0.1255	0.1684	0.2086
0.2469	0.2833	0.3075	0.3403	0.3764
0.4131	0.4495	0.4864	0.5209	0.5535
0.5849	0.6160	0.6463	0.6788	0.7116
0.7442	0.7783	0.8114	0.8442	0.8755
0.9049	0.9304	0.9461	0.9520	0.9376
0.9074	0.8838	0.8403	0.8132	0.8053
0.8093	0.8213	0.8389	0.8604	0.8846
0.9109	0.9359	0.9552	0.9648	0.9669
0.9654	0.9690	0.9777	0.9900	1.0000

Width:

0.0110	0.0184	0.0222	0.0260	0.0298
0.0336	0.0376	0.0434	0.0481	0.0523
0.0562	0.0602	0.0639	0.0680	0.0723
0.0768	0.0814	0.0862	0.0906	0.0950
0.0994	0.1036	0.1080	0.1123	0.1170
0.1263	0.1390	0.1660	0.1952	0.2322
0.2920	0.3724	0.5381	0.5424	0.5450
0.5477	0.5499	0.5523	0.5547	0.5578
0.5610	0.6118	0.6721	0.7727	0.8660
0.9478	0.9593	0.9674	0.9767	1.0000

Transect 12591.8

Area:

0.0003	0.0010	0.0020	0.0031	0.0044
0.0059	0.0076	0.0095	0.0116	0.0138
0.0163	0.0189	0.0217	0.0246	0.0279
0.0314	0.0352	0.0391	0.0433	0.0476

0.0522	0.0570	0.0620	0.0672	0.0726
0.0782	0.0841	0.0914	0.1032	0.1179
0.1355	0.1611	0.1978	0.2376	0.2779
0.3184	0.3591	0.4003	0.4432	0.4878
0.5334	0.5805	0.6281	0.6761	0.7252
0.7754	0.8265	0.8801	0.9387	1.0000

Hrad:

0.0431	0.0987	0.1582	0.2120	0.2624
0.3105	0.3571	0.4025	0.4472	0.4913
0.5348	0.5780	0.6209	0.6636	0.7374
0.8053	0.8685	0.9278	0.9834	1.0353
1.0842	1.1304	1.1744	1.2165	1.2561
1.2940	1.3295	1.3398	1.2758	1.2012
1.1194	0.9725	0.8153	0.7641	0.7441
0.7423	0.7517	0.7677	0.7854	0.7859
0.8025	0.8268	0.8553	0.8848	0.9062
0.9349	0.9638	0.9834	0.9726	1.0000

Width:

0.0085	0.0141	0.0171	0.0200	0.0230
0.0260	0.0290	0.0320	0.0349	0.0379
0.0409	0.0439	0.0469	0.0498	0.0553
0.0592	0.0623	0.0656	0.0689	0.0724
0.0759	0.0793	0.0827	0.0861	0.0898
0.0934	0.1007	0.1435	0.2218	0.2560
0.3300	0.5084	0.6415	0.6505	0.6551
0.6584	0.6613	0.6810	0.7102	0.7297
0.7569	0.7685	0.7743	0.7812	0.8083
0.8204	0.8514	0.8964	0.9873	1.0000

Transect 12613.3

Area:

0.0003	0.0010	0.0019	0.0030	0.0044
0.0058	0.0075	0.0093	0.0114	0.0136
0.0160	0.0185	0.0213	0.0242	0.0274
0.0308	0.0343	0.0380	0.0419	0.0459
0.0501	0.0546	0.0592	0.0639	0.0690
0.0743	0.0799	0.0859	0.0943	0.1079
0.1283	0.1513	0.1864	0.2256	0.2653
0.3052	0.3461	0.3887	0.4341	0.4807
0.5277	0.5758	0.6251	0.6752	0.7260
0.7779	0.8311	0.8852	0.9410	1.0000

Hrad:

0.0430	0.0981	0.1577	0.2114	0.2617
0.3097	0.3562	0.4015	0.4461	0.4901
0.5335	0.5766	0.6194	0.6619	0.7318
0.8027	0.8706	0.9353	0.9958	1.0524
1.1059	1.1566	1.2047	1.2501	1.2910
1.3280	1.3608	1.3895	1.3717	1.2762
1.1070	1.0120	0.8383	0.7780	0.7504
0.7447	0.7493	0.7569	0.7650	0.7670
0.7905	0.8079	0.8326	0.8597	0.8863
0.9106	0.9373	0.9626	0.9843	1.0000

Width:

0.0084	0.0141	0.0170	0.0200	0.0229
0.0259	0.0289	0.0318	0.0348	0.0378
0.0407	0.0437	0.0467	0.0496	0.0550
0.0571	0.0592	0.0619	0.0650	0.0682
0.0711	0.0742	0.0773	0.0805	0.0847
0.0894	0.0948	0.1105	0.1778	0.2795
0.3565	0.4267	0.6434	0.6471	0.6559
0.6589	0.6884	0.7230	0.7599	0.7713
0.7758	0.8053	0.8181	0.8283	0.8429
0.8649	0.8821	0.9040	0.9396	1.0000

Transect 12627.6

Area:

0.0002	0.0008	0.0018	0.0032	0.0048
0.0066	0.0085	0.0106	0.0128	0.0151
0.0176	0.0202	0.0230	0.0259	0.0290
0.0322	0.0355	0.0390	0.0426	0.0464
0.0502	0.0543	0.0584	0.0627	0.0672
0.0718	0.0766	0.0825	0.0913	0.1058
0.1245	0.1464	0.1716	0.1988	0.2273
0.2586	0.2997	0.3474	0.3975	0.4488
0.5006	0.5528	0.6053	0.6586	0.7133
0.7687	0.8245	0.8810	0.9387	1.0000

Hrad:

0.0527	0.1055	0.1646	0.2522	0.3236
0.3922	0.4579	0.5201	0.5794	0.6356

0.6891	0.7370	0.7817	0.8279	0.8725
0.9152	0.9565	0.9971	1.0368	1.0752
1.1123	1.1487	1.1848	1.2182	1.2497
1.2805	1.3108	1.3076	1.2572	1.1237
0.9310	0.8434	0.7579	0.7332	0.7308
0.7312	0.6946	0.6627	0.6320	0.6640
0.6990	0.7370	0.7785	0.8063	0.8443
0.8850	0.9263	0.9670	0.9960	1.0000

Width:

0.0064	0.0128	0.0189	0.0241	0.0270
0.0290	0.0310	0.0333	0.0354	0.0375
0.0396	0.0421	0.0448	0.0469	0.0490
0.0511	0.0533	0.0554	0.0574	0.0595
0.0617	0.0638	0.0659	0.0683	0.0710
0.0736	0.0763	0.1080	0.1806	0.2595
0.3260	0.3647	0.4080	0.4343	0.4639
0.5467	0.7143	0.7632	0.7984	0.8051
0.8125	0.8184	0.8214	0.8484	0.8604
0.8690	0.8774	0.8872	0.9141	1.0000

Transect 12676.2

Area:

0.0002	0.0007	0.0016	0.0032	0.0050
0.0071	0.0092	0.0115	0.0138	0.0163
0.0189	0.0215	0.0243	0.0271	0.0301
0.0331	0.0363	0.0395	0.0428	0.0463
0.0498	0.0534	0.0572	0.0610	0.0650
0.0690	0.0734	0.0801	0.0942	0.1170
0.1491	0.1834	0.2179	0.2525	0.2873
0.3234	0.3639	0.4066	0.4515	0.4982
0.5458	0.5943	0.6435	0.6932	0.7432
0.7936	0.8445	0.8958	0.9475	1.0000

Hrad:

0.0329	0.0659	0.0855	0.1197	0.1702
0.2225	0.2735	0.3224	0.3705	0.4176
0.4638	0.5086	0.5523	0.5949	0.6362
0.6848	0.7451	0.8039	0.8606	0.9155
0.9687	1.0199	1.0694	1.1173	1.1641
1.2087	1.2471	1.2294	1.0950	0.9230
0.7645	0.6972	0.6702	0.6649	0.6708
0.6819	0.6666	0.6789	0.6922	0.7111
0.7348	0.7585	0.7870	0.8170	0.8485
0.8803	0.9129	0.9457	0.9795	1.0000

Width:

0.0063	0.0127	0.0237	0.0325	0.0363
0.0387	0.0409	0.0430	0.0449	0.0468
0.0485	0.0503	0.0521	0.0539	0.0557
0.0575	0.0593	0.0610	0.0628	0.0646
0.0664	0.0685	0.0706	0.0725	0.0744
0.0770	0.0898	0.1719	0.3570	0.5142
0.6378	0.6395	0.6418	0.6440	0.6500
0.7184	0.7796	0.8131	0.8546	0.8782
0.8910	0.9112	0.9190	0.9266	0.9331
0.9413	0.9490	0.9574	0.9646	1.0000

Transect 12795

Area:

0.0002	0.0007	0.0016	0.0028	0.0040
0.0054	0.0069	0.0085	0.0102	0.0120
0.0140	0.0162	0.0187	0.0215	0.0244
0.0275	0.0307	0.0341	0.0376	0.0412
0.0449	0.0488	0.0528	0.0570	0.0612
0.0657	0.0703	0.0754	0.0834	0.0957
0.1112	0.1319	0.1573	0.1867	0.2187
0.2528	0.2897	0.3283	0.3741	0.4270
0.4813	0.5377	0.5947	0.6520	0.7095
0.7672	0.8251	0.8831	0.9413	1.0000

Hrad:

0.0379	0.0757	0.1167	0.1745	0.2275
0.2769	0.3237	0.3685	0.4117	0.4536
0.4974	0.5592	0.6116	0.6583	0.7025
0.7462	0.7892	0.8312	0.8721	0.9122
0.9514	0.9898	1.0273	1.0641	1.0993
1.1313	1.1635	1.1858	1.1131	1.0382
0.9135	0.8277	0.7494	0.6990	0.6769
0.6724	0.6575	0.6771	0.6872	0.6934
0.7087	0.7275	0.7532	0.7830	0.8163
0.8518	0.8892	0.9278	0.9661	1.0000

Width:

0.0062	0.0124	0.0180	0.0200	0.0221
0.0241	0.0261	0.0282	0.0302	0.0322
0.0349	0.0405	0.0444	0.0484	0.0511
0.0533	0.0555	0.0577	0.0600	0.0622
0.0645	0.0667	0.0690	0.0713	0.0738
0.0769	0.0797	0.1106	0.1724	0.2338
0.2981	0.3808	0.4641	0.5184	0.5619
0.5900	0.6486	0.6787	0.8445	0.9124
0.9278	0.9632	0.9672	0.9710	0.9741
0.9772	0.9801	0.9830	0.9878	1.0000

Transect 12894.8

Area:

0.0005	0.0020	0.0045	0.0079	0.0120
0.0165	0.0213	0.0265	0.0321	0.0381
0.0444	0.0511	0.0582	0.0656	0.0734
0.0815	0.0899	0.0986	0.1078	0.1177
0.1281	0.1392	0.1509	0.1631	0.1758
0.1891	0.2028	0.2172	0.2320	0.2473
0.2631	0.2793	0.2961	0.3133	0.3310
0.3491	0.3677	0.3867	0.4062	0.4261
0.4467	0.4678	0.4897	0.5161	0.5558
0.6043	0.6679	0.7624	0.8718	1.0000

Hrad:

0.0353	0.0700	0.1047	0.1400	0.1923
0.2410	0.2869	0.3307	0.3727	0.4133
0.4528	0.4913	0.5291	0.5662	0.6111
0.6752	0.7358	0.7932	0.8466	0.8952
0.9398	0.9810	1.0198	1.0570	1.0926
1.1269	1.1597	1.1916	1.2231	1.2540
1.2842	1.3139	1.3430	1.3722	1.4010
1.4296	1.4582	1.4869	1.5145	1.5401
1.5643	1.5881	1.5954	1.5964	1.5426
1.4179	1.3044	1.1763	1.0914	1.0000

Width:

0.0073	0.0144	0.0215	0.0285	0.0312
0.0339	0.0366	0.0393	0.0420	0.0447
0.0474	0.0501	0.0528	0.0555	0.0579
0.0597	0.0624	0.0650	0.0692	0.0738
0.0784	0.0828	0.0869	0.0907	0.0945
0.0983	0.1022	0.1061	0.1096	0.1131
0.1166	0.1202	0.1237	0.1270	0.1303
0.1336	0.1368	0.1398	0.1432	0.1472
0.1516	0.1559	0.1666	0.2405	0.3259
0.3848	0.5699	0.7508	0.8366	1.0000

Transect 6318.4

Area:

0.0007	0.0015	0.0026	0.0044	0.0084
0.0128	0.0174	0.0223	0.0275	0.0330
0.0387	0.0447	0.0510	0.0576	0.0644
0.0715	0.0789	0.0866	0.0945	0.1028
0.1113	0.1200	0.1291	0.1384	0.1480
0.1579	0.1680	0.1784	0.1891	0.2004
0.2127	0.2259	0.2395	0.2534	0.2678
0.2825	0.2976	0.3137	0.3353	0.3649
0.3996	0.4371	0.4788	0.5378	0.6020
0.6695	0.7411	0.8229	0.9098	1.0000

Hrad:

0.0626	0.1106	0.1523	0.1028	0.1452
0.2064	0.2641	0.3192	0.3719	0.4227
0.4718	0.5196	0.5661	0.6115	0.6560
0.6996	0.7426	0.7848	0.8265	0.8677
0.9084	0.9487	0.9885	1.0281	1.0673
1.1062	1.1448	1.1833	1.2214	1.2856
1.3428	1.3939	1.4424	1.4897	1.5352
1.5789	1.6207	1.6560	1.6522	1.5931
1.5393	1.4910	1.4406	1.3420	1.2620
1.1965	1.1428	1.0769	1.0370	1.0000

Width:

0.0081	0.0103	0.0124	0.0337	0.0455
0.0484	0.0514	0.0543	0.0573	0.0603
0.0632	0.0662	0.0691	0.0721	0.0751
0.0780	0.0810	0.0840	0.0869	0.0899
0.0928	0.0958	0.0988	0.1017	0.1047
0.1077	0.1106	0.1136	0.1165	0.1269
0.1376	0.1445	0.1483	0.1520	0.1561
0.1603	0.1651	0.1950	0.2730	0.3601
0.3904	0.4124	0.5348	0.6766	0.7061

0.7464	0.7913	0.9236	0.9483	1.0000

Transect 6357.5

Area:

0.0009	0.0022	0.0037	0.0060	0.0115
0.0177	0.0243	0.0313	0.0386	0.0464
0.0545	0.0630	0.0719	0.0812	0.0908
0.1009	0.1113	0.1221	0.1333	0.1449
0.1569	0.1693	0.1820	0.1951	0.2086
0.2225	0.2368	0.2515	0.2665	0.2819
0.2985	0.3157	0.3335	0.3517	0.3703
0.3894	0.4090	0.4291	0.4499	0.4741
0.5008	0.5292	0.5591	0.5930	0.6326
0.6769	0.7306	0.7932	0.8789	1.0000

Hrad:

0.0463	0.0821	0.1131	0.0802	0.1030
0.1484	0.1913	0.2322	0.2714	0.3091
0.3457	0.3811	0.4156	0.4494	0.4824
0.5148	0.5466	0.5779	0.6088	0.6393
0.6695	0.6993	0.7289	0.7581	0.7871
0.8159	0.8445	0.8729	0.9012	0.9296
0.9767	1.0211	1.0637	1.1048	1.1445
1.1829	1.2196	1.2548	1.2876	1.3051
1.3187	1.3293	1.3367	1.3321	1.3195
1.3003	1.2597	1.2093	1.1228	1.0000

Width:

0.0083	0.0104	0.0125	0.0307	0.0461
0.0491	0.0520	0.0549	0.0579	0.0608
0.0638	0.0667	0.0697	0.0726	0.0756
0.0785	0.0815	0.0844	0.0874	0.0903
0.0932	0.0962	0.0991	0.1021	0.1050
0.1080	0.1109	0.1139	0.1168	0.1200
0.1300	0.1342	0.1378	0.1412	0.1446
0.1482	0.1523	0.1565	0.1638	0.1982
0.2115	0.2231	0.2371	0.2878	0.3235
0.3768	0.4397	0.5340	0.8030	1.0000

Transect 6507.5

Area:

0.0008	0.0017	0.0029	0.0049	0.0093
0.0142	0.0195	0.0251	0.0310	0.0372
0.0437	0.0506	0.0577	0.0652	0.0729
0.0810	0.0893	0.0980	0.1070	0.1163
0.1259	0.1358	0.1460	0.1566	0.1674
0.1785	0.1900	0.2018	0.2138	0.2262
0.2393	0.2530	0.2671	0.2816	0.2965
0.3117	0.3273	0.3433	0.3597	0.3770
0.3960	0.4209	0.4613	0.5173	0.5795
0.6473	0.7219	0.8035	0.8950	1.0000

Hrad:

0.0562	0.0995	0.1370	0.0960	0.1256
0.1808	0.2329	0.2826	0.3302	0.3761
0.4204	0.4635	0.5054	0.5464	0.5865
0.6258	0.6645	0.7026	0.7401	0.7772
0.8138	0.8501	0.8859	0.9215	0.9568
0.9917	1.0265	1.0610	1.0953	1.1344
1.1927	1.2474	1.2995	1.3494	1.3977
1.4444	1.4895	1.5329	1.5737	1.6094
1.6339	1.6211	1.5424	1.4292	1.3334
1.2529	1.1756	1.1121	1.0572	1.0000

Width:

0.0081	0.0101	0.0122	0.0306	0.0451
0.0480	0.0509	0.0538	0.0567	0.0596
0.0624	0.0653	0.0682	0.0711	0.0740
0.0769	0.0798	0.0826	0.0855	0.0884
0.0913	0.0942	0.0971	0.1000	0.1028
0.1057	0.1086	0.1115	0.1144	0.1183
0.1257	0.1299	0.1341	0.1376	0.1408
0.1441	0.1477	0.1514	0.1570	0.1672
0.1915	0.3021	0.4635	0.5623	0.6043
0.6608	0.7310	0.7861	0.9344	1.0000

Transect 6650.9

Area:

0.0011	0.0029	0.0053	0.0103	0.0201
0.0299	0.0397	0.0496	0.0595	0.0694
0.0793	0.0892	0.0992	0.1092	0.1192
0.1294	0.1396	0.1498	0.1601	0.1704
0.1808	0.1913	0.2018	0.2123	0.2230

	0.2337	0.2445	0.2555	0.2665	0.2776
	0.2889	0.3003	0.3117	0.3234	0.3351
	0.3471	0.3591	0.3714	0.3840	0.3969
	0.4127	0.4408	0.4781	0.5185	0.5633
	0.6167	0.6840	0.7657	0.8778	1.0000
Hrad:					
	0.0567	0.1002	0.1402	0.0813	0.1512
	0.2208	0.2882	0.3533	0.4163	0.4774
	0.5366	0.5941	0.6498	0.7036	0.7541
	0.8053	0.8553	0.9039	0.9514	0.9977
	1.0429	1.0871	1.1303	1.1727	1.2127
	1.2518	1.2905	1.3286	1.3661	1.4029
	1.4392	1.4750	1.5085	1.5415	1.5742
	1.6066	1.6376	1.6582	1.6800	1.7060
	1.6434	1.5644	1.4760	1.4180	1.3796
	1.3283	1.2512	1.1791	1.0780	1.0000
Width:					
	0.0114	0.0167	0.0221	0.0757	0.0780
	0.0782	0.0784	0.0786	0.0788	0.0789
	0.0791	0.0793	0.0795	0.0798	0.0806
	0.0810	0.0814	0.0818	0.0822	0.0826
	0.0830	0.0834	0.0839	0.0843	0.0851
	0.0859	0.0867	0.0876	0.0884	0.0892
	0.0901	0.0909	0.0921	0.0933	0.0944
	0.0956	0.0969	0.0992	0.1015	0.1034
	0.1426	0.2769	0.3098	0.3333	0.3887
	0.4879	0.5875	0.8025	0.9317	1.0000

Transect 7026.4

Area:					
	0.0007	0.0016	0.0029	0.0061	0.0103
	0.0148	0.0195	0.0246	0.0300	0.0357
	0.0417	0.0480	0.0546	0.0614	0.0686
	0.0761	0.0839	0.0920	0.1004	0.1091
	0.1181	0.1275	0.1371	0.1470	0.1572
	0.1677	0.1785	0.1897	0.2014	0.2136
	0.2262	0.2393	0.2529	0.2669	0.2813
	0.2962	0.3115	0.3272	0.3436	0.3606
	0.3810	0.4090	0.4445	0.4975	0.5637
	0.6362	0.7162	0.8071	0.9031	1.0000
Hrad:					
	0.0591	0.1042	0.1097	0.1073	0.1667
	0.2225	0.2751	0.3254	0.3736	0.4200
	0.4651	0.5089	0.5516	0.5935	0.6345
	0.6749	0.7146	0.7538	0.7925	0.8308
	0.8686	0.9062	0.9434	0.9803	1.0170
	1.0534	1.0896	1.1446	1.2066	1.2649
	1.3197	1.3716	1.4209	1.4677	1.5124
	1.5549	1.5955	1.6340	1.6696	1.7013
	1.7096	1.6681	1.6116	1.4833	1.3588
	1.2553	1.1718	1.0908	1.0365	1.0000
Width:					
	0.0084	0.0109	0.0182	0.0412	0.0443
	0.0474	0.0504	0.0535	0.0566	0.0597
	0.0628	0.0659	0.0690	0.0721	0.0752
	0.0783	0.0814	0.0845	0.0876	0.0907
	0.0938	0.0969	0.1000	0.1031	0.1061
	0.1092	0.1123	0.1172	0.1218	0.1270
	0.1320	0.1364	0.1410	0.1455	0.1499
	0.1545	0.1591	0.1639	0.1703	0.1787
	0.2476	0.3219	0.4319	0.6563	0.6917
	0.7754	0.8381	0.9672	0.9872	1.0000

Transect 7157.8

Area:					
	0.0008	0.0019	0.0032	0.0064	0.0112
	0.0163	0.0217	0.0274	0.0335	0.0399
	0.0466	0.0537	0.0611	0.0688	0.0769
	0.0852	0.0940	0.1030	0.1124	0.1221
	0.1321	0.1425	0.1532	0.1642	0.1756
	0.1873	0.1993	0.2117	0.2243	0.2375
	0.2513	0.2656	0.2804	0.2955	0.3110
	0.3268	0.3430	0.3595	0.3764	0.3937
	0.4117	0.4333	0.4595	0.5043	0.5719
	0.6444	0.7189	0.7993	0.8934	1.0000
Hrad:					
	0.0539	0.0953	0.1315	0.0892	0.1439
	0.1951	0.2436	0.2899	0.3342	0.3770
	0.4184	0.4586	0.4979	0.5363	0.5739

0.6109	0.6473	0.6831	0.7185	0.7535
0.7881	0.8224	0.8564	0.8900	0.9235
0.9567	0.9897	1.0225	1.0551	1.1126
1.1670	1.2185	1.2678	1.3153	1.3613
1.4061	1.4495	1.4914	1.5321	1.5706
1.6050	1.6193	1.6147	1.5326	1.3785
1.2772	1.2021	1.1389	1.0631	1.0000

Width:

0.0083	0.0106	0.0129	0.0403	0.0432
0.0462	0.0491	0.0520	0.0549	0.0578
0.0607	0.0636	0.0665	0.0694	0.0723
0.0752	0.0781	0.0810	0.0840	0.0869
0.0898	0.0927	0.0956	0.0985	0.1014
0.1043	0.1072	0.1101	0.1130	0.1189
0.1238	0.1279	0.1315	0.1348	0.1378
0.1405	0.1437	0.1470	0.1502	0.1548
0.1637	0.2168	0.2845	0.4889	0.6316
0.6455	0.6661	0.7593	0.8961	1.0000

Transect 7307

Area:

0.0011	0.0047	0.0102	0.0163	0.0228
0.0297	0.0370	0.0447	0.0527	0.0611
0.0699	0.0790	0.0884	0.0982	0.1082
0.1186	0.1294	0.1405	0.1520	0.1639
0.1762	0.1888	0.2018	0.2151	0.2287
0.2427	0.2570	0.2718	0.2870	0.3026
0.3187	0.3353	0.3525	0.3704	0.3888
0.4076	0.4269	0.4466	0.4668	0.4874
0.5084	0.5297	0.5513	0.5734	0.5964
0.6226	0.6733	0.7527	0.8690	1.0000

Hrad:

0.0290	0.0550	0.0963	0.1439	0.1894
0.2313	0.2732	0.3129	0.3512	0.3891
0.4253	0.4626	0.4988	0.5346	0.5692
0.6024	0.6338	0.6637	0.6943	0.7245
0.7549	0.7861	0.8170	0.8481	0.8793
0.9079	0.9338	0.9606	0.9886	1.0078
1.0308	1.0478	1.0642	1.0834	1.1084
1.1336	1.1590	1.1844	1.2119	1.2417
1.2732	1.3042	1.3335	1.3625	1.3891
1.4039	1.3431	1.2231	1.1006	1.0000

Width:

0.0157	0.0345	0.0422	0.0451	0.0477
0.0506	0.0532	0.0558	0.0585	0.0610
0.0636	0.0659	0.0682	0.0705	0.0728
0.0752	0.0779	0.0807	0.0833	0.0860
0.0886	0.0910	0.0934	0.0958	0.0981
0.1007	0.1037	0.1065	0.1092	0.1130
0.1163	0.1205	0.1249	0.1290	0.1323
0.1356	0.1389	0.1422	0.1452	0.1479
0.1503	0.1528	0.1554	0.1581	0.1725
0.2251	0.4567	0.6945	0.8780	1.0000

Transect 7357.6

Area:

0.0009	0.0020	0.0035	0.0064	0.0115
0.0170	0.0227	0.0289	0.0353	0.0422
0.0493	0.0568	0.0647	0.0729	0.0814
0.0903	0.0995	0.1091	0.1190	0.1293
0.1399	0.1508	0.1621	0.1738	0.1858
0.1981	0.2107	0.2238	0.2371	0.2508
0.2651	0.2803	0.2961	0.3124	0.3292
0.3464	0.3639	0.3817	0.3999	0.4185
0.4375	0.4569	0.4770	0.4981	0.5294
0.5686	0.6484	0.7583	0.8781	1.0000

Hrad:

0.0523	0.0928	0.1281	0.0814	0.1336
0.1837	0.2312	0.2765	0.3199	0.3618
0.4023	0.4416	0.4800	0.5175	0.5543
0.5904	0.6259	0.6609	0.6954	0.7295
0.7632	0.7965	0.8296	0.8624	0.8949
0.9272	0.9592	0.9911	1.0228	1.0543
1.1023	1.1536	1.2019	1.2481	1.2925
1.3357	1.3777	1.4187	1.4585	1.4971
1.5343	1.5700	1.6028	1.6268	1.6035
1.5539	1.3806	1.2096	1.0844	1.0000

Width:

0.0082	0.0104	0.0126	0.0392	0.0426

0.0454	0.0482	0.0510	0.0538	0.0565
0.0593	0.0621	0.0649	0.0677	0.0705
0.0732	0.0760	0.0788	0.0816	0.0844
0.0872	0.0899	0.0927	0.0955	0.0983
0.1011	0.1039	0.1067	0.1094	0.1122
0.1200	0.1258	0.1300	0.1340	0.1373
0.1400	0.1429	0.1458	0.1486	0.1519
0.1554	0.1594	0.1655	0.1847	0.2807
0.4407	0.8419	0.9456	0.9801	1.0000

Transect 7549.2

Area:

0.0009	0.0022	0.0037	0.0062	0.0114
0.0172	0.0233	0.0297	0.0365	0.0437
0.0511	0.0590	0.0672	0.0757	0.0846
0.0939	0.1034	0.1134	0.1237	0.1343
0.1453	0.1566	0.1683	0.1803	0.1927
0.2054	0.2185	0.2319	0.2457	0.2598
0.2743	0.2891	0.3043	0.3198	0.3357
0.3521	0.3689	0.3860	0.4035	0.4215
0.4399	0.4587	0.4779	0.4987	0.5457
0.6124	0.6889	0.7707	0.8736	1.0000

Hrad:

0.0502	0.0893	0.1234	0.0845	0.1192
0.1679	0.2140	0.2579	0.3001	0.3407
0.3800	0.4181	0.4553	0.4916	0.5272
0.5621	0.5964	0.6302	0.6635	0.6964
0.7289	0.7611	0.7929	0.8245	0.8557
0.8868	0.9176	0.9482	0.9787	1.0089
1.0390	1.0690	1.1172	1.1706	1.2219
1.2712	1.3186	1.3646	1.4091	1.4521
1.4936	1.5337	1.5723	1.6039	1.5255
1.4010	1.2894	1.2007	1.1003	1.0000

Width:

0.0081	0.0102	0.0122	0.0317	0.0418
0.0444	0.0470	0.0496	0.0522	0.0549
0.0575	0.0601	0.0627	0.0653	0.0679
0.0706	0.0732	0.0758	0.0784	0.0810
0.0836	0.0863	0.0889	0.0915	0.0941
0.0967	0.0993	0.1019	0.1046	0.1072
0.1098	0.1124	0.1148	0.1177	0.1209
0.1242	0.1273	0.1300	0.1331	0.1362
0.1392	0.1424	0.1460	0.1998	0.4496
0.5522	0.5928	0.6553	0.8901	1.0000

Transect 7681.8

Area:

0.0009	0.0022	0.0037	0.0060	0.0112
0.0169	0.0230	0.0295	0.0363	0.0435
0.0510	0.0589	0.0671	0.0757	0.0846
0.0939	0.1035	0.1135	0.1238	0.1345
0.1455	0.1569	0.1687	0.1808	0.1932
0.2060	0.2191	0.2326	0.2465	0.2607
0.2752	0.2901	0.3054	0.3210	0.3370
0.3534	0.3701	0.3873	0.4048	0.4227
0.4410	0.4598	0.4792	0.5003	0.5248
0.5691	0.6584	0.7577	0.8715	1.0000

Hrad:

