Trails Edge West Block 121

Site Servicing and Stormwater Management Report

Stantec

Prepared for:
Richcraft Homes Ltd.

Prepared by:
Stantec Consulting Ltd.

Date:
October 30, 2026

Project/File:
160401760

Stantec Consulting Ltd.

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	1st Submission for SPC	Michael Wu / Warren Johnson	2026-03-25	Dustin Thiffault	2026-03-25	Sheridan Gillis	2026-03-25
1	2nd Submission for SPC	Michael Wu / Warren Johnson	2026-10-30	Dustin Thiffault	2026-10-30	Sheridan Gillis	2026-10-30

Disclaimer

The conclusions in the Report titled Trails Edge West Block 121 are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Richcraft Homes Ltd. (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by:

Signature

Michael Wu, P.Eng.

Prepared by:

Signature

Warren Johnson, L.E.T. C.E.T.

Reviewed and Approved by:

Signature

Dustin Thiffault, P.Eng.



Table of Contents

1 Introduction 4
2 References 5
3 Water Servicing 6
3.1 Background 6
3.2 Design Criteria 6
3.2.1 Water Demand and Allowable Pressure 6
3.2.2 Fire Flow and Hydrant Capacity 6
3.3 Proposed Watermain Sizing and Layout 7
3.3.1 Water Demands 7
3.3.2 Fire Flow Demands 7
3.3.3 Boundary Conditions 7
3.4 Hydraulic Assessment 8
3.4.1 Model Development 8
3.4.2 Hydraulic Modeling Results 8
3.5 Summary of Findings 12

4 Wastewater Servicing 13
4.1 Background 13
4.2 Design Criteria 13
4.3 Proposed Servicing 13

5 Stormwater Management 16
5.1 Objectives 16
5.2 Background 16
5.3 Design Criteria and Constraints 16
5.4 Post-Development Modeling 18
5.4.1 Design Methodology 18
5.4.2 Modeling Rationale 18
5.4.3 SWMM Dual Drainage Methodology 19
5.4.4 Boundary Conditions 20
5.4.5 Hydrologic Parameters 21
5.4.6 Hydraulic Parameters 23
5.5 Model Results and Discussion 24
5.5.1 Proposed ICD Schedule 24
5.5.2 Hydraulic Grade Line Analysis 25
5.5.3 Overland Flow 26
5.5.4 Uncontrolled Areas 26
5.5.5 Overall Release Rates 29
5.6 Quality Control Requirements 31

6 Grading 34
7 Utilities 34
8 Approvals 34
9 Erosion and Sediment Control During Construction 35
10 Geotechnical Investigation 36
11 Conclusion 37
11.1 Potable Water Analysis 37
11.2 Wastewater Servicing 37
11.3 Stormwater Management 37

11.4 Grading 37
11.5 Utilities 38

List of Tables

Table 3.1: Estimated Water Demands 7
Table 3.2: Boundary Conditions 7
Table 3.3: C-Factors Applied Based on Watermain Diameter 8
Table 4.1: Wastewater Peak Flows 15
Table 5.1: Stormwater Boundary Conditions 21
Table 5.2: General Subcatchment Parameters 21
Table 5.3: Proposed Subcatchment Parameters 21
Table 5.4: Storage Node Parameters 22
Table 5.5: Runoff Coefficient Calculations 23
Table 5.6: Orifice Parameters for Proposed Catchments 24
Table 5.7: Proposed Orifice and Outlet Link Results 24
Table 5.8: Proposed Development Hydraulic Grade Line Results 25
Table 5.9: Proposed Development – Maximum Static and Dynamic Surface Water Depths 26
Table 5.10: Melodie Street Background Study AxC Comparison 27
Table 5.11: Melodie Street Existing Pre-development AxC Comparison 28
Table 5.12: Trailsedge West AxC Comparison 28
Table 5.13: Offsite ICD Sizing 29
Table 5.14: Proposed Development – Peak Outflows 30
Table 5.15: Melodie Street Background Study AxC Comparison 33
Table 10.1: Recommended Pavement Structure 36

List of Figures

Figure 1: Site Location 4
Figure 3.1: Maximum Pressures During AVDY Conditions 9
Figure 3.2: Minimum Pressures During PKHR Conditions 10
Figure 3.3: Residual Pressures and Available Fire Flows during MXDY Conditions 11
Figure 5.1: Schematic Representing Model Object Roles 19

List of Appendices

Appendix A Water Servicing
A.1 Domestic Water Demands
A.2 Fire Flow Demands (2020 FUS)
A.3 Hydraulic Boundary Conditions
A.4 Hydraulic Analysis
A.5 Fire Hydrant Coverage
A.6 Background Report Excerpts
Appendix B Wastewater Servicing
B.1 Sanitary Sewer Design Sheet
B.2 Background Report Excerpts
Appendix C Stormwater Management
C.1 Storm Sewer Design Sheet
C.2 Sample PCSWMM Output Files
C.3 Background Report Excerpts

C.4 Manufacturer Specifications
C.5 Typical ICD Discharge Curve Calculations
C.6 Modified Rational Method Calculations for Existing ICD Upsizing
Appendix D External Report Excerpts
Appendix E City of Ottawa Correspondence
E.1 Phase 1 Pre-consultation Feedback Form
E.2 Permitted ROW Service Connections
E.3 Stormwater Criteria Confirmation
E.4 Sanitary Capacity Confirmation

1 Introduction

Richcraft Homes Ltd. has commissioned Stantec Consulting Ltd. to prepare this Servicing and Stormwater Management Report for their development site identified as Block 121. The block maintains a municipal address of 6273 Renaud Road within the Trails Edge West Subdivision in the City of Ottawa.

The subject site is zoned DR – Development Reserved and I1A – Institutional (now INZ under 2026 zoning by-law), and is bound by Mud Creek to the north, Melodie Street to the west, Renaud Road to the south, and Compass Street to the east. The site location is outlined in **Figure 1** below.

The proposed 1.33 ha residential development will consist of 7 back-to-back and terrace townhome blocks for a total of 80 townhouse units, associated private access roads, and an amenity area facing the creek. The objective of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the various background studies outlined in **Section 2**. Refer to **Appendix E.1** for the Phase 1 Pre-consultation Feedback form for the proposed development and **Appendix E.2** for correspondence with the City of Ottawa regarding the permitted right-of-way service connection locations.

Figure 1: Site Location



2 References

The following documents were referenced in the preparation of this report:

- *City of Ottawa Design Guidelines – Water Distribution*, Infrastructure Services Department, City of Ottawa, Second Edition, November 2025
- *City of Ottawa Sewer Design Guidelines*, 4th Ed., City of Ottawa, November 2025
- *Trails Edge West Design Brief*, Revision 3, David Schaeffer Engineering Ltd. (DSEL), January 2015
- *Geotechnical Investigation – Trailsedge West – Block 121,* Revision 3, Paterson Group, June 2025
- *Design Brief Minto Trailsedge Phase II*, IBI Group, May 2015
- *Stormwater Management Report for the Trails Edge West Subdivision*, JFSA, January 2015
- *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 For the Trails Edge Subdivision,* DSEL, March 2014
- *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan,* DSEL, June 2020

3 Water Servicing

3.1 Background

The site at Block 121 of the Trails Edge West Subdivision is within the 2E pressure zone of the City of Ottawa's water distribution network. The existing watermains along the boundaries of the site consist of the 305 mm diameter watermains within Renaud Road and Compass Street. The 305 mm mains are supplied by multiple connections to distribution mains within the adjacent phases of the Trails Edge West subdivision.

3.2 Design Criteria

3.2.1 Water Demand and Allowable Pressure

The domestic water demand and allowable water pressure are assessed using the City of Ottawa Water Distribution Guidelines (2025) as amended, and Table 3-3 of the MECP Water Design Guidelines.

Residential Apartment Population Rate	
Townhouse	2.7 persons / unit

Residential Apartment Demand	
Average Daily (AVDY)	280 L/cap/day
Maximum Daily (MXDY)	4.4 × AVDY
Peak Hour (PKHR)	6.7 × AVDY

Allowable Water Pressure	
MXDY Flow	345 kPa (50 psi) to 552 kPa (80 psi)
PKHR Flow Minimum	276 kPa (40 psi)
MXDY + Fire Flow	140 kPa (20 psi)
Maximum Allowable for Occupied Area	552 kPa (80 psi)

3.2.2 Fire Flow and Hydrant Capacity

Detailed fire flow requirements are assessed using the Fire Underwriters Survey (FUS) methodology (2020). Site specific criteria considered are noted in **Section 3.3.2**.

Fire hydrant capacity in relation to estimated fire flow requirements is assessed based on Table 18.5.4.3 of the National Fire Protection Agency (NFPA) Fire Code document. A hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678 L/min, and a hydrant 76 to less than 152 m away can supply a maximum capacity of 3,785 L/min.

3.3 Proposed Watermain Sizing and Layout

The proposed development will be serviced by a looped private watermain network fed by two connections to existing watermains: one to the 305 mm diameter watermain in Renaud Road, and a second to the existing 305 mm diameter watermain in Compass Street.

3.3.1 Water Demands

Based on the site layout, the proposed development is estimated to have a total population of 216 persons. The estimated demand for the proposed development is summarized in **Table 3.1** and detailed in **Appendix A.1**.

Table 3.1: Estimated Water Demands

Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
216	0.7	3.0	4.6

3.3.2 Fire Flow Demands

The fire flow requirements for the residential properties are determined using the 2020 Fire Underwriters Survey (FUS), in combination with Section 3.1.11.5 of the Ontario Building Code (OBC), which caps the building area of the residential blocks at 600 m^2 to suit Part 9 of the code. To accomplish the building area reduction for the purposes of the fire flow analysis, firewalls with a minimum two-hour fire-resistance rating that comply with OBC Div. B, Subsection 3.1.10, are constructed to separate the townhouses and meet the 600 m^2 cap in building area.

Based on the FUS calculations, Block 7 as a 12-unit back-to-back townhouse block and Block 3 as a 12-unit Terrace Flat have the worst-case fire flow demand of 233 L/s (14,000 L/min). Per the latest Site Plan, all 12-unit back-to back dwellings within the development will be built with 2-hr fire separation walls to separate the blocks into 4-unit and 8-unit clusters to comply with OBC Div. B, Subsection 3.1.10.

3.3.3 Boundary Conditions

Boundary conditions were provided for the site development by the City of Ottawa. These are attached in **Appendix A.3** and summarized in **Table 3.2**.

Table 3.2: Boundary Conditions

Scenario	Renaud Road	Compass Street
Minimum HGL (m)	127.3	127.3
Maximum HGL (m)	130.6	130.6
MXDY + FF (233 L/s) (m)	124.3	125.3

3.4 Hydraulic Assessment

A hydraulic model was built by Stantec using the boundary conditions for the connections on Renaud Road and Compass Street to assess the anticipated pressures to meet the minimum servicing requirements. A fire flow analysis was also performed under maximum day conditions.

3.4.1 Model Development

New watermains were added to the hydraulic model to simulate the proposed distribution system. Hazen-Williams coefficients ("C-Factors") were applied to the new watermain in accordance with the City of Ottawa's Water Distribution Design Guidelines (**Table 3.3**).

Table 3.3: C-Factors Applied Based on Watermain Diameter

Pipe Diameter (mm)	C-Factor
150	100
200 to 250	110
300 to 600	120
> 600	130

3.4.2 Hydraulic Modeling Results

PCSWMM by Computational Hydraulics Inc. (CHI) was used to conduct the watermain hydraulic analysis. The model was tested for AVDY, PKHR and MXDY+FF demands under the boundary conditions provided by the City of Ottawa.

3.4.2.1 Average Day & Peak Hour

The hydraulic model results show that the maximum pressures (AVDY condition) are anticipated to be approximately 423 to 427 kPa (60.6 to 61.2 psi), while minimum pressures during PKHR are anticipated to be approximately 390 to 394 kPa (56.6 to 57.2 psi). These pressures are well above the minimum allowable pressure of 276 kPa (40 psi).