0.0506	0.0900	0.1244	0.0882	0.1167
0.1659	0.2123	0.2567	0.2991	0.3401
0.3797	0.4181	0.4556	0.4922	0.5280
0.5631	0.5977	0.6317	0.6653	0.6984
0.7311	0.7635	0.7955	0.8273	0.8588
0.8900	0.9210	0.9519	0.9825	1.0129
1.0432	1.0734	1.1188	1.1726	1.2243
1.2743	1.3227	1.3695	1.4150	1.4591
1.5017	1.5426	1.5805	1.6111	1.6238
1.5608	1.3660	1.2235	1.0994	1.0000

Width:

0.0081	0.0102	0.0123	0.0296	0.0421
0.0447	0.0474	0.0500	0.0527	0.0553
0.0580	0.0606	0.0633	0.0659	0.0686
0.0712	0.0738	0.0765	0.0791	0.0818
0.0844	0.0871	0.0897	0.0924	0.0950
0.0977	0.1003	0.1029	0.1056	0.1082
0.1109	0.1135	0.1161	0.1188	0.1222
0.1249	0.1277	0.1307	0.1334	0.1363
0.1394	0.1434	0.1498	0.1676	0.2160
0.5845	0.7207	0.7792	0.9272	1.0000

Transect 7747.7

Area:

0.0011	0.0024	0.0041	0.0064	0.0120
0.0184	0.0253	0.0326	0.0402	0.0482
0.0567	0.0654	0.0746	0.0842	0.0941
0.1045	0.1152	0.1263	0.1378	0.1497
0.1619	0.1746	0.1876	0.2010	0.2148
0.2290	0.2436	0.2586	0.2739	0.2896
0.3057	0.3222	0.3391	0.3564	0.3740
0.3919	0.4101	0.4287	0.4477	0.4671
0.4872	0.5078	0.5289	0.5547	0.5960
0.6500	0.7086	0.7794	0.8667	1.0000

Hrad:

0.0452	0.0806	0.1114	0.0867	0.0989
0.1430	0.1849	0.2248	0.2630	0.2999
0.3355	0.3701	0.4038	0.4367	0.4689
0.5005	0.5315	0.5621	0.5922	0.6219
0.6512	0.6802	0.7089	0.7374	0.7656
0.7936	0.8214	0.8489	0.8763	0.9036
0.9307	0.9576	0.9844	1.0184	1.0669
1.1142	1.1604	1.2052	1.2487	1.2904
1.3304	1.3686	1.4054	1.4249	1.3931
1.3322	1.2791	1.2081	1.1278	1.0000

Width:

0.0080	0.0099	0.0119	0.0247	0.0411
0.0436	0.0461	0.0486	0.0511	0.0536
0.0561	0.0586	0.0612	0.0637	0.0662
0.0687	0.0712	0.0737	0.0762	0.0787
0.0813	0.0838	0.0863	0.0888	0.0913
0.0938	0.0963	0.0988	0.1013	0.1039
0.1064	0.1089	0.1114	0.1138	0.1158
0.1178	0.1200	0.1224	0.1253	0.1289
0.1325	0.1362	0.1395	0.2234	0.3169
0.3706	0.4137	0.5039	0.7051	1.0000

Transect 7885.5

Area:

0.0011	0.0025	0.0041	0.0067	0.0125
0.0190	0.0259	0.0330	0.0406	0.0484
0.0567	0.0652	0.0741	0.0834	0.0930
0.1030	0.1133	0.1239	0.1349	0.1462
0.1579	0.1700	0.1823	0.1951	0.2081
0.2216	0.2353	0.2494	0.2639	0.2787
0.2938	0.3093	0.3253	0.3423	0.3600
0.3784	0.3974	0.4170	0.4372	0.4578
0.4791	0.5009	0.5232	0.5462	0.5709
0.6056	0.6554	0.7485	0.8608	1.0000

Hrad:

0.0484	0.0862	0.1191	0.0860	0.1111
0.1589	0.2043	0.2475	0.2890	0.3290
0.3677	0.4052	0.4417	0.4773	0.5121
0.5462	0.5797	0.6126	0.6450	0.6770
0.7085	0.7397	0.7705	0.8010	0.8312
0.8611	0.8908	0.9203	0.9496	0.9786
1.0075	1.0362	1.0730	1.1203	1.1646
1.2064	1.2462	1.2841	1.3206	1.3555
1.3889	1.4210	1.4517	1.4808	1.5041
1.4809	1.4197	1.2681	1.1373	1.0000

Width:

0.0080	0.0101	0.0121	0.0284	0.0413
0.0436	0.0458	0.0481	0.0504	0.0527
0.0549	0.0572	0.0595	0.0617	0.0640
0.0663	0.0685	0.0708	0.0731	0.0753
0.0776	0.0799	0.0821	0.0844	0.0867
0.0889	0.0912	0.0935	0.0957	0.0980
0.1003	0.1025	0.1072	0.1140	0.1184
0.1225	0.1264	0.1300	0.1335	0.1371
0.1408	0.1445	0.1483	0.1527	0.1758
0.2854	0.4538	0.6553	0.8021	1.0000

Transect 8086

Area:

0.0008	0.0020	0.0035	0.0057	0.0109
0.0170	0.0234	0.0302	0.0374	0.0449
0.0527	0.0610	0.0696	0.0785	0.0878
0.0975	0.1075	0.1179	0.1287	0.1398
0.1513	0.1631	0.1753	0.1879	0.2008
0.2141	0.2277	0.2417	0.2561	0.2708

0.2859	0.3014	0.3172	0.3335	0.3505
0.3683	0.3868	0.4060	0.4256	0.4458
0.4665	0.4878	0.5098	0.5325	0.5579
0.5984	0.6639	0.7571	0.8693	1.0000

Hrad:

0.0459	0.0807	0.1116	0.0853	0.1049
0.1528	0.1981	0.2413	0.2827	0.3226
0.3611	0.3985	0.4350	0.4705	0.5053
0.5394	0.5729	0.6059	0.6384	0.6704
0.7021	0.7334	0.7644	0.7951	0.8255
0.8557	0.8857	0.9154	0.9450	0.9744
1.0036	1.0326	1.0616	1.1064	1.1555
1.2015	1.2447	1.2856	1.3250	1.3629
1.3991	1.4337	1.4663	1.4964	1.5166
1.4795	1.3817	1.2369	1.1103	1.0000

Width:

0.0069	0.0093	0.0117	0.0260	0.0413
0.0438	0.0464	0.0489	0.0514	0.0540
0.0565	0.0590	0.0616	0.0641	0.0666
0.0692	0.0717	0.0742	0.0768	0.0793
0.0818	0.0844	0.0869	0.0894	0.0920
0.0945	0.0970	0.0996	0.1021	0.1046
0.1072	0.1097	0.1122	0.1173	0.1222
0.1273	0.1323	0.1362	0.1398	0.1434
0.1474	0.1517	0.1564	0.1629	0.2055
0.4023	0.5460	0.7357	0.8190	1.0000

Transect 8285.6

Area:

0.0009	0.0021	0.0035	0.0055	0.0103
0.0159	0.0218	0.0281	0.0347	0.0416
0.0489	0.0564	0.0644	0.0726	0.0812
0.0901	0.0994	0.1089	0.1188	0.1291
0.1396	0.1505	0.1618	0.1733	0.1852
0.1974	0.2100	0.2228	0.2361	0.2496
0.2635	0.2777	0.2922	0.3071	0.3229
0.3397	0.3571	0.3752	0.3938	0.4132
0.4332	0.4580	0.4873	0.5184	0.5529
0.6002	0.6681	0.7644	0.8740	1.0000

Hrad:

0.0536	0.0956	0.1322	0.1036	0.1166
0.1691	0.2188	0.2662	0.3116	0.3554
0.3978	0.4389	0.4789	0.5180	0.5562
0.5938	0.6306	0.6669	0.7026	0.7379
0.7728	0.8072	0.8413	0.8751	0.9086
0.9418	0.9748	1.0075	1.0400	1.0724
1.1045	1.1365	1.1683	1.2056	1.2595
1.3089	1.3550	1.3986	1.4400	1.4790
1.5151	1.5251	1.5244	1.5209	1.5094
1.4446	1.3472	1.2110	1.0983	1.0000

Width:

0.0079	0.0099	0.0118	0.0244	0.0411
0.0436	0.0461	0.0486	0.0511	0.0536
0.0561	0.0586	0.0611	0.0636	0.0661
0.0686	0.0711	0.0736	0.0761	0.0786
0.0811	0.0836	0.0861	0.0886	0.0911
0.0936	0.0961	0.0986	0.1011	0.1036
0.1061	0.1086	0.1111	0.1153	0.1234
0.1294	0.1344	0.1389	0.1435	0.1484
0.1552	0.2157	0.2279	0.2432	0.2990
0.4517	0.6309	0.7755	0.9016	1.0000

Transect 8485.6

Area:

0.0010	0.0022	0.0037	0.0058	0.0108
0.0167	0.0230	0.0296	0.0366	0.0439
0.0515	0.0596	0.0679	0.0766	0.0857
0.0951	0.1049	0.1150	0.1255	0.1363
0.1474	0.1589	0.1708	0.1830	0.1956
0.2085	0.2217	0.2353	0.2493	0.2636
0.2782	0.2932	0.3086	0.3243	0.3412
0.3588	0.3770	0.3959	0.4155	0.4358
0.4570	0.4791	0.5080	0.5475	0.5907
0.6359	0.6905	0.7704	0.8690	1.0000

Hrad:

0.0509	0.0907	0.1255	0.1003	0.1097
0.1595	0.2067	0.2517	0.2948	0.3363
0.3765	0.4155	0.4535	0.4906	0.5269
0.5625	0.5974	0.6318	0.6658	0.6992

0.7323	0.7650	0.7973	0.8293	0.8611
0.8926	0.9239	0.9549	0.9858	1.0164
1.0469	1.0773	1.1074	1.1374	1.1880
1.2357	1.2808	1.3232	1.3632	1.4007
1.4351	1.4664	1.4670	1.4317	1.4024
1.3761	1.3314	1.2405	1.1324	1.0000

Width:

0.0079	0.0099	0.0118	0.0237	0.0409
0.0434	0.0459	0.0484	0.0509	0.0534
0.0559	0.0584	0.0608	0.0633	0.0658
0.0683	0.0708	0.0733	0.0758	0.0783
0.0807	0.0832	0.0857	0.0882	0.0907
0.0932	0.0957	0.0982	0.1007	0.1031
0.1056	0.1081	0.1106	0.1179	0.1225
0.1277	0.1322	0.1371	0.1421	0.1475
0.1542	0.1616	0.2651	0.3023	0.3133
0.3367	0.4699	0.6336	0.7954	1.0000

Transect 8681.6

Area:

0.0010	0.0022	0.0038	0.0059	0.0110
0.0170	0.0233	0.0300	0.0371	0.0445
0.0522	0.0603	0.0688	0.0776	0.0868
0.0963	0.1062	0.1164	0.1270	0.1379
0.1492	0.1609	0.1729	0.1853	0.1980
0.2111	0.2245	0.2383	0.2524	0.2669
0.2818	0.2970	0.3125	0.3285	0.3453
0.3631	0.3817	0.4010	0.4209	0.4416
0.4630	0.4881	0.5190	0.5510	0.5864
0.6278	0.6817	0.7626	0.8686	1.0000

Hrad:

0.0496	0.0884	0.1222	0.0946	0.1087
0.1571	0.2030	0.2468	0.2887	0.3291
0.3682	0.4061	0.4431	0.4791	0.5145
0.5491	0.5831	0.6166	0.6496	0.6822
0.7144	0.7462	0.7777	0.8089	0.8398
0.8705	0.9010	0.9312	0.9613	0.9912
1.0209	1.0504	1.0799	1.1182	1.1686
1.2145	1.2571	1.2974	1.3355	1.3714
1.4047	1.4195	1.4199	1.4208	1.4096
1.3870	1.3301	1.2280	1.1167	1.0000

Width:

0.0080	0.0099	0.0119	0.0249	0.0411
0.0436	0.0461	0.0486	0.0511	0.0537
0.0562	0.0587	0.0612	0.0637	0.0662
0.0688	0.0713	0.0738	0.0763	0.0788
0.0813	0.0839	0.0864	0.0889	0.0914
0.0939	0.0964	0.0989	0.1015	0.1040
0.1065	0.1090	0.1115	0.1157	0.1224
0.1293	0.1345	0.1390	0.1435	0.1489
0.1552	0.2137	0.2229	0.2319	0.2797
0.3286	0.4553	0.6711	0.8424	1.0000

Transect 8768.8

Area:

0.0010	0.0023	0.0039	0.0059	0.0096
0.0152	0.0211	0.0274	0.0340	0.0409
0.0481	0.0557	0.0637	0.0719	0.0805
0.0894	0.0987	0.1083	0.1182	0.1285
0.1391	0.1500	0.1613	0.1729	0.1848
0.1971	0.2097	0.2227	0.2359	0.2495
0.2635	0.2778	0.2924	0.3073	0.3227
0.3390	0.3559	0.3733	0.3913	0.4097
0.4286	0.4480	0.4683	0.4978	0.5428
0.5956	0.6639	0.7573	0.8737	1.0000

Hrad:

0.0529	0.0942	0.1307	0.1646	0.1118
0.1635	0.2138	0.2617	0.3075	0.3517
0.3943	0.4357	0.4759	0.5152	0.5537
0.5913	0.6283	0.6648	0.7006	0.7360
0.7710	0.8055	0.8398	0.8736	0.9072
0.9405	0.9736	1.0064	1.0390	1.0714
1.1036	1.1357	1.1676	1.1993	1.2385
1.2926	1.3437	1.3922	1.4386	1.4832
1.5262	1.5673	1.6045	1.5940	1.5287
1.4620	1.3680	1.2298	1.1040	1.0000

Width:

0.0085	0.0110	0.0135	0.0160	0.0396
0.0427	0.0451	0.0476	0.0501	0.0526

0.0551	0.0575	0.0600	0.0625	0.0650
0.0675	0.0699	0.0724	0.0749	0.0774
0.0798	0.0823	0.0848	0.0873	0.0898
0.0922	0.0947	0.0972	0.0997	0.1022
0.1046	0.1071	0.1096	0.1121	0.1180
0.1230	0.1273	0.1314	0.1351	0.1384
0.1419	0.1462	0.1541	0.2852	0.3782
0.4398	0.5665	0.8030	0.8956	1.0000

Transect 8858.2

Area:

0.0010	0.0024	0.0039	0.0058	0.0093
0.0155	0.0221	0.0291	0.0365	0.0442
0.0523	0.0608	0.0696	0.0788	0.0884
0.0984	0.1087	0.1194	0.1305	0.1419
0.1537	0.1659	0.1784	0.1913	0.2046
0.2183	0.2323	0.2467	0.2614	0.2766
0.2921	0.3080	0.3242	0.3408	0.3578
0.3753	0.3941	0.4136	0.4335	0.4540
0.4749	0.4962	0.5181	0.5438	0.5817
0.6283	0.6794	0.7532	0.8603	1.0000

Hrad:

0.0483	0.0864	0.1194	0.1496	0.0912
0.1312	0.1765	0.2196	0.2609	0.3006
0.3391	0.3763	0.4125	0.4479	0.4824
0.5163	0.5496	0.5823	0.6145	0.6463
0.6777	0.7087	0.7393	0.7697	0.7998
0.8297	0.8593	0.8887	0.9179	0.9469
0.9757	1.0044	1.0330	1.0614	1.0896
1.1292	1.1753	1.2193	1.2617	1.3026
1.3422	1.3805	1.4172	1.4397	1.4150
1.3780	1.3396	1.2567	1.1324	1.0000

Width:

0.0077	0.0094	0.0111	0.0128	0.0363
0.0422	0.0446	0.0471	0.0495	0.0519
0.0544	0.0568	0.0592	0.0616	0.0641
0.0665	0.0689	0.0713	0.0738	0.0762
0.0786	0.0810	0.0835	0.0859	0.0883
0.0907	0.0932	0.0956	0.0980	0.1005
0.1029	0.1053	0.1077	0.1102	0.1126
0.1193	0.1257	0.1291	0.1324	0.1356
0.1386	0.1418	0.1457	0.2100	0.2869
0.3161	0.3522	0.6705	0.7538	1.0000

Transect 9005.1

Area:

0.0005	0.0019	0.0043	0.0077	0.0120
0.0170	0.0224	0.0282	0.0344	0.0411
0.0482	0.0557	0.0637	0.0720	0.0808
0.0901	0.0997	0.1098	0.1204	0.1313
0.1427	0.1545	0.1667	0.1794	0.1925
0.2062	0.2205	0.2354	0.2509	0.2670
0.2836	0.3009	0.3187	0.3372	0.3559
0.3748	0.3937	0.4127	0.4319	0.4511
0.4704	0.4919	0.5284	0.5772	0.6324
0.6905	0.7553	0.8304	0.9106	1.0000

Hrad:

0.0486	0.0973	0.1459	0.1945	0.2467
0.3170	0.3831	0.4459	0.5061	0.5643
0.6207	0.6758	0.7297	0.7827	0.8348
0.8862	0.9370	0.9872	1.0370	1.0863
1.1353	1.1840	1.2324	1.2805	1.3188
1.3544	1.3909	1.4282	1.4662	1.5048
1.5440	1.5836	1.6238	1.6649	1.7365
1.8068	1.8759	1.9438	2.0106	2.0763
2.1410	2.1915	2.1450	2.0450	1.9178
1.8106	1.1257	1.1903	1.2518	1.0000

Width:

0.0093	0.0187	0.0280	0.0374	0.0460
0.0501	0.0543	0.0584	0.0626	0.0667
0.0709	0.0750	0.0792	0.0833	0.0875
0.0917	0.0958	0.1000	0.1041	0.1083
0.1124	0.1166	0.1207	0.1249	0.1302
0.1359	0.1416	0.1473	0.1530	0.1587
0.1644	0.1701	0.1759	0.1815	0.1824
0.1833	0.1842	0.1851	0.1860	0.1869
0.1878	0.2771	0.4257	0.5078	0.5505
0.5879	0.6705	0.7588	0.7973	1.0000

Transect 9058.4
Area:

0.0003	0.0013	0.0028	0.0051	0.0079
0.0112	0.0148	0.0187	0.0229	0.0273
0.0320	0.0371	0.0423	0.0479	0.0538
0.0599	0.0663	0.0730	0.0800	0.0872
0.0948	0.1026	0.1107	0.1191	0.1277
0.1367	0.1460	0.1558	0.1659	0.1764
0.1873	0.1986	0.2102	0.2223	0.2347
0.2476	0.2610	0.2749	0.2892	0.3039
0.3190	0.3346	0.3570	0.3845	0.4324
0.5202	0.6267	0.7436	0.8679	1.0000

Hrad:

0.0700	0.1401	0.2101	0.2802	0.3502
0.4509	0.5475	0.6393	0.7272	0.8120
0.8943	0.9746	1.0530	1.1300	1.2058
1.2805	1.3542	1.4271	1.4993	1.5708
1.6418	1.7123	1.7824	1.8520	1.9213
1.9771	2.0283	2.0807	2.1343	2.1888
2.2442	2.3004	2.3573	2.4149	2.4731
2.5161	2.5499	2.6017	2.6639	2.7269
2.7867	2.8457	2.8279	2.7806	2.5720
2.2115	1.9267	0.8880	1.0024	1.0000

Width:

0.0044	0.0089	0.0133	0.0178	0.0222
0.0244	0.0263	0.0283	0.0303	0.0323
0.0342	0.0362	0.0382	0.0402	0.0421
0.0441	0.0461	0.0481	0.0500	0.0520
0.0540	0.0560	0.0579	0.0599	0.0619
0.0644	0.0671	0.0698	0.0725	0.0753
0.0780	0.0807	0.0834	0.0861	0.0888
0.0922	0.0961	0.0992	0.1020	0.1047
0.1076	0.1180	0.1772	0.2178	0.4911
0.7071	0.7837	0.8588	0.8936	1.0000

Transect 9090.7
Area:

0.0002	0.0009	0.0021	0.0038	0.0059
0.0082	0.0108	0.0136	0.0166	0.0198
0.0233	0.0269	0.0307	0.0348	0.0390
0.0435	0.0482	0.0531	0.0582	0.0635
0.0690	0.0747	0.0806	0.0867	0.0931
0.0998	0.1068	0.1141	0.1216	0.1295
0.1376	0.1460	0.1547	0.1637	0.1731
0.1834	0.2001	0.2245	0.2552	0.2907
0.3354	0.3930	0.4560	0.5228	0.5925
0.6655	0.7423	0.8219	0.9066	1.0000

Hrad:

0.0424	0.0848	0.1272	0.1696	0.2176
0.2783	0.3354	0.3897	0.4418	0.4921
0.5410	0.5887	0.6355	0.6814	0.7265
0.7711	0.8152	0.8588	0.9020	0.9449
0.9875	1.0298	1.0718	1.1098	1.1406
1.1721	1.2044	1.2374	1.2709	1.3049
1.3394	1.3743	1.4096	1.4364	1.4679
1.5074	1.4822	1.4094	1.3237	1.2464
1.1602	1.0611	1.0048	0.9806	0.9769
0.9767	0.9787	0.9987	1.0140	1.0000

Width:

0.0048	0.0095	0.0143	0.0190	0.0231
0.0252	0.0273	0.0294	0.0315	0.0336
0.0357	0.0378	0.0400	0.0421	0.0442
0.0463	0.0484	0.0505	0.0526	0.0547
0.0569	0.0590	0.0611	0.0634	0.0664
0.0693	0.0722	0.0751	0.0780	0.0809
0.0838	0.0867	0.0896	0.0931	0.0963
0.1266	0.2095	0.2777	0.3398	0.3798
0.5529	0.6091	0.6602	0.6949	0.7185
0.7586	0.7996	0.8176	0.9061	1.0000

Transect 9140.7
Area:

0.0002	0.0008	0.0018	0.0032	0.0050
0.0070	0.0092	0.0116	0.0142	0.0169
0.0199	0.0230	0.0262	0.0297	0.0333
0.0371	0.0411	0.0453	0.0496	0.0541
0.0588	0.0637	0.0688	0.0740	0.0794
0.0851	0.0911	0.0973	0.1037	0.1104
0.1173	0.1244	0.1332	0.1451	0.1619

0.1878	0.2230	0.2643	0.3109	0.3610
0.4136	0.4678	0.5232	0.5802	0.6397
0.7046	0.7722	0.8434	0.9195	1.0000

Hrad:

0.0447	0.0895	0.1342	0.1790	0.2291
0.2933	0.3537	0.4111	0.4662	0.5194
0.5710	0.6215	0.6709	0.7194	0.7671
0.8142	0.8608	0.9069	0.9525	0.9978
1.0428	1.0874	1.1318	1.1737	1.2059
1.2391	1.2731	1.3078	1.3430	1.3789
1.4152	1.4520	1.4683	1.4627	1.4128
1.2957	1.1578	1.0429	0.9640	0.7522
0.7446	0.7770	0.8059	0.8398	0.8663
0.9086	0.9496	0.9863	1.0115	1.0000

Width:

0.0048	0.0095	0.0143	0.0190	0.0232
0.0253	0.0274	0.0295	0.0316	0.0337
0.0359	0.0380	0.0401	0.0422	0.0443
0.0464	0.0486	0.0507	0.0528	0.0549
0.0570	0.0591	0.0613	0.0635	0.0664
0.0693	0.0722	0.0752	0.0781	0.0810
0.0839	0.0868	0.1351	0.1468	0.2581
0.3763	0.4528	0.5299	0.5861	0.6123
0.6383	0.6522	0.6702	0.6882	0.7499
0.7880	0.8271	0.8793	0.9265	1.0000

Transect 9235.2

Area:

0.0002	0.0009	0.0021	0.0038	0.0059
0.0085	0.0116	0.0151	0.0192	0.0237
0.0286	0.0341	0.0400	0.0464	0.0531
0.0599	0.0670	0.0742	0.0817	0.0894
0.0972	0.1053	0.1135	0.1219	0.1306
0.1394	0.1485	0.1577	0.1672	0.1769
0.1867	0.1968	0.2071	0.2177	0.2284
0.2394	0.2507	0.2623	0.2744	0.2870
0.3003	0.3171	0.3611	0.4219	0.4963
0.5802	0.6726	0.7738	0.8850	1.0000

Hrad:

0.0391	0.0781	0.1172	0.1563	0.1953
0.2344	0.2735	0.3125	0.3516	0.3907
0.4298	0.4688	0.5079	0.5501	0.6062
0.6604	0.7128	0.7636	0.8132	0.8615
0.9086	0.9548	1.0001	1.0446	1.0882
1.1308	1.1727	1.2141	1.2544	1.2942
1.3335	1.3725	1.4111	1.4494	1.4847
1.5163	1.5481	1.5672	1.5739	1.5829
1.6013	1.5834	1.4214	1.2815	1.1815
1.1098	1.0575	1.0159	0.9998	1.0000

Width:

0.0040	0.0081	0.0121	0.0162	0.0202
0.0243	0.0283	0.0324	0.0364	0.0405
0.0445	0.0486	0.0526	0.0563	0.0579
0.0596	0.0613	0.0629	0.0646	0.0663
0.0680	0.0697	0.0714	0.0731	0.0748
0.0765	0.0783	0.0800	0.0818	0.0836
0.0854	0.0873	0.0891	0.0909	0.0930
0.0954	0.0978	0.1012	0.1059	0.1107
0.1158	0.2458	0.4585	0.5911	0.6812
0.7576	0.8320	0.9159	0.9696	1.0000

Transect 9294.7

Area:

0.0007	0.0030	0.0067	0.0112	0.0160
0.0211	0.0265	0.0323	0.0383	0.0447
0.0513	0.0583	0.0656	0.0731	0.0810
0.0892	0.0977	0.1066	0.1157	0.1251
0.1349	0.1449	0.1553	0.1660	0.1769
0.1882	0.1998	0.2117	0.2240	0.2365
0.2493	0.2625	0.2759	0.2897	0.3037
0.3181	0.3328	0.3478	0.3630	0.3784
0.4016	0.4301	0.4626	0.5004	0.5532
0.6157	0.6837	0.7708	0.8751	1.0000

Hrad:

0.0348	0.0696	0.1076	0.1653	0.2189
0.2691	0.3165	0.3618	0.4052	0.4471
0.4876	0.5270	0.5655	0.6031	0.6399
0.6762	0.7118	0.7470	0.7817	0.8159
0.8499	0.8835	0.9168	0.9498	0.9826

1.0152	1.0476	1.0797	1.1117	1.1436
1.1753	1.2068	1.2382	1.2696	1.3008
1.3319	1.3680	1.4116	1.4546	1.4968
1.5135	1.5112	1.4985	1.4735	1.3976
1.3286	1.2681	1.1861	1.1019	1.0000

Width:

0.0113	0.0226	0.0328	0.0351	0.0374
0.0398	0.0421	0.0444	0.0468	0.0491
0.0514	0.0538	0.0561	0.0584	0.0608
0.0631	0.0654	0.0678	0.0701	0.0724
0.0748	0.0771	0.0794	0.0818	0.0841
0.0864	0.0888	0.0911	0.0934	0.0958
0.0981	0.1004	0.1028	0.1051	0.1074
0.1098	0.1119	0.1138	0.1157	0.1179
0.2023	0.2274	0.2668	0.3144	0.4553
0.4867	0.5814	0.7145	0.8482	1.0000

Transect 9338.7

Area:

0.0007	0.0029	0.0064	0.0112	0.0161
0.0210	0.0261	0.0314	0.0370	0.0432
0.0497	0.0567	0.0640	0.0717	0.0798
0.0885	0.0977	0.1075	0.1178	0.1286
0.1400	0.1520	0.1647	0.1779	0.1917
0.2061	0.2210	0.2365	0.2525	0.2694
0.2871	0.3054	0.3245	0.3449	0.3670
0.3902	0.4147	0.4407	0.4682	0.4985
0.5324	0.5684	0.6060	0.6451	0.6855
0.7282	0.7777	0.8374	0.9067	1.0000

Hrad:

0.0253	0.0505	0.0758	0.1140	0.1565
0.1961	0.2331	0.2614	0.2849	0.3058
0.3326	0.3589	0.3845	0.4095	0.4293
0.4489	0.4675	0.4871	0.5077	0.5288
0.5463	0.5648	0.5842	0.6052	0.6271
0.6492	0.6708	0.6915	0.7111	0.7210
0.7405	0.7626	0.7681	0.8002	0.8300
0.8580	0.8838	0.9166	0.9480	0.9733
0.9920	1.0092	1.0268	1.0441	1.0614
1.0735	1.0762	1.0637	1.0522	1.0000

Width:

0.0135	0.0271	0.0406	0.0459	0.0468
0.0477	0.0486	0.0515	0.0556	0.0605
0.0640	0.0675	0.0710	0.0746	0.0794
0.0844	0.0898	0.0950	0.1000	0.1050
0.1110	0.1168	0.1225	0.1279	0.1332
0.1384	0.1437	0.1494	0.1554	0.1641
0.1705	0.1763	0.1866	0.1995	0.2147
0.2251	0.2386	0.2535	0.2677	0.3094
0.3317	0.3495	0.3630	0.3760	0.3912
0.4312	0.4927	0.6179	0.7534	1.0000

Transect 9370.6

Area:

0.0007	0.0030	0.0066	0.0118	0.0177
0.0237	0.0296	0.0357	0.0417	0.0478
0.0552	0.0635	0.0723	0.0815	0.0912
0.1015	0.1124	0.1239	0.1362	0.1492
0.1636	0.1790	0.1952	0.2120	0.2294
0.2474	0.2664	0.2867	0.3076	0.3289
0.3507	0.3729	0.3955	0.4185	0.4419
0.4657	0.4899	0.5146	0.5398	0.5656
0.5932	0.6231	0.6543	0.6863	0.7192
0.7550	0.8012	0.8610	0.9268	1.0000

Hrad:

0.0215	0.0429	0.0644	0.0861	0.1250
0.1616	0.1963	0.2291	0.2602	0.2898
0.2613	0.2852	0.3090	0.3311	0.3507
0.3695	0.3887	0.4065	0.4218	0.4304
0.4316	0.4486	0.4685	0.4929	0.5179
0.5339	0.5432	0.5758	0.6073	0.6381
0.6682	0.6978	0.7270	0.7552	0.7831
0.8104	0.8359	0.8603	0.8832	0.9181
0.9494	0.9761	1.0016	1.0264	1.0502
1.0690	1.0667	1.0466	1.0309	1.0000

Width:

0.0160	0.0319	0.0479	0.0636	0.0640
0.0644	0.0647	0.0651	0.0655	0.0658
0.0871	0.0920	0.0968	0.1020	0.1081

0.1147	0.1211	0.1281	0.1361	0.1470
0.1618	0.1708	0.1787	0.1846	0.1902
0.1994	0.2127	0.2235	0.2277	0.2329
0.2380	0.2422	0.2463	0.2506	0.2548
0.2591	0.2640	0.2693	0.2751	0.2827
0.3150	0.3311	0.3413	0.3503	0.3617
0.4378	0.5869	0.6953	0.7232	1.0000

Transect 9528.4

Area:

0.0015	0.0056	0.0100	0.0147	0.0197
0.0248	0.0302	0.0358	0.0417	0.0477
0.0541	0.0606	0.0674	0.0744	0.0816
0.0891	0.0969	0.1050	0.1134	0.1221
0.1312	0.1408	0.1507	0.1611	0.1720
0.1835	0.1954	0.2077	0.2205	0.2337
0.2473	0.2613	0.2758	0.2907	0.3060
0.3218	0.3389	0.3608	0.3866	0.4195
0.4605	0.5088	0.5612	0.6174	0.6775
0.7408	0.8051	0.8698	0.9348	1.0000

Hrad:

0.0297	0.0756	0.1277	0.1766	0.2227
0.2666	0.3086	0.3489	0.3877	0.4253
0.4617	0.4972	0.5318	0.5657	0.5975
0.6282	0.6574	0.6848	0.7120	0.7361
0.7580	0.7787	0.7994	0.8150	0.8314
0.8525	0.8751	0.8987	0.9230	0.9475
0.9724	0.9983	1.0231	1.0483	1.0722
1.0965	1.1145	1.1217	1.1398	1.1349
1.1100	1.0779	1.0494	1.0255	1.0035
0.9882	0.9835	0.9848	0.9907	1.0000

Width:

0.0473	0.0664	0.0700	0.0735	0.0771
0.0806	0.0841	0.0877	0.0912	0.0947
0.0983	0.1018	0.1054	0.1089	0.1128
0.1169	0.1212	0.1260	0.1308	0.1362
0.1423	0.1487	0.1553	0.1632	0.1713
0.1784	0.1852	0.1919	0.1984	0.2050
0.2115	0.2178	0.2244	0.2309	0.2378
0.2447	0.2982	0.3640	0.4275	0.5725
0.6880	0.7659	0.8299	0.8870	0.9474
0.9824	0.9866	0.9908	0.9952	1.0000

Transect 9581

Area:

0.0016	0.0063	0.0118	0.0176	0.0236
0.0299	0.0364	0.0431	0.0500	0.0571
0.0645	0.0721	0.0800	0.0880	0.0963
0.1048	0.1136	0.1225	0.1318	0.1413
0.1513	0.1616	0.1723	0.1832	0.1943
0.2057	0.2175	0.2297	0.2424	0.2557
0.2696	0.2841	0.2992	0.3147	0.3306
0.3471	0.3640	0.3814	0.4006	0.4249
0.4563	0.4944	0.5390	0.5893	0.6501
0.7145	0.7810	0.8503	0.9229	1.0000

Hrad:

0.0304	0.0695	0.1249	0.1774	0.2274
0.2752	0.3211	0.3653	0.4081	0.4495
0.4896	0.5288	0.5669	0.6042	0.6407
0.6765	0.7116	0.7452	0.7754	0.8007
0.8226	0.8501	0.8828	0.9152	0.9473
0.9770	1.0014	1.0137	1.0272	1.0402
1.0502	1.0692	1.0904	1.1124	1.1364
1.1604	1.1836	1.2074	1.2227	1.2194
1.1968	1.1614	1.1203	1.0854	1.0386
1.0114	1.0021	1.0003	1.0002	1.0000

Width:

0.0409	0.0695	0.0724	0.0753	0.0781
0.0810	0.0839	0.0868	0.0897	0.0926
0.0955	0.0984	0.1013	0.1042	0.1070
0.1099	0.1128	0.1159	0.1196	0.1242
0.1296	0.1339	0.1372	0.1404	0.1436
0.1473	0.1520	0.1589	0.1659	0.1732
0.1814	0.1881	0.1944	0.2007	0.2066
0.2125	0.2187	0.2249	0.2676	0.3633
0.4364	0.5328	0.5994	0.7104	0.8062
0.8310	0.8673	0.9069	0.9567	1.0000

Transect 9802

Area:

0.0016	0.0062	0.0141	0.0250	0.0383
0.0520	0.0660	0.0801	0.0944	0.1090
0.1237	0.1387	0.1538	0.1692	0.1848
0.2005	0.2165	0.2327	0.2491	0.2657
0.2825	0.2995	0.3167	0.3341	0.3517
0.3696	0.3876	0.4058	0.4243	0.4429
0.4618	0.4808	0.5001	0.5196	0.5392
0.5591	0.5792	0.5995	0.6200	0.6407
0.6616	0.6827	0.7040	0.7255	0.7472
0.7692	0.7913	0.8203	0.9000	1.0000

Hrad:

0.0181	0.0362	0.0543	0.0725	0.1015
0.1350	0.1677	0.1996	0.2308	0.2613
0.2912	0.3204	0.3491	0.3772	0.4048
0.4319	0.4585	0.4847	0.5105	0.5358
0.5608	0.5854	0.6096	0.6335	0.6571
0.6804	0.7034	0.7261	0.7485	0.7707
0.7927	0.8143	0.8358	0.8571	0.8781
0.8989	0.9195	0.9400	0.9603	0.9803
1.0003	1.0200	1.0396	1.0591	1.0824
1.1101	1.1381	1.1545	1.0804	1.0000

Width:

0.0301	0.0602	0.0904	0.1205	0.1313
0.1333	0.1353	0.1372	0.1392	0.1412
0.1432	0.1451	0.1471	0.1491	0.1511
0.1531	0.1550	0.1570	0.1590	0.1610
0.1630	0.1649	0.1669	0.1689	0.1709
0.1728	0.1748	0.1768	0.1788	0.1808
0.1827	0.1847	0.1867	0.1887	0.1906
0.1926	0.1946	0.1966	0.1986	0.2005
0.2025	0.2045	0.2065	0.2084	0.2105
0.2125	0.2149	0.4658	0.9051	1.0000

Transect 9829.2

Area:

0.0007	0.0027	0.0059	0.0096	0.0137
0.0181	0.0228	0.0278	0.0331	0.0388
0.0449	0.0514	0.0583	0.0655	0.0730
0.0808	0.0888	0.0970	0.1055	0.1141
0.1230	0.1320	0.1413	0.1508	0.1605
0.1705	0.1806	0.1910	0.2015	0.2123
0.2232	0.2344	0.2458	0.2575	0.2694
0.2816	0.2941	0.3070	0.3202	0.3340
0.3484	0.3634	0.3805	0.4199	0.4842
0.5707	0.6670	0.7720	0.8853	1.0000

Hrad:

0.0405	0.0811	0.1327	0.1971	0.2566
0.3124	0.3654	0.4160	0.4647	0.5100
0.5485	0.5869	0.6294	0.6784	0.7261
0.7734	0.8214	0.8701	0.9189	0.9668
1.0138	1.0595	1.1021	1.1443	1.1860
1.2293	1.2726	1.3154	1.3577	1.3994
1.4387	1.4760	1.5131	1.5500	1.5873
1.6195	1.6410	1.6634	1.6842	1.6969
1.6924	1.7024	1.7066	1.6238	1.4741
1.3082	1.1893	1.0968	1.0353	1.0000

Width:

0.0115	0.0230	0.0311	0.0339	0.0367
0.0395	0.0423	0.0451	0.0479	0.0509
0.0546	0.0583	0.0616	0.0639	0.0663
0.0686	0.0707	0.0726	0.0743	0.0760
0.0778	0.0795	0.0816	0.0836	0.0856
0.0873	0.0891	0.0908	0.0925	0.0942
0.0961	0.0982	0.1003	0.1024	0.1045
0.1069	0.1103	0.1138	0.1174	0.1218
0.1280	0.1332	0.2109	0.4745	0.6770
0.8044	0.8719	0.9726	0.9937	1.0000

Transect 9843.1

Area:

0.0006	0.0026	0.0057	0.0092	0.0131
0.0174	0.0219	0.0268	0.0320	0.0375
0.0435	0.0500	0.0572	0.0649	0.0733
0.0822	0.0916	0.1015	0.1116	0.1221
0.1328	0.1439	0.1552	0.1668	0.1786
0.1908	0.2033	0.2160	0.2290	0.2422
0.2558	0.2696	0.2837	0.2981	0.3127
0.3277	0.3429	0.3585	0.3746	0.3913

	0.4084	0.4276	0.4593	0.4974	0.5471
	0.6140	0.6926	0.7828	0.8821	1.0000
Hrad:					
	0.0338	0.0676	0.1111	0.1633	0.2113
	0.2560	0.2983	0.3386	0.3774	0.4149
	0.4371	0.4607	0.4857	0.5117	0.5385
	0.5660	0.6011	0.6392	0.6811	0.7221
	0.7624	0.8019	0.8404	0.8778	0.9146
	0.9524	0.9900	1.0266	1.0624	1.0978
	1.1333	1.1683	1.2030	1.2374	1.2712
	1.3029	1.3330	1.3563	1.3749	1.3941
	1.4007	1.3801	1.3717	1.3490	1.3056
	1.2185	1.1537	1.0924	1.0448	1.0000
Width:					
	0.0094	0.0187	0.0251	0.0275	0.0298
	0.0322	0.0346	0.0369	0.0393	0.0417
	0.0459	0.0503	0.0546	0.0589	0.0632
	0.0676	0.0708	0.0736	0.0756	0.0777
	0.0798	0.0819	0.0840	0.0861	0.0883
	0.0903	0.0922	0.0943	0.0963	0.0984
	0.1004	0.1024	0.1044	0.1064	0.1084
	0.1107	0.1131	0.1163	0.1201	0.1238
	0.1290	0.1841	0.2555	0.3328	0.4119
	0.5525	0.6197	0.6989	0.7691	1.0000

Transect 9881.6

Area:					
	0.0005	0.0021	0.0047	0.0081	0.0123
	0.0172	0.0227	0.0286	0.0349	0.0416
	0.0488	0.0563	0.0641	0.0721	0.0803
	0.0885	0.0969	0.1055	0.1141	0.1230
	0.1319	0.1410	0.1503	0.1597	0.1692
	0.1789	0.1888	0.1988	0.2090	0.2194
	0.2299	0.2408	0.2520	0.2635	0.2754
	0.2877	0.3004	0.3136	0.3273	0.3419
	0.3574	0.3740	0.3967	0.4464	0.5168
	0.5983	0.6912	0.7894	0.8938	1.0000
Hrad:					
	0.0325	0.0651	0.1009	0.1375	0.1726
	0.2114	0.2573	0.3010	0.3429	0.3822
	0.4204	0.4627	0.5087	0.5567	0.6039
	0.6499	0.6945	0.7380	0.7802	0.8214
	0.8617	0.9007	0.9390	0.9765	1.0134
	1.0491	1.0842	1.1191	1.1535	1.1848
	1.2118	1.2324	1.2534	1.2707	1.2886
	1.3062	1.3240	1.3329	1.3279	1.3207
	1.2938	1.2868	1.2439	1.1324	1.0618
	1.0146	0.9845	0.9749	0.9796	1.0000
Width:					
	0.0097	0.0195	0.0280	0.0355	0.0430
	0.0493	0.0531	0.0569	0.0608	0.0648
	0.0689	0.0719	0.0740	0.0754	0.0767
	0.0779	0.0792	0.0804	0.0818	0.0831
	0.0844	0.0858	0.0872	0.0886	0.0900
	0.0915	0.0930	0.0944	0.0959	0.0977
	0.0999	0.1030	0.1060	0.1096	0.1132
	0.1169	0.1206	0.1255	0.1322	0.1397
	0.1502	0.1614	0.3062	0.5718	0.7087
	0.8246	0.8919	0.9498	0.9870	1.0000

Transect 9902.3

Area:					
	0.0024	0.0092	0.0176	0.0260	0.0344
	0.0429	0.0514	0.0600	0.0686	0.0773
	0.0860	0.0948	0.1037	0.1125	0.1215
	0.1304	0.1395	0.1486	0.1579	0.1675
	0.1773	0.1874	0.1977	0.2082	0.2189
	0.2299	0.2412	0.2526	0.2643	0.2762
	0.2884	0.3008	0.3134	0.3263	0.3393
	0.3527	0.3662	0.3800	0.3940	0.4083
	0.4238	0.4539	0.5046	0.5587	0.6173
	0.6844	0.7545	0.8287	0.9119	1.0000
Hrad:					
	0.0314	0.0701	0.1308	0.1897	0.2467
	0.3020	0.3557	0.4078	0.4585	0.5078
	0.5558	0.6026	0.6481	0.6925	0.7359
	0.7782	0.8195	0.8536	0.8849	0.9159
	0.9466	0.9772	1.0076	1.0378	1.0679
	1.0978	1.1275	1.1571	1.1866	1.2160

1.2453	1.2744	1.3035	1.3325	1.3613
1.3901	1.4188	1.4474	1.4760	1.5045
1.5278	1.4816	1.3719	1.2991	1.2357
1.1717	1.1217	1.0788	1.0357	1.0000

Width:

0.0525	0.0917	0.0922	0.0928	0.0933
0.0938	0.0944	0.0949	0.0955	0.0960
0.0966	0.0971	0.0977	0.0982	0.0987
0.0993	0.0998	0.1018	0.1044	0.1070
0.1096	0.1121	0.1147	0.1173	0.1199
0.1225	0.1250	0.1276	0.1302	0.1328
0.1354	0.1379	0.1405	0.1431	0.1457
0.1483	0.1508	0.1534	0.1560	0.1586
0.2449	0.4580	0.5776	0.6154	0.7003
0.7593	0.7901	0.8655	0.9505	1.0000

Transect 9923.8

Area:

0.0008	0.0032	0.0072	0.0129	0.0192
0.0257	0.0324	0.0392	0.0463	0.0536
0.0611	0.0687	0.0766	0.0846	0.0929
0.1014	0.1101	0.1190	0.1282	0.1377
0.1475	0.1576	0.1681	0.1789	0.1900
0.2015	0.2133	0.2256	0.2383	0.2514
0.2648	0.2787	0.2929	0.3076	0.3228
0.3385	0.3548	0.3716	0.3891	0.4071
0.4259	0.4457	0.4664	0.4887	0.5287
0.5902	0.6640	0.7484	0.8662	1.0000

Hrad:

0.0366	0.0732	0.1098	0.1513	0.2155
0.2764	0.3344	0.3897	0.4427	0.4937
0.5429	0.5904	0.6364	0.6810	0.7239
0.7645	0.8042	0.8432	0.8774	0.9098
0.9420	0.9742	1.0059	1.0372	1.0677
1.0947	1.1214	1.1484	1.1756	1.2048
1.2341	1.2613	1.2880	1.3126	1.3377
1.3573	1.3744	1.3926	1.4142	1.4334
1.4286	1.4364	1.4454	1.4375	1.4042
1.3218	1.2493	1.1905	1.0887	1.0000

Width:

0.0118	0.0236	0.0354	0.0455	0.0470
0.0484	0.0498	0.0512	0.0527	0.0541
0.0555	0.0569	0.0583	0.0598	0.0613
0.0630	0.0647	0.0663	0.0685	0.0708
0.0732	0.0755	0.0779	0.0803	0.0828
0.0857	0.0886	0.0916	0.0945	0.0973
0.1001	0.1031	0.1062	0.1096	0.1130
0.1171	0.1215	0.1259	0.1300	0.1346
0.1420	0.1484	0.1549	0.2077	0.3907
0.4750	0.5848	0.7004	0.9653	1.0000

Transect 9966.3

Area:

0.0006	0.0024	0.0054	0.0095	0.0143
0.0195	0.0251	0.0310	0.0372	0.0438
0.0507	0.0580	0.0656	0.0735	0.0817
0.0902	0.0989	0.1078	0.1169	0.1263
0.1358	0.1456	0.1557	0.1659	0.1764
0.1872	0.1982	0.2094	0.2209	0.2326
0.2445	0.2568	0.2693	0.2820	0.2951
0.3085	0.3224	0.3366	0.3514	0.3666
0.3823	0.4063	0.4527	0.5067	0.5670
0.6358	0.7109	0.7943	0.8945	1.0000

Hrad:

0.0332	0.0664	0.0996	0.1390	0.1861
0.2368	0.2847	0.3304	0.3743	0.4165
0.4574	0.4973	0.5361	0.5754	0.6158
0.6583	0.7002	0.7411	0.7811	0.8204
0.8588	0.8957	0.9321	0.9682	1.0041
1.0387	1.0730	1.1069	1.1405	1.1738
1.2060	1.2368	1.2674	1.2963	1.3236
1.3462	1.3643	1.3815	1.3996	1.4184
1.4328	1.3945	1.2826	1.1774	1.0960
1.0675	1.0495	1.0296	1.0046	1.0000

Width:

0.0111	0.0223	0.0334	0.0423	0.0473
0.0505	0.0536	0.0567	0.0599	0.0630
0.0662	0.0694	0.0725	0.0755	0.0781
0.0802	0.0823	0.0844	0.0864	0.0885

```
           0.0906     0.0928     0.0950     0.0972     0.0993
           0.1016     0.1039     0.1061     0.1084     0.1106
           0.1130     0.1156     0.1181     0.1208     0.1238
           0.1273     0.1314     0.1357     0.1401     0.1444
           0.1494     0.3351     0.4902     0.5247     0.6121
           0.6792     0.7182     0.8428     0.9756     1.0000


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... MODIFIED_HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/17/2019 00:00:00
Ending Date .............. 03/19/2019 00:00:00
Antecedent Dry Days ...... 7.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 00:15:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 100
Number of Threads ........ 6
Head Tolerance ........... 0.001000 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......       171.005        81.587
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........        34.450        16.436
Surface Runoff ...........       120.994        57.727
Final Storage ............        17.064         8.141
Continuity Error (%) .....        -0.879


**************************        Volume        Volume
Flow Routing Continuity        hectare-m     10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       120.994      1209.951
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        12.036       120.365
External Outflow .........       126.500      1265.015
Flooding Loss ............         0.000         0.001
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.001
Final Stored Volume ......         6.731        67.306
Continuity Error (%) .....        -0.151


*************************
Highest Continuity Errors
*************************
Node J8 (3.50%)
Node J61 (1.09%)


***************************
Time-Step Critical Elements
```

****
None

****
Highest Flow Instability Indexes
****
Link CJ11919.8 (5)
Link CJ11913.3 (5)
Link CJ10475.3 (4)
Link CJ11939.6 (4)
Link CJ11896.4 (3)

****
Routing Time Step Summary
****
Minimum Time Step : 0.10 sec
Average Time Step : 1.00 sec
Maximum Time Step : 1.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.36
Percent Not Converging : 0.15

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S103	81.59	0.00	0.00	16.90	35.15	33.40	59.76	31.55	5.91	0.732
S104	81.59	0.00	0.00	13.21	44.31	30.03	63.26	54.54	9.64	0.775
S105	81.59	0.00	0.00	0.62	75.79	20.04	76.88	33.47	6.58	0.942
S106	81.59	0.00	0.00	17.39	30.24	40.51	63.19	9.67	2.50	0.775
S107	81.59	0.00	0.00	12.29	46.62	28.14	63.11	32.94	4.78	0.773
S108A	81.59	0.00	0.00	21.84	19.45	44.78	59.36	7.13	1.44	0.728
S108B	81.59	0.00	0.00	21.52	23.47	35.46	53.06	8.12	1.27	0.650
S109	81.59	0.00	0.00	16.28	36.72	33.39	60.93	34.30	6.72	0.747
S110	81.59	0.00	0.00	10.15	51.44	25.10	63.67	63.67	6.40	0.780
S111	81.59	0.00	0.00	19.70	34.58	26.14	54.18	39.95	7.83	0.664
S112	81.59	0.00	0.00	16.93	41.91	26.90	62.09	24.04	6.62	0.761
S113	81.59	0.00	0.00	18.47	37.07	23.97	55.05	40.14	7.58	0.675
S114	81.59	0.00	0.00	14.76	40.13	27.46	57.55	48.23	5.73	0.705
S115	81.59	0.00	0.00	30.16	1.54	34.75	35.91	10.77	0.31	0.440
S116A	81.59	0.00	0.00	14.45	41.16	28.35	59.23	30.84	4.09	0.726
S117	81.59	0.00	0.00	12.69	43.71	34.55	67.33	11.69	3.40	0.825
S118	81.59	0.00	0.00	15.07	39.56	29.73	59.40	60.16	9.05	0.728
S119	81.59	0.00	0.00	6.75	60.46	25.69	71.04	34.21	6.39	0.871
S121	81.59	0.00	0.00	23.06	19.56	37.07	51.74	17.24	2.52	0.634
S201	81.59	0.00	0.00	18.43	31.30	36.29	59.77	5.01	1.01	0.733

S202	81.59	0.00	0.00	21.52	23.46	35.11	52.70	23.72	3.65	0.646
S203	81.59	0.00	0.00	16.91	35.05	31.89	58.17	24.16	4.02	0.713
S204A	81.59	0.00	0.00	30.16	1.54	44.80	45.96	9.87	0.46	0.563
S204B	81.59	0.00	0.00	29.23	3.86	45.98	48.88	4.36	0.30	0.599
S205	81.59	0.00	0.00	30.16	1.55	29.74	30.91	13.99	0.39	0.379
S206	81.59	0.00	0.00	19.38	28.70	27.39	48.91	47.50	6.20	0.600
S207	81.59	0.00	0.00	16.90	35.18	34.11	60.49	18.18	3.59	0.741
S208	81.59	0.00	0.00	17.52	33.50	32.20	57.33	17.18	2.83	0.703
S209	81.59	0.00	0.00	19.06	29.67	33.53	55.78	21.74	3.59	0.684
S301	81.59	0.00	0.00	8.71	54.77	29.79	70.87	2.75	0.83	0.869
S302A	81.59	0.00	0.00	29.85	2.31	48.26	50.00	3.71	0.26	0.613
S302B	81.59	0.00	0.00	17.52	33.49	32.04	57.16	23.40	3.81	0.701
S303	81.59	0.00	0.00	17.21	34.42	32.08	57.90	26.00	4.31	0.710
S304	81.59	0.00	0.00	17.21	34.39	31.61	57.40	25.41	4.05	0.704
S305	81.59	0.00	0.00	14.13	42.21	30.84	62.49	15.75	2.83	0.766
S306_1	81.59	0.00	0.00	13.80	43.19	32.70	65.09	15.46	3.52	0.798
S306_2	81.59	0.00	0.00	13.81	43.14	32.07	64.43	35.28	7.50	0.790
S307	81.59	0.00	0.00	18.45	31.29	30.56	54.03	20.53	3.26	0.662
S308	81.59	0.00	0.00	18.45	31.00	29.19	52.44	44.05	5.60	0.643
S309	81.59	0.00	0.00	15.37	38.73	29.17	58.22	22.71	3.17	0.714
S310	81.59	0.00	0.00	15.36	39.03	32.51	61.78	14.83	2.89	0.757
S311	81.59	0.00	0.00	16.91	34.90	29.78	55.95	31.33	4.36	0.686
S312A	81.59	0.00	0.00	15.39	43.08	18.40	56.88	29.40	4.28	0.697
S312B	81.59	0.00	0.00	11.07	49.27	26.15	63.10	37.86	4.36	0.773
S313	81.59	0.00	0.00	8.87	54.77	29.58	70.66	8.75	2.52	0.866
S314A	81.59	0.00	0.00	16.90	35.23	32.42	58.85	14.71	2.55	0.721
S314B	81.59	0.00	0.00	19.06	29.77	33.00	55.32	7.04	1.13	0.678
S315	81.59	0.00	0.00	15.37	38.96	29.92	59.14	21.47	3.23	0.725
S316	81.59	0.00	0.00	18.45	31.06	28.53	51.83	31.10	4.39	0.635

****
Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	Time of Max Occurrence hr:min	Reported Max Depth Meters
J01	JUNCTION	0.14	1.55	180.79	0	01:46	1.55
J10016.1	JUNCTION	0.96	3.13	183.73	0	02:48	3.13
J10066.1	JUNCTION	0.97	3.16	183.76	0	02:48	3.16
J10094.5	JUNCTION	0.73	2.91	183.76	0	02:47	2.91
J10144.4	JUNCTION	1.69	3.92	183.79	0	02:56	3.92
J10244.4	JUNCTION	1.65	3.90	183.81	0	02:53	3.89
J103	JUNCTION	2.70	4.64	187.79	0	02:55	4.64
J10344.4	JUNCTION	1.60	3.85	183.82	0	02:52	3.85
J103B	JUNCTION	0.17	0.84	186.46	0	04:07	0.84
J10444.3	JUNCTION	1.43	3.68	183.83	0	02:52	3.68

J10475.3	JUNCTION	1.43	3.71	183.86	0	02:57	3.69
J105	JUNCTION	0.36	2.31	184.55	0	02:45	2.31
J10500	JUNCTION	1.85	3.80	183.90	0	02:58	3.80
J10614.5	JUNCTION	1.85	3.84	183.94	0	02:50	3.83
J10679.3	JUNCTION	2.44	4.44	183.94	0	02:51	4.44
J10694.8	JUNCTION	2.39	4.45	184.00	0	02:44	4.42
J107	JUNCTION	0.11	0.85	184.17	0	02:47	0.85
J10749	JUNCTION	1.81	3.85	184.00	0	02:51	3.84
J10848.5	JUNCTION	1.77	3.80	184.00	0	02:52	3.80
J109	JUNCTION	0.42	3.80	186.54	0	02:02	3.80
J110	JUNCTION	0.40	5.56	187.52	0	01:44	4.49
J11048.5	JUNCTION	1.68	3.72	184.02	0	02:53	3.72
J112	JUNCTION	1.80	3.59	183.87	0	04:19	3.59
J11248.4	JUNCTION	1.59	3.65	184.05	0	02:53	3.65
J113	JUNCTION	0.33	4.66	187.00	0	01:39	4.66
J11448.4	JUNCTION	1.49	3.57	184.07	0	02:54	3.57
J1145	JUNCTION	0.27	3.01	188.31	0	02:09	3.01
J11648.4	JUNCTION	1.26	3.35	184.10	0	02:55	3.35
J116A	JUNCTION	0.44	2.95	185.03	0	03:16	2.95
J11748.1	JUNCTION	0.92	3.00	184.10	0	02:56	3.00
J118	JUNCTION	0.36	2.00	184.60	0	02:02	2.00
J11848.1	JUNCTION	0.63	2.71	184.11	0	02:50	2.71
J11881.3	JUNCTION	0.56	2.63	184.11	0	02:51	2.63
J11896.4	JUNCTION	1.63	3.71	184.11	0	02:50	3.71
J11913.3	JUNCTION	1.63	3.73	184.13	0	02:51	3.73
J11919.8	JUNCTION	1.34	3.44	184.14	0	02:51	3.44
J11939.6	JUNCTION	1.14	3.24	184.14	0	02:51	3.24
J11972.5	JUNCTION	1.12	3.22	184.14	0	02:51	3.22
J12011.7	JUNCTION	1.10	3.20	184.14	0	02:51	3.20
J12037.2	JUNCTION	0.99	3.22	184.28	0	02:42	3.22
J12067.5	JUNCTION	0.98	3.21	184.28	0	02:49	3.21
J12091.1	JUNCTION	0.97	3.20	184.28	0	02:49	3.20
J12117.3	JUNCTION	0.96	3.19	184.28	0	02:42	3.19
J12152.8	JUNCTION	0.96	3.18	184.28	0	02:42	3.18
J12160.9	JUNCTION	1.08	3.00	184.50	0	02:48	3.00
J12177.5	JUNCTION	1.08	3.03	184.53	0	02:48	3.03
J12213.2	JUNCTION	1.04	2.99	184.53	0	02:49	2.99
J12263.1	JUNCTION	1.04	2.99	184.53	0	02:49	2.99
J12330.4	JUNCTION	0.98	2.93	184.53	0	02:49	2.93
J12340	JUNCTION	0.98	2.94	184.54	0	02:49	2.94
J12359.8	JUNCTION	0.86	2.81	184.54	0	02:49	2.81
J12390.7	JUNCTION	0.82	2.77	184.54	0	02:49	2.77
J12415.2	JUNCTION	0.61	2.56	184.54	0	02:49	2.56
J12418	JUNCTION	0.82	2.86	184.63	0	02:51	2.86
J12442.1	JUNCTION	0.79	2.83	184.63	0	02:51	2.83
J12491.9	JUNCTION	0.77	2.81	184.63	0	02:51	2.81
J12524.2	JUNCTION	0.76	2.79	184.63	0	02:51	2.79
J12591.8	JUNCTION	0.74	2.78	184.64	0	02:51	2.78
J12613.3	JUNCTION	0.70	2.74	184.64	0	02:51	2.74
J12627.6	JUNCTION	0.50	2.54	184.64	0	02:51	2.54
J12641.2	JUNCTION	0.45	2.52	184.67	0	02:51	2.52
J12676.2	JUNCTION	0.39	2.37	184.67	0	02:51	2.37
J12795	JUNCTION	0.47	2.35	184.68	0	02:52	2.35
J12955.5	JUNCTION	2.11	3.96	184.68	0	02:52	3.96
J13	JUNCTION	1.51	3.83	184.40	0	01:39	3.83
J18	JUNCTION	0.15	2.32	181.32	0	01:41	1.99
J19	JUNCTION	0.44	2.75	183.35	0	02:47	2.74
J2	JUNCTION	0.37	4.86	186.90	0	01:38	4.53
J20	JUNCTION	0.10	1.74	182.04	0	01:45	1.06
J201	JUNCTION	0.05	0.52	180.80	0	01:48	0.52
J203	JUNCTION	0.25	1.30	182.14	0	01:49	1.30
J204A	JUNCTION	0.30	3.16	184.91	0	03:02	3.16
J204B	JUNCTION	0.18	0.47	183.32	0	01:55	0.47
J205	JUNCTION	0.19	0.46	183.36	0	01:53	0.46
J207	JUNCTION	0.37	3.52	184.89	0	01:59	3.52
J208	JUNCTION	0.10	1.41	180.90	0	02:03	1.41
J209	JUNCTION	0.35	2.81	179.71	0	02:02	2.78
J21	JUNCTION	0.15	2.61	183.11	0	01:52	2.61
J22	JUNCTION	0.15	4.00	186.41	0	01:45	1.96
J23	JUNCTION	0.22	4.50	186.76	0	01:42	3.41
J3	JUNCTION	0.42	4.85	186.60	0	01:38	4.39
J301	JUNCTION	0.05	0.64	181.81	0	01:54	0.64
J302B	JUNCTION	0.11	0.90	181.29	0	01:46	0.90
J31	JUNCTION	0.13	2.40	182.90	0	01:47	2.40
J314A	JUNCTION	0.11	1.06	182.41	0	01:48	1.06
J314B	JUNCTION	0.10	3.50	185.45	0	01:37	3.10
J315	JUNCTION	0.28	3.54	184.44	0	02:15	3.54
J32	JUNCTION	0.19	1.94	183.49	0	02:41	1.89
J33	JUNCTION	0.03	0.66	183.66	0	01:45	0.66