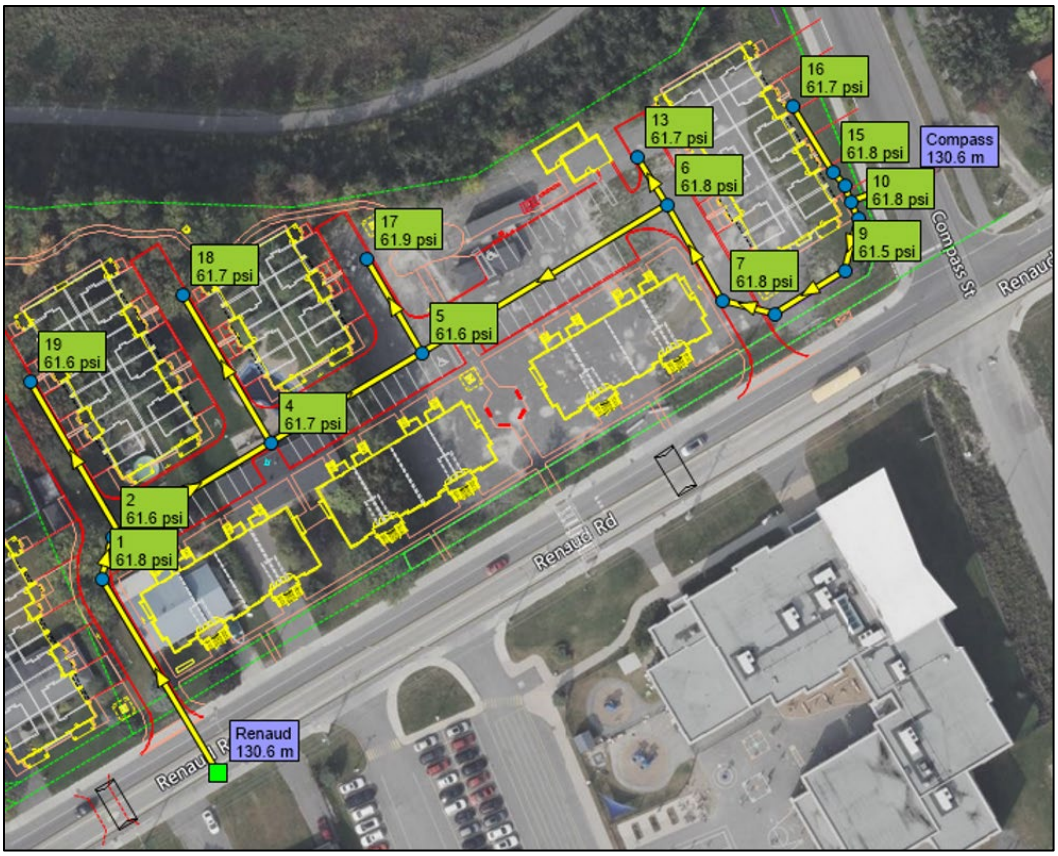


Figure 3.1: Maximum Pressures During AVDY Conditions

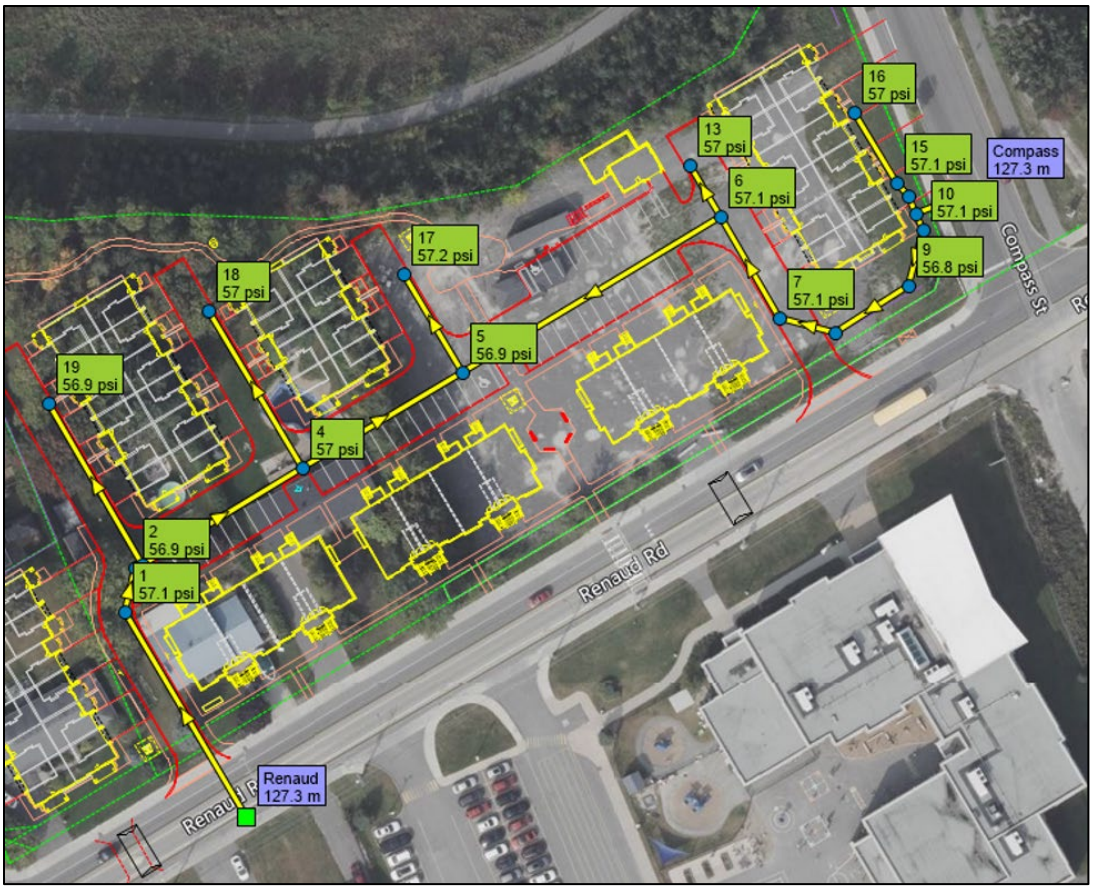


Figure 3.2: Minimum Pressures During PKHR Conditions

3.4.2.2 Maximum Day & Fire Flow

An analysis was carried out using the hydraulic model to determine if the development, under maximum day demands, can achieve a fire flow of 14,000 L/min (233 L/s) at watermain locations feeding proposed hydrants. This was accomplished using a steady-state maximum day demand scenario along with the automated fire flow simulation feature of the software.

Results of the modeling analysis indicate that adequate flows are available in the main under emergency fire demand conditions while still maintaining a residual pressure of 140 kPa (20 psi). The residual pressures and available flows for the fire flow analysis in the main and the static pressures in the dead-end mains are demonstrated in **Figure 3.3**. Results of the hydraulic modeling are included in **Appendix A.4**.

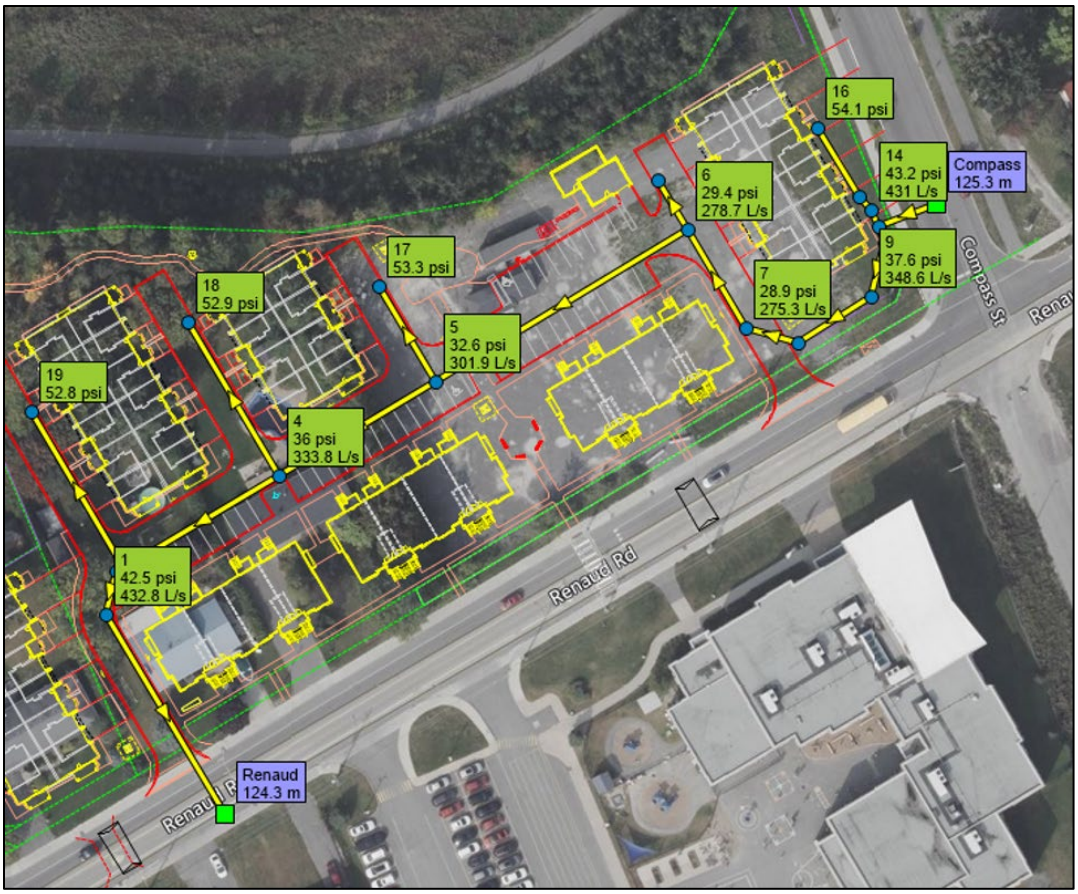


Figure 3.3: Residual Pressures and Available Fire Flows during MXDY Conditions

3.4.2.3 Fire Hydrant Coverage

There are two fire hydrants proposed to deliver fire flows within the site. Additionally, four existing hydrants within Renaud, Melodie, and Compass Street lie within proximity to the development. According to the NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02, a hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678 L/min.

The proposed fire hydrant layout provides for all on-site buildings to be within the 76 m coverage range from at least two on-site hydrants, with 1 to 2 other hydrants within 152 m. As such, the fire flow demands for each on-site townhome block are well served by the proposed layout. See **Appendix A.5** for fire hydrant coverage table calculations.

3.5 Summary of Findings

Based on the findings of the hydraulic analysis, the proposed network is capable of servicing the development area and will meet all servicing requirements as per the City of Ottawa standards under typical demand conditions (average day and peak hour conditions) as well as under emergency fire demand conditions (maximum day + fire flow).

Adequate fire hydrant coverage has been provided throughout the subdivision. Fire walls will be required for the back-to-back blocks that are over 600 m^2 in area to meet OBC requirements for buildings under Part 9. Three proposed fire hydrants have been situated to provide the required fire flow for the development.

4 Wastewater Servicing

4.1 Background

The existing sanitary sewers adjacent to the block comprise of the 200 mm diameter municipal sanitary sewers in Melodie Street and Renaud Road and the 750 mm diameter municipal sanitary sewer in Compass Street. An existing 200 mm service stub has been provided from the 750mm Compass Street sewer to facilitate site development. The sanitary service laterals servicing the three existing residential dwellings at the west boundary of the site are expected to be abandoned and removed prior to construction. In the 2015 IBI Design Brief for the Trailsedge West subdivision, the site area falls under Areas 413A and 206. The two areas are to contribute a total of 1.2 L/s of sanitary peak flow based on an assumed total population of 34 persons in Area 413A and institutional usage in Area 206 with a combined area of 1.15 ha. The sanitary drainage area plan from the Design Brief is attached in **Appendix B**.