J34	JUNCTION	0.31	1.60	186.09	0	01:48	1.52
J35	JUNCTION	0.76	4.46	183.81	0	02:08	4.46
J36	JUNCTION	0.15	1.05	185.64	0	01:50	1.05
J37	JUNCTION	0.07	0.48	181.98	0	01:45	0.48
J4	JUNCTION	0.67	5.05	186.50	0	01:38	5.04
J44	JUNCTION	0.04	0.42	181.06	0	01:56	0.42
J45	JUNCTION	0.16	0.38	183.18	0	02:08	0.38
J46	JUNCTION	0.24	1.14	181.81	0	01:51	1.14
J47	JUNCTION	0.15	2.16	180.88	0	02:04	2.16
J48	JUNCTION	0.28	4.00	181.92	0	01:53	2.91
J5	JUNCTION	0.95	4.74	185.90	0	01:38	4.11
J50	JUNCTION	0.22	2.61	181.51	0	02:02	2.10
J53	JUNCTION	0.43	0.43	188.03	0	02:31	0.43
J56	JUNCTION	0.11	2.70	183.20	0	01:48	2.70
J58	JUNCTION	0.14	1.80	183.30	0	01:51	1.80
J59	JUNCTION	0.06	0.76	181.46	0	01:45	0.76
J6	JUNCTION	0.15	1.96	182.21	0	01:55	1.96
J61	JUNCTION	0.57	2.28	185.38	0	02:35	2.28
J6318.4	JUNCTION	0.92	3.33	178.94	0	02:29	3.33
J6357.5	JUNCTION	0.88	3.28	178.95	0	02:29	3.28
J64	JUNCTION	0.20	2.96	185.46	0	01:59	2.96
J65	JUNCTION	0.36	1.97	184.53	0	02:02	1.97
J6507.5	JUNCTION	0.79	3.16	178.99	0	02:29	3.16
J66	JUNCTION	0.36	1.93	184.45	0	02:03	1.93
J6653.2	JUNCTION	0.70	3.04	179.01	0	02:29	3.04
J67	JUNCTION	0.35	1.89	184.36	0	02:03	1.89
J68	JUNCTION	0.35	1.84	184.27	0	02:04	1.84
J6801	JUNCTION	0.63	2.99	179.12	0	02:28	2.99
J69	JUNCTION	0.34	1.77	184.16	0	02:04	1.77
J7	JUNCTION	0.12	0.15	186.88	0	01:20	0.15
J70	JUNCTION	0.33	1.67	184.02	0	02:04	1.67
J7040.9	JUNCTION	0.66	2.78	179.18	0	02:26	2.78
J7055.4	JUNCTION	0.62	2.87	179.37	0	02:27	2.87
J71	JUNCTION	0.32	1.51	183.82	0	02:05	1.51
J7157.8	JUNCTION	0.65	2.81	179.41	0	02:27	2.81
J7307	JUNCTION	0.57	2.68	179.43	0	02:27	2.68
J7357.6	JUNCTION	0.61	2.66	179.46	0	02:27	2.66
J7564	JUNCTION	0.64	2.58	179.56	0	02:27	2.58
J7578.9	JUNCTION	0.68	2.79	179.78	0	02:28	2.79
J7681.8	JUNCTION	0.67	2.75	179.82	0	02:28	2.75
J77	JUNCTION	0.17	4.86	187.37	0	01:44	3.36
J7762.1	JUNCTION	0.66	2.71	179.85	0	02:28	2.71
J7784.1	JUNCTION	0.70	2.91	180.06	0	02:28	2.91
J78	JUNCTION	0.16	4.73	187.22	0	01:44	2.80
J7885.5	JUNCTION	0.68	2.86	180.09	0	02:28	2.86
J79	JUNCTION	0.16	4.60	187.07	0	01:44	2.56
J8	JUNCTION	0.22	0.23	186.31	1	13:39	0.23
J80	JUNCTION	0.16	4.69	187.14	0	01:44	2.83
J8086	JUNCTION	0.68	2.77	180.15	0	02:28	2.77
J81	JUNCTION	0.16	4.35	186.78	0	01:44	2.05
J82	JUNCTION	0.40	5.48	187.37	0	01:45	4.40
J8285.6	JUNCTION	0.66	2.69	180.22	0	02:28	2.69
J83	JUNCTION	0.41	5.44	187.26	0	01:45	4.30
J84	JUNCTION	0.41	5.39	187.14	0	01:45	4.21
J8485.6	JUNCTION	0.65	2.62	180.29	0	02:27	2.62
J85	JUNCTION	0.43	5.32	187.00	0	01:44	4.09
J86	JUNCTION	0.47	4.99	186.60	0	01:45	2.81
J8696.4	JUNCTION	0.65	2.57	180.38	0	02:27	2.57
J87	JUNCTION	0.52	2.81	184.35	0	02:33	2.76
J8716.3	JUNCTION	0.69	2.75	180.56	0	02:26	2.75
J8768.8	JUNCTION	0.68	2.73	180.57	0	02:27	2.73
J88	JUNCTION	0.57	2.78	184.25	0	02:44	2.72
J8872.8	JUNCTION	0.67	2.69	180.59	0	02:26	2.69
J8915.1	JUNCTION	0.66	2.72	180.66	0	02:26	2.72
J9	JUNCTION	1.23	4.33	185.20	0	01:38	3.97
J9023.5	JUNCTION	0.54	2.00	180.88	0	02:26	2.00
J9036.3	JUNCTION	0.57	2.12	181.01	0	02:26	2.12
J9058.4	JUNCTION	0.58	2.14	181.14	0	02:26	2.14
J9090.7	JUNCTION	0.57	2.12	181.32	0	02:26	2.12
J9204.3	JUNCTION	0.76	2.52	181.82	0	02:26	2.52
J9223.6	JUNCTION	0.98	2.71	182.04	0	02:26	2.71
J9243.4	JUNCTION	0.95	2.70	182.07	0	02:26	2.70
J9283.1	JUNCTION	1.06	3.30	182.69	0	02:48	3.30
J9294.7	JUNCTION	0.53	2.45	182.70	0	02:48	2.45
J9313.3	JUNCTION	0.60	2.87	183.17	0	02:48	2.87
J9338.7	JUNCTION	0.67	2.91	183.19	0	02:48	2.91
J9385.8	JUNCTION	0.90	3.12	183.21	0	02:48	3.12
J9499.8	JUNCTION	2.61	4.99	183.33	0	02:47	4.99
J9528.4	JUNCTION	2.60	4.98	183.33	0	02:47	4.98

J9563	JUNCTION	2.59	4.97	183.33	0	02:48	4.97
J9597.4	JUNCTION	2.58	4.96	183.33	0	02:47	4.96
J97	JUNCTION	1.11	3.16	184.07	0	03:25	3.16
J9789.2	JUNCTION	0.77	3.18	183.43	0	02:46	3.18
J9802	JUNCTION	0.72	3.12	183.43	0	02:46	3.12
J9812.9	JUNCTION	0.64	3.10	183.50	0	02:46	3.10
J9829.2	JUNCTION	0.63	3.08	183.51	0	02:46	3.08
J9843.1	JUNCTION	0.63	3.05	183.52	0	02:46	3.05
J9881.6	JUNCTION	0.63	2.99	183.53	0	02:47	2.99
J9902.3	JUNCTION	0.65	3.01	183.54	0	02:51	3.01
J9912	JUNCTION	0.96	3.10	183.67	0	02:46	3.10
J9923.8	JUNCTION	0.93	3.08	183.68	0	02:46	3.08
J9966.3	JUNCTION	0.95	3.10	183.70	0	02:45	3.10
J6291.6	OUTFALL	0.87	3.28	178.93	0	02:29	3.28
SU104	STORAGE	3.28	3.63	188.23	0	18:45	3.63
SU108A	STORAGE	0.22	2.49	184.57	0	03:00	2.49
SU108B	STORAGE	0.19	1.83	184.06	0	02:46	1.83

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J01	JUNCTION	7.502	8.064	0	01:45	35.3	41.7	0.591
J10016.1	JUNCTION	0.000	21.476	0	03:32	0	442	0.022
J10066.1	JUNCTION	0.000	20.313	0	03:32	0	412	0.020
J10094.5	JUNCTION	0.000	20.437	0	03:31	0	412	0.012
J10144.4	JUNCTION	0.000	20.643	0	03:31	0	412	0.129
J10244.4	JUNCTION	0.000	20.611	0	03:19	0	412	0.166
J103	JUNCTION	5.914	5.914	0	01:45	31.6	32.3	0.004
J10344.4	JUNCTION	0.000	21.518	0	02:43	0	412	0.159
J103B	JUNCTION	0.000	1.435	0	01:30	0	32.3	-0.072
J10444.3	JUNCTION	3.398	24.995	0	02:57	11.7	413	0.070
J10475.3	JUNCTION	0.000	21.473	0	03:57	0	401	0.087
J105	JUNCTION	6.581	6.581	0	01:45	33.5	35.7	0.003
J10500	JUNCTION	0.000	24.908	0	03:29	0	401	0.102
J10614.5	JUNCTION	0.000	22.163	0	02:45	0	403	0.275
J10679.3	JUNCTION	0.000	24.957	0	02:43	0	405	0.115
J10694.8	JUNCTION	0.000	23.631	0	02:35	0	361	-0.584
J107	JUNCTION	4.775	4.775	0	01:45	32.9	32.9	-0.001
J10749	JUNCTION	0.000	21.117	0	02:42	0	362	0.231
J10848.5	JUNCTION	0.000	20.678	0	02:29	0	364	0.412
J109	JUNCTION	6.720	6.720	0	01:45	34.3	34.3	0.474
J110	JUNCTION	6.400	6.998	0	01:44	63.7	66.7	-0.030
J11048.5	JUNCTION	0.000	22.394	0	01:58	0	366	0.427
J112	JUNCTION	0.000	7.627	0	01:45	0	41.8	0.361
J11248.4	JUNCTION	0.000	17.896	0	02:28	0	303	0.510
J113	JUNCTION	7.580	7.580	0	01:45	40.1	40.1	-0.082
J11448.4	JUNCTION	0.000	19.143	0	02:04	0	296	0.479
J1145	JUNCTION	6.038	6.038	0	01:45	59	59	0.063
J11648.4	JUNCTION	0.000	20.207	0	02:04	0	297	0.221
J116A	JUNCTION	4.087	4.087	0	01:45	30.8	30.8	0.013
J11748.1	JUNCTION	0.000	13.149	0	02:04	0	204	0.177
J118	JUNCTION	15.446	15.446	0	01:45	94.4	153	-0.401
J11848.1	JUNCTION	0.000	13.574	0	02:05	0	204	0.017
J11881.3	JUNCTION	0.000	13.705	0	02:05	0	204	0.007
J11896.4	JUNCTION	0.000	13.775	0	02:05	0	204	0.030
J11913.3	JUNCTION	0.000	14.473	0	01:59	0	204	0.028
J11919.8	JUNCTION	0.000	13.856	0	02:02	0	205	0.046
J11939.6	JUNCTION	0.000	10.730	0	02:31	0	172	0.044
J11972.5	JUNCTION	0.000	10.812	0	02:16	0	172	0.069
J12011.7	JUNCTION	0.000	10.893	0	02:15	0	172	0.055
J12037.2	JUNCTION	0.000	10.999	0	02:16	0	172	0.028
J12067.5	JUNCTION	0.000	9.526	0	02:44	0	160	0.040
J12091.1	JUNCTION	0.000	9.522	0	02:44	0	160	0.042
J12117.3	JUNCTION	0.000	9.725	0	02:18	0	160	0.052
J12152.8	JUNCTION	0.000	9.854	0	02:18	0	160	0.023
J12160.9	JUNCTION	0.000	9.860	0	02:18	0	160	0.024
J12177.5	JUNCTION	0.000	9.923	0	02:18	0	162	0.053
J12213.2	JUNCTION	0.000	7.427	0	03:15	0	127	0.131
J12263.1	JUNCTION	0.000	7.368	0	03:14	0	127	0.119
J12330.4	JUNCTION	0.000	7.336	0	03:12	0	127	0.096
J12340	JUNCTION	0.000	7.325	0	03:12	0	127	0.033

J12359.8	JUNCTION	0.000	7.295	0	03:12	0	127	0.044
J12390.7	JUNCTION	0.000	7.258	0	03:09	0	127	0.043
J12415.2	JUNCTION	0.133	7.243	0	03:09	0.57	127	0.011
J12418	JUNCTION	0.000	7.198	0	03:09	0	127	0.017
J12442.1	JUNCTION	0.000	7.171	0	03:04	0	127	0.058
J12491.9	JUNCTION	0.000	7.142	0	03:04	0	127	0.059
J12524.2	JUNCTION	0.843	7.109	0	03:03	5.74	127	0.059
J12591.8	JUNCTION	0.000	6.705	0	03:03	0	121	0.044
J12613.3	JUNCTION	0.000	6.695	0	03:02	0	121	0.017
J12627.6	JUNCTION	0.000	6.691	0	03:02	0	121	0.006
J12641.2	JUNCTION	0.000	6.683	0	03:02	0	121	-0.007
J12676.2	JUNCTION	4.108	6.660	0	02:57	39.7	122	0.011
J12795	JUNCTION	0.000	4.485	0	02:56	0	82.1	0.199
J12955.5	JUNCTION	2.998	3.047	0	02:50	42.1	50.3	0.048
J13	JUNCTION	0.000	7.627	0	01:45	0	40	0.442
J18	JUNCTION	5.596	5.596	0	01:45	44	44	0.071
J19	JUNCTION	0.000	13.370	0	02:05	0	153	0.056
J2	JUNCTION	0.000	7.629	0	01:45	0	40.2	-0.016
J20	JUNCTION	3.170	3.170	0	01:45	22.7	22.7	0.000
J201	JUNCTION	1.009	1.009	0	01:45	5.01	5.01	-0.422
J203	JUNCTION	4.019	4.099	0	01:45	24.2	42.4	-0.078
J204A	JUNCTION	0.462	1.512	0	01:35	9.87	11.7	0.003
J204B	JUNCTION	0.298	0.590	0	01:48	4.36	18.3	0.080
J205	JUNCTION	0.390	0.390	0	01:45	14	14	0.078
J207	JUNCTION	3.592	3.592	0	01:45	18.2	29.9	-0.004
J208	JUNCTION	2.831	2.831	0	01:45	17.2	17.2	-0.040
J209	JUNCTION	3.593	16.271	0	01:52	21.7	186	0.458
J21	JUNCTION	4.305	4.305	0	01:45	26	26	-0.037
J22	JUNCTION	0.000	0.980	0	01:44	0	2.25	-0.399
J23	JUNCTION	0.000	2.736	0	01:41	0	13	0.194
J3	JUNCTION	0.000	7.628	0	01:45	0	40.2	-0.025
J301	JUNCTION	0.825	0.825	0	01:45	2.75	2.75	-0.016
J302B	JUNCTION	3.809	3.809	0	01:45	23.4	23.4	0.255
J31	JUNCTION	4.053	4.053	0	01:45	25.4	25.4	-0.018
J314A	JUNCTION	2.546	3.671	0	01:45	14.7	21.8	-0.146
J314B	JUNCTION	1.125	1.125	0	01:45	7.04	7.04	0.017
J315	JUNCTION	3.229	3.229	0	01:45	21.5	21.5	0.027
J32	JUNCTION	2.521	2.521	0	01:45	17.2	17.2	0.198
J33	JUNCTION	2.523	2.523	0	01:45	8.75	8.75	0.024
J34	JUNCTION	4.390	4.390	0	01:45	31.1	31.1	0.002
J35	JUNCTION	4.275	7.981	0	01:48	29.4	60.8	0.422
J36	JUNCTION	0.000	4.390	0	01:45	0	31.1	-0.819
J37	JUNCTION	4.360	4.360	0	01:45	37.9	37.9	0.086
J4	JUNCTION	0.000	7.628	0	01:45	0	40.2	0.061
J44	JUNCTION	0.259	0.846	0	01:54	3.71	6.46	0.076
J45	JUNCTION	0.000	0.560	0	01:54	0	18.3	0.372
J46	JUNCTION	0.000	5.125	0	01:48	0	70.5	0.031
J47	JUNCTION	0.000	8.118	0	01:46	0	94	-0.152
J48	JUNCTION	6.197	15.404	0	01:50	47.5	164	0.005
J5	JUNCTION	0.000	7.627	0	01:45	0	40.2	0.178
J50	JUNCTION	3.649	3.649	0	01:45	23.7	23.7	0.862
J53	JUNCTION	0.000	0.050	0	00:47	0	8.55	0.505
J56	JUNCTION	2.829	2.829	0	01:45	15.7	15.7	-0.012
J58	JUNCTION	4.362	4.362	0	01:45	31.3	31.3	-0.019
J59	JUNCTION	2.886	2.886	0	01:45	14.8	14.8	-0.000
J6	JUNCTION	3.260	3.260	0	01:45	20.5	20.5	-0.002
J61	JUNCTION	0.000	5.526	0	01:46	0	59.3	1.104
J6318.4	JUNCTION	0.000	75.060	0	02:29	0	1.27e+03	0.001
J6357.5	JUNCTION	0.000	75.066	0	02:29	0	1.27e+03	0.003
J64	JUNCTION	6.624	6.624	0	01:45	24	24	0.098
J65	JUNCTION	0.000	13.499	0	01:58	0	153	0.005
J6507.5	JUNCTION	0.000	75.087	0	02:28	0	1.26e+03	-0.056
J66	JUNCTION	0.000	13.449	0	01:59	0	153	0.005
J6653.2	JUNCTION	0.000	62.458	0	02:27	0	1.06e+03	0.005
J67	JUNCTION	0.000	13.412	0	02:01	0	153	0.005
J68	JUNCTION	0.000	13.394	0	02:02	0	153	0.005
J6801	JUNCTION	0.000	62.470	0	02:26	0	1.06e+03	0.004
J69	JUNCTION	0.000	13.383	0	02:03	0	153	0.005
J7	JUNCTION	0.000	0.051	0	01:17	0	8.5	0.150
J70	JUNCTION	0.000	13.376	0	02:04	0	153	0.004
J7040.9	JUNCTION	0.000	60.921	0	02:27	0	1.03e+03	0.001
J7055.4	JUNCTION	0.000	59.443	0	02:28	0	1.01e+03	0.001
J71	JUNCTION	0.000	13.373	0	02:04	0	153	0.110
J7157.8	JUNCTION	0.000	59.435	0	02:28	0	1.01e+03	0.005
J7307	JUNCTION	0.000	59.430	0	02:27	0	1.01e+03	0.003
J7357.6	JUNCTION	0.000	59.428	0	02:26	0	1.01e+03	-0.001
J7564	JUNCTION	0.000	56.981	0	02:28	0	964	0.003
J7578.9	JUNCTION	0.000	54.550	0	02:30	0	925	0.010
J7681.8	JUNCTION	0.000	54.536	0	02:29	0	925	0.003

J77	JUNCTION	0.000	0.428	0	01:43	0	2.17	-0.053
J7762.1	JUNCTION	0.000	54.530	0	02:29	0	926	0.001
J7784.1	JUNCTION	0.000	54.529	0	02:28	0	926	0.002
J78	JUNCTION	0.000	0.428	0	01:43	0	2.16	-0.031
J7885.5	JUNCTION	0.000	54.537	0	02:28	0	926	0.005
J79	JUNCTION	0.000	0.428	0	01:43	0	2.17	-0.036
J8	JUNCTION	0.000	0.052	0	01:33	0	8.49	3.627
J80	JUNCTION	0.000	0.428	0	01:43	0	2.17	-0.005
J8086	JUNCTION	0.000	52.914	0	02:26	0	904	0.003
J81	JUNCTION	0.000	0.435	0	01:44	0	2.19	-0.095
J82	JUNCTION	0.000	6.802	0	01:44	0	64	-0.007
J8285.6	JUNCTION	0.000	52.005	0	02:25	0	889	0.004
J83	JUNCTION	0.000	6.802	0	01:44	0	64	-0.008
J84	JUNCTION	0.000	6.805	0	01:44	0	64	-0.009
J8485.6	JUNCTION	0.000	50.680	0	02:25	0	868	0.002
J85	JUNCTION	0.000	6.816	0	01:44	0	64	-0.001
J86	JUNCTION	0.000	6.938	0	01:44	0	64	0.007
J8696.4	JUNCTION	0.000	48.788	0	02:26	0	836	0.001
J87	JUNCTION	0.000	6.913	0	01:45	0	64	0.023
J8716.3	JUNCTION	6.681	48.801	0	02:25	33.9	836	-0.034
J8768.8	JUNCTION	0.000	39.870	0	02:27	0	737	0.002
J88	JUNCTION	0.000	6.597	0	01:47	0	63.9	0.061
J8872.8	JUNCTION	0.000	39.861	0	02:26	0	737	0.003
J8915.1	JUNCTION	0.000	39.859	0	02:26	0	737	-0.004
J9	JUNCTION	0.000	7.627	0	01:45	0	40.1	0.319
J9023.5	JUNCTION	0.000	38.261	0	02:26	0	715	0.006
J9036.3	JUNCTION	0.000	38.265	0	02:26	0	715	0.001
J9058.4	JUNCTION	0.000	38.268	0	02:26	0	715	0.001
J9090.7	JUNCTION	0.000	38.295	0	02:26	0	715	-0.002
J9204.3	JUNCTION	3.523	37.207	0	02:26	15.5	699	0.005
J9223.6	JUNCTION	0.000	31.581	0	02:48	0	623	-0.002
J9243.4	JUNCTION	0.000	31.581	0	02:48	0	624	0.006
J9283.1	JUNCTION	0.000	31.581	0	02:48	0	624	0.004
J9294.7	JUNCTION	0.000	31.581	0	02:48	0	624	0.001
J9313.3	JUNCTION	0.000	31.585	0	02:48	0	624	-0.000
J9338.7	JUNCTION	0.000	31.064	0	02:48	0	616	0.008
J9385.8	JUNCTION	0.000	31.144	0	02:47	0	616	0.066
J9499.8	JUNCTION	0.000	31.538	0	02:47	0	616	0.110
J9528.4	JUNCTION	0.000	31.357	0	02:47	0	617	0.134
J9563	JUNCTION	0.000	31.569	0	02:46	0	618	0.145
J9597.4	JUNCTION	0.000	31.295	0	02:47	0	618	0.052
J97	JUNCTION	7.826	7.826	0	01:45	40	40	0.175
J9789.2	JUNCTION	1.720	22.072	0	03:21	8.03	466	0.183
J9802	JUNCTION	0.000	21.275	0	03:33	0	441	0.004
J9812.9	JUNCTION	0.000	21.289	0	03:32	0	441	0.001
J9829.2	JUNCTION	0.000	21.306	0	03:32	0	441	0.001
J9843.1	JUNCTION	0.000	21.329	0	03:32	0	441	0.002
J9881.6	JUNCTION	0.000	21.324	0	03:32	0	441	0.005
J9902.3	JUNCTION	0.000	21.320	0	03:32	0	441	0.002
J9912	JUNCTION	0.000	21.317	0	03:32	0	441	0.004
J9923.8	JUNCTION	0.000	21.339	0	03:32	0	441	0.014
J9966.3	JUNCTION	0.000	21.427	0	03:32	0	441	0.023
J6291.6	OUTFALL	0.000	75.060	0	02:29	0	1.27e+03	0.000
SU104	STORAGE	9.641	9.641	0	01:45	54.5	54.5	0.010
SU108A	STORAGE	1.441	1.441	0	01:45	7.13	7.13	0.021
SU108B	STORAGE	1.266	1.486	0	01:52	8.12	8.26	0.107

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J103	JUNCTION	4.72	1.466	0.000
J109	JUNCTION	1.10	1.176	0.000
J110	JUNCTION	2.74	3.608	1.082
J112	JUNCTION	7.43	1.477	0.000
J113	JUNCTION	0.72	2.864	0.000
J1145	JUNCTION	0.89	1.509	0.000
J116A	JUNCTION	5.16	2.272	0.000
J13	JUNCTION	7.44	2.026	0.000
J18	JUNCTION	0.27	1.120	1.680
J2	JUNCTION	4.10	3.057	0.000
J20	JUNCTION	0.04	0.740	0.960

J204A	JUNCTION	3.53	1.963	0.000
J207	JUNCTION	3.55	2.269	0.000
J209	JUNCTION	0.80	0.389	2.186
J21	JUNCTION	0.57	1.555	0.000
J22	JUNCTION	4.49	3.325	0.000
J23	JUNCTION	0.98	1.801	0.000
J3	JUNCTION	7.17	3.051	0.000
J31	JUNCTION	0.41	1.351	0.000
J314B	JUNCTION	0.53	2.750	0.000
J315	JUNCTION	1.47	2.490	0.000
J32	JUNCTION	2.22	0.441	0.414
J34	JUNCTION	0.46	0.398	1.210
J35	JUNCTION	1.90	1.958	0.000
J4	JUNCTION	7.20	3.245	0.000
J48	JUNCTION	0.47	1.575	0.000
J5	JUNCTION	7.24	2.938	0.000
J50	JUNCTION	0.14	0.664	1.686
J56	JUNCTION	0.59	1.802	0.000
J58	JUNCTION	0.46	0.752	0.000
J6	JUNCTION	0.52	0.911	0.000
J64	JUNCTION	3.75	2.057	0.000
J77	JUNCTION	4.38	4.185	0.869
J78	JUNCTION	4.40	4.055	0.653
J79	JUNCTION	4.41	3.926	0.436
J80	JUNCTION	4.46	4.017	0.000
J81	JUNCTION	4.49	3.671	0.000
J82	JUNCTION	2.86	3.529	0.831
J83	JUNCTION	2.98	3.494	0.536
J84	JUNCTION	3.12	3.442	0.258
J85	JUNCTION	3.24	3.370	0.000
J86	JUNCTION	3.34	3.040	0.000
J87	JUNCTION	3.41	0.857	1.853
J88	JUNCTION	3.48	0.831	1.549
J9	JUNCTION	7.32	2.532	0.000
J97	JUNCTION	7.78	1.957	0.000

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

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J103	4.60	4.478	0 01:45	6.907	0.135
J109	1.06	2.928	0 01:45	2.003	0.036
J112	7.18	5.483	0 01:45	19.903	0.273
J113	0.05	2.570	0 01:38	0.046	0.001
J1145	0.89	1.139	0 01:45	0.988	0.009
J116A	4.50	2.586	0 01:45	5.917	0.134
J13	0.02	1.555	0 01:38	0.014	0.000
J2	0.01	1.795	0 01:38	0.007	0.000
J204A	3.53	1.312	0 01:45	3.259	0.163
J207	1.87	1.376	0 01:45	0.919	0.018
J21	0.34	0.777	0 01:45	0.248	0.005
J22	0.01	0.248	0 01:44	0.001	0.000
J3	0.01	0.870	0 01:38	0.001	0.000
J31	0.12	0.254	0 01:45	0.030	0.001
J314B	0.01	0.043	0 01:37	0.000	0.000
J315	1.47	1.573	0 01:45	1.621	0.040
J35	0.62	3.633	0 01:49	0.885	0.008
J4	0.01	2.207	0 01:38	0.009	0.000
J5	0.01	0.751	0 01:38	0.003	0.000
J56	0.18	0.258	0 01:45	0.044	0.002
J58	0.27	0.520	0 01:45	0.135	0.002
J6	0.52	0.885	0 01:45	0.412	0.011
J64	1.15	3.136	0 01:45	2.231	0.057
J81	0.01	0.373	0 01:44	0.003	0.000
J85	0.01	0.521	0 01:44	0.001	0.000
J86	0.01	0.396	0 01:45	0.000	0.000
J9	0.01	0.582	0 01:38	0.002	0.000
J97	3.28	2.802	0 01:45	5.171	0.070

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU104	45.225	80	0	0	50.463	89	0 18:45	0.050
SU108A	0.224	6	0	0	2.487	62	0 03:00	0.465
SU108B	0.192	5	0	0	1.829	46	0 02:46	1.010

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
J6291.6	98.46	7.485	75.060	1265.010
System	98.46	7.485	75.060	1265.010