4.2 Design Criteria

As outlined in the City's Sewer Design Guidelines, the following design parameters were used to calculate estimated wastewater flow rates and to size on-site sanitary sewers for the proposed development:

- Minimum Full Flow Velocity – 0.6 m/s
- Maximum Full Flow Velocity – 3.0 m/s
- Manning's roughness coefficient for all smooth walled pipes – 0.013
- Population Persons per unit – 2.7
- Extraneous Flow Allowance – 0.33 L/s/ha
- Residential Average Flows – 280 L/cap/day
- Manhole Spacing – 120 m
- Minimum Cover – 2.5 m

4.3 Proposed Servicing

As shown on **Drawing SA-1** and detailed in the sanitary sewer design sheet attached in **Appendix B**, the development will be serviced by a network of 200 mm diameter sanitary sewers discharging to the existing 200 mm diameter sanitary sewer within Renaud Road and the existing eastern 200 mm diameter sanitary stub which connects to the 750 mm diameter Compass Street trunk sewer. The units on the western side of Block 7 (area EXT-1) will be serviced from the existing 200 mm diameter sanitary sewer within Melodie Street.

Peak design flows from the site are summarized in

Table 4.1 below. Details of the peak flow calculations are included in the sanitary sewer design sheet attached in **Appendix B**.

Table 4.1: Wastewater Peak Flows

Outlet Location	Peak Flow (L/s)
Renaud Road (South)	0.9
Compass Street (East)	1.9
Total	**2.8**

The proposed development increases the overall peak flows to the downstream system from the 2015 IBI Design Brief by 1.6 L/s. As per correspondence with the City on August 11, 2026 (refer to **Appendix E)** there are no capacity concerns at the Forest Valley Pump Station or in the downstream trunk sanitary system related to the anticipated increased peak flows. The eastern connection to Compass Street discharges to the existing 750 mm diameter trunk sewer which has sufficient capacity as indicated by the City for the downstream trunk infrastructure. As per the sanitary sewer design sheet in the 2015 IBI Design Brief (refer to **Appendix B.2**), the high-level sanitary sewer within Renaud Road at MH413A has an available capacity of 27.29 L/s which is sufficient to support the proposed 1.0 L/s directed to the existing local sewer.

Full port backwater valves are to be installed on all sanitary services within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property. Final design of the valves and sizing of the service laterals are to be confirmed by the mechanical consultant and/or plumbing contractor at building permit.

5 Stormwater Management

5.1 Objectives

The goal of this servicing and stormwater management (SWM) plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed development to meet the design criteria established for the site, and to provide the details required for approval and construction.

5.2 Background

Stormwater generated on the site is subject to the requirements outlined in the *Design Brief Minto Trailsedge Phase II* (IBI Group, May 2015) and the *Stormwater Management Report for the Trails Edge West Subdivision* (JFSA, January 2015). The background reports outline that portions of stormwater from the proposed site are to be directed east to an existing 1500 mm dia. storm sewer within the Compass Street ROW, south to an existing 525mm dia. storm sewer within the Renaud Road ROW, and west to an existing 375mm dia. storm sewer and rear yard catch basin network within the Melodie Street ROW. Minor system contributions are to be restricted to 175 L/s to the Compass Street storm sewer and 110 L/s to the Renaud Road storm sewer. The stormwater contributions assumed to be directed to the Melodie Street storm sewer in the background studies will be matched. Runoff in excess of the minor system capture rate is to be directed overland through the downstream street segments ultimately discharging to either Mud Creek directly or via the downstream EUC Pond 1. Existing Renaud Road sewers adjacent to the westerly half of the development (Area 410F, *Design Brief Minto Trailsedge Phase II,* IBI Group) ultimately discharge to the downstream EUC Pond 3. Quality control is to be provided through the downstream SWM facilities. Drainage area plans and excerpts from background reports are included in **Appendix C.3**. Additional SWM criteria outlined in the background reports are listed in the subsequent sections.

Under existing conditions, the site contains several residential buildings, construction trailers, asphalt driveways, and gravel parking areas. The majority of the drainage from the site currently sheet flows overland to adjacent ROWs and Mud Creek to the north.

5.3 Design Criteria and Constraints

The following summarizes the SWM criteria and constraints that will govern the detailed design of the proposed site as per the latest revision of the City of Ottawa Sewer Design Guidelines, background studies, and correspondence with the City of Ottawa (refer to **Appendix E.3)**.

General

- Application of the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1967 to 1997, as described in the City of Ottawa's Sewer Design Guidelines.
- Minimum time of concentration values applied for each subcatchment cannot be less than 10 minutes (City of Ottawa).
- Create a PCSWMM model that generates major and minor system hydrographs and assesses the minor system hydraulic grade line and the major system flow depths under worst-case conditions using the dual drainage principle. (City of Ottawa SDG)
- Quality control has been provided for the site via the existing downstream SWM facilities.

Storm Sewer & Inlet Controls

- Minor system capture rate from the proposed site up to the 100-year storm to the Compass Street storm sewer (Area 21, ultimately discharging to EUC Pond 1) is to be restricted to **175 L/s**. (*Design Brief Minto Trailsedge Phase II,* IBI Group)
- Minor system capture rate from the proposed site up to the 100-year storm to the Renaud Road storm sewer (Area 410F, ultimately discharging to EUC Pond 3) is to be restricted to **110 L/s**. (*Design Brief Minto Trailsedge Phase II,* IBI Group)
- Discharge from the proposed site to the Melodie Street ROW is to be restricted to the previously assumed contributions for the area as per the background studies (reference from *Design Brief Minto Trailsedge Phase II, IBI Group*)
- Size storm sewers to convey the 2-year storm event under free-flow conditions using 2025 City of Ottawa IDF parameters. (City of Ottawa).
- Ensure that the resulting 100-year hydraulic grade line does not encroach within 0.30 m of the proposed underside of footings (USF) for the proposed units where there is footing drainage connected to the storm collection system (City of Ottawa).
- Ensure that the resulting 'climate change' hydraulic grade line does not encroach on the proposed underside of footings (USF) for the proposed units where there is footing drainage connected to the storm collection system (City of Ottawa).

Surface Storage & Overland Flow

- Runoff in excess of the minor system capture rate is to be directed overland over the downstream street segments ultimately discharging to either Mud Creek directly, or via EUC Pond 1 (*Design Brief Minto Trailsedge Phase II*, IBI Group)
- No surface ponding is permitted within the site during the 2-year storm event (City of Ottawa).
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35 m for design storm events (i.e., up to 100-year storm) (City of Ottawa).
- Minimum clearance depth of 0.30 m to be provided from spill elevations to building envelopes in proximity of overland flow routes or ponding areas on private sites (City of Ottawa).
- Dynamic flow must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100-year storm + 20%) (City of Ottawa).

- Provide adequate emergency overflow conveyance off-site (City of Ottawa).

5.4 Post-Development Modeling

5.4.1 Design Methodology

The design methodology for the SWM component of the development is as follows:

- Create a PCSWMM model that generates major and minor system hydrographs and assesses the minor system hydraulic grade line and the major system flow depths.
- Size inlet control devices for the proposed catch basins to avoid surface ponding during the 2-year storm while meeting the required 0.3 m 100-year HGL to USF clearance and the allowable minor system allowable release rate in the 100-year storm as described in the background reports.
- Ensure that total dynamic and static surface ponding depths do not exceed 0.35 m during the 100-year storm scenario.
- Confirm that climate change storm simulation does not result in flooding of properties.

The site is designed using the “dual drainage” principle, whereby the minor (pipe) system is designed to convey the peak rate of runoff from the 2-year design storm and runoff from larger events is conveyed by both minor (pipe) and major (overland) channels, such as roadways and walkways, safely to the appropriate outlet without impacting proposed or existing downstream properties.

Drawing SD-1 outlines the proposed storm sewer alignment, drainage divides, and labels. The storm sewer design sheet is included in **Appendix C.1**.

5.4.2 Modeling Rationale

A comprehensive hydrologic modeling exercise was completed with PCSWMM, accounting for the estimated major and minor systems to evaluate the storm sewer infrastructure. The use of PCSWMM for modeling of the site hydrology and hydraulics allowed for an analysis of the systems’ response during various storm events. The following assumptions were applied to the detailed model:

- Hydrologic parameters as per Ottawa Sewer Design Guidelines, including Horton infiltration, Manning’s ‘n,’ and depression storage values.
- 3-hour Chicago Storm distribution for the 2-year to determine inlet capture rates for the different catchments.
- Minor and major system response assessed for the 100-year using the 3-hour Chicago Storm Distribution with fixed water levels in the receiving sewers.
- To ‘stress test’ the system a ‘climate change’ scenario was created by adding 20% of the individual intensity values of the 100-year storm at their specified time step.

- Percent imperviousness calculated based on actual soft and hard surfaces for representative catchments and converted to equivalent runoff coefficient using the relationship C = (Imp. x 0.7) + 0.2.
- Subcatchment areas are defined from high-point to high-point where sags occur.
- Width parameter was taken as twice the length of the street/swale segment for two-sided catchments and as the length of the street/swale segment for one-sided catchments. Irregular shaped catchments were calculated by measuring the flow length on the drawing and the width parameter was calculated respectively or alternatively set at 225 x subcatchment area per recommendations of the OSDG.
- Catch basin inflow restricted with inlet-control devices (ICDs) as per City guidelines.
- Surface ponding in sag storage calculated based on grading plans (**Drawing GP-1**).
- Inlet control devices (ICDs) to have a minimum orifice diameter of 83 mm.

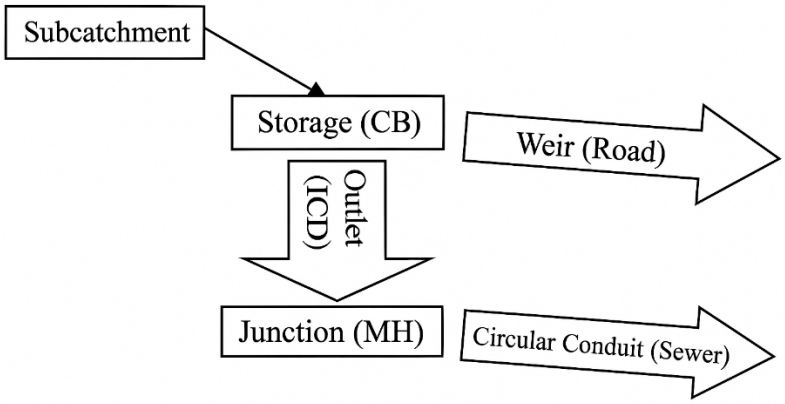
In keeping with the 2-year inlet restriction criterion, inlet control devices (ICDs) or orifice plates are specified for all catch basins to limit the inflow to the minor system. Restricted inlet rates to the sewer are necessary to prevent the hydraulic grade line from surcharging storm sewers into basements during major storms. **Drawing SD-1** outlines the proposed storm sewer alignment and drainage divides.

5.4.3 SWMM Dual Drainage Methodology

The proposed development is modeled in one modeling program as a dual conduit system (see

Figure 5.1), with: 1) circular conduits representing the sewers & storage nodes representing manholes; 2) weirs have been added at the spill grade elevation of each catch basin to direct major system overflows to the next downstream catch basin, while storage nodes have been used to represent catch basins. The dual drainage systems are connected via orifice link objects from storage node (i.e., CB) to storage node (i.e., MH) and represent inlet control devices (ICDs). Subcatchments are linked to the storage node (CB) on the surface so that generated hydrographs are directed there firstly.

Figure 5.1: Schematic Representing Model Object Roles



For storage nodes representing low point catch basins (CB's), the invert of the storage node represents the invert of the catch basin, and the rim of the storage node represents the maximum allowable flow depth elevation above the storage node. Additional depth has been added to rim elevations to allow for dynamic routing from one surface storage to the next. Sag storage within irregular parking areas has been represented with a stage-area curve in the storage node as per **Drawing GP-1**. If the available storage volume in a storage node is exceeded, flows spill above the storage node and through a wide weir (representing the spill grade elevation) that directs overflows towards the downstream catch basin and continue routing through the system until ultimately flows either re-enter the minor system or reach the outfall of the major system. Weirs representing high points are assigned an invert elevation equal to the spill elevation at the edge of pavement and a rim elevation equal to the maximum allowable flow depth elevation above the storage node. In this manner, storage will accumulate according to the actual ponding depths before spilling along the overflow weir, and to the next downstream catch basin.

Inlet control devices, as represented by orifice links, use a user-specified diameter and a discharge coefficient of 0.572. Typical manufacturer discharge curves have been provided in **Appendix C.5** along with orifice calculations to demonstrate the applicable discharge coefficients and exponents. A minimum orifice diameter of 83 mm has been specified as per City of Ottawa specifications.

LMF inlet control devices, as represented by outlet links, use a discharge coefficient and exponent as per manufacturers specifications (refer to **Appendix C.4**).

5.4.4 Boundary Conditions

Static hydraulic grade lines (HGLs) were obtained from the *Design Brief Minto Trailsedge Phase II* (IBI Group, May 2015) to use as boundary conditions at the existing storm maintenance holes STM 404 and STM 406 on Compass Street. HGL information for the existing storm sewers on Renaud Road between STM 410C and the intersection with Glenlivet Avenue was not available at the time of writing, and so was assumed to be at the obvert of the pipe. The HGL at the proposed site connections has been interpolated

based on these assumptions. The following table summarizes the high-water levels (HWL) used as boundary conditions for the different storm events.

Table 5.1: Stormwater Boundary Conditions

Storm Event	STM 404 HGL (m)	Interpolated Site HGL	STM 406 HGL (m)
5-year, 3hr Chicago	83.66	83.61	83.58
100-year, 3hr Chicago	84.27	84.15	84.09
100-year, 3hr Chicago+20%	84.79	84.45	84.28

The detailed PCSWMM hydrology, and the proposed storm sewers within the proposed development were used to assess the peak inflows and hydraulic grade line (HGL) in the proposed development.

5.4.5 Hydrologic Parameters

Drawing SD-1 summarizes the discretized subcatchments used in the analysis of the proposed development and outlines the major overland flow paths.

Key parameters for the subject area are summarized below, while an example input file is provided for the 100-year, 3hr Chicago storm which indicates all other parameters (see **Appendix C.2**). For all other input files and results from storm scenarios, please examine the electronic modeling files included in the digital submission. **Table 5.2** presents the general subcatchment parameters used:

Table 5.2: General Subcatchment Parameters

Subcatchment Parameter	Value
Infiltration Method	Horton
Max. Infil. Rate (mm/hr)	76.2
Min. Infil. Rate (mm/hr)	13.2
Decay Constant (1/hr)	4.14
N Imperv	0.013
N Perv	0.25
Dstore Imperv (mm)	1.57
Dstore Perv (mm)	4.67
Zero Imperv (%)	0

Table 5.3 presents the individual parameters that vary for each of the proposed subcatchments.

Table 5.3: Proposed Subcatchment Parameters

Area ID	Area (ha)	Width (m)	Slope (%)	Imperviousness (%)	Runoff Coefficient

410A-1	0.09	76.0	3.0	67.14	0.67
410C-1	0.06	46.0	3.0	62.86	0.64
L101A	0.08	28.0	6.0	88.57	0.82
L102A	0.05	22.0	3.0	61.43	0.63
L103A	0.14	50.0	2.0	74.29	0.72
L104A	0.08	27.0	5.0	77.14	0.74
L105A	0.10	44.0	4.0	85.71	0.80
L106A	0.11	66.0	5.0	94.29	0.86
L201A	0.10	36.0	3.0	82.86	0.78
L203A	0.09	36.0	5.0	87.14	0.81
L204A	0.09	32.0	3.0	80.00	0.76
MEL-1	0.06	41.0	6.0	81.43	0.77
NORTH-1	0.09	68.0	3.0	14.29	0.30
NORTH-2	0.06	91.0	7.0	7.14	0.25
S404-1	0.08	71.0	6.0	62.86	0.64
WEST-1	0.02	91.0	30.0	0.00	0.20

Please note that runoff from areas several areas at the boundaries of the site (S404-1, MEL-1, NORTH-1, NORTH-2, 410C-1, 410A-1, WEST-1) cannot be captured into the minor system due to grading constraints and have been modeled to sheet flow uncontrolled towards the adjacent ROWs and Mud Creek. **Table 5.4** summarizes the storage node parameters used in the model.

Table 5.4: Storage Node Parameters

Storage Node	Invert Elev. (m)	Rim Elev.* (m)	Depth (m)
C101A-1	85.62	87.25	1.63
C102A-1	85.67	87.30	1.63
C103A-1	85.72	87.35	1.63
C104A-1	85.62	87.23	1.61
C105A-1	85.62	87.35	1.73
C106A-1	85.65	87.28	1.63
C201A-1	85.69	87.32	1.63
C203A-1	85.69	87.32	1.63
C204A-1	85.65	87.28	1.63
* Rim elevations shown above are above the proposed grade elevation to account for dynamic flow routing			

The proposed site will be developed with a mixture of amenity areas, back-to-back and terrace townhouse blocks, and associated access roads and parking areas. Runoff coefficients have been calculated for the proposed subcatchments based on actual hard and soft surface areas shown on the architectural site plan.

Runoff Coefficient values of 0.90 were used for hard areas, 0.70 for granular areas, and 0.20 for soft areas. **Table 5.5** summarizes the runoff coefficient calculations.

Table 5.5: Runoff Coefficient Calculations

Area ID	Total Area (m^2)	Hard Area (m^2)	Granular Area (m^2)	Soft Area (m^2)	Runoff Coefficient (C)
410A*	2096	-	-	-	0.80
410A-1	886	598	0	288	0.67
410B*	901	-	-	-	0.80
410C*	1075	-	-	-	0.80
410C-1	574	364	0	210	0.64
410D*	772	-	-	-	0.80
410E*	914	-	-	-	0.80
L101A	777	687	0	90	0.82
L102A	476	292	0	184	0.63
L103A	1444	1083	0	361	0.72
L104A	796	580	32	216	0.74
L105A	1019	867	0	152	0.80
L106A	1078	1014	0	64	0.86
L201A	1021	843	0	178	0.78
L203A	876	758	0	118	0.81
L204A	866	693	0	173	0.76
MEL-1	599	492	0	107	0.77
NORTH-1	917	0	130	917	0.30
NORTH-2	616	43	0	573	0.25
S404*	1620	-	-	-	0.69
S404-1	849	529	0	320	0.64
WEST-1	173	0	0	173	0.20

*Runoff coefficients for the existing Compass Street and Renaud Road drainage areas assumed as per the *Design Brief Minto Trailsedge Phase II*, IBI Group, May 2015

5.4.6 Hydraulic Parameters

As per the OSDG 2025, Manning's roughness values of 0.013 were used for sewer modeling and overland flow corridors representing roadways.

Storm sewers were modeled to confirm conveyance capacities and assess hydraulic grade lines (HGLs). The detailed storm sewer design sheet is included in **Appendix C.1**.

The table below presents the parameters for the orifice link objects within the proposed development which represent ICDs. A coefficient of 0.572 was applied when using circular orifices and specific head/discharge curve parameters were applied to correspond to manufacturer specified discharge curve when using LMF orifices. Refer to **Appendix C.4** for IPEX Tempest manufacturer specifications.

Table 5.6: Orifice Parameters for Proposed Catchments

Orifice Name	CB ID	Tributary Area ID	Minor System Node	ICD Type	Inlet Elev. (m)	Discharge Coeff.
C101A-1IC	C101A-1	C101A	101	CIRCULAR (83mm ORIFICE)	85.62	0.572
C103A-1IC	C103A-1	C103A	103	CIRCULAR (102mm ORIFICE)	85.72	0.572
C104A-1IC	C104A-1	C104A	104	CIRCULAR (83mm ORIFICE)	85.62	0.572
C105A-1IC	C105A-1	C105A	105	CIRCULAR (94mm ORIFICE)	85.62	0.572
C106A-1IC	C106A-1	C106A	106	CIRCULAR (102mm ORIFICE)	85.65	0.572
C201A-1IC	C201A-1	C201A	201	CIRCULAR (94mm ORIFICE)	85.69	0.572
C203A-1IC	C203A-1	C203A	203	CIRCULAR (83mm ORIFICE)	85.69	0.572
C204A-1IC	C204A-1	C204A	204	CIRCULAR (83mm ORIFICE)	85.65	0.572
C102A-1IC	C102A-1	C102A	102	IPEX TEMPEST LMF80	85.67	*

*Denotes specific head/discharge curve to correspond to manufacturer specified discharge.

5.5 Model Results and Discussion

The following sections summarize the key hydrologic and hydraulic model results for the proposed development. For detailed model results or inputs please refer to the example output file in **Appendix C.2** and the electronic model files included in the digital submission.

5.5.1 Proposed ICD Schedule

The site requires quantity control measures to meet the restrictive stormwater release criteria. The use of surface and subsurface storage is proposed to reduce site peak outflows to the allowable target release rate. It is proposed to detain stormwater on the surface in parking lot areas using inlet control devices (ICDs) in associated catch basins. ICD's have been sized to ensure meet target release rates for the site set out in the background studies.

Table 5.7 summarizes the orifice link maximum flow rates and heads across the proposed development. Flows for the 2-year event calculated via the rational method have been provided for comparison. The maximum deviation from modeled flows of 1.5 L/s in an individual subcatchment and 3% from the site wide release rate is considered to be within allowable tolerances.

Table 5.7: Proposed Orifice and Outlet Link Results

Orifice Name	Tributary Area ID	ICD Type	2yr Head (m)	2yr Flow (L/s)	Rational Method 2yr Flow (L/s)	5yr Head (m)	5yr Flow (L/s)	100yr Head (m)	100yr Flow (L/s)
C101A-1IC	C101A	CIRCULAR (83mm ORIFICE)	1.14	14.38	14.0	1.48	16.43	1.59	17.05
C103A-1IC	C103A	CIRCULAR (102mm ORIFICE)	1.26	22.77	21.5	1.49	24.81	1.57	25.52
C104A-1IC	C104A	CIRCULAR (83mm ORIFICE)	0.90	12.72	12.3	1.44	16.22	1.57	16.95
C105A-1IC	C105A	CIRCULAR (94mm ORIFICE)	1.15	18.49	17.1	1.47	21.01	1.60	21.90
C106A-1IC	C106A	CIRCULAR (102mm ORIFICE)	1.14	21.65	20.2	1.47	24.69	1.57	25.51
C201A-1IC	C201A	CIRCULAR (94mm ORIFICE)	1.08	17.87	17.3	1.47	20.97	1.56	21.64
C203A-1IC	C203A	CIRCULAR (83mm ORIFICE)	1.38	15.85	15.1	1.48	16.43	1.56	16.88
C204A-1IC	C204A	CIRCULAR (83mm ORIFICE)	1.15	14.44	14.6	1.46	16.33	1.59	17.04
C102A-1IC	C102A	IPEX TEMPEST LMF80	0.93	5.51	6.7	1.46	6.91	1.55	7.12

5.5.2 Hydraulic Grade Line Analysis

The hydraulic grade line (HGL) elevation across the proposed development was estimated using the HGLs from the *Design Brief Minto Trailsedge Phase II* (IBI Group, May 2015) at the existing storm maintenance holes STM 404 and STM 406 on Compass Street. HGL information for the existing storm sewers on Renaud Road between STM 410C and the intersection with Glenlivet Avenue was not available at the time of writing this report so the HGL was assumed to be at the obvert of the pipe. The 'climate change' scenario required by the City of Ottawa Sewer Design Guidelines (2025), where 100-year intensities are increased by 20% was also assessed.

Table 5.8 below presents the clearance between the proposed storm sewer HGL and the proposed under side of footings (USFs).