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C100	CONDUIT	2.888	0 01:45	4.34	0.87	0.72
C101	CONDUIT	3.844	0 01:51	4.46	1.57	0.98
C103A	CONDUIT	1.350	0 01:30	3.52	26.40	1.00
C107	CONDUIT	4.749	0 01:45	3.22	0.57	0.78
C110_1	CONDUIT	6.802	0 01:44	2.28	1.97	1.00
C110_2	CONDUIT	6.802	0 01:44	2.28	1.97	1.00
C110_3	CONDUIT	6.805	0 01:44	2.28	1.97	1.00
C110_4	CONDUIT	6.816	0 01:44	2.28	1.98	1.00
C110_5	CONDUIT	6.938	0 01:44	2.36	2.01	1.00
C110_6	CONDUIT	6.913	0 01:45	2.36	2.00	1.00
C110_7	CONDUIT	6.597	0 01:47	2.28	1.91	1.00
C110_8	CONDUIT	6.819	0 01:46	2.58	1.98	1.00
C113_1	CONDUIT	7.629	0 01:45	3.00	1.27	1.00
C113_2	CONDUIT	7.628	0 01:45	3.00	1.27	1.00
C113_3	CONDUIT	7.628	0 01:45	3.00	1.27	1.00
C113_4	CONDUIT	7.627	0 01:45	3.00	1.28	1.00
C113_5	CONDUIT	7.627	0 01:45	3.00	1.27	1.00
C113_6	CONDUIT	7.627	0 01:45	3.00	1.27	1.00
C113_7	CONDUIT	7.627	0 01:45	3.00	1.27	1.00
C25	CONDUIT	2.338	0 01:43	2.80	2.90	1.00
C26	CONDUIT	13.273	0 02:05	2.47	0.63	1.00
C27	CONDUIT	4.071	0 01:47	2.46	0.67	1.00
C28	CONDUIT	0.398	0 01:54	1.11	0.52	1.00
C29	CONDUIT	2.805	0 01:56	1.59	0.59	1.00
C30	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C31	CONDUIT	0.847	0 01:42	1.33	2.97	1.00
C32_1	CONDUIT	0.428	0 01:43	1.20	4.03	1.00
C32_2	CONDUIT	0.428	0 01:43	1.20	4.03	1.00
C32_3	CONDUIT	0.428	0 01:43	1.20	4.03	1.00
C32_4	CONDUIT	0.428	0 01:43	1.20	3.93	1.00
C32_5	CONDUIT	0.421	0 01:46	1.18	3.96	1.00
C32_6	CONDUIT	0.980	0 01:44	2.75	9.22	1.00
C33	CONDUIT	0.976	0 01:45	2.73	1.43	1.00
C34	CONDUIT	1.721	0 01:45	2.71	2.04	1.00
C35	CONDUIT	2.040	0 01:42	3.25	3.49	1.00
C36	CONDUIT	1.520	0 02:03	2.91	7.23	1.00
C38	CONDUIT	0.709	0 01:41	4.45	1.78	1.00
C39	CONDUIT	1.010	0 01:47	2.08	0.48	1.00
C4_1	CONDUIT	5.121	0 01:48	3.08	1.41	1.00
C4_2	CONDUIT	3.952	0 02:35	0.38	0.59	0.69
C40	CONDUIT	0.465	0 03:06	1.64	0.87	1.00
C44	CONDUIT	1.514	0 01:58	4.23	6.91	1.00
C47	CONDUIT	2.506	0 01:45	2.29	0.32	1.00

C48	CONDUIT	2.525	0	01:45	5.09	0.88	0.73
C49	CONDUIT	6.723	0	01:50	7.76	7.45	1.00
C50	CONDUIT	4.390	0	01:45	4.06	2.13	0.94
C51	CONDUIT	3.911	0	01:50	0.70	0.14	0.71
C52	CONDUIT	1.785	0	01:45	3.85	0.27	0.66
C53	CONDUIT	2.591	0	01:45	5.29	0.22	0.51
C54	CONDUIT	1.125	0	01:45	2.55	2.13	1.00
C55	CONDUIT	3.309	0	01:48	2.06	0.85	0.85
C56	CONDUIT	1.663	0	02:15	2.12	1.82	0.85
C57	CONDUIT	0.592	0	01:54	1.02	0.21	0.27
C61_4	CONDUIT	5.621	0	01:39	4.97	2.36	1.00
C62_1	CONDUIT	0.843	0	01:56	0.69	0.11	0.53
C62_2	CONDUIT	7.810	0	01:46	3.42	1.06	0.89
C63	CONDUIT	3.625	0	01:46	1.85	0.37	0.64
C64	CONDUIT	1.333	0	01:35	1.21	0.87	1.00
C65	CONDUIT	0.307	0	01:50	0.24	0.21	0.47
C67	CONDUIT	1.456	0	01:39	2.35	2.34	1.00
C7_1	CONDUIT	13.499	0	01:58	0.85	0.79	0.79
C7_2	CONDUIT	13.449	0	01:59	0.85	0.80	0.78
C7_3	CONDUIT	13.412	0	02:01	0.86	0.78	0.76
C7_4	CONDUIT	13.394	0	02:02	0.89	0.79	0.74
C7_5	CONDUIT	13.383	0	02:03	0.93	0.78	0.72
C7_6	CONDUIT	13.376	0	02:04	1.00	0.79	0.69
C7_7	CONDUIT	13.373	0	02:04	1.13	0.79	0.64
C7_8	CONDUIT	13.370	0	02:05	1.69	0.78	0.50
C71	CONDUIT	2.777	0	01:45	1.90	0.57	0.97
C76	CONDUIT	0.883	0	01:48	0.70	0.26	0.67
C85	CONDUIT	0.560	0	01:54	0.53	0.33	0.42
C89	CONDUIT	3.491	0	01:46	5.49	1.80	1.00
C94	CONDUIT	2.380	0	01:55	2.87	1.58	0.92
C95	CONDUIT	5.596	0	01:45	4.95	1.39	1.00
C96	CONDUIT	3.168	0	01:45	4.21	1.10	0.97
C97	CONDUIT	3.531	0	01:52	4.11	2.14	0.97
C98	CONDUIT	3.800	0	01:47	4.41	1.77	0.98
C99	CONDUIT	2.572	0	01:49	4.07	2.13	0.98
Central_Deziel	CONDUIT	0.051	0	01:17	0.43	0.04	0.28
Central_ECR	CONDUIT	0.050	1	13:39	0.28	0.00	0.18
Central_ECR_Cul	CONDUIT	0.052	0	01:33	0.79	0.02	0.16
CJ10016.1	CHANNEL	21.427	0	03:32	0.95	2.54	0.71
CJ10066.1	CHANNEL	20.290	0	03:32	0.83	1.79	0.67
CJ10094.5	CHANNEL	20.313	0	03:32	0.61	0.04	0.70
CJ10144.4	CHANNEL	20.437	0	03:31	0.73	0.01	0.61
CJ10244.4	CHANNEL	20.643	0	03:31	0.50	0.14	0.72
CJ10344.4	CHANNEL	20.611	0	03:19	0.64	0.04	0.58
CJ10444.3	CHANNEL	21.518	0	02:43	0.73	0.07	0.71
CJ10475.3	CHANNEL	24.337	0	02:57	0.34	0.96	0.76
CJ10500	CONDUIT	10.748	0	03:57	2.78	0.15	0.93
CJ10500_2	CONDUIT	10.725	0	03:57	2.79	0.15	0.93
CJ10614.5	CHANNEL	24.908	0	03:29	0.76	1.26	0.72
CJ10679.3	CHANNEL	22.163	0	02:45	0.73	0.46	0.88
CJ10694.8	CONDUIT	24.957	0	02:43	1.43	4.10	1.00
CJ10749	CHANNEL	23.631	0	02:35	0.78	0.23	0.69
CJ10848.5	CHANNEL	21.117	0	02:42	0.71	0.14	0.63
CJ11048.5	CHANNEL	20.678	0	02:29	0.83	0.39	0.67
CJ11248.4	CHANNEL	17.621	0	02:45	0.61	0.11	0.64
CJ11448.4	CHANNEL	17.648	0	02:31	0.73	0.09	0.62
CJ11648.4	CHANNEL	19.143	0	02:04	0.85	0.09	0.66
CJ11748.1	CHANNEL	12.456	0	02:05	0.55	0.04	0.61
CJ11848.1	CHANNEL	13.149	0	02:04	1.05	0.01	0.48
CJ11881.3	CHANNEL	13.574	0	02:05	1.22	0.02	0.45
CJ11896.4	CHANNEL	13.705	0	02:05	1.48	0.03	0.40
CJ11913.3	CONDUIT	13.775	0	02:05	1.08	1.91	0.93
CJ11919.8	CHANNEL	14.473	0	01:59	0.79	0.15	0.54
CJ11939.6	CHANNEL	10.685	0	02:31	0.82	0.01	0.54
CJ11972.5	CHANNEL	10.730	0	02:31	0.69	0.05	0.60
CJ12011.7	CHANNEL	10.812	0	02:16	0.59	0.08	0.61
CJ12037.2	CONDUIT	10.893	0	02:15	1.82	0.63	1.00
CJ12067.5	CHANNEL	9.547	0	02:44	1.19	0.09	0.72
CJ12091.1	CHANNEL	9.526	0	02:44	0.66	0.10	0.76
CJ12117.3	CHANNEL	9.522	0	02:44	0.65	0.02	0.50
CJ12152.8	CHANNEL	9.725	0	02:18	0.71	0.04	0.58
CJ12160.9	CONDUIT	9.854	0	02:18	3.34	0.38	0.89
CJ12177.5	CONDUIT	9.860	0	02:18	0.97	0.22	0.60
CJ12213.2	CHANNEL	7.477	0	03:15	0.59	0.02	0.48
CJ12263.1	CHANNEL	7.427	0	03:15	0.79	0.02	0.51
CJ12330.4	CHANNEL	7.368	0	03:14	0.68	0.02	0.50
CJ12340	CONDUIT	7.336	0	03:12	0.64	0.17	0.98
CJ12359.8	CHANNEL	7.325	0	03:12	1.44	0.01	0.51
CJ12390.7	CHANNEL	7.295	0	03:12	1.11	0.01	0.49

CJ12415.2	CHANNEL	7.258	0	03:09	1.52	0.02	0.70
CJ12418	CONDUIT	7.209	0	03:09	1.42	0.91	1.00
CJ12442.1	CHANNEL	7.198	0	03:09	0.89	0.02	0.48
CJ12491.9	CHANNEL	7.171	0	03:04	0.66	0.11	0.74
CJ12524.2	CHANNEL	7.142	0	03:04	1.55	0.02	0.53
CJ12591.8	CHANNEL	6.733	0	03:04	0.86	0.02	0.51
CJ12613.3	CHANNEL	6.705	0	03:03	1.70	0.01	0.51
CJ12627.6	CHANNEL	6.695	0	03:02	1.84	0.00	0.52
CJ12641.2	CONDUIT	6.691	0	03:02	1.17	0.34	0.83
CJ12676.2	CHANNEL	6.683	0	03:02	0.85	0.01	0.49
CJ12795	CHANNEL	4.579	0	03:06	0.45	0.02	0.45
CJ12894.8	CHANNEL	3.050	0	02:56	0.35	0.06	0.61
CJ6318.4	CHANNEL	75.060	0	02:29	1.94	0.12	0.44
CJ6357.5	CHANNEL	75.060	0	02:29	1.94	0.18	0.46
CJ6507.5	CHANNEL	75.066	0	02:29	2.00	0.08	0.45
CJ6653.2	CHANNEL	62.437	0	02:26	1.47	0.08	0.42
CJ6801	CONDUIT	62.458	0	02:27	1.50	0.36	0.73
CJ7026.4	CHANNEL	60.926	0	02:27	1.98	0.05	0.37
CJ7055.4	CONDUIT	59.447	0	02:28	1.99	0.15	0.64
CJ7157.8	CHANNEL	59.443	0	02:28	1.98	0.07	0.39
CJ7307	CHANNEL	59.435	0	02:28	1.75	0.10	0.45
CJ7357.6	CHANNEL	59.430	0	02:27	2.36	0.07	0.38
CJ7564	CHANNEL	56.997	0	02:29	2.16	0.09	0.40
CJ7578.9	CONDUIT	54.561	0	02:30	1.98	0.38	0.59
CJ7681.8	CHANNEL	54.550	0	02:30	1.90	0.10	0.42
CJ7762.1	CHANNEL	54.536	0	02:29	1.94	0.10	0.44
CJ7784.1	CONDUIT	54.530	0	02:29	1.94	0.54	0.63
CJ7885.5	CHANNEL	54.529	0	02:28	1.86	0.10	0.45
CJ8086	CHANNEL	52.875	0	02:28	1.80	0.10	0.44
CJ8285.6	CHANNEL	51.942	0	02:27	1.86	0.10	0.44
CJ8485.6	CHANNEL	50.630	0	02:26	1.90	0.10	0.43
CJ8696.4	CHANNEL	48.772	0	02:26	1.89	0.10	0.41
CJ8716.3	CONDUIT	48.788	0	02:26	1.82	2.69	0.62
CJ8768.8	CHANNEL	39.886	0	02:27	1.50	0.09	0.44
CJ8872.8	CHANNEL	39.870	0	02:27	1.56	0.08	0.45
CJ8915.1	CONDUIT	39.861	0	02:26	1.15	0.33	0.66
CJ9023.5	CHANNEL	38.251	0	02:26	2.43	0.12	0.46
CJ9036.3	CONDUIT	38.261	0	02:26	1.52	0.58	0.51
CJ9058.4	CHANNEL	38.265	0	02:26	2.77	0.15	0.43
CJ9090.7	CHANNEL	38.268	0	02:26	2.77	0.06	0.40
CJ9204.3	CHANNEL	37.173	0	02:26	2.33	0.14	0.44
CJ9223.6	CONDUIT	31.582	0	02:48	2.10	0.51	0.69
CJ9243.4	CHANNEL	31.581	0	02:48	2.18	0.26	0.67
CJ9283.1	CONDUIT	31.581	0	02:48	2.93	1.70	0.66
CJ9294.7	CHANNEL	31.581	0	02:48	1.74	0.08	0.37
CJ9313.3	CONDUIT	31.581	0	02:48	2.68	1.05	0.74
CJ9338.7	CHANNEL	31.032	0	02:48	1.39	0.10	0.44
CJ9385.8	CHANNEL	31.064	0	02:48	1.09	0.05	0.44
CJ9499.8	CONDUIT	31.144	0	02:47	1.02	1.31	1.00
CJ9528.4	CHANNEL	31.538	0	02:47	0.42	0.03	0.52
CJ9563	CHANNEL	31.357	0	02:47	0.59	0.07	0.67
CJ9597.4	CHANNEL	31.569	0	02:46	0.42	0.07	0.67
CJ9789.2	CONDUIT	22.202	0	03:33	0.83	1.02	1.00
CJ9802	CHANNEL	21.253	0	03:33	0.49	0.06	0.88
CJ9812.9	CONDUIT	21.275	0	03:33	1.50	0.18	1.00
CJ9829.2	CHANNEL	21.289	0	03:32	1.17	0.23	0.81
CJ9843.1	CHANNEL	21.306	0	03:32	1.27	0.25	0.79
CJ9881.6	CHANNEL	21.329	0	03:32	1.10	0.20	0.74
CJ9902.3	CHANNEL	21.324	0	03:32	0.75	2.45	0.70
CJ9912	CONDUIT	21.320	0	03:32	1.93	0.66	0.97
CJ9923.8	CHANNEL	21.317	0	03:32	1.09	0.29	0.79
CJ9966.3	CHANNEL	21.339	0	03:32	0.94	3.53	0.74
Northway_Cleary	CONDUIT	5.004	0	01:51	2.51	0.51	0.72
Northway_Mark1	CONDUIT	3.812	0	01:48	2.28	1.19	0.74
Northway_Mark2	CONDUIT	0.490	0	02:08	0.76	0.12	0.48
Northway_Trunk1	CONDUIT	15.343	0	01:55	2.94	1.37	1.00
Northway_Trunk2	CONDUIT	13.404	0	01:52	2.34	1.15	1.00
Northway_Trunk3	CONDUIT	6.980	0	01:51	1.30	0.45	1.00
Northway_Trunk4	CONDUIT	3.547	0	01:46	1.91	1.21	1.00
Temple_Open	CONDUIT	1.435	0	04:07	0.48	0.27	0.78
P5	PUMP	0.085	0	01:00		1.00	
Rhodes_SWMP1	PUMP	0.050	0	00:47		1.00	

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C100	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C101	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C103A	1.00	0.00	0.00	0.00	0.32	0.00	0.67	0.00	0.00	0.00
C107	1.00	0.00	0.00	0.00	0.98	0.00	0.00	0.02	0.92	0.00
C110_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00
C110_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00
C110_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.49	0.00
C110_4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.46	0.00
C110_5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C110_6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C110_7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C110_8	1.00	0.00	0.00	0.00	0.97	0.00	0.00	0.03	0.00	0.00
C113_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.81	0.00
C113_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.81	0.00
C113_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
C113_4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C113_5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C113_6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C113_7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
C25	1.00	0.03	0.00	0.00	0.96	0.00	0.00	0.01	0.00	0.00
C26	1.00	0.03	0.00	0.00	0.96	0.00	0.00	0.01	0.28	0.00
C27	1.00	0.01	0.83	0.00	0.16	0.00	0.00	0.00	0.03	0.00
C28	1.00	0.86	0.04	0.00	0.10	0.00	0.00	0.00	0.00	0.00
C29	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.00
C30	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.61	0.20	0.00	0.19	0.00	0.00	0.00	0.81	0.00
C32_1	1.00	0.74	0.09	0.00	0.15	0.00	0.02	0.00	0.00	0.00
C32_2	1.00	0.72	0.03	0.00	0.26	0.00	0.00	0.00	0.81	0.00
C32_3	1.00	0.70	0.02	0.00	0.28	0.00	0.00	0.00	0.80	0.00
C32_4	1.00	0.67	0.03	0.00	0.30	0.00	0.00	0.00	0.80	0.00
C32_5	1.00	0.03	0.63	0.00	0.33	0.00	0.00	0.00	0.78	0.00
C32_6	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
C33	1.00	0.02	0.60	0.00	0.38	0.00	0.00	0.00	0.83	0.00
C34	1.00	0.02	0.59	0.00	0.39	0.00	0.00	0.00	0.83	0.00
C35	1.00	0.92	0.00	0.00	0.03	0.00	0.00	0.05	0.00	0.00
C36	1.00	0.00	0.01	0.00	0.08	0.00	0.92	0.00	0.00	0.00
C38	1.00	0.96	0.00	0.00	0.03	0.00	0.00	0.00	0.94	0.00
C39	1.00	0.00	0.00	0.00	0.18	0.02	0.00	0.80	0.07	0.00
C4_1	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.94	0.00
C4_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
C40	1.00	0.00	0.00	0.00	0.97	0.00	0.00	0.03	0.81	0.00
C44	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.00	0.00
C47	1.00	0.00	0.00	0.00	0.96	0.00	0.00	0.04	0.83	0.00
C48	1.00	0.00	0.00	0.00	0.04	0.02	0.00	0.94	0.05	0.00
C49	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C50	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
C51	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C52	1.00	0.00	0.00	0.00	0.18	0.02	0.00	0.80	0.19	0.00
C53	1.00	0.00	0.00	0.00	0.06	0.03	0.00	0.91	0.09	0.00
C54	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
C55	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.98	0.00
C56	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C57	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C61_4	1.00	0.00	0.00	0.00	0.97	0.00	0.00	0.03	0.00	0.00
C62_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C62_2	1.00	0.00	0.00	0.00	0.39	0.02	0.00	0.59	0.28	0.00
C63	1.00	0.00	0.00	0.00	0.34	0.00	0.00	0.66	0.32	0.00
C64	1.00	0.00	0.00	0.00	0.45	0.00	0.00	0.55	0.28	0.00
C65	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C67	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.85	0.00
C7_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
C7_3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.00
C7_4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.00
C7_5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.00
C7_6	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.00
C7_7	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.07	0.00
C7_8	1.00	0.03	0.00	0.00	0.06	0.00	0.00	0.91	0.00	0.00
C71	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.95	0.00
C76	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
C85	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.00
C89	1.00	0.00	0.00	0.00	0.96	0.00	0.00	0.04	0.85	0.00
C94	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C95	1.00	0.00	0.00	0.00	0.05	0.03	0.00	0.93	0.06	0.00
C96	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

C97	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C98	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C99	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Central_Deziel	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Central_ECR	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.06	0.00
Central_ECR_Cul	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.96	0.00
CJ10016.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10066.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10094.5	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ10144.4	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.01	0.00
CJ10244.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ10344.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10444.3	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
CJ10475.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ10500	1.00	0.04	0.00	0.00	0.25	0.14	0.00	0.57	0.07	0.00
CJ10500_2	1.00	0.04	0.00	0.00	0.25	0.13	0.00	0.59	0.06	0.00
CJ10614.5	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ10679.3	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ10694.8	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ10749	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.01	0.00	0.00
CJ10848.5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11048.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11248.4	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11448.4	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.01	0.00
CJ11648.4	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
CJ11748.1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.01	0.00
CJ11848.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ11881.3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ11896.4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ11913.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ11919.8	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
CJ11939.6	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ11972.5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12011.7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12037.2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12067.5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12091.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12117.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12152.8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ12160.9	1.00	0.01	0.00	0.00	0.12	0.00	0.87	0.00	0.00	0.00
CJ12177.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12213.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12263.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12330.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12340	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12359.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12390.7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12415.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ12418	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12442.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12491.9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12524.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12591.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12613.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12627.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12641.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12676.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.77	0.00
CJ12795	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ12894.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ6318.4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.25	0.00
CJ6357.5	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.01	0.00	0.00
CJ6507.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.22	0.00
CJ6653.2	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.30	0.00
CJ6801	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.16	0.00
CJ7026.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.00
CJ7055.4	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.07	0.00
CJ7157.8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ7307	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.41	0.00
CJ7357.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ7564	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
CJ7578.9	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ7681.8	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ7762.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.05	0.00
CJ7784.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ7885.5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
CJ8086	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.06	0.00
CJ8285.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.48	0.00
CJ8485.6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.07	0.00
CJ8696.4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.26	0.00

CJ8716.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ8768.8	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ8872.8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.00
CJ8915.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9023.5	1.00	0.00	0.01	0.00	0.72	0.00	0.00	0.26	0.56	0.00
CJ9036.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9058.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.20	0.00
CJ9090.7	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.70	0.00
CJ9204.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CJ9223.6	1.00	0.02	0.00	0.00	0.31	0.00	0.00	0.66	0.00	0.00
CJ9243.4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9283.1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
CJ9294.7	1.00	0.00	0.00	0.00	0.18	0.00	0.00	0.81	0.00	0.00
CJ9313.3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
CJ9338.7	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
CJ9385.8	1.00	0.00	0.02	0.00	0.96	0.00	0.02	0.00	0.36	0.00
CJ9499.8	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.00	0.00
CJ9528.4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ9563	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ9597.4	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.00	0.00
CJ9789.2	1.00	0.00	0.00	0.00	0.96	0.00	0.00	0.03	0.00	0.00
CJ9802	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ9812.9	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ9829.2	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ9843.1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ9881.6	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ9902.3	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
CJ9912	1.00	0.03	0.00	0.00	0.17	0.00	0.00	0.80	0.00	0.00
CJ9923.8	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
CJ9966.3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
Northway_Cleary	1.00	0.00	0.00	0.00	0.05	0.95	0.00	0.00	0.03	0.00
Northway_Mark1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.00
Northway_Mark2	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.99	0.00
Northway_Trunk1	1.00	0.00	0.00	0.00	0.48	0.00	0.00	0.52	0.22	0.00
Northway_Trunk2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.91	0.00
Northway_Trunk3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
Northway_Trunk4	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
Temple_Open	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C101	0.01	0.46	0.01	0.58	0.01
C103A	4.64	4.72	4.64	9.99	4.64
C107	0.01	0.01	5.92	0.01	0.01
C110_1	2.73	2.74	2.86	1.25	1.13
C110_2	2.85	2.86	2.98	1.23	1.12
C110_3	2.97	2.98	3.12	1.22	1.12
C110_4	3.11	3.12	3.24	1.21	1.11
C110_5	3.23	3.24	3.34	1.19	1.10
C110_6	3.28	3.34	3.41	1.18	1.04
C110_7	3.35	3.41	3.48	1.17	0.97
C110_8	3.42	3.48	3.55	1.16	0.91
C113_1	0.72	0.72	4.10	0.22	0.22
C113_2	4.10	4.10	7.17	0.22	0.22
C113_3	7.16	7.17	7.20	0.22	0.22
C113_4	7.20	7.20	7.24	0.23	0.22
C113_5	7.24	7.24	7.32	0.22	0.22
C113_6	7.32	7.32	7.44	0.22	0.22
C113_7	7.44	7.44	7.89	0.22	0.22
C25	7.25	7.43	7.26	5.38	5.16
C26	1.88	1.88	2.15	0.01	0.01
C27	2.45	2.45	3.37	0.01	0.01
C28	3.38	3.38	4.40	0.01	0.01
C29	3.31	3.31	4.06	0.01	0.01
C31	4.10	4.10	4.48	1.10	0.01
C32_1	4.33	4.36	4.38	2.02	1.91
C32_2	4.35	4.38	4.40	1.98	1.88
C32_3	4.37	4.40	4.41	1.95	1.84
C32_4	4.40	4.41	4.46	1.88	1.79
C32_5	4.45	4.46	4.49	1.89	1.83
C32_6	4.46	4.49	4.49	1.88	1.80

C33	4.49	4.49	6.93	0.01	0.01
C34	4.45	4.48	6.01	1.12	1.07
C35	0.98	1.14	0.98	1.95	0.98
C36	2.80	2.80	5.31	7.85	0.01
C38	1.10	1.10	1.12	1.11	1.10
C39	3.57	3.57	4.84	0.01	0.01
C4_1	0.75	0.89	2.84	0.91	0.75
C40	5.62	5.62	8.10	0.01	0.01
C44	4.80	5.16	4.80	8.12	4.80
C47	2.22	2.22	4.98	0.01	0.01
C49	8.98	9.00	9.24	4.23	4.15
C50	0.01	0.01	0.46	0.68	0.01
C51	0.01	0.01	1.90	0.01	0.01
C52	0.01	0.01	1.08	0.01	0.01
C54	0.48	0.53	0.48	0.61	0.48
C55	0.01	0.01	5.22	0.01	0.01
C56	0.01	1.47	0.01	1.54	0.01
C61_4	7.72	7.78	46.38	0.94	0.92
C62_2	0.01	0.01	1.56	0.09	0.01
C63	0.01	0.01	0.26	0.01	0.01
C64	3.53	3.53	3.55	0.01	0.01
C67	0.85	3.77	0.85	3.96	0.85
C71	0.01	0.01	1.39	0.01	0.01
C76	0.01	0.01	1.39	0.01	0.01
C89	3.73	3.75	6.19	1.21	1.19
C94	0.01	0.52	0.01	0.60	0.01
C95	0.05	0.27	0.66	0.36	0.05
C96	0.01	0.04	0.01	0.12	0.01
C97	0.01	0.57	0.01	0.82	0.01
C98	0.01	0.41	0.01	0.54	0.01
C99	0.01	0.59	0.01	0.76	0.01
CJ10016.1	0.01	0.01	0.01	5.50	0.01
CJ10066.1	0.01	0.01	0.01	4.38	0.01
CJ10500	0.01	0.01	0.75	0.01	0.01
CJ10500_2	0.01	0.01	0.63	0.01	0.01
CJ10614.5	0.01	0.01	0.01	0.78	0.01
CJ10694.8	3.93	3.98	3.93	5.39	3.90
CJ11913.3	0.01	0.01	0.01	3.23	0.01
CJ12037.2	4.55	4.56	4.63	0.01	3.19
CJ12418	5.44	5.44	5.49	0.01	4.55
CJ8716.3	0.01	0.01	0.01	4.65	0.01
CJ9283.1	0.01	0.01	0.01	3.75	0.01
CJ9313.3	0.01	0.01	0.01	0.90	0.01
CJ9499.8	3.41	3.42	3.41	2.71	3.41
CJ9789.2	3.17	3.17	3.20	0.66	2.58
CJ9812.9	0.94	0.94	1.03	0.01	0.01
CJ9902.3	0.01	0.01	0.01	5.39	0.01
CJ9966.3	0.01	0.01	0.01	6.85	0.01
Northway_Mark1	0.01	0.01	0.01	0.26	0.01
Northway_Trunk1	0.68	0.80	1.02	0.78	0.48
Northway_Trunk2	0.44	0.47	0.80	0.37	0.22
Northway_Trunk3	0.15	0.15	0.77	0.01	0.01
Northway_Trunk4	0.14	0.14	0.24	0.08	0.01
Temple_Open	0.01	0.01	3.58	0.01	0.01

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Pumping Summary
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Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	% Time Off Pump Curve High
P5	100.00	1	0.00	0.04	0.09	6.054	5.82	0.0	97.8
Rhodes_SWMP1	100.00	1	0.00	0.05	0.05	8.546	6.46	0.0	96.0

Analysis begun on: Wed Mar 25 10:50:09 2020
Analysis ended on: Wed Mar 25 10:50:37 2020
Total elapsed time: 00:00:28

Appendix E-2

St. Rose Avenue Pumping Station - Pumping Station Location Comparative Evaluation (October 2020)

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Memo

To:	Anna Godo, P.Eng., City of Windsor
From:	Laura Herlehy, P.Eng., Dillon Consulting Limited
	Chris Patten, P.Eng., Dillon Consulting Limited
Date:	October 5, 2020
Subject:	St. Rose Avenue Pumping Station – Pumping Station Location Comparative Evaluation
	Windsor Sewer and Coastal Flood Protection Master Plan
Our File:	17-6638

The following section will be incorporated into the Windsor Sewer and Coastal Flood Protection Master Plan (SMP) to document the evaluation of the location selection of the proposed St. Rose Avenue Pumping Station. Information regarding the modelling analysis and functional design used to determine the need and size of the St. Rose Avenue Pumping Station is included in the Technical Volume 2: Flood Reduction Solution Alternative Development Report (Appendix E) and the Technical Volume 3: Functional Design, Estimated Costs and Implementation Plan (Appendix F).

Regional Areas 1 & 2 – St. Rose Avenue Pumping Station - Surface Flooding Risk Reduction Measure (PS-E1-ROSE)

This problem area requires storms sewer system improvements to manage surface flooding within Regional Areas 1 & 2, under the 1:100 year storm, and to reduce surface flooding on major roadways under the Climate Change storm (1:100 year storm + 40% factor). Description of the comprehensive solution for this areas is described in the SMP report.

Regarding the St. Rose Pump Station alternatives, it is assumed that:

- The pumping capacity of the proposed pumping station is based on providing a 1:100 year storm level of service area-wide within the Regional Areas 1 &2 (Area between Riverside Drive and the Via Rail ROW and between Ford Blvd and east of Lauzon Road). This includes added resilience (enhanced level of service) for major roadways (Riverside Drive East, Lauzon Road, and Jefferson Boulevard) to mitigate surface flooding during a Climate Change Storm Event;
- The functional design of the pumping station and site features determined to be preferred, will be refined through the next step in the master plan process (Schedule C) with additional input received from stakeholders and additional site assessments; and
- The City will provide opportunity for further consultation during the detailed design phase of this essential long-term component of the Windsor MP.