Table 5.8: Proposed Development Hydraulic Grade Line Results

Manhole ID	USF Elevation	Worst Case 100-year HGL (m)	Prop. USF – HGL Clearance	100-Year 3-hour Chicago +20%	Prop. USF – HGL Clearance
100	N/A	84.23	-	84.53	-
100A	N/A	84.18	-	84.48	-
101	85.15	84.35	0.80	84.59	0.56
102	85.15	84.35	0.80	84.59	0.56
103	85.49	84.57	0.92	84.80	0.69
104	85.20	84.58	0.62	84.81	0.39
105	85.51	84.65	0.86	84.88	0.63
106	85.20	84.76	0.44	84.91	0.29
201	85.33	84.55	0.78	84.55	0.78
202	85.33	84.58	0.75	84.58	0.75

203	85.30	84.74	0.56	84.74	0.56
204	85.46	84.69	0.77	84.69	0.77
409	N/A	84.16	-	84.47	-

Storm services with gravity connections are provided from each building for the foundation drains complete with full port backwater valves.

5.5.3 Overland Flow

Drawings SD-1 and GP-1 show the proposed emergency overland flow route from the site.

Table 5.9 presents the total surface water depths (static ponding depth + dynamic flow) above the top-of-grate of the proposed street catch basins for the 2-year storm, 5-year storm, 100-year 3-hr Chicago storm, and the 'climate change' storm. Based on the model results, there is no surface ponding within the site during the 2-year storm event, and the total ponding depth (static + dynamic) does not exceed 0.35 m during the 100-year event or encroach on the lowest building opening during the 'climate change' event.

Table 5.9: Proposed Development – Maximum Static and Dynamic Surface Water Depths

Drainage Area ID	Storage node ID	Top of Grate Elevation (m)	Lowest Adjacent Building Opening (m)	Max. 2 yr HGL (m)	Total Surface Ponding Depth (m)	Max. 5 yr HGL (m)	Total Surface Ponding Depth (m)	Max. 100 yr HGL (m)	Total Surface Ponding Depth (m)	Max. 100 yr + 20% HGL (m)	Total Surface Ponding Depth (m)
L101A	C101A-1	87.00	87.50	86.76	0.00	87.13	0.13	87.21	0.21	87.22	0.22
L102A	C102A-1	87.05	87.50	86.60	0.00	87.21	0.16	87.22	0.17	87.23	0.18
L103A	C103A-1	87.10	87.55	86.98	0.00	87.06	0.00	87.29	0.19	87.30	0.20
L104A	C104A-1	87.00	87.45	86.52	0.00	87.09	0.09	87.19	0.19	87.22	0.22
L105A	C105A-1	87.00	87.57	86.77	0.00	87.12	0.12	87.22	0.22	87.25	0.25
L106A	C106A-1	87.03	87.50	86.79	0.00	87.16	0.13	87.22	0.19	87.25	0.22
L201A	C201A-1	87.07	87.58	86.77	0.00	87.17	0.10	87.25	0.18	87.27	0.20
L203A	C203A-1	87.07	87.55	87.07	0.00	87.11	0.04	87.25	0.18	87.27	0.20
L204A	C204A-1	87.03	87.52	86.80	0.00	0.00	0.00	87.24	0.21	87.26	0.23

5.5.4 Uncontrolled Areas

Due to grading constraints, seven subcatchments cannot drain to the site's storm sewer system and will instead sheet-flow uncontrolled to surrounding areas.

- Area S404-1 consists of proposed building frontage and driveways and drains to the Compass Street ROW. The flows up to the 5-year event will be captured by the existing street catch basins while flows from the major events will spill overland to Mud Creek based on existing roadway grading.

- Areas MEL-1 and WEST-1 consist of proposed building frontage, driveways, and landscaped transitional grading and drain to the Melodie Street ROW via surface drainage and rear yard infrastructure.
- Areas NORTH-1 and NORTH-2 consist of mostly landscaped areas, existing trees, and a proposed walkway. The areas sheet flow overland to the north into Mud Creek.
- Area 410C-1 consists of proposed building frontage and driveways and drains to the Renaud Road ROW. The flows up to the 5-year event will be captured by the existing street catch basins directed to the western Renaud Road storm sewers while flows from the major events will spill overland per existing roadway drainage paths.
- Area 410A-1 consists of proposed building frontage and driveways and drains to the Renaud Road ROW. The flows up to the 5-year event will be captured by the existing street catch basins directed to the eastern Renaud Road storm sewers while flows from the major events will spill overland ultimately discharging to Mud Creek.

The background studies have assumed that major system discharge from the development would be directed to Mud Creek. No adverse impacts are anticipated for the proposed uncontrolled drainage directed to Mud Creek (NORTH-1 and NORTH-2) in conjunction with major system flows from the 100-year storm event.

A comparison between the post-development uncontrolled flows and those assumed in the background studies for areas draining to the Melodie Street ROW (MEL-1, WEST-1) was undertaken to confirm that there would be no adverse impact on downstream stormwater infrastructure.

5.5.4.1 Melodie Street Runoff Comparison

An AxC comparison was employed to assess the rate of runoff generated from the assumed site areas (A045NE, A043SE, and A034R4) in the *Stormwater Management Report for the Trails Edge West Subdivision* (JFSA, January 2015) and from uncontrolled subcatchments discharging to the Melodie Street ROW (MEL-1 and WEST-1) under post development conditions. **Drawings SD-1** and **BSD-1** outline the proposed and previously assumed drainage divides respectively.

Table 5.10 summarizes the AxC comparison from the development, with direct correlation to anticipated runoff. An overall reduction in peak flows directed to the Melodie Street ROW under post-development conditions is expected based on lower anticipated AxC than assumed in the background studies so no negative impacts on the downstream system are anticipated.

Table 5.10: Melodie Street Background Study AxC Comparison

Study	Drainage Area ID	Area (ha)	Runoff Coefficient (C)	AxC
JFSA 2015	A045NE	0.05	0.76	0.04
	A043SE	0.02	0.65	0.01

	A034R4	0.07	0.42	0.03
	Total	**0.14**	**0.57**	**0.08**
Stantec 2026	MEL-1	0.06	0.77	0.05
	WEST-1	0.02	0.20	0.00
	Total	**0.08**	**0.63**	**0.05**

An AxC comparison was also employed to assess the existing pre-development rate of runoff generated to the Melodie Street rear yards and from the uncontrolled subcatchment WEST-1 under post development conditions. **Drawings SD-1** and **ESD-1** outline the proposed and existing pre-development drainage divides respectively.

Table 5.11 summarizes the AxC comparison from the development, with direct correlation to anticipated runoff. An overall reduction in peak flows directed to the existing Melodie Street rear yards under post-development conditions is expected so no negative impacts on the existing rear yard infrastructure are anticipated.

Table 5.11: Melodie Street Existing Pre-development AxC Comparison

	Drainage Area ID	**Area (ha)**	**Runoff Coefficient (C)**	**AxC**
Existing Pre-development conditions	WEST-1	0.36	0.32	0.115
Proposed Development	WEST-1	0.02	0.20	0.004
	Difference	**-0.34**	**-**	**-0.111**

5.5.4.2 Impacts to the Trailsedge West Subdivision

The Trailsedge West subdivision model (*Design Brief Minto Trailsedge Phase II*, IBI Group, May 2015) has been reviewed to determine impacts to the downstream infrastructure from overland discharges from uncontrolled areas from the proposed development. **Table 5.12** summarizes the AxC comparison from the development, with direct correlation to anticipated runoff. No increase in peak flows is expected within existing drainage areas 410B, 410D, and 410E so no negative impacts on the existing infrastructure are anticipated.

Table 5.12: Trailsedge West AxC Comparison

Name	**Existing Area (ha)**	**Existing Runoff Coefficient (C)**	**Existing AxC**	**Propoesd Area (ha)**	**Proposed Runoff Coefficient (C)**	**Proposed AxC**	**Difference**
S404, S404-1	0.16	0.69	0.11	0.24	0.67	0.16	-0.05
410A, 410A-1	0.21	0.80	0.17	0.30	0.76	0.23	-0.06
410B	0.09	0.80	0.07	0.09	0.80	0.07	0.00

410C, 410C-1	0.11	0.80	0.09	0.17	0.74	0.13	-0.04
410D	0.08	0.80	0.06	0.08	0.80	0.06	0.00
410E	0.09	0.80	0.07	0.09	0.80	0.07	0.00

Peak flows to existing drainage areas S404, S410A, and S410C are expected to increase due to the additional uncontrolled drainage proposed to be directed to the ROW's from drainage areas S404-1, 410A-1 and S410C-1. ICD's within the adjacent Compass Street and Renaud Road ROW's have been sized to ensure full capture of the 5-year event runoff, with runoff above the 5-year return period progressing overland to a surface outfall immediately north of the development directly to Mud Creek. As the development is proposed to direct additional surface outflow to these controlled catch basins, existing ICDs within areas S404, 410A and S410C are to be upsized to capture uncontrolled runoff from the 5-year storm event from these additional areas. Rational method calculations to size the ICD's have been provided in **Appendix C.6** with the results summarized in **Table 5.13** below.

Table 5.13: Offsite ICD Sizing

Tributary Area ID	CB Name	ICD Type	5yr Head (m)	5yr Flow (L/s)
S404, S404-1	CB S404-1	CIRCULAR (127mm ORIFICE)	1.70	34.82
410A, 410A-1	CB 410A-1	CIRCULAR (127mm ORIFICE)	1.70	40.64
410C, 410C-1	CB 410C-1	CIRCULAR (94mm ORIFICE)	1.70	22.71

The remainder of runoff can be conveyed to Mud Creek via the existing surface outfall. Street segments adjacent to S404-1, 410A-1 and S410C-1 convey minimal roadway discharge per the approved DDSWMM models for Trailsedge West, and so should have ample capacity for conveyance of the minor increase in major system runoff during the 100-year storm event.

As per Section 4.5 of the *Design Brief Minto Trailsedge Phase II*, IBI Group, May 2015, the Compass Street Mud Creek overflow has a maximum capacity of 0.70 cms. It is noted that in the 100-year event only 0.10 cms is conveyed through this channel so it is anticipated that ample additional capacity is available for the minor increase in flow from the proposed uncontrolled areas and the channel will not be negatively impacted.

5.5.5 Overall Release Rates

The allowable minor system release rates from the proposed development to the existing storm sewers on Compass Street and Renaud Road as obtained from the *Design Brief Minto Trailsedge Phase II* (IBI Group, May 2015) are 175 L/s and 110 L/s respectively. The uncontrolled areas discharging offsite towards Mud Creek (NORTH-1 and NORTH-2) have not been considered when comparing the proposed release rate to the allowable release rate since these areas are not directed to the storm sewer systems in the ROW's and major system discharge has been accounted for separately in the relevant background studies. The uncontrolled areas discharging offsite to Compass Street and Renaud Road (S404-1, 410A-



1, 410C-1) have been assumed to be captured within the existing street catch basins and directed to the minor system up to the 5-year event. The major events beyond the 5-year storm are assumed to discharge overland and ultimately outlet to Mud Creek. As the approved model for Trailsedge West Phase II assumed major system runoff from the entirety of the development to be directed to Mud Creek without any flow storage, proposed major system runoff to Mud Creek is expected to be well below that originally anticipated by background reports.

Table 5.14 summarizes the overall site allowable release rates and the proposed development discharges.

Table 5.14: Proposed Development – Peak Outflows

Location	Contributing Drainage Area ID's	Discharge Location	System	Storm Event			
				2-Year 3hr Chicago (L/s)	5-Year 3hr Chicago (L/s)	100-Year 3hr Chicago (L/s)	100-Year, 3hr Chicago +20% (L/s)
409A	L101A, L102A, L103A, L104A, L105A, L106A	Compass Street	Minor	94.4	109.7	113.7	113.9
COMPASS	S404-1	Compass Street	Major	11.8	22.6	22.6*	22.6*
RENAUD-E	410A-1	Renaud Road (east)	Major	13.0	23.7	23.7*	23.7*
Total Discharge to Compass Street				**119.2**	**156.0**	**160.0**	**160.2**
Compass Street Minor System Target				**175.0**			**N/A**
***Minor system inflow restricted to 5-year flow rate through ICD on street CB.**							
200	L201A, L203A, L204A	Renaud Road (west)	Minor	47.8	53.7	55.5	55.9
RENAUD-W	410C-1	Renaud Road (west)	Major	7.9	15.0	15.0*	15.0*
Total Discharge to Renaud Road				**55.7**	**68.7**	**70.5**	**70.9**
Renaud Road Minor System Target				**110.0**			**N/A**
***Minor system inflow restricted to 5-year flow rate through ICD on street CB.**							
MELODIE	MEL-1, WEST-1	Melodie Street	Major	11.5	21.0	37.1	44.8
Melodie Street Minor System Target				**Refer to Section 5.5.4.1**			
CREEK	NORTH-1, NORTH-2	Mud Creek	Major	4.6	29.6	66.6	83.1

OF1	L104A, L105A, L106A, L201A, L203A, L204A	Mud Creek	Major	0.0	0.0	73.9	124.7
OF2	L101A, L102A, L103A	Mud Creek	Major	0.0	0.0	70.2	101.0
Total Uncontrolled to Mud Creek				**4.6**	**29.6**	**210.7**	**308.8**

Allowable release rates and boundary conditions as per "Design Brief Minto Trailsedge Phase II", Project 31855-5.2.2, prepared by IBI Group, dated May 2015 and "Stormwater Management Report for the Trails Edge West Subdivision", JFSA, January 2015.

As can be seen in the above table, the allowable release rates for both the major and minor systems have been met.

5.6 Quality Control Requirements

Quality control requirements established for the Trailsedge West Subdivision have been satisfied through the overall subdivision design in downstream SWM facilities (refer to revised SWM criteria confirmations through correspondence with the City of Ottawa in **Appendix E.3**). As a result, no further quality control requirements were placed on the proposed site.

An AxC comparison was employed to assess the rate of runoff generated from the assumed site areas (21 and 410F) in the *Design Brief Minto Trailsedge Phase II* (IBI Group, May 2015) and from proposed subcatchments ultimately discharging to Pond 1 (S404-1, L101A, L102A, L103A, L104A, L105A, L106A, and 410A-1) and Pond 3 (L201A, L203A, L204A, and 410C-1) under post development conditions to determine if adequate capacity had been accounted for in the downstream stormwater facilities. **Drawings SD-1** and **BSD-1** outline the proposed and previously assumed drainage divides respectively.

Table 5.15 summarizes the AxC comparison from the development, with direct correlation to anticipated runoff. An overall reduction in peak flows directed to Pond 3 under post-development conditions is expected based on lower anticipated AxC than assumed in the background studies, so adequate quality control capacity to support the proposed development is anticipated to be available in the stormwater facilities.

A minor increase in peak flows directed to Pond 1 under post-development conditions is expected based on higher anticipated AxC than assumed in the background studies. However, as per Section 6.2 of the *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 For the Trails Edge Subdivision* (DSEL, March 2014), 19,259 m^3 of permanent pool volume is required to meet quality control requirements for the associated drainage area and 36,400 m^3 has been provided (refer to **Appendix C.3**). This equates to an excess volume of 17,141 m^3 which is anticipated to provide ample storage to meet the quality control requirements for the minor increase in runoff attributed to the proposed development.

Table 5.15: Melodie Street Background Study AxC Comparison

Ultimate Pond Outlet	Study	Drainage Area ID	Area (ha)	Runoff Coefficient (C)	AxC
Pond 1	IBI 2015 (Background Study)	21	0.63	0.8	0.50
	Proposed Development	S404-1	0.08	0.64	0.05
		L101A	0.08	0.82	0.06
		L102A	0.05	0.63	0.03
		L103A	0.14	0.72	0.10
		L104A	0.08	0.74	0.06
		L105A	0.10	0.80	0.08
		L106A	0.11	0.86	0.09
		410A-1	0.09	0.67	0.06
		Total	**0.73**	**0.74**	**0.54**
		Difference	**0.10**		**0.04**
Pond 3	IBI 2015 (Background Study)	410F	0.53	0.65	0.34
	Proposed Development	L201A	0.10	0.78	0.08
		L203A	0.09	0.81	0.07
		L204A	0.09	0.76	0.07
		410C-1	0.06	0.64	0.04
		Total	**0.33**	**0.76**	**0.25**
		Difference	**-0.20**		**-0.09**

5.6.1.1 Water Balance, Infiltration, and Low Impact Development Measures

Requirements for water balance, infiltration targets, and Low Impact Development (LID) measures established for the East Urban Community area have been satisfied through the overall subdivision design.

As outlined in the *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan* (DSEL, 2020), site-specific infiltration testing had been undertaken in the study area. The results found that infiltration is restricted by the low permeability of the clay soils and the perched water table; therefore, infiltration volumes for any LID measures are limited. Also, the area was not expected to fully meet MECP requirements for clearance from groundwater and bedrock for use of LID's as significant components of the stormwater management system. Based on the site-specific constraints it was determined that the implementation of LIDs would have little impact on the erosion protection requirements for Mud Creek. Therefore, measures throughout the overall subdivision have been implemented and as a result, no further requirements were placed on the proposed site.

6 Grading

The proposed Block 121 development site measures approximately 1.33 ha in area. The topography across the site under existing conditions slopes generally to the north to existing Mud Creek. The objective of the grading design strategy is to satisfy the stormwater management requirements, adhere to permissible grade raise restrictions, and provide for minimum cover requirements for sewers.

The grading plan (**Drawing GP-1**) was prepared considering the grade raise restrictions identified in the geotechnical investigation. Areas where grades are expected to exceed the maximum permissible grade raise will be subject to either a pre-loading/surcharge program, or lightweight fill and/or other approved means outside of the proposed rights-of-way to reduce the risks of unacceptable long-term post-construction differential settlements.

It is understood that a tree protection zone is proposed in the northwestern corner of the site. As such, grading has been minimized in the area to avoid the disturbance of existing trees. The contractor shall be responsible to limit the extent of grading where possible to retain the existing trees as directed by the landscape architect. Refer to the Tree Conservation Report prepared by Kilgour & Associates Ltd. for details.

7 Utilities

As the subject site lies within a residential development community, Hydro, Bell, Gas, and Cable servicing for the proposed site will be readily available within subsurface infrastructure within the neighbouring rights-of-way. Exact size, location and routing of hydro utilities will be finalized after design circulation.

8 Approvals

An Ontario Ministry of Environment, Conservation, and Parks (MECP) Environmental Compliance Approval (ECA), under the *Ontario Water Resources Act* is not required for the proposed site, as the quality control for the site is accomplished in the East Urban Community Page Road Stormwater Management Pond 1 (ECA No. 0849-9KPPEJ), and that the proposed works are anticipated to be under single ownership and discharging to a municipal separated storm sewer system.

A Ministry of Environment Conservation and Parks (MECP) Permit to Take Water (PTTW) or reporting on the Environmental Activity and Sector Registry (EASR) may be required for the site as some of the proposed works may be below the groundwater elevation shown in the geotechnical report. The geotechnical investigation report has confirmed that the PTTW may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. For ground or surface water volumes pumped at between 50,000 to 400,000 L/day during construction, it is required to register on the EASR.

9 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing ECDS-1** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, sediment traps, and other erosion control measures.

10 Geotechnical Investigation

A geotechnical investigation for the development was completed by Paterson Group Inc. in June 2025 and a slope stability analysis in March 2009. The report summarizes the existing soil conditions within the Block 121 site and construction recommendations. For details which are not summarized below, please see the Paterson report and memo included in the submission package.

Subsurface soil conditions within Block 121 were determined through field investigations conducted on July 12, 2024, in addition to the previous investigations, completed by Paterson on October 3, 2022, in the vicinity of the subject site, and an initial investigation in August 2006. In total, three (3) boreholes were drilled in the July 2024 investigation in addition to the four (4) boreholes drilled that were drilled in the October 2022 investigation.

In general, soil stratigraphy consisted of topsoil/fill layer followed by a silty sand and deep silty clay deposit. Bedrock was estimated to occur between depths of 25 to 50 m. Based on moisture levels and colour of the recovered soil samples, the long-term groundwater table is expected to be at 2 to 3 m below ground surface, though as groundwater levels fluctuate seasonally, they could vary at the time of construction.

Based on the observed soil conditions, a permissible grade raise restriction of 1.0 m above existing grade was recommended. Areas where grades are expected to exceed the maximum permissible grade raise will be subject to either a pre-loading/surcharge program, or lightweight fill and/or other approved means outside of the proposed rights-of-ways to reduce the risks of unacceptable long-term post-construction differential settlements.

The recommended rigid pavement structure is further presented in the table below.

Table 10.1: Recommended Pavement Structure

Material	Driveways and Car-only Parking Areas	Local Residential Roadways
Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete	50 mm	40 mm
Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete	-	50 mm
BASE – OPSS Granular A Crushed Stone	150 mm	150 mm
SUBBASE – OPSS Granular B Type II	300 mm	400 mm

11 Conclusion

Based on the preceding information, the following conclusions are summarized below:

11.1 Potable Water Analysis

Based on the findings of the report, sufficient pressures exist within surrounding existing watermains to provide an adequate source of domestic supply for the development per City of Ottawa standards.

Analysis results indicate that sufficient fire flows are available within the proposed watermain network under emergency fire demand conditions (maximum day + fire flow) while meeting the minimum pressure requirements as per City of Ottawa standards.

11.2 Wastewater Servicing

Block 121 will be serviced by a network of gravity sewers which will direct wastewater flows to Compass Street. The receiving sewer system has sufficient available capacity to receive the design flows. Design guidelines for slope and velocity have been met within the proposed sewers.

11.3 Stormwater Management

The proposed stormwater management plan complies with the requirements outlined in the background studies, the City of Ottawa Sewer Design Guidelines, and the Ontario Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual.

Minor system peak flows will be directed to the existing 1500 mm diameter storm sewer on Compass Street and the existing 525 mm diameter storm sewer on Renaud Road. Inlet control devices were defined for each subcatchment to restrict minor system peak flows rates to 175 L/s to the Compass Street storm sewers and to 110 L/s to the Renaud Road storm sewers as per background study design criteria.

Major system runoff has been directed to the fullest extent possible to Mud Creek as per background documents.

Quality control of stormwater runoff will be provided through the existing downstream SWM facilities. Requirements for water balance, infiltration targets, and Low Impact Development (LID) measures have been satisfied through the overall subdivision design.

11.4 Grading

A grading plan has been prepared to account for the required overland flow conveyance, cover over sewers, hydraulic grade line requirements, and grade raise restrictions as identified in the geotechnical

investigation. he contractor shall be responsible to limit the extent of grading where possible to retain the existing trees within the tree protection zone as directed by the landscape architect.

11.5 Utilities

Electrical, gas, cable, and telephone infrastructure exist within the Trails Edge West subdivision development and has been designed by their respective utility providers to service the site plan blocks. Private utility servicing for Block 121 will be designed by the respective utilities.

Appendices

Appendix A Water Servicing

A.1 Domestic Water Demands

Trailsedge Block 121, Ottawa, ON - Domestic Water Demand Estimates

Site Plan Provided by M.David Blakely Architect Inc. 2026-09-15

Project No. 160401760 Designed by: ZW

Date 2026-09-24 Checked by: MW

Population densities per Table 4.1 City of Ottawa Water Design Guidelines (2025):		
Townhomes	2.7	ppu
Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines (2025):		
Residential	280	L/cap/day

Type of Unit	No. of Units	Population	Avg Day Demand		Max Day Demand [1]		Max Hour Demand [1]	
			(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Townhouse								
Block 1	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Block 2	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Block 3	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Block 4	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Block 5	8	22	4.2	0.07	18.2	0.30	27.4	0.46
Block 6	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Block 7	12	32	6.3	0.11	27.3	0.45	41.1	0.68
Total Site :	**80**	**216**	**42.0**	**0.70**	**181.8**	**3.03**	**273.8**	**4.56**

Notes:

1 As per Table 3-3 from the MECP Water Design Guidelines, the peaking factors used to estimate peak demand rates for residential areas are as follows:

Maximum daily demand rate = 4.3 × Average day demand rate

Peak hour demand rate = 6.5 × Average day demand rate

Table 3-3 MECP		
Population	MXDY	PKHR
150	4.9	7.4
300	3.6	5.4
216	4.328	6.52

A.2 Fire Flow Demands (2020 FUS)

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401760
Project Name: Trails Edge Block 121
Date: 10/29/2026
Fire Flow Calculation #: 1
Description: 12-unit back-to-back townhouse

Notes: Building footprint of 648 m², per site plan provided by M.David Blakely Architect Inc., Rev 12, dated October 28, 2026.. 2-hour firewall proposed to split block into 4-unit and 8-unit clusters and reduce building footprint to 432 m².