From the numerous options explored in the pre-design phase, the four (4) viable pumping station location alternatives were evaluated as described below:

- **Alternative 1** – Construct the St. Rose Avenue Pumping Station in the St. Rose Avenue Park greenspace on the north side of Riverside Drive East, within the existing sheet pile/break wall area of the park. This alternative is the closest to the existing outfall and does not require displacement of any existing residences.

- Alternative 2 – Construct the St. Rose Avenue Pumping Station to the south of Riverside Drive and east of St. Rose Avenue. This alternative requires permanent displacement of two residential buildings.
- Alternative 3 - Construct the St. Rose Avenue Pumping Station to the south of Riverside Drive and west of St. Rose Avenue. This alternative requires permanent displacement of three residential buildings.
- Alternative 4 - Construct the St. Rose Avenue Pumping Station, at the northwest corner of the St. Rose Avenue/Wyandotte Street East intersection. This alternative requires permanent displacement of one commercial building, one residential building, and will require property from the adjacent property (acquire a portion of the existing parking area).

Each site is located in the vicinity of the existing St. Rose Avenue storm box culvert that provides the primary drainage outlet for the entire St. Rose Avenue drainage area (195 Ha). Alternatives were chosen based on their proximity to the outlet and the receiving water course. Alternative locations refer to more general areas where the pumping station could be located. The City may be able to fine tune the location of the pumping station based on further discussion and negotiation with property owners. For instance, there may be property owners along St. Rose Avenue or Riverside Drive, east of St. Rose Avenue that may be more open to selling and the homes may be less costly for the City to acquire.

For the purpose of this comparative evaluation, the four alternative pumping station locations are as listed above and shown in Figure 6-29. Exact property limits and impacted properties are subject to refinement based on detailed design of the proposed pumping station. This figure shows the footprint required to construct the proposed pumping station based on the functional design of the 13.5 cms pumping station. The functional design includes provisions for maintenance access, an electrical/control building and an on-site emergency power generator.

Common features and considerations of all three of these alternatives include:

- New pumping station wet well structure to house 3 large sized pumps and 2 smaller duty pumps to provide a storm sewer outlet for the St. Rose Avenue drainage area. The firm capacity of the pumping station (all pumps running) will be 13.5 m^3/s. The dimensions of the wet well are a function of the depth of the inlet sewers, on-site soil conditions, and the size and operation of the pumps;
- Building structure to house the electrical systems and controls is required;
- A back-up power generator is recommended to provide standby power. Size and location of the generator shall be confirmed prior to detailed design to determine an appropriate power rating and size that would adequately mitigate risk associated with power outages. The generator will be placed and constructed to mitigate impacts of noise from surrounding properties as required by applicable regulations;

- To provide power, an on-site power transformer will be required. Power source will need to be reviewed with EnWin prior to detailed design;
- Vehicular access points from the City's right-of-way to provide access for periodic maintenance of the site and pumps; and
- Landscaping amenities to improve the esthetic of the facility but also to provide site features that will add value to the property and be beneficial to the community. Local residents will be involved in the design process to assist in the development in a design that will fit the neighbourhood.

A detailed comparison of the St. Rose Avenue Pumping Station Location Alternatives to the Do Nothing alternative is included in Appendix G (Appended to this memo). Table 1 below provides a high level comparison of the St. Rose Avenue Pumping Station Location Alternatives and is followed by additional commentary on the section of the preferred alternative.

Table 1: St. Rose Pumping **Station Expansion/Upgrade Surface Flooding Risk Reduction (PS-**E1**-ROSE) Alternatives**

Evaluation Criteria		Alt. 1 St. Rose Avenue Park	Alt. 2 SE Corner of St. Rose Ave./Riverside DR. E.	Alt. 3 SW Corner of St. Rose Ave./Riverside DR. E.	Alt. 4 NE Corner of St. Rose Ave./Riverside DR. E.
Meets Flood Mitigation Objectives		✓	✓	✓	✓
Flexibility to Adjust to Climate Change		✓	✓	✓	✓
Coastal Flood Risk					✓
Water Quality		✓	✓	✓	✓
Complexity of Installation & Operation		✓			
Anticipated Extent of Maintenance Required		✓			
Length of Time Required for Implementation		✓			
Disruption during Construction		✓			
Permanent Changes to the Urban Community	Noise/Vibration Impacts				✓
	Displacement of Existing Residents/Businesses	✓			
	Disruption to Greenspaces/Parks		✓	✓	✓
	Disruption to Waterfront/Views		✓	✓	✓
Impacts to Archaeological, Built Heritage, & Cultural Heritage					✓
Impacts to the Natural Environment		✓	✓	✓	✓
Relative Capital Cost		✓			
Preferred:		PREFERRED			

Flexibility to Adjust to Climate Change: Many of the solutions developed through this study are recommended to help mitigate the impacts of climate change; however, in this case, the pumping station and outlet will also be susceptible to impacts related to high river levels that may result in climate change. To mitigate risks to the pumping station outlet sewers, the outlet sewer must be equipped with a gate which must be built above the projected Climate Change instantaneous high water level (177.10), to prevent river water from backing into the wet well. Back up of the river into the wet well will cause recirculation the river water and it will impact the capacity of the storm outlet. Refer to Appendix E, Technical Volume 2 report for more information on the projected water levels.

For Alternative 1, the outlet chamber is proposed to be elevated to incorporate the outlet gate directly into the pumping station, which requires the height of the pumping station to be 1.7 metres above existing grade (top of pumping station 178.00, finished grade 176.30).

For Alternatives 2, 3 and 4, to avoid conflict with other storm and sanitary sewers at the St. Rose Avenue and Riverside Drive East intersection, the pumping station outlet forcemain needs to be sufficiently deep (invert elevation at approximately 6.0 m depth). An outlet chamber equipped with backflow prevention gate will be required to protect the deep outlet forcemain and to provide spillover of outlet flows into the shallower river outlet pipe. This chamber would be in an approximately 6.0 m wide by 6.0 m long structure at a 1.7 m height to protect from instantaneous high river levels.

In addition, for all sites, to mitigate risks of high river levels on on-site electrical equipment, generators, electrical buildings and transformers will need to be built higher and be equipped with flood protection barriers/walls. Refer to Appendix Technical Volume 2 report for more details for more information on the projected water levels.

Complexity of Installation & Operation:

Each site will have challenges related to the construction of the large pumping station and storm sewer culvert. There are a number of factors that have been considered as part of the Ease of Implementation criteria. To provide the City better understanding of the comparative construction complexities that are associated with each alternative, a more detailed breakdown has been included in Table 2 below. To confirm the feasibility of Alt. 4, a schematic cross section of St. Rose Ave. is attached showing the potential alignment of the 3 large trunk sewers required along St. Rose Ave. (Two deep large storm box culverts and one large sanitary sewer trunks sewer). It is anticipated that the pole line, gas main and other telecommunication utilities would need to be relocated outside to the existing 20 m right-of-way to facilitate construction of the storm sewer, sanitary sewer and watermain.

Due the added complexity of construction, two large storm sewers along St. Rose Avenue for Alt. 4, this option would be the least preferred from a constructability perspective.

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Table 2: St. Rose Pumping **Station Alternatives** – Constructability Comparison

Construction Component	Alt. 1 St. Rose Avenue Park, Northeast Corner of St. Rose Avenue and Riverside Drive East	Alt. 2 Southeast Corner of St. Rose Avenue and Riverside Drive East	Alt.3 Southwest Corner of St. Rose Avenue and Riverside Drive East	Alt. 4 St. Rose Avenue and/or at Wyandotte Street East
PS Wet Well and Equipment	Most shallow pumping station with least hydraulic head loss and closest proximity to the receiving outlet.	More shallow than Alt. 4.	More shallow than Alt. 4.	Pumping Station requires increased pumping HP to overcome additional hydraulic loses between PS and outlet.
PS Excavation Dewatering	PS excavation will require the greatest amount of dewatering due to proximity to the existing shoreline.	Excavation dewatering will be required.	Excavation dewatering will be required.	Furthest from existing shoreline and therefore will require least amount of dewatering.
Excavation Material	Site is comprised of fill material that may be contaminated and need environmental remediation. Additional environmental testing and considerations shall be made related to the disposal of excess soil from this site. Wet well foundation will be built mostly in native clay material. (Geotechnical Desktop Review - Appendix J)	This site is least likely to require environmental testing and considerations shall be made related to the disposal of excess soil from this site. Wet well foundation will be built mostly in native clay material.	Similar to Alt. 2.	Similar to Alt. 2.
Proximity to existing shoreline	Closest proximity, challenges working in the vicinity of the existing sheet pile wall and tiebacks. Pumping station wet well will need to be constructed away from the sheet pile to mitigate impacts to the existing infrastructure.	Location is not in close proximity to the existing sheet pile wall.	Same as Alt. 2.	Same as Alt. 2.
Shoreline flood Protection – Overland Flooding	Site will need to incorporate protection of proposed equipment. Close proximity to existing shoreline will require most protection from high water, wave run-up and wind impacts.	PS will need to be built above climate change flood protection elevations.	PS will need to be built above climate change flood protection elevations.	PS will need to be built above climate change flood protection elevations. This site is at the highest elevation.
Shoreline Flood Protection Storm System Outlet	The PS wet well will need to be equipped with a gate to isolate the pumping station and sewers system from high water levels for safety and maintenance.	A separate outlet chamber with a gate within the park land area will need to be built to isolate the pumping station and sewers system, and pumping station outlet from high water levels for safety and maintenance. Watertight PS outlet culvert required along St. Rose to mitigate risk of flooding local area.	Same as Alt. 2.	Same as Alt. 2.
Demolition of Existing Structures	Does not require the demolition of buildings or removal of other infrastructure.	Requires demolition of three residential buildings and other landscape features.	Same as Alt. 2.	Requires demolition of one commercial property and one residential property.
Sewer/Culvert Trench Excavation Dewatering	Storm sewer excavation will require dewatering however this scenario has the most shallow and shortest sewer excavation.	Deeper and longer storm sewer culvert length than Alt. 1	Deeper and longer storm sewer culvert length than Alt. 1	Greatest length of trench excavation and deepest excavations required for storm culverts.
Storm Sewer Culvert Installation	Shortest and most shallow culvert installation. Can construct culvert along the alignment and depth of the existing culvert. Least impact to the St. Rose Ave. ROW.	Additional works required within the Riverside Drive. ROW and at the St. Rose/Riverside Intersection. Outlet culvert crossing riverside drive will need to be sufficiently deep to mitigate conflicts with other infrastructure.	Similar to Alt. 2.	Greatest impact to St. Rose Ave., due to the depth of the two large box culverts, the entire ROW will need to be closed. Excavations are greater than 6.0 meters which will require specialized equipment, staged excavation, additional safety precautions and full closer of the ROW.
Extent of Existing Utility Relation	Least amount of relocation of existing utilities (Gas mains, aerial service)	Similar to Alt. 1	Similar to Alt. 1	Most amount of relocation of existing utilities (Gas mains, aerial service) which will require property acquisition along the east and west side of the ROW.
Conclusion	Each site will have challenges related to the construction of the large pumping station and storm sewer culvert. The due the added complexity of construction two large storm sewers along St. Rose for Alt. 4, this option would be the least preferred from a constructability perspective.			
Green highlighted cells show alternatives have most positive/beneficial result under each item.				

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Anticipated Extent of Maintenance Required: Standard maintenance practices required for the proposed pumping station is anticipated to be similar for all four alternatives. For all alternatives, the pumping station forcemain will need to be "watertight" to mitigate back-up of flows within the lower lying area during major rain events. Due to the length of the pumping station forcemain required for Alt. 4, sealed and lockable access points are required. Due to the length of the enclosed forcemain outlet, risks associated with sewer back-up is more significant. Any maintenance on the forcemain would require the pumping station to be shut down. There is no opportunity to construct an additional back-up forcemain due to space limitations in the St. Rose Avenue right-of-way. Based on the extent of equipment and culverts required, Alternative 1 is most preferred.

Length of Time Required for Implementation: Alternatives 2, 3 and 4 require acquisition of private property and demolition of structures which would delay implementation. Risk associated with property acquisitions, including the potential need to expropriate could add additional time and costs to the project. Alternative 4 be most time-consuming to implement due to the extent of reconstruction and underground infrastructure required along St. Rose Avenue.

Disruption during Construction: For all alternatives, temporary road closure of Riverside Drive East and St. Rose Avenue will be required. Alternative 4 will require the most disruption to residents due to the depth and size of the two proposed culverts required within the St. Rose Avenue right-of-way. Extensive advance utility relocation will be required. Potential need to provide temporary sanitary flow pumping, interim on-grade water distribution or other measures will be required to maintain servicing during construction. Access to driveways and emergency access during construction will also be limited. Alternative 1 is determined to be the least disruptive as it is on vacant land, requiring less time to construct.

Permanent Changes to the Urban Community: For the purpose of this pumping station location evaluation, this criteria has been separated into three distinct components:

- Noise/Vibration Impacts
- Displacement of Existing Residents/Businesses
- Disruption to Greenspaces/Parks
- Disruption to Waterfront/View

Noise and vibration impacts to the local environment are not expected to be significant. As part of the detailed design of the pumping station, necessary noise abatement measures such as noise enclosures and landscape/fence buffers will be incorporated into the design. Minimal vibration impacts are expected as the wet well and generator foundation structures will be designed adequately to mitigate vibration of equipment/structures. Alternative 4 is considered most preferred as it is furthest from adjacent property owners and located within a Commercial zoned area.

Alternatives 2, 3 and 4 all require the purchase of existing properties to accommodate the proposed pumping station, equipment and access areas. For the purposes of this comparative evaluation, properties impacted by each alternative is shown in Figure 6-29. The locations shown are subject to refinement upon further property owner consultation, which will be required under the Schedule C Class Environmental Assessment Process. The need for the relocation of existing residents/property owners is considered a significant negative impact to those local property owners. Up to 2-3 homes could need to be purchased to accommodate the pumping station which would require the displacement of up to 3 families. Alternative 4, would have less impact to residents and would require the relocation of an established business and 1 property owner.

Alternative 1 will result in the greatest permanent change to the local urban community due to the greater impact to the St. Rose Avenue Park land. Within the City, and especially in the Riverside Area, waterfront access is limited and is only available through the presence of City owned park lands. Placing the pumping station within the St. Rose Avenue Park (Alt. 1) will limit the use of most of the east portion of the Beach (east of the pier/walkway). Alternatives 2, 3, and 4 will require the installation of an outlet chamber within the park which will have less impact to the park land use. The detailed design of the pumps station/outlet chamber will consider additional features that will provide value to the local community, examples include (additional seating, plantings, look-out feature, etc.).

In addition to the significant change to the park use, the existing waterfront view will be compromised. The existing waterfront and Detroit River views are valuable to adjacent homeowners as well as the local community. The placement of this pumping station will have impacts to those that live adjacent or across from the park as it will partially impact the existing view of the river and Detroit city skyline. Alternative 2, 3, and 4 is preferred with respect to the impacts to waterfront view and park impacts as Alternative 1 will have the most permanent impact.

Impacts to Archaeological, Built Heritage, & Cultural Heritage: Alternative 1 would have the most impact on the local cultural heritage by impacting the existing waterfront access and riverfront view, while Alternatives 2, 3 and 4 would have less of an impact as the proposed structure would be located away from the shoreline. There are no heritage classified or designated properties in the vicinity of the proposed pumping station site; therefore, minimal impacts from each of the alternatives is expected. The architecture of the proposed pumping station site should be designed such that it fits into the esthetic of the local neighbourhood. A Stage 2 archaeological assessment is required for Alternative 1, 2 and 3 in the area along the existing property line along the City's Riverside Drive East right-of-way. Alternative 4 will have the least, archaeological, built heritage and cultural heritage impact.

Impacts to the Natural Environment: Each of the 4 alternative sites are urban, landscaped properties that lack the potential for terrestrial habitats. All sites required the construction of a large outlet culvert in the vicinity of the existing outlet sewer. As noted in the St. Rose Avenue Pumping Station Preferred Location - Natural Environment Review document (August 2020) (Appendix H of the SMP), the Detroit River has potential for aquatic habitat and therefore, measures to mitigate impacts to aquatic species and their habitat will need to be implemented prior and during construction. Each solution requires a similar quantity of in-water works. Alternative 1 will require additional sedimentation and erosion control measures due to the proximity of the wet well to the existing shoreline.

Relative Capital Cost: For the purposes of this evaluation a more detailed cost comparison was completed to evaluate the cost difference between the identified alternatives. For the purpose of this assessment, the cost comparison between Alt. 1 and Alt. 4 was completed to help understand the approximate order of magnitude cost difference. Alternative 1 is estimated to be approximately 15%-20% less costly than Alternative 4 based on the cost of the proposed pumping station, required additional upstream and downstream storm sewers and outlet. This cost comparison does not include considerations for cost differences resulting in the acquisition of private property, or any costs for relocating residents or businesses. Cost for park land is less than the cost to acquire residential/commercial property; therefore, the estimated cost difference is estimated to be greater than 20%. It is recommended that the City consult their Legal and Property Departments to confirm estimated costs. It is estimated that Alt. 2 and 3 will be more costly than Alt. 1 and less costly than Alt. 4.

St. Rose Pumping Station Comparative Evaluation Conclusion

To summarize, the project team reviewed and completed a detailed comparative evaluation of 4 alternative pumping station locations for the required St. Rose Ave. storm sewer outlet pumping station. Alternative 1 – St. Rose Beach is determined as preferred, based on the balance of criteria related to displacement of residents/property owners, constructability, and cost versus impacts to the park community feature and waterfront views. The results of the comparative evaluation does not show that Alternative 1 is significantly more preferred than Alternative 4. The project is also classified as a Schedule C project based on the current Municipal Class Environmental Assessment (MCEA) process, therefore this solution will require additional investigation and consultation with property owners including consultation with those who own property along St. Rose Ave. and at the Wyandotte St. E./St. Rose Ave. intersection.

A latest conceptual site layout of the St. Rose Pumping Station is included in this memo. This pump station layout has been revised from the versions presented in the February 2020 Public Information Center and draft SMP report. To accommodate the widening of Riverside Dr. E. at the St. Rose Intersection to accommodate a future left turn lane and to provide minimum separation from the existing shoreline wall, the pump station footprint has been modified.

We ask that the City review and provide comments related to the findings of this evaluation in advance of the completion of the SMP Report. If the City is in agreement with the conclusions listed above this assessment will be integrated into the final SMP document. If you have any questions please contact Laura Herlehy, P. Eng. at 519-818-3105 or lherlehy@dillon.ca.

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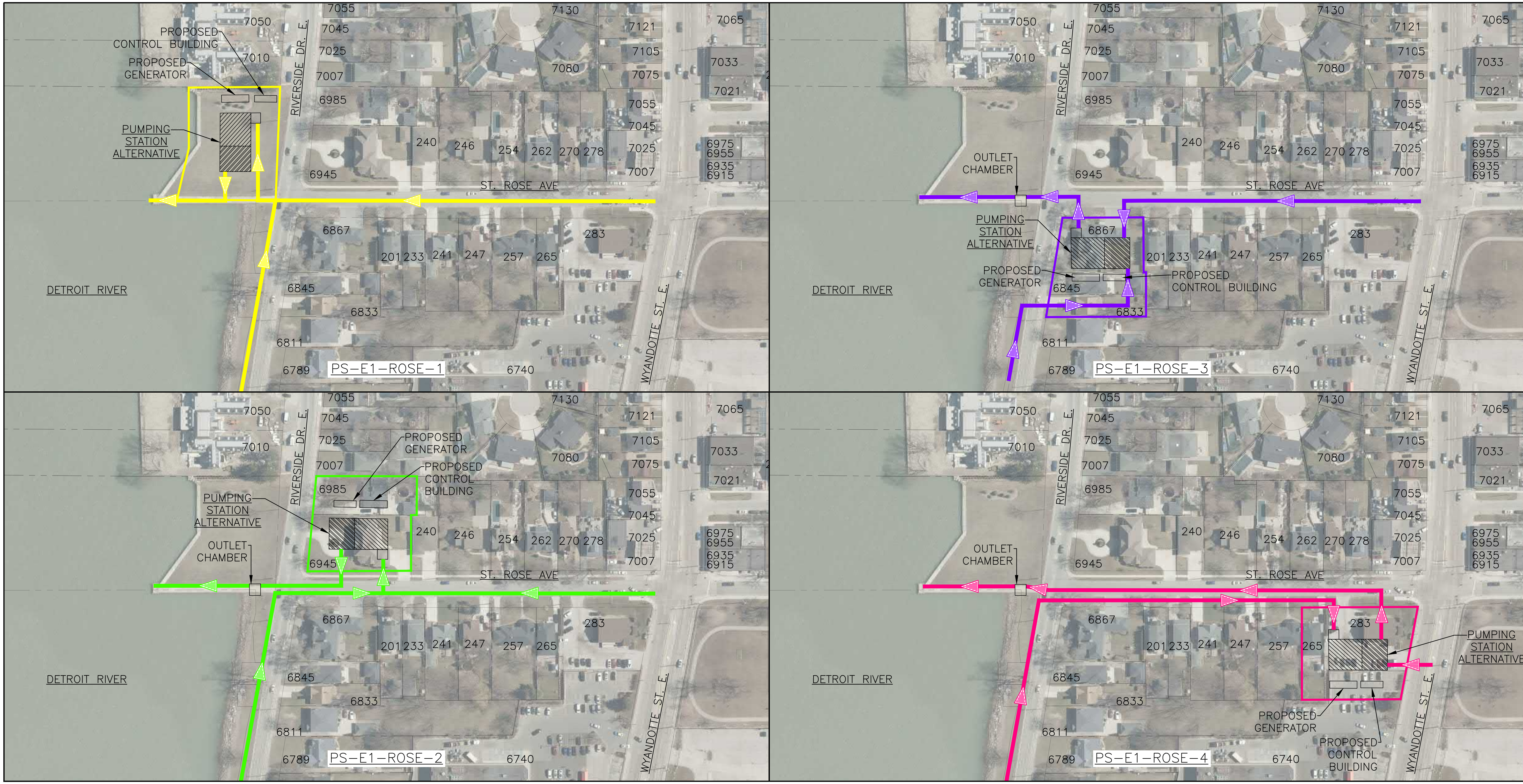

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

FIGURE 6-29
Riverside Drive East - Storm Alternatives
PROPOSED ALTERNATIVES
ST. ROSE PUMP STATION LOCATIONS

PS–E1–ROSE–1 (Preferred Alternative)
PS–E1–ROSE–2
PS–E1–ROSE–3
PS–E1–ROSE–4
HIGHER PORTION OF PUMP STATION
LOWER PORTION OF PUMP STATION
PROPERTY LINE

NOTE:
Alternative site plan configurations are based on preliminary site plans and should be used for reference only. The more refined conceptual design of the preferred alternative St. Rose Pump Station is included in the Technical Volume 3 report.

CREATED BY: JTB
CHECKED BY: LMH

FILE LOCATION:
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October, 07, 2020 10:20 AM

PROJECT: 17-6638 STATUS: FINAL DATE: October 2020

Windsor Sewer Master Plan
Environmental Assessment Evaluation
Riverside Drive - St. Rose Storm Pump Station Solution

Highlighted cells indicate solution that has least impact or best outcome.

Sewershed/Sub-Sewershed Area: East / Detroit River-Riverside

Date: Oct. 5, 2020

Sewer System: Storm System
Problem Area: Problem Area 1 - St. Rose Pump Station (PS) (PS-E-ROSE)
Description: Improvements to the St. Rose Pump Station is recommended as part of the storm solution alternatives developed for the East Windsor. The recommended St. Rose pump Station recommended capacity is 13.5 cms.

Objective (what)	Evaluation Criteria (how measured)	Rationale (why being considered)	DO NOTHING ALTERNATIVE	ALTERNATIVE 1 (PS-E-ROSE-1)	ALTERNATIVE 2 (PS-E-ROSE-2)	ALTERNATIVE 3 (PS-E-ROSE-3)	ALT 4 (PS-E-ROSE-4)
		Alternative	Baseline	New St. Rose PS - St. Rose Beach	New St. Rose PS - Southeast Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Southwest Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Northwest Corner of Wyandotte St. E. and St. Rose Ave.
		Summary of Required Infrastructure	No New Infrastructure.	13.5 cms pump station within Park land. Emergency back up power generator Electrical/Control Building Additional Culvert Outlet to Detroit River. 3.0 m x 1.8 m storm sewer culvert on St. Rose Ave.	13.5 cms pump station within residential property. Demo of existing residential home. Emergency back up power generator Electrical/Control Building Additional Culvert Outlet to Detroit River crossing Riverside Drive. Need for outlet chamber within Park Lands (6 m by 6m structure, 1.7 m in Height). 3.0 m x 1.8 m storm sewer culvert on St. Rose Ave.	13.5 cms pump station within residential property. Demo of existing residential home. Emergency back up power generator Electrical/Control Building Additional Culvert Outlet to Detroit River crossing Riverside Drive. Need for outlet chamber within Park Lands (6 m by 6m structure, 1.7 m in Height). 3.0 m x 1.8 m storm sewer culvert on St. Rose Ave.	Larger pump station required within commercial and residential property at Wyandotte St. E. and St. Rose intersection. Demo of existing commercial building. Emergency back up power generator Electrical/Control Building. Need for outlet chamber within Park Lands (6 m by 6m structure, 1.7 m in Height). 3000 mm dia. on St. Rose Ave. directing Riverside Dr. sewer to Wyandotte PS. 3.0 m diameter forcemain (or 3.0 m x 1.8 m storm sewer culvert) on St. Rose Ave.
Level of Service: Reduce Potential for Flooding	Flood reduction realized by alternative.	Reducing the potential for decreasing undesirable flooding.	Does not meet the Level of Service objectives. Option will not be carried forward for assessment.	Pump station improvements meets the Level of Service Objectives of this study.	Same as Alt. 1.	Same as Alt. 1.	Same as Alt. 1.
Resilience	Flexibility to adjust to impacts climate change will have on rain frequency and volume.	Being forward looking and resilient in considering climate change and growth/intensification.	N/A	Improved resiliency. PS capacity is based on providing level of service for 1:100 + Climate Change Factor.	Same as Alt. 1.	Same as Alt. 1.	Same as Alt. 1.
	Flexibility to adjust to impacts climate change will have on Detroit River levels.	Considerations required to mitigate risks associated with coastal flood risks along shoreline/low lying areas.	N/A	The pump station wet well must be constructed to mitigate risks of river water back up during periods of instantaneous high water levels. The storms sewer system outlet invert must exceed Climate Change projected instantaneous high water levels (177.1 m). This requires a portion of the pump station to be constructed approximately 1.7 m above existing grade. Additional coastal flood protection will be required onsite to protect the power and electrical equipment.	Coastal flood mitigation measures must be implemented similar to Alt. 1. This will require an outlet chamber with the St. Rose Park area with an approximately height of 1.7 m above existing grade.	Similar to Alt. 2	Similar to Alt. 2. This site is at the highest elevation and is furthest from the existing shoreline.
Water Quality	Ability to maintain or improve water quality.	Solutions should meet environmental standards and minimize impact to water courses.	N/A	Water quality maintained or improved through construction of the upstream storm sewer system.	Water quality maintained or improved through construction of the upstream storm sewer system.	Water quality maintained or improved through construction of the upstream storm sewer system.	Water quality maintained or improved through construction of the upstream storm sewer system.
Ease of Implementation	Complexity of installation and operation related to the pump station and storm sewer infrastructure.	Reducing City challenges and barriers to flood reduction measures. Includes consideration of space requirements, construction requirements, installation, and operation. (REFER TO SEPARATE CONSTRUCTABILITY EVALUATION)	N/A	Least comparatively complex to construct overall based on separate constructability comparative evaluation table.	Moderate level of construction complexity.	Similar to Alt. 2.	Most comparatively complex to construct.
Ease of Maintenance and Operation	Anticipated extent of maintenance required.	Providing solutions that are relatively easy/less costly to maintain.	N/A	Regular pump and mechanical system maintenance required throughout the lifetime of this facility. No additional storm sewer maintenance is anticipated as St. Rose box culvert is similar to the existing configuration.	PS maintenance is similar to Alt. 1, longer outlet sewer and additional outlet chamber will require comparatively more maintenance.	Similar to Alt. 2.	PS maintenance is similar to Alt. 1. Longest enclosed pump station outlet forcemain will require comparatively more maintenance. Minimal access manholes along the outlet pipe will require more complex maintenance. Consideration for a redundant forcemain for maintained and back up.

Windsor Sewer Master Plan
Environmental Assessment Evaluation
Riverside Drive - St. Rose Storm Pump Station Solution

Highlighted cells indicate solution that has least impact or best outcome.