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		432	432	432								1296	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12000
4	Determine Occupancy Charge	Limited Combustible										-15%	10200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	> 30	0	0	0-20	Type V	NO				0%	1224
		East	> 30	0	0	0-20	Type V	NO				0%	
		South	0 to 3	20	3	41-60	Type V	YES				0%	
		West	10.1 to 20	26	2	41-60	Type V	NO				12%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											11000
		Total Required Fire Flow in L/s											183.3
		Required Duration of Fire Flow (hrs)											2.00
		Required Volume of Fire Flow (m^3)											1320

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401760
Project Name: Trails Edge Block 121
Date: 10/29/2026
Fire Flow Calculation #: 2
Description: 12-unit back-to-back townhouse
Notes: Building footprint of 648 m², per site plan provided by M.David Blakely Architect Inc., Rev 12, dated October 28, 2026.. 2-hour firewall proposed to split block into 4-unit and 8-unit clusters and reduce building footprint to 432 m².

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		432	432	432								1296	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12000
4	Determine Occupancy Charge	Limited Combustible										-15%	10200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	> 30	0	0	0-20	Type V	NO				0%	2550
		East	10.1 to 20	26	3	61-80	Type V	NO				13%	
		South	0 to 3	20	3	41-60	Type V	YES				0%	
		West	10.1 to 20	26	2	41-60	Type V	NO				12%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											13000
		Total Required Fire Flow in L/s											216.7
		Required Duration of Fire Flow (hrs)											2.50
		Required Volume of Fire Flow (m^3)											1950

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401760
Project Name: Trails Edge Block 121
Date: 10/29/2026
Fire Flow Calculation #: 3
Description: 12-unit back-to-back townhouse

Notes: Building footprint of 648 m², per site plan provided by M.David Blakely Architect Inc., Rev 12, dated October 28, 2026.. 2-hour firewall proposed to split block into 4-unit and 8-unit clusters and reduce building footprint to 432 m².

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										NO	-
		432	432	432								1296	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12000
4	Determine Occupancy Charge	Limited Combustible										-15%	10200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	3.1 to 10	20	2	21-49	Type V	NO				16%	3366
		East	10.1 to 20	26	3	61-80	Type V	NO				13%	
		South	0 to 3	20	3	41-60	Type V	YES				0%	
		West	20.1 to 30	26	2	41-60	Type V	NO				4%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											14000
		Total Required Fire Flow in L/s											233.3
		Required Duration of Fire Flow (hrs)											3.00
		Required Volume of Fire Flow (m^3)											2520

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401760
Project Name: Trails Edge Block 121
Date: 10/29/2026
Fire Flow Calculation #: 4
Description: 12-unit Terrace Flat Unit

Notes: Building footprint of 416m², per site plan provided by M.David Blakely Architect Inc., Rev 12, dated October 28, 2026. Terrace Flat Units are 2 storey plus basement. Basement has been included in this FUS Calculation based on more than 50% exposure of the basement unit.

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		416	416	416								1248	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12000
4	Determine Occupancy Charge	Limited Combustible										-15%	10200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	20.1 to 30	32.4	3	81-100	Type V	NO				8%	3570
		East	10.1 to 20	13.1	3	21-49	Type V	NO				11%	
		South	> 30	32.4	3	81-100	Type V	YES				0%	
		West	3.1 to 10	13.1	3	21-49	Type V	NO				16%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											14000
		Total Required Fire Flow in L/s											233.3
		Required Duration of Fire Flow (hrs)											3.00
		Required Volume of Fire Flow (m^3)											2520

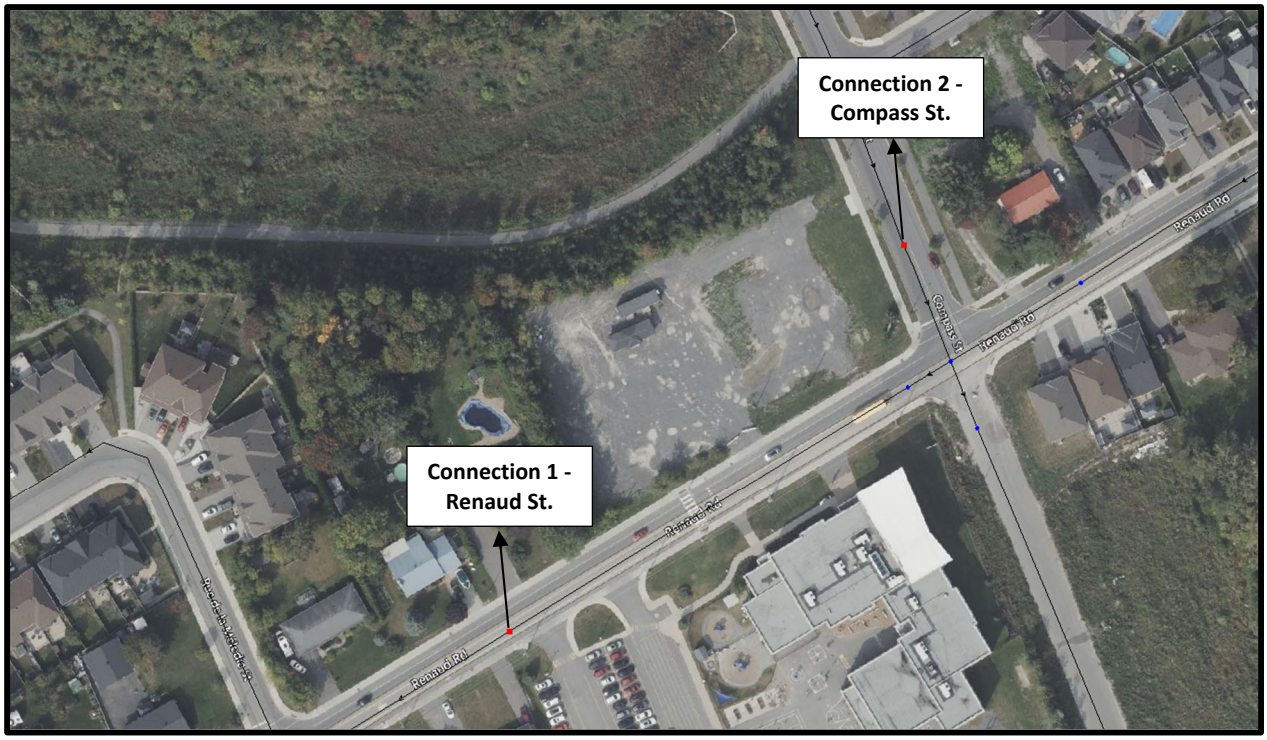
A.3 Hydraulic Boundary Conditions

Boundary Conditions
6259-6273 Renaud Road – 2026

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	42.0	0.70
Maximum Daily Demand	181.8	3.03
Peak Hour	273.6	4.56
Fire Flow Demand #1	14,000.0	233.33

Location



Results

Connection 1 - Renaud Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	61
Peak Hour	127.3	57
Max Day plus Fire Flow #1	124.3	53

[1] Ground Elevation = 87.4 m

Connection 2 - Compass Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	62
Peak Hour	127.3	58
Max Day plus Fire Flow #1	125.3	55

[1] Ground Elevation = 86.8 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

A.4 Hydraulic Analysis

Junction Results - Basic Day

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
1	0.05	87.16	130.60	43.44	61.10	425.88
10	0.00	87.15	130.60	43.45	61.11	425.96
11	0.00	87.13	130.60	43.47	61.14	426.21
13	0.05	87.18	130.60	43.43	61.08	425.74
14	0.00	87.08	130.60	43.52	61.21	426.70
15	0.05	87.14	130.60	43.46	61.13	426.11
16	0.00	87.22	130.60	43.38	61.02	425.33
17	0.04	87.07	130.60	43.53	61.22	426.75
18	0.09	87.23	130.60	43.37	61.00	425.23
19	0.05	87.26	130.60	43.34	60.96	424.91
2	0.11	87.26	130.60	43.34	60.96	424.93
3	0.00	87.20	130.60	43.40	61.05	425.54
4	0.11	87.22	130.60	43.38	61.01	425.28
5	0.11	87.25	130.60	43.35	60.97	424.99
6	0.00	87.15	130.60	43.45	61.11	425.96
7	0.00	87.15	130.60	43.45	61.12	426.03
8	0.00	87.49	130.60	43.11	60.63	422.65
9	0.00	87.36	130.60	43.24	60.82	423.95

Link Results - Basic Day

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	Renaud	42.90	204	110	-0.436	0.013
1001	2	1	8.06	204	110	-0.386	0.012
1002	3	2	1.50	204	110	-0.276	0.008
1003	4	3	33.47	204	110	-0.226	0.007
1004	5	4	33.47	204	110	-0.026	0.001
1005	6	5	53.99	204	110	0.124	0.004
1006	7	6	20.72	155	100	0.174	0.009
1007	8	7	10.14	155	100	0.174	0.009
1008	9	8	15.57	155	100	0.174	0.009
1009	10	9	10.23	155	100	0.174	0.009
1010	11	10	3.39	155	100	0.174	0.009
1011	Compass	11	16.01	204	110	0.224	0.007
1012	13	6	10.95	155	100	-0.050	0.003
1013	14	11	3.50	155	100	-0.050	0.003
1014	15	14	3.05	155	100	-0.050	0.003
1015	16	15	14.91	155	100	0.000	0.000
1016	17	5	20.69	155	100	-0.040	0.002
1017	4	18	32.99	155	100	0.090	0.005
1018	19	3	32.99	155	100	-0.050	0.003

Junction Results - Peak Hour

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
1	0.34	87.16	127.30	40.14	57.07	393.51
10	0.00	87.15	127.30	40.15	57.09	393.63
11	0.00	87.13	127.30	40.17	57.12	393.83
13	0.34	87.18	127.30	40.12	57.04	393.30
14	0.00	87.08	127.30	40.22	57.19	394.32
15	0.34	87.14	127.30	40.16	57.11	393.73
16	0.00	87.22	127.30	40.08	56.99	392.95
17	0.23	87.07	127.30	40.23	57.20	394.37
18	0.57	87.23	127.30	40.07	56.97	392.80
19	0.34	87.26	127.30	40.04	56.93	392.52
2	0.69	87.26	127.30	40.04	56.93	392.52
3	0.00	87.20	127.30	40.10	57.02	393.11
4	0.69	87.22	127.30	40.08	56.99	392.91
5	0.69	87.25	127.30	40.05	56.94	392.62
6	0.00	87.15	127.30	40.15	57.09	393.60
7	0.00	87.15	127.30	40.15	57.09	393.61
8	0.00	87.49	127.30	39.81	56.61	390.28
9	0.00	87.36	127.30	39.94	56.79	391.57