Sewershed/Sub-Sewershed Area: East / Detroit River-Riverside
Date: Oct. 5, 2020
Sewer System: Storm System
Problem Area: Problem Area 1 - St. Rose Pump Station (PS) (PS-E-ROSE)
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Objective (what)	Evaluation Criteria (how measured)	Rationale (why being considered)	DO NOTHING ALTERNATIVE	ALTERNATIVE 1 (PS-E-ROSE-1)	ALTERNATIVE 2 (PS-E-ROSE-2)	ALTERNATIVE 3 (PS-E-ROSE-3)	ALT 4 (PS-E-ROSE-4)
		Alternative	Baseline	New St. Rose PS - St. Rose Beach	New St. Rose PS - Southeast Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Southwest Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Northwest Corner of Wyandotte St. E. and St. Rose Ave.
Timing for Implementation	Length of time required for implementation.	Implement solutions as soon as possible to mitigate risks of flooding in a timely manner.	N/A	Less risk of time delays due to property acquisition/expropriation or building demolition. Time delays related to obtain necessary DFO clearances. Schedule C requirements and additional site assessments must be completed prior to completing detailed design.	Risk of time delays due to need to acquire and demolish 2 existing residential properties. Time delays related to obtain necessary DFO clearances, similar to Alt. 1. Schedule C requirements must be met similar to Alt. 1.	Risk of time delays due to need to acquire and demolish 3 existing residential properties. Time delays related to obtain necessary DFO clearances, similar to Alt. 1. Schedule C requirements must be met similar to Alt. 1.	Risk of time delays due to need to acquire and demolish existing commercial building and one residential property. Time delays related to obtain necessary DFO clearances, similar to Alt. 1. Schedule C requirements must be met similar to Alt. 1.
Minimize Impacts of Construction	Disruption during construction.	Identifying solutions that can be implemented with minimal disruption to neighbours and the environment.	N/A	Greatest impact to public park space during construction to construct the PS. Park will require closure during construction. Greatest potential impact to marine environmental with PS construction site closest to Detroit River. Storm outlet requires in water works. Noise and vibration - close proximity to one residential home. Least impact to St. Rose Ave. Row therefore least amount of impact to those properties. Least disruption to Riverside Dr. ROW to facilitate construction of PS inlet. Some disruption to construct one storm sewer culvert along St. Rose Ave.	Least impact to public park to construct outlet culvert and outlet chamber. Park will require closure during construction. Some potential impact to marine environmental with outlet chamber construction within park land area. Storm outlet requires in water works similar to Alt. 1. Noise and vibration- close proximity to two residential homes. Additional ROW impacts to St. Rose Ave. results in additional impact to adjacent property owners. Longer and more extensive disruption to Riverside Dr. ROW to facilitate construction of PS inlet and outlet, comparatively greater construction impact than Alt. 1. Similar to Alt. 1.	Similar to Alt. 2 Similar to Alt. 2 Similar to Alt. 2 Similar to Alt. 2 Similar to Alt. 1.	Similar to Alt. 2 Similar to Alt. 2 Noise and vibration- close proximity to residential homes and commercial properties along Wyandotte St. E. Greatest impact to properties along St. Rose Ave. and Wyandotte St. E. Longer and more extensive disruption on Riverside Dr. E., St. Rose Ave., and Wyandotte St. E. to facilitate construction. Requires greater impact to existing services and may require temporary sewage pumping or on grade watermain during construction.
Minimize Long-Term Social/Economical Impacts	Permanent changes to the urban community such as existing residents, greenspaces, recreational uses (parks, open spaces, trees).	Potential for disruption or displacement of existing residents.	N/A	Does not require displacement of residential or commercial property owners.	Requires permanent displacement of 2 existing residents.	Requires permanent displacement of 3 existing residents.	Requires permanent displacement of existing commercial and residential property owners. Will also require the removal of parking spaces within the adjacent commercial property (Grocery Store).
		Noise and Vibration impacts, proximity to existing land uses. (Minimum noise/vibration standards will need to be met for all alternatives.)		Pump station location is adjacent to one residential property. Due to site constraints there is limited opportunity to provide additional buffer between pump station work and adjacent property. Additional noise abatement measures may be required. Increased impact of noise/vibration within parkland.	Pump station location will be adjacent to two residential properties. Additional property acquisitions required to provide additional buffer. Increased impact of noise/vibration within existing residential area.	Pump station location will be adjacent to three residential properties. Additional property acquisitions required to provide additional buffer. Increased impact of noise/vibration within existing residential area.	Pump station location will be adjacent to one residential property and one commercial property. Additional property acquisitions required to provide additional buffer. Increased impact of noise/vibration within existing commercial area.
		Potential for disruption or displacement of greenspaces, recreational uses (parks, open spaces, trees).		Most impact to waterfront community feature which will require the introduction of additional park amenities to offset the permeant impact.	Some impact to waterfront community or park lands to construct outlet and outlet structure.	Similar to Alt. 2.	Similar to Alt. 2.
		Potential for disruption or displacement of scenic/heritage views of the waterfront.		Most disruption to scenic/heritage views of waterfront.	Some disruption to scenic/heritage views of waterfront due to need for outlet chamber in proximity to the receiving water outlet to provide coastal flood protection to the storm sewer system.	Similar to Alt. 2.	Similar to Alt. 2.

Windsor Sewer Master Plan
Environmental Assessment Evaluation
Riverside Drive - St. Rose Storm Pump Station Solution

Highlighted cells indicate solution that has least impact or best outcome.

Sewershed/Sub-Sewershed Area: East / Detroit River-Riverside

Date: Oct. 5, 2020

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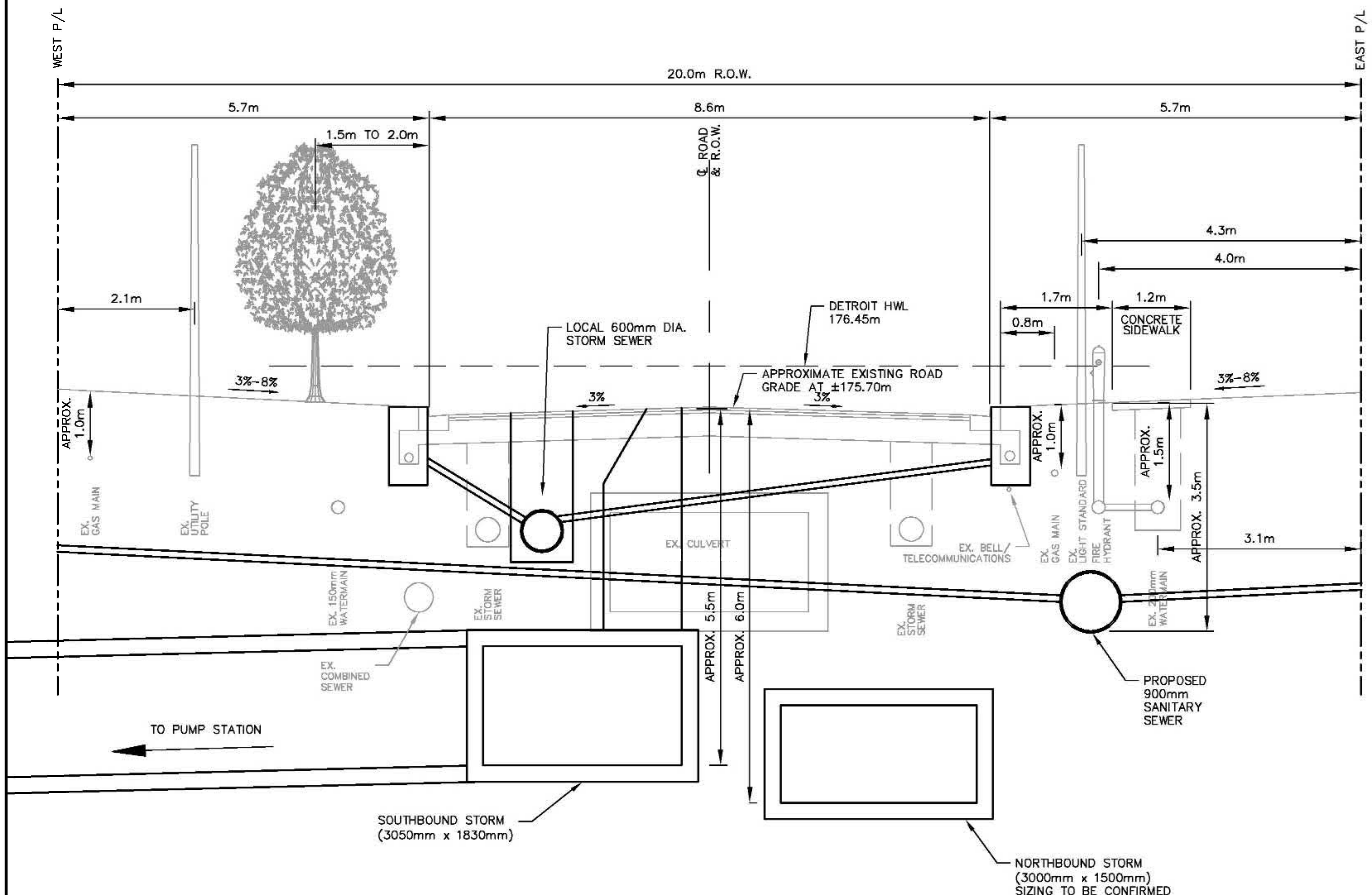
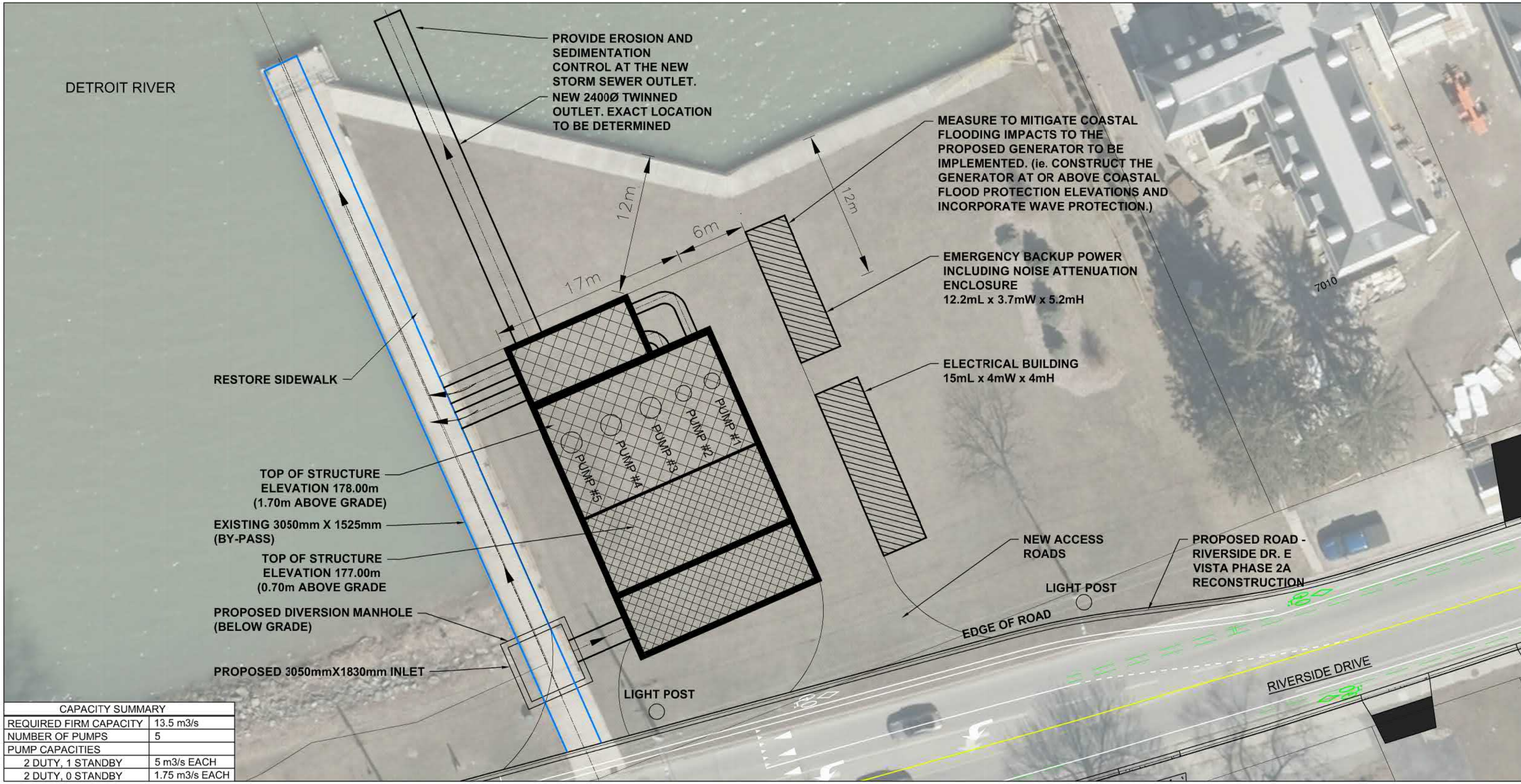
		Alternative	Baseline	New St. Rose PS - St. Rose Beach	New St. Rose PS - Southeast Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Southwest Corner of Riverside Dr & St Rose Ave.	New St. Rose PS - Northwest Corner of Wyandotte St. E. and St. Rose Ave.
Minimize/Mitigate impacts to Cultural/Heritage Resources	Impacts to Built Heritage, Cultural Heritage, and/or Archaeological Resources	Potential for temporary or permanent disruption or displacement of existing resources (built heritage, cultural heritage, archaeological) and consideration of methods to minimize and/or mitigate impacts.	N/A	No designated heritage features in the vicinity of the site. Most impact to heritage of the area due to the potential impact to the waterfront park. Potential for temporary and permanently impact to public waterfront access as a cultural feature. Although proposed works are within high archaeological potential areas, the majority of lands have been significantly disturbed. This site is mostly comprised of infill with exported materials.	No designated heritage features in the vicinity of the site. Least cultural impact to place PS in Commercial zoned lands. No permanent impact to public waterfront access as a cultural feature. Although proposed works are within high archaeological potential areas, the majority of lands have been significantly disturbed due to the construction of a residential home.	No designated heritage features in the vicinity of the site. Less cultural impact than Atl. 1 to place PS in Commercial zoned lands. No permanent impact to public waterfront access as a cultural feature. Similar to Alt. 2.	No designated heritage features in the vicinity of the site. Least cultural impact to place PS in Commercial zoned lands. No permanent impact to public waterfront access as a cultural feature. Although proposed works are within high archaeological potential areas, the majority of lands have been significantly disturbed before due to the development in the area. This site is furthest from the Detroit River and is at the boundary of the high/low archaeological potential boundary per the City's Archaeological Master Plan.
Minimize Impacts to the Natural Environment	Minimize Impacts to the Natural Environment	Potential for impacts to natural environmental features and consideration of how to minimize.	N/A	Additional outlet culvert required for pump station outlet will require mitigation with in-water sediment and erosion protection measures. Due to proximity of construction to shoreline additional sedimentation and erosion control measures are needed. No impacts to the terrestrial environment.	Additional outlet culvert required for pump station outlet will require mitigation with in-water sediment and erosion protection measures. No impacts to the terrestrial environment.	Similar to Alt. 2.	Similar to Alt. 2.
Consideration of Cost	Relative capital cost.	Being cognizant of the need to consider capital municipal infrastructure improvement costs of each alternative (construction/installation/ operation).	N/A	Lowest comparative capital cost due to pump station proximity to the outlet, least amount infrastructure conflicts, does not require building demo and lowest cost for land purchase. Additional incremental costs may be required for site dewatering due to proximity to the Detroit River. Additional cost to export fill material from site during excavation including environmental testing. No costs associated with the relocation of residents or costs for property acquisition.	Moderate capital cost due to additional sewer works at the St. Rose and Riverside intersection and property acquisition of several properties and demolition of existing buildings. Less comparative cost for dewatering, export of material, environmental testing required. Additional costs for relocating residents, potential risk of additional legal fees (i.e. expropriation).	Similar to Alt. 2.	Highest capital cost due requirement for an additional deep storm sewer along St. Rose Ave. (and potentially Wyandotte Street), property acquisition of several properties and potential demolition of existing building(s). Increased pump size required to account for increased head losses to outlet at Detroit River. Less comparative cost for dewatering, export of material, environmental testing required. Additional costs for relocating residents, potential risk of additional legal fees (i.e.. expropriation).
		Preferred:		PREFERRED			



ST. ROSE AVENUE
Approximately 50m south of Riverside Drive
PS-E1-ROSE Alternative 4

SCALE 1:75



CAPACITY SUMMARY	
REQUIRED FIRM CAPACITY	13.5 m3/s
NUMBER OF PUMPS	5
PUMP CAPACITIES	
2 DUTY, 1 STANDBY	5 m3/s EACH
2 DUTY, 0 STANDBY	1.75 m3/s EACH

CITY OF WINDSOR
SEWER AND COASTAL FLOOD PROTECTION MASTER PLAN

RECOMMENDED SOLUTION
ST. ROSE PUMP STATION LAYOUT SCHEMATIC

PROPERTY LINE
PROPOSED SEWER
EXISTING STORM SEWER
EXISTING SANITARY SEWER

NOTE:

THIS PUMP STATION FUNCTIONAL DESIGN REPRESENTS THE CONCEPTUAL LAYOUT OF THE PROPOSED PUMP STATION, CONTROL AND ELECTRICAL BUILDING AND EMERGENCY BACKUP POWER GENERATOR.

PRIOR TO DETAILED DESIGN OF THIS PUMP STATION THE CITY WILL NEED TO CONSULT STAKEHOLDERS ON THE LAYOUT AND TREATMENT OF THE PUMP STATION FACILITY AS WELL AS THE SURROUNDING PARK AREA.

THE RECOMMEND BACKUP POWER GENERATOR SIZE IS BASED ON A MAXIMUM SIZE TO PROVIDE BACK UP POWER FOR A 1:100 YEAR LEVEL OF SERVICE

CREATED BY: SMZ
CHECKED BY: TC

N W E S

PS-E1-ROSE 1
PROJECT: 17-6638 STATUS: FINAL DATE: November 2020

Appendix E-3

East Riverside Flood Risk Assessment – Supplementary Report

Lake St. Clair/Detroit River Shoreline - Overland Spill Flood Analysis (November 2020)

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Landmark Engineers Inc.

November 11, 2020 Project No.: 18-033B

City of Windsor
Engineering Department
350 City Hall Square West
Windsor, ON, N9A 6S1

Attention: Ms. Anna Godo, P.Eng.

Re: East Riverside Flood Risk Assessment – Supplementary Report
Lake St. Clair/Detroit River Shoreline - Overland Spill Flood Analysis

Dear Ms. Godo:

We are pleased to submit this report, supplemental to the 2019 East Riverside Flood Risk Assessment study, summarizing our more detailed analyses and modelling of the potential for inland flooding due to wind setup and high water levels on Lake St. Clair. Our findings are presented below.

Background

As noted in our proposal of 31 January 2020, the City of Windsor requested that Landmark Engineers coordinate with Dillon Consulting to ensure that the findings and recommendations of the East Riverside Flood Risk Assessment were incorporated into the City's ongoing Sewer Master Plan. Over the course of our coordination efforts, it was noted that further analyses and modelling of the potential for overland flood flows from Lake St. Clair would be beneficial for emergency planning purposes and to aid in the prioritization of diking improvements.

Based on the above, Landmark carried out several overland flood flow analyses for various lake levels and dike conditions. These analyses were aimed at assessing the inland floodwater elevations that could occur under a variety of conditions. These conditions accounted for: the available capacity of the minor drainage system (i.e., storm sewers & pumping systems), the condition/elevation of the perimeter diking system, and the variability of water levels on Lake St. Clair – particularly as a result of a wind setup event.

This letter serves to provide a brief written report of our modelling approach and our findings.

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Professional Engineers
Ontario

Historical Wind Setup Events

In addition to the flood risks generally presented by high water levels on the Great Lakes, the potential for flooding due to 'wind setup' (*defined here as the displacement of water toward one end of a lake or reservoir due to wind blowing continuously over time*) on Lake St. Clair is of particular concern in the East Riverside area. Given the site's location along the southwest shore of Lake St. Clair, this concern is the greatest when sustained winds are blowing out of the northeast.

In reviewing the historical data for recorded wind speed and direction at Windsor Airport (for the period of record between 1955 and 2019) and the corresponding water levels recorded at the Belle River gauge (Fisheries & Oceans Canada) and the Windmill Point gauge (NOAA), we noted that the most extreme wind setup events appear to have occurred on 17 March 1973 and 9 April 1998 – two dates that correspond with significant flooding events in the study area. While the March 1973 event was clearly a more severe wind (and flooding) event, we have determined that the April 1998 event is more suited for evaluating the typical flood risk along the East Riverside shoreline, as explained below.

Wind generally moves from areas of high pressure to areas of low pressure – which typically means from cold to warm. The conditions that caused the March 1973 event appear to have been more typical of a "polar vortex type" wind event, which tends to last longer as compared to an event caused by a storm front. It would be highly unusual to get winds out of the east (or northeast) as a result of a polar vortex. It is more probable for such an event to produce winds from the north and northwest, which we believe the March 1973 event produced.

By comparison, the April 1998 event appears to have been caused by a low-pressure area moving through Ohio, south of the Great Lakes. As air flow rotates counterclockwise around low-pressure areas north of the equator, this event produced winds from the east-northeast direction, which is certainly a more critical wind direction for the East Riverside shoreline. These types of events are also typically shorter in duration. The duration of the April 1998 event was substantially shorter than the March 1973 event.

Therefore, to evaluate the potential flooding that could result from an inland spill, we considered a hypothetical wind setup event (*hereafter 'spill event'*) that mimics the 9 April 1998 historical wind setup event combined with a starting calm water level equal to the historical high-water level of 175.96m on Lake St. Clair. This starting calm water level represents a 0.41m increase above the actual April 1998 calm water level of 175.55m. The hydrograph representing the adopted spill event (time-series of the Lake St. Clair / upper Detroit River water level) is depicted in Figure 1.

Model Approach & Findings

To model the potential impact of a spill event, our approach entailed calculating input flow rates and volumes and then applying those input flows to a 2D surface mesh of the existing terrain to estimate inland flood extents and depths. To achieve this, we utilized a simplified modelling approach that employed two separate software programs: PCSWMM to estimate inflow hydrographs representing the spill flow; and GeoHECRAS to model the inland surface flow and flooding extents.

PCSWMM Modelling

Hydrographs representing the spill event were used as a dynamic outfall condition in our PCSWMM model and the corresponding spill flows were simulated using a series of 251 weirs with various spill elevations ranging from 176.03m to 177.21m and weir lengths ranging from 0.5m to 53m.

The varying weir lengths were made to fit the varying topography near the shoreline (i.e., between existing dwellings). These weirs were then grouped into 4 nodes of 50 weirs and 1 node of 51 weirs, with the sum of the individual weir flows determined for each node. Figures 2 to 4 depict the node areas as well as an example of the weir representation of the near-shore berming/diking. Figure 5 depicts the inflows (i.e., spill flows) that were estimated for each node.

GeoHECRAS Modelling

The inflows estimated from the PCSWMM model were then applied to the GeoHECRAS surface model to estimate flood depths and extents resulting from the spill event. This assessment was undertaken for two assumed states for the perimeter dike/berm, specifically:

- the existing state of the perimeter barrier; and,
- the improved dike raised to a minimum elevation of 176.15m.

For each of these assumed barrier conditions, three drainage/pump scenarios were assumed, namely:

- no removal of inflows, assuming 0% of the existing pump capacity (representing the passive condition of no pumping);
- reduction of inflows at a rate of 50% of existing pump capacity (i.e., 4.65 m^3/s); and,
- reduction of inflows at a rate of 100% of existing pump capacity (i.e., 9.3 m^3/s).

Figures 6 to 8 depict the resulting flooding at elapsed time intervals. Table 1 below summarizes the approximate peak flood water levels that would occur for the varying simulated conditions:

Table 1 – Summary of GeoHECRAS Flood Simulations

Scenario	Perimeter Barrier Condition	Pump Condition	Peak Flood Water Level
1	Existing	No pumping	175.58
2		50% Existing pump capacity	175.48
3		100% Existing pump capacity	175.44
4	Weirs raised to min. elevation of 176.15m	No pumping	175.40
5		50% Existing pump capacity	175.34
6		100% Existing pump capacity	175.30

Discussion of Modelling Results

Figures 6 through 8 and Table 1 summarize the basic findings of this flood risk assessment. The figures indicate that a vast area of east Windsor could potentially be affected by flood waters originating from Lake St. Clair / Detroit River during a wind setup event while high water levels prevail.

If no improvements are undertaken to the perimeter diking, the modelling suggests that inland water levels would crest at an elevation in the range of 175.44m to 175.58m, depending on the level of stormwater pumping that were to occur during the event. If the lowest portions of the perimeter diking were to be raised to a minimum elevation of 176.15m at some future time, then the peak flood levels could be reduced by approximately 140mm to 180mm – with water levels peaking in the range of 175.30m to 175.40m. For comparison purposes, estimated water levels on Lake St. Clair would peak at an elevation in the order of 176.26m during the same event.

The flood risk assessment was completed assuming a range of inland drainage rates. This approach was intended to assess the impact of the local minor drainage and pumping system on peak flood levels within the study area. As presented in Table 1, the internal minor drainage system can reduce peak flood levels in the order or 100mm to 140 mm, as compared to the level that would occur if the interior drainage system was not functioning.

Finally, in addition to illustrating the extent and depth of local flooding that could occur under the assumed storm conditions, Figures 6 through 8 illustrate the flooding sequence as a time series. This mapping may be useful to emergency responders, by depicting the segments of roadway that are most likely to first become impassible during a flood event.

Conclusions and Recommendations

Based on the findings of this assessment, the following conclusions and recommendations appear to be warranted.

1. Our analyses confirm that a significant area of East Riverside is susceptible to flooding due to overtopping of the existing perimeter berms and dikes. If a wind event similar to the one that occurred in April 1998 were to occur when static Lake St Clair water levels match the historic monthly maximum high water level (175.96m), interior flood levels could peak in the range indicated in Table 1.

2. All of the estimated levels presented in Table 1 are well below the estimated peak Lake St. Clair / Detroit River water level of 176.26m. This finding warrants that the City of Windsor and Essex Region Conservation Authority give consideration to establishing a Special Policy Area for future flood hazard regulation. More specifically, the findings of this assessment should be utilized to rationalize an engineered flood proofing standard for future land development projects within the study area.

3. The analyses presented herein illustrate that measurable reductions in flood risk can be realized by improving the condition of the perimeter dikes and berms.

We trust that the above will be sufficient for your purposes. If you have any questions or concerns, please do not hesitate to call.

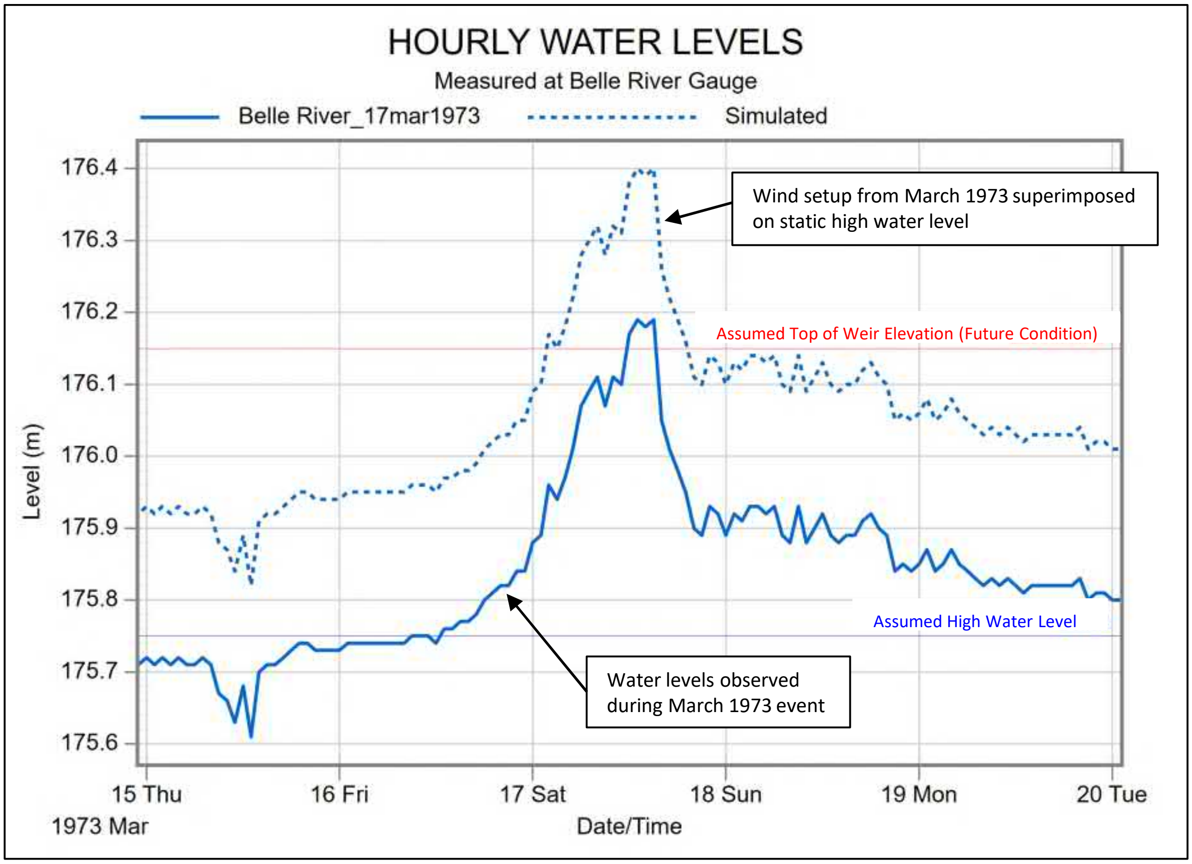
Yours truly,

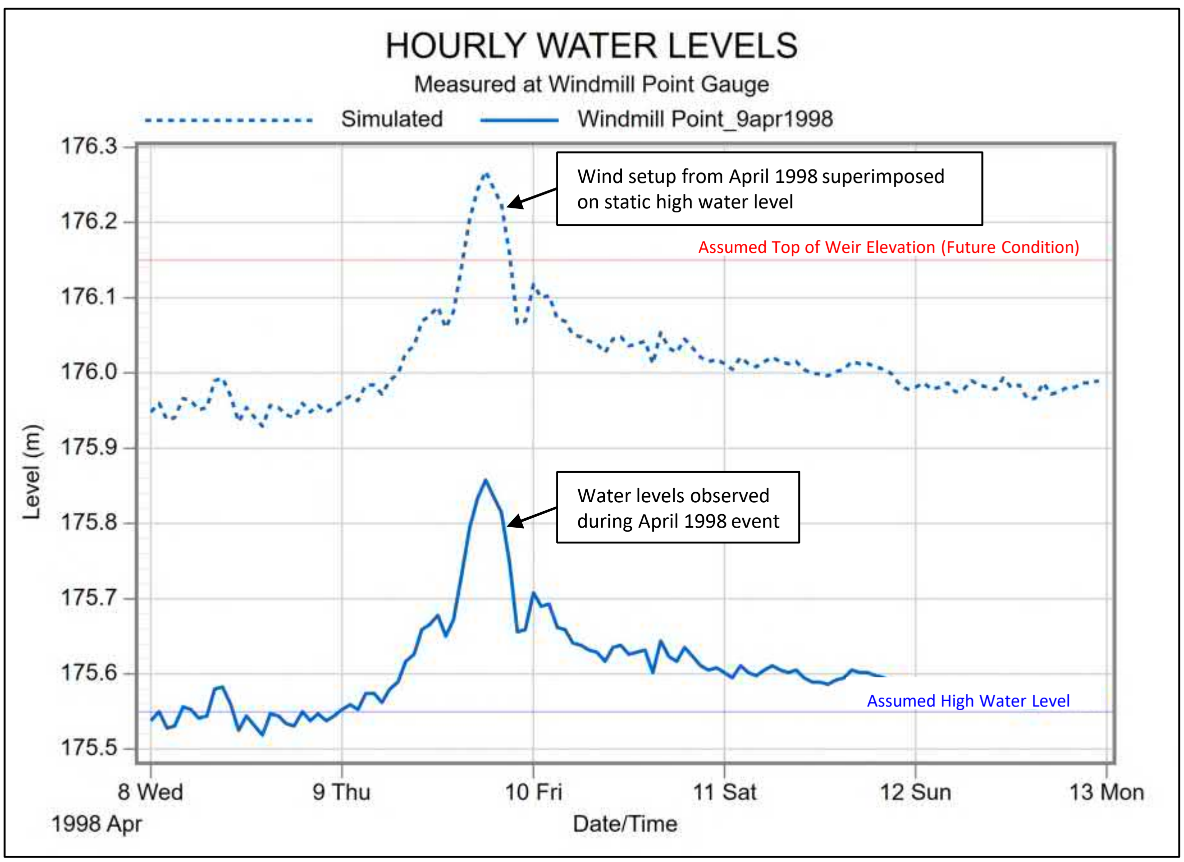
Landmark Engineers Inc.