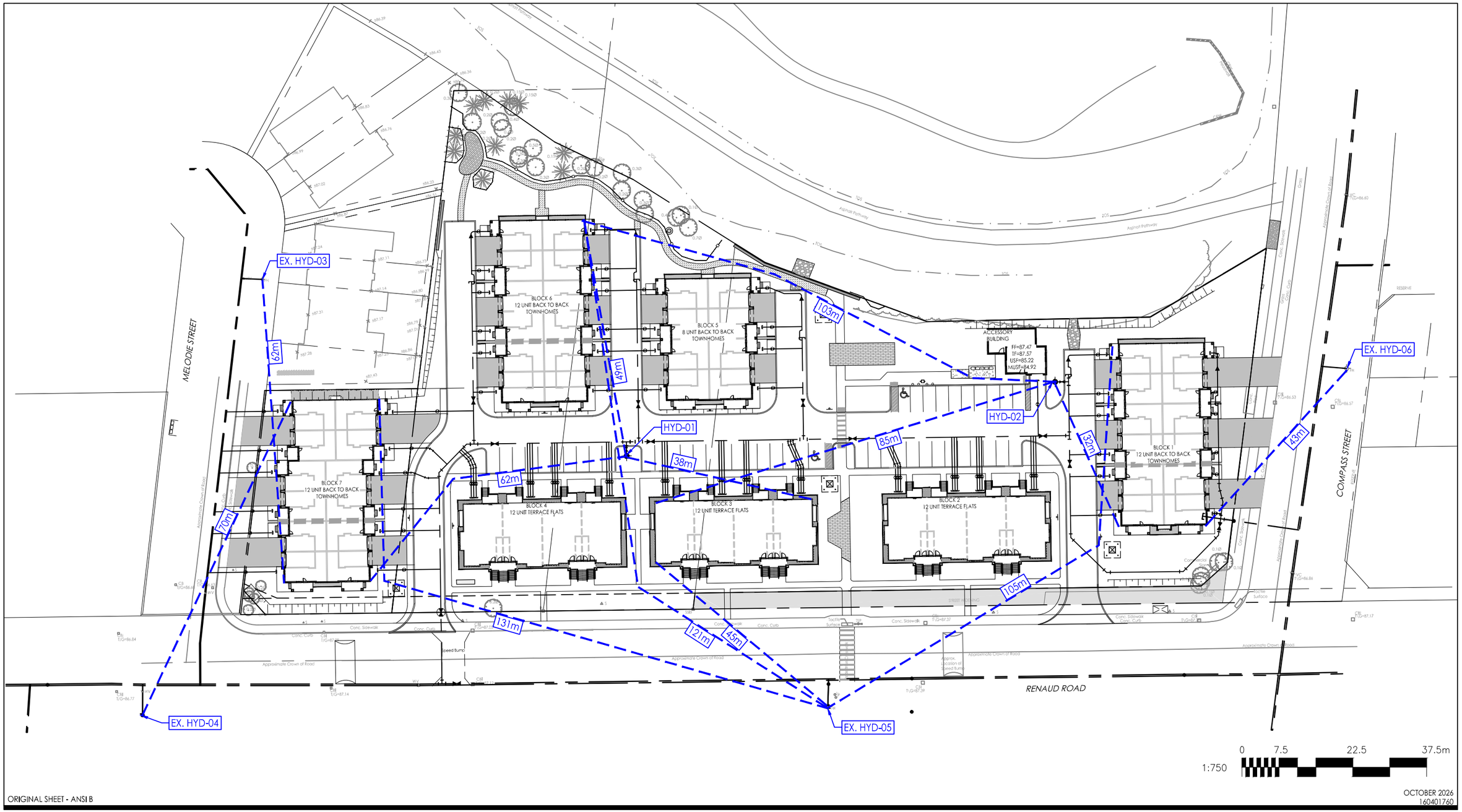
Link Results - Peak Hour

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	Renaud	42.90	204	110	-2.781	0.085
1001	2	1	8.06	204	110	-2.441	0.075
1002	3	2	1.50	204	110	-1.751	0.054
1003	4	3	33.47	204	110	-1.411	0.043
1004	5	4	33.47	204	110	-0.151	0.005
1005	6	5	53.99	204	110	0.769	0.024
1006	7	6	20.72	155	100	1.109	0.059
1007	8	7	10.14	155	100	1.109	0.059
1008	9	8	15.57	155	100	1.109	0.059
1009	10	9	10.23	155	100	1.109	0.059
1010	11	10	3.39	155	100	1.109	0.059
1011	Compass	11	16.01	204	110	1.449	0.044
1012	13	6	10.95	155	100	-0.340	0.018
1013	14	11	3.50	155	100	-0.340	0.018
1014	15	14	3.05	155	100	-0.340	0.018
1015	16	15	14.91	155	100	0.000	0.000
1016	17	5	20.69	155	100	-0.230	0.012
1017	4	18	32.99	155	100	0.570	0.030
1018	19	3	32.99	155	100	-0.340	0.018

Fire Flow Results - Max Day + 233 L/s

ID	Static Demand (L/s)	Static Pressure (m)	Static Pressure (psi)	Static Pressure (kPa)	Static Head (m)	Fire Flow Demand (L/s)	Residual Pressure (m)	Residual Pressure (psi)	Available Flow (L/s)	Available Pressure (psi)
1	0.23	37.21	52.91	364.83	124.37	233.33	29.90	42.51	432.82	20
10	0.00	38.08	54.15	373.32	125.23	233.33	32.15	45.72	501.33	20
11	0.00	38.13	54.22	373.86	125.26	233.33	34.69	49.33	678.05	20
13	0.23	37.46	53.27	367.28	124.64	233.33	6.95	9.88	201.86	20
14	0.00	38.18	54.30	374.35	125.26	233.33	30.37	43.19	431.00	20
15	0.23	38.12	54.21	373.76	125.26	233.33	26.49	37.67	346.18	20
16	0.00	38.04	54.10	372.98	125.26	233.33	7.81	11.10	205.43	20
17	0.15	37.45	53.26	367.18	124.52	233.33	-2.77	-3.93	173.90	20
18	0.38	37.22	52.93	364.93	124.45	233.33	-15.97	-22.71	148.72	20
19	0.23	37.13	52.80	364.02	124.39	233.33	-12.62	-17.95	153.92	20
2	0.46	37.13	52.79	363.99	124.39	233.33	28.81	40.96	403.19	20
3	0.00	37.19	52.88	364.61	124.39	233.33	28.69	40.79	399.22	20
4	0.46	37.23	52.94	365.03	124.45	233.33	25.34	36.03	333.78	20
5	0.46	37.27	53.00	365.42	124.52	233.33	22.91	32.58	301.92	20
6	0.00	37.49	53.31	367.58	124.64	233.33	20.67	29.40	278.71	20
7	0.00	37.71	53.62	369.67	124.86	233.33	20.32	28.90	275.28	20
8	0.00	37.47	53.28	367.37	124.96	233.33	21.49	30.55	286.66	20
9	0.00	37.76	53.70	370.22	125.12	233.33	26.44	37.60	348.61	20

A.5 Fire Hydrant Coverage



W:\active\160401760\design\drawing\160401760-FA.dwg
2026/10/30 2:15 PM By: Johnson, Warren

ORIGINAL SHEET - ANSI B

OCTOBER 2026
160401760

Legend

Notes

Stantec
Stantec Consulting Ltd.
300 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Client/Project
RICHCRAFT HOMES LTD.
TRAILS EDGE WEST
BLOCK 121

Figure No.
APPENDIX A.5

Title
FIRE HYDRANT COVERAGE FIGURE

Stantec	Project: **Trails Edge West Block 121**	160401760
	TABLE 1: FIRE HYDRANT COVERAGE TABLE	
	Revision: 01	MW
	Revision Date: 10/29/2026	SG

Description	Hydrants[1]						Total Available Fire Flow (L/min)	Total Required Fire Flow[2] (L/min)
	HYD-01	**HYD-02**	**EX HYD-03**	**EX HYD-04**	**EX HYD-05**	**EX HYD-06**		
Block 1								
Distance from building (m)		32.0			105.0	43.0	-	-
Maximum fire flow capacity[3] (L/min)		5,678			3,785	5,678	**15,141**	11,000
Block 3								
Distance from building (m)	39.4	85.0			45.0		-	-
Maximum fire flow capacity[3] (L/min)	5,678	3,785			5,678		**15,141**	13,000
Block 6								
Distance from building (m)	49.0	103.0			121.0		-	-
Maximum fire flow capacity[3] (L/min)	5,678	3,785			3,785		**13,248**	14,000
Block 7								
Distance from building (m)	62.0		62.0	70.0			-	-
Maximum fire flow capacity[3] (L/min)	5,678		5,678	5,678			**17,034**	14,000

NFPA 1 Table 18.5.4.3	
Distance to Building (m)	Maximum Capacity (L/min)
≤ 76	**5,678**
> 76 and ≤ 152	**3,785**
> 152 and ≤ 305	**2,839**

Notes:

1. Hydrant locations as per Drawing SSP-1. Refer to fire hydrant coverage sketch (Appendix A.5).
2. See FUS Calculations, Appendix A.2 for fire flow requirements.
3. See NFPA 1 Table 18.5.4.3 for maxiumim fire flow capacity of hydrants by distance to building.

A.6 Background Report Excerpts

REPORT
PROJECT: 31855-5.2.2

DESIGN BRIEF
MINTO TRAILSEDGE PHASE II

Prepared for MINTO COMMUNITIES INC.
by IBI GROUP
REVISED FEB 2015
REVISED MAY 2015

2 WATER SUPPLY

2.1 Existing Conditions

As noted in the 'Gloucester East Urban Community (EUC) Infrastructure Servicing Update' (Stantec, 2006), the TrailsEdge subdivision lies within the water distribution pressure zone 2E. Existing 300mm diameter watermain along Renaud Road is within close proximity to the site. The Serviceability Study (DSEL, 2014) prepared for the TrailsEdge subdivision discusses the requirement for additional feeds to the EUC as development progresses. The inclusion of a new 400 mm watermain on the Belcourt Boulevard extension will form part of the infrastructure works for this development.

2.2 Master Servicing Study and Boundary Conditions

The most recent servicing study for the TrailsEdge development is the "Servicing Report for TrailsEdge and Orleans Business Park", which was completed in March 2014 by DSEL Ltd. The report includes recommended watermain sizes for the entire development which are based on results from the model analysis of the system. As the subject site is the initial phase of development, boundary conditions have been requested and provided by the City of Ottawa. The interim criteria includes boundary conditions for connections to the existing Renaud Road watermain, but prior to full completion of the Belcourt extension.

A full list of the applicable boundary conditions supplied by the City of Ottawa is included in Appendix A.

2.3 Design Criteria

In order to determine the water plan needed to adequately service the subject site, a hydraulic model was prepared using H20 MAP software by MWH Soft Inc. As mentioned above, the site was modelled under boundary conditions prior to full build out. The City of Ottawa supplied boundary conditions for the current 2E pressure zone near the intersections of Renaud Road and Compass Street and Pin Cherry Grove, respectively as well as Belcourt Boulevard. The specific boundary conditions are:

2E Zone Condition (Connection 1)	
Max Day and Fire Flow	= 116.9 m (Fire Flow = 167 l/s)
Minimum HGL	= 127.3 m
Maximum Pressure Check	= 134.7 m
2E Zone Condition (Connection 2)	
Max Day and Fire Flow	= 115.8 m (Fire Flow = 167 l/s)
Minimum HGL	= 127.3 m
Maximum Pressure Check	= 134.7 m

2E Zone Condition (Connection 3)	
Max Day and Fire Flow	= 114.7 m (Fire Flow = 167 l/s)
Minimum HGL	= 127.3 m
Maximum Pressure Check	= 134.7 m

The following parameters were also used in the analysis of the subject residential site:

Average Daily Demand (ADD)	= 350 l/cap/day
Maximum Daily Demand (MDD) = 2.5 x ADD	= 875 l/cap/day
Peak Hourly Demand = 2.2 x MDD	= 1925 l/cap/day

A copy of the hydraulic analysis report and details on boundary conditions are included in Appendix A.

2.3.1 Fire Flows

Changes to the methodology involved in calculating fire flows have been introduced recently by the City of Ottawa in the form of Technical Bulletin ISDTB-2014-02. The bulletin specifies in Section 3 that the FUS long method for calculating fire flows be used for single family homes (wood frame construction) not exceeding 2 stories in height, separated at less than 3.0 meters. This situation applies to all units within the proposed site.

However, the Technical Bulletin also allows for a maximum cap of 10,000 l/min, provided that the backs of adjacent units are separated by a minimum of 10 meters (refer to ISDTB-2014-02 Section 4.1).

Based on the long form FUS calculation (included in Appendix A), the required fire flow works out to 10,000 l/min, which is the value that has been carried in the hydraulic model.

Since the required fire flow is not more than 10,000 l/min, there is no need to apply the maximum cap.

2.4 Proposed Water Plan

2.4.1 Phasing

The Owner is intending to construct the proposed subdivision