Daniel M. Krutsch, P.Eng.

Alain Michaud, P.Eng.

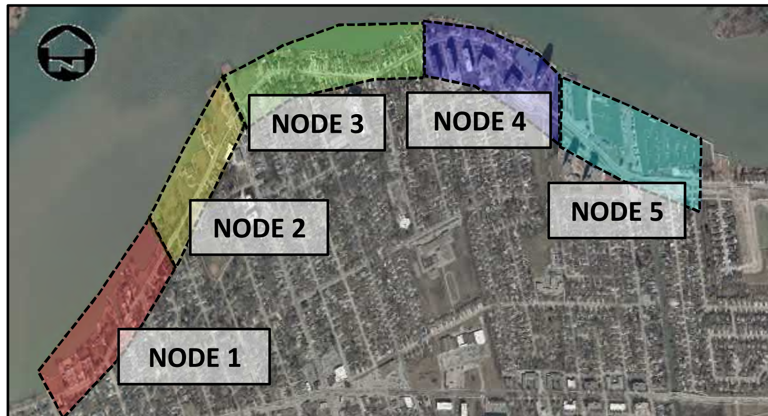
Attachments: Figures 1 to 8





Landmark Engineers Inc.

Title: HISTORICAL WIND SETUP EVENTS	Date: NOV 2020	FIGURE 1
	Scale: NTS	
Project: EAST RIVERSIDE FLOOD RISK ASSESSMENT	Project No. 18-033B	



KEY PLAN
N.T.S

LEGEND

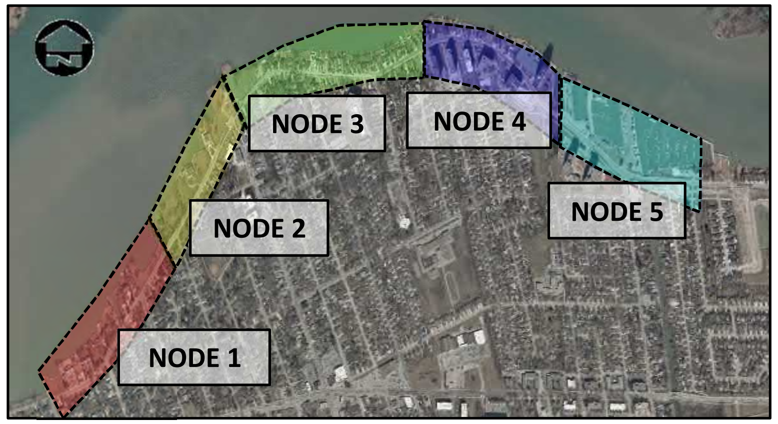
- EXISTING LANDFORM BARRIER
- GEOHECRAS BOUNDARY CONDITIONS
- EXTENT OF NODE

NODE #1 - ST. ROSE TO EASTLAWN

NODE #2 – EASTLAWN TO LAUZON

Landmark
Engineers Inc.

Title: EXISTING LANDFORM BARRIER MODELING NODES 1 AND 2	Date: NOV 2020		FIGURE 2
	Scale: NTS		
Project: EAST RIVERSIDE FLOOD RISK ASSESMENT	Project No. 18-033B		



KEY PLAN
N.T.S

LEGEND

EXISTING LANDFORM BARRIER

GEOHECRAS BOUNDARY CONDITIONS

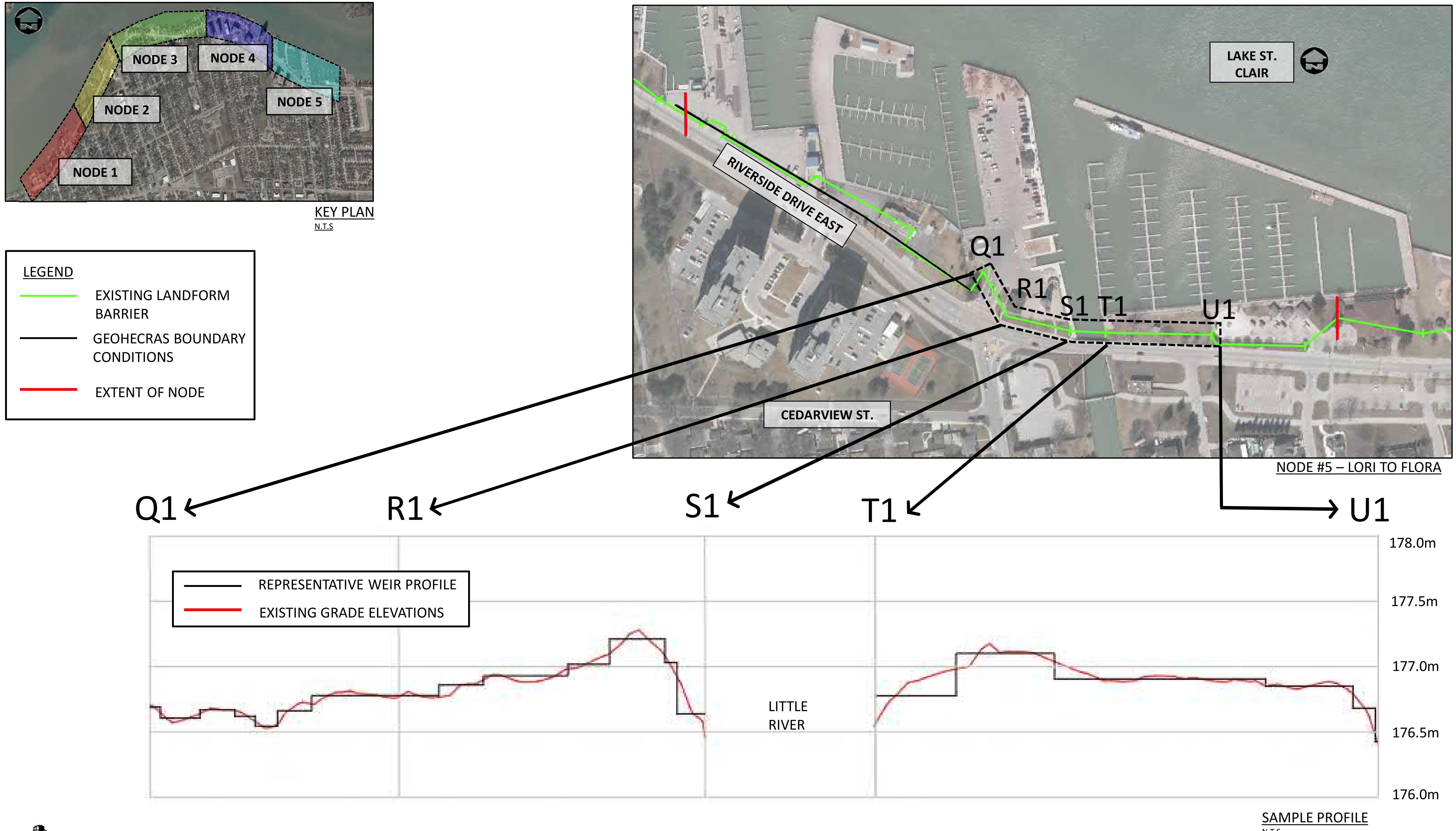
EXTENT OF NODE

NODE #3 – LAUZON TO GENEVIEVE

NODE #4 – GENEVIEVE TO LORI

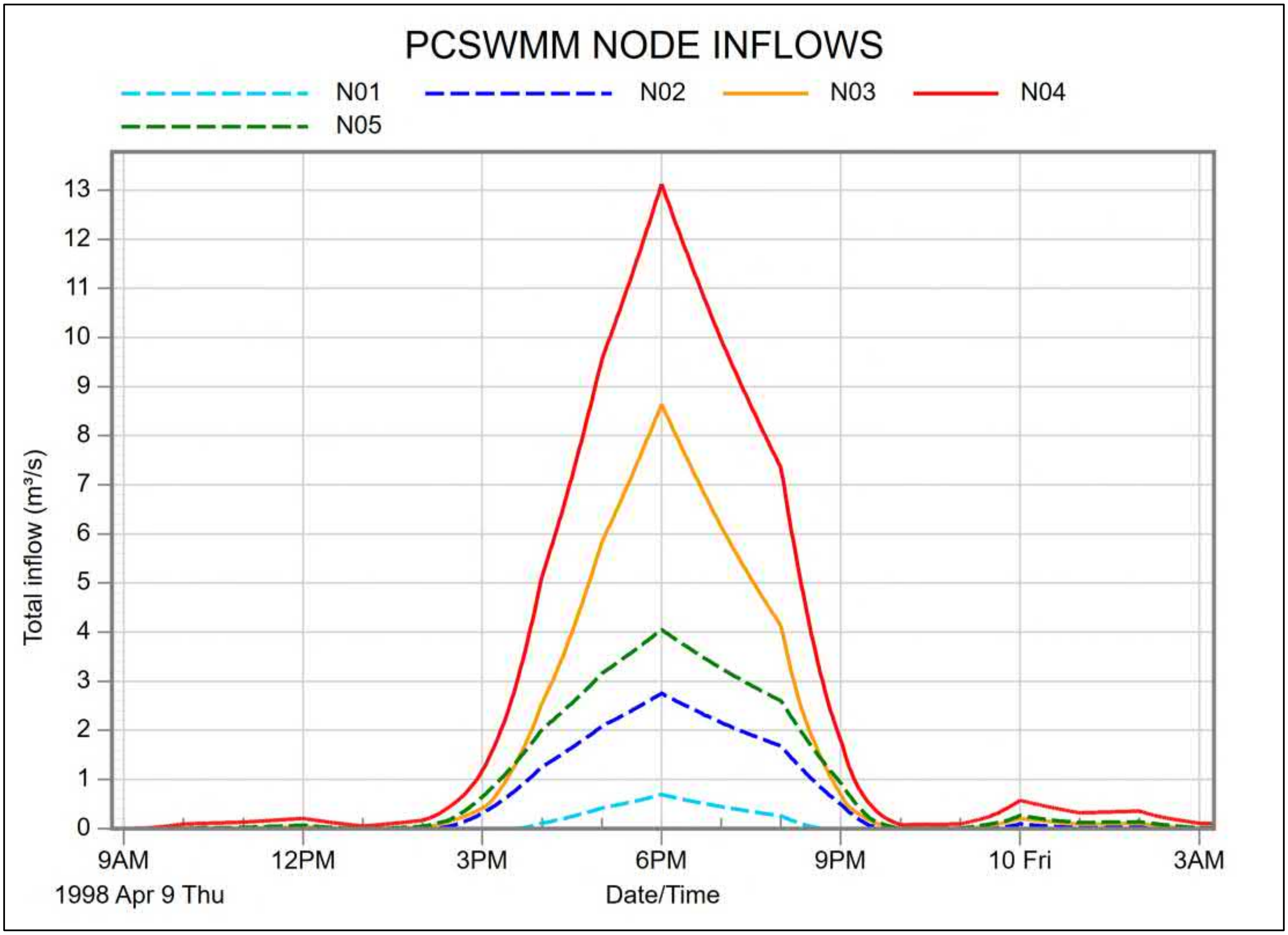
Landmark Engineers Inc.

Title: EXISTING LANDFORM BARRIER MODELING NODES 3 AND 4	Date: NOV 2020	FIGURE 3
	Scale: NTS	
Project: EAST RIVERSIDE FLOOD RISK ASSESMENT	Project No. 18-033B	



Landmark Engineers Inc.

Title: EXISTING LANDFORM BARRIER MODELING NODE 5	Date: NOV 2020	Scale: NTS	FIGURE 4
Project: EAST RIVERSIDE FLOOD RISK ASSESMENT	Project No. 18-033B		



Inflow Node	N01	N02	N03	N04	N05
Peak Flow (m^3/s)	0.7	2.8	8.6	13.1	4.0
Total Volume (m^3)	6,400	37,900	100,400	175,800	60,700

Landmark Engineers Inc.

Title: MODELLED FLOW RATES FOR OVERLAND FLOODING	Date: NOV 2020	FIGURE 5
	Scale: NTS	
Project: EAST RIVERSIDE FLOOD RISK ASSESSMENT	Project No. 18-033B	

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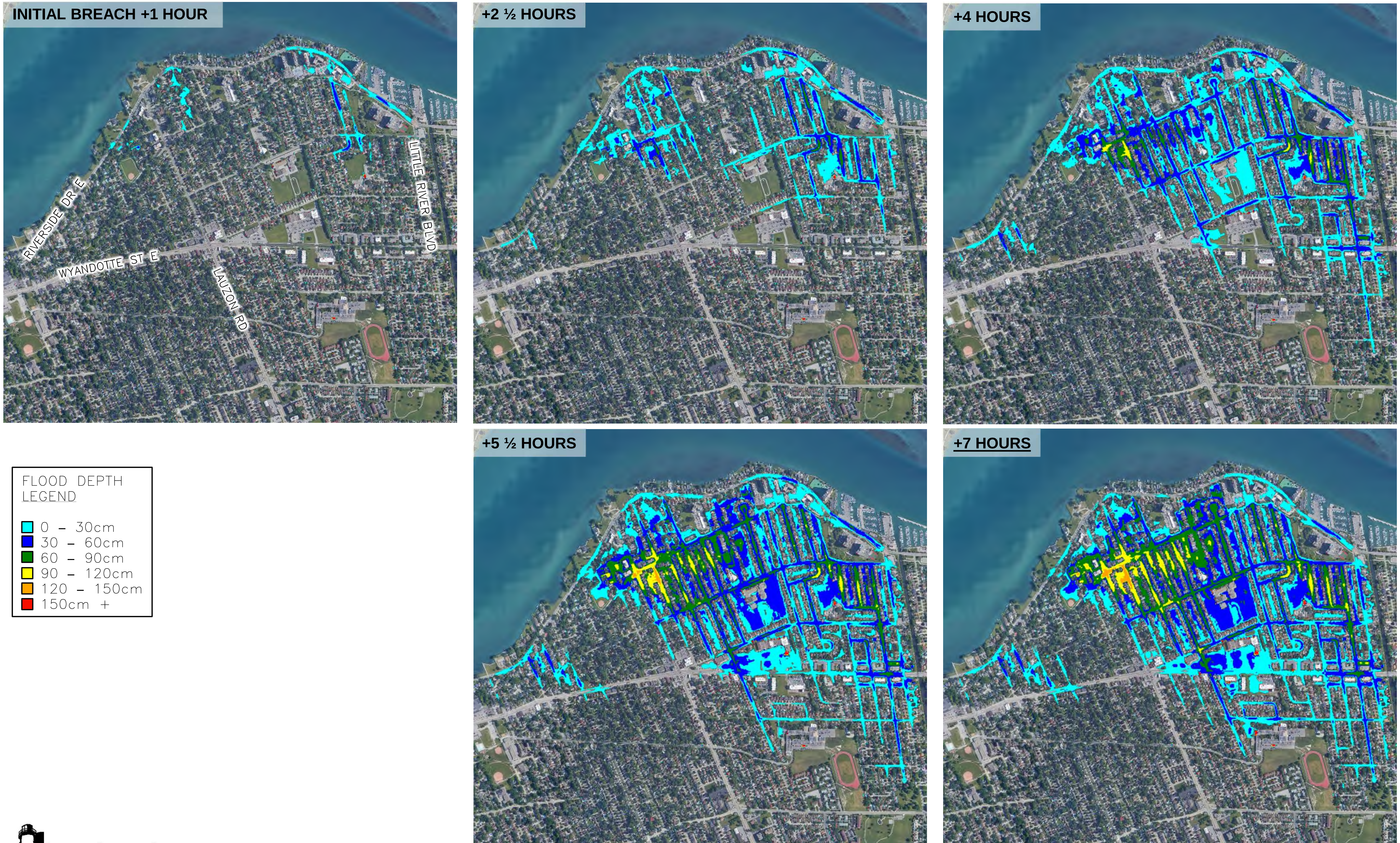
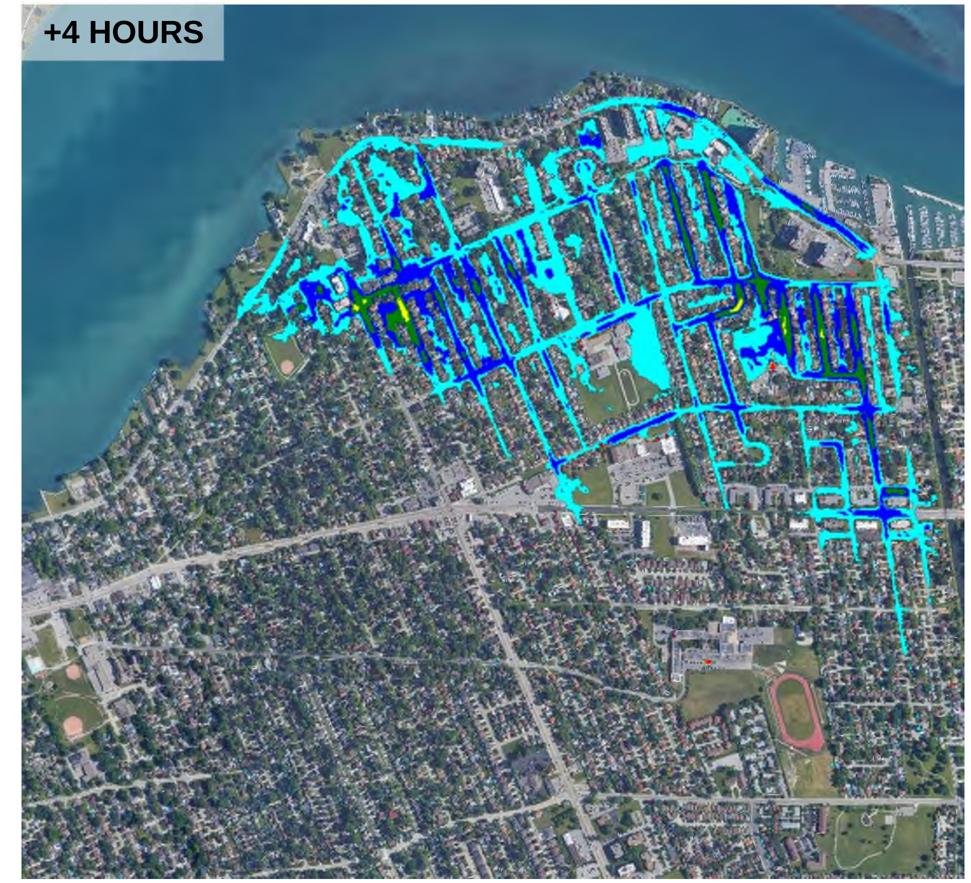
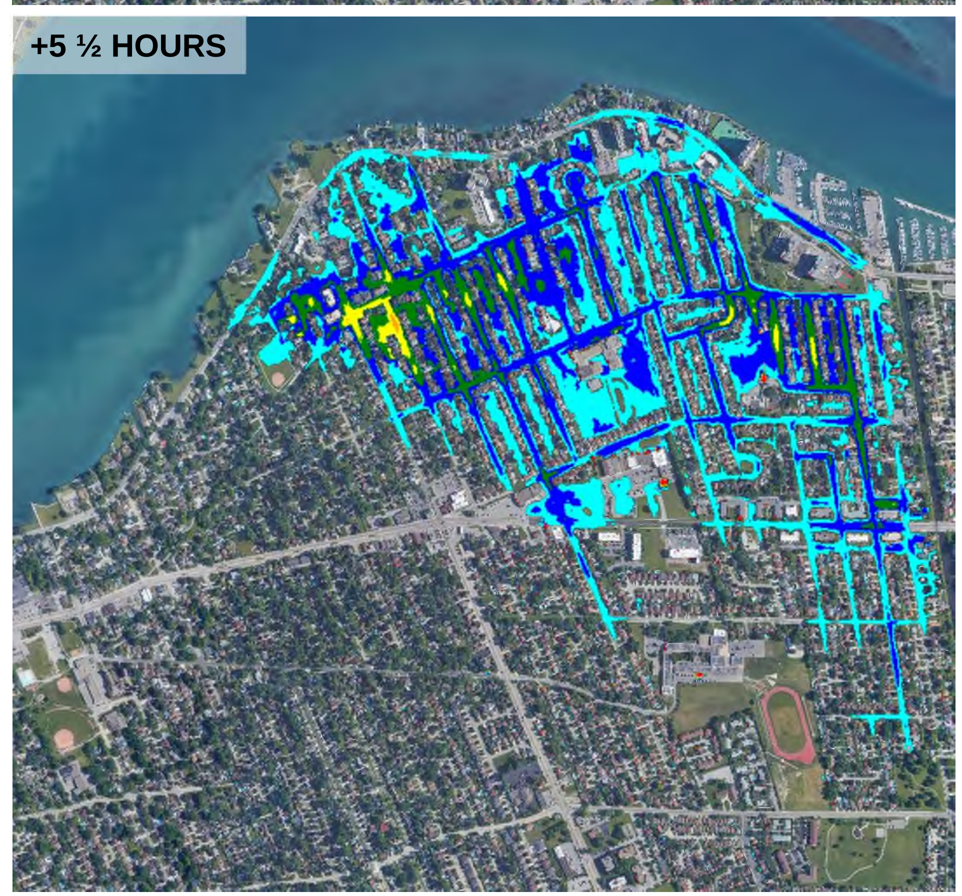
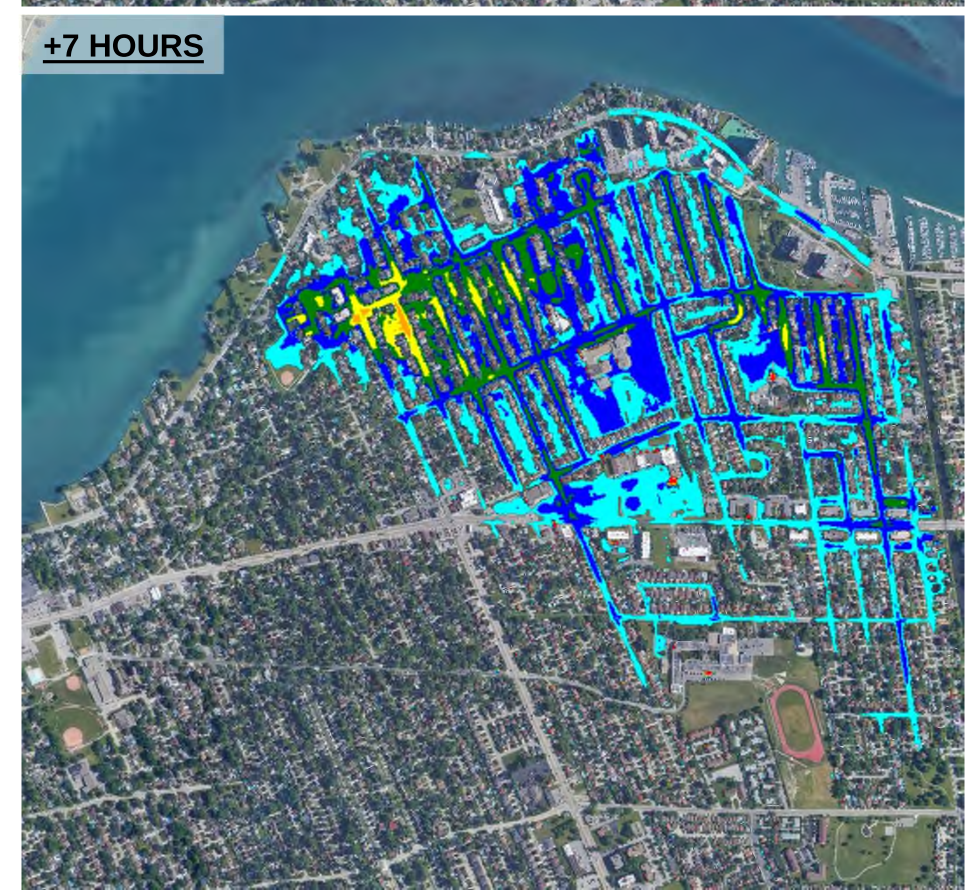


Landmark Engineers Inc.

Title: OVERLAND FLOODING MODEL – EXISTING CONDITION (WITH ZERO PUMPING)	Date: NOV 2020		FIGURE 6
	Scale: NTS		
Project: EAST RIVERSIDE FLOOD RISK ASSESSMENT	Project No. 18-033B		





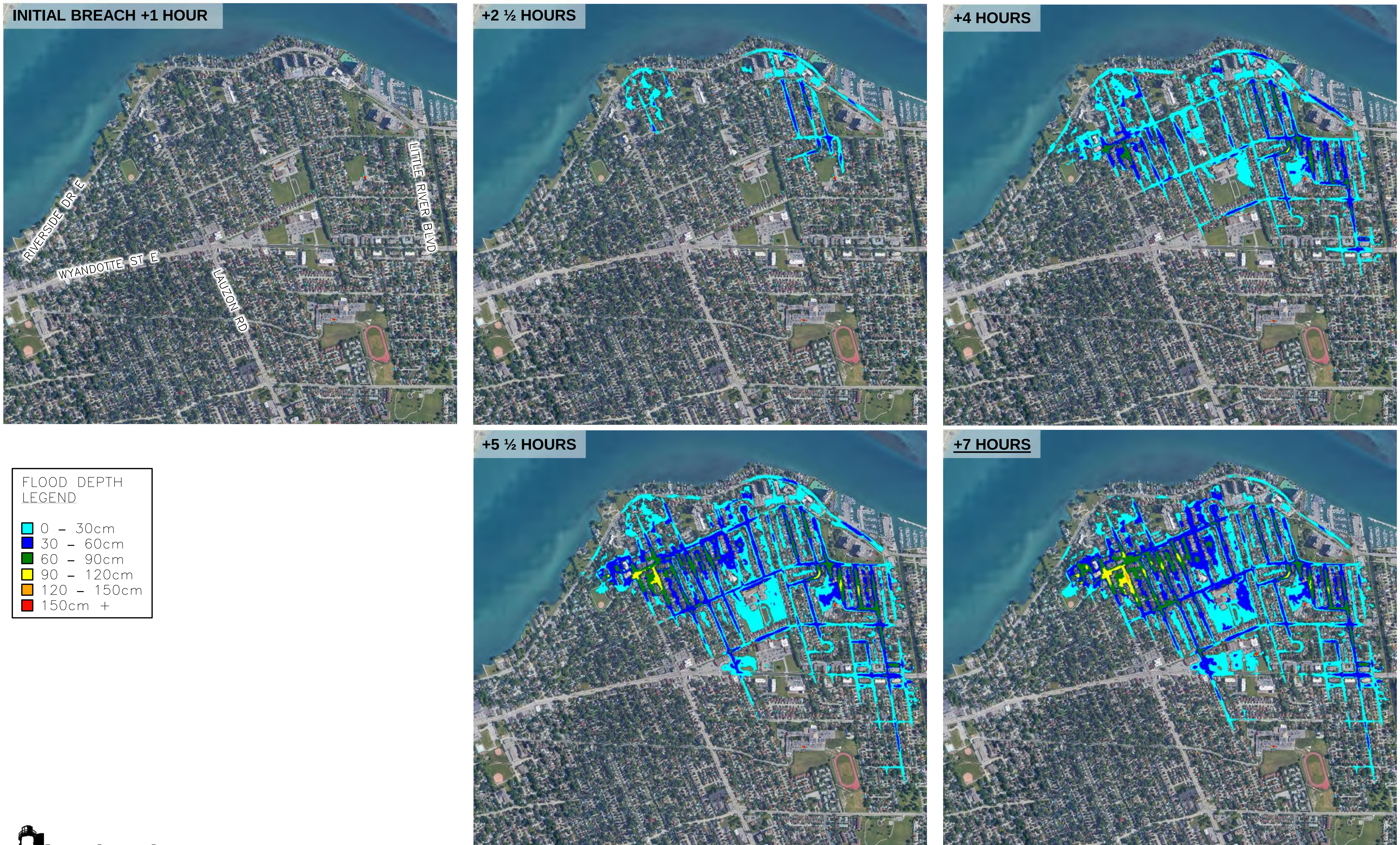


FLOOD DEPTH LEGEND

- 0 – 30cm
- 30 – 60cm
- 60 – 90cm
- 90 – 120cm
- 120 – 150cm
- 150cm +

Landmark Engineers Inc.

Title: OVERLAND FLOODING MODEL – EXISTING CONDITION (UTILIZING 50% OF EXISTING PUMP CAPACITY)	Date: NOV 2020	Scale: NTS	FIGURE 7
Project: EAST RIVERSIDE FLOOD RISK ASSESSMENT	Project No. 18-033B		



Landmark Engineers Inc.

Title: OVERLAND FLOODING MODEL – EXISTING CONDITION (UTILIZING 100% OF EXISTING PUMP CAPACITY)	Date: NOV 2020 Scale: NTS	FIGURE 8
Project: EAST RIVERSIDE FLOOD RISK ASSESSMENT	Project No. 18-033B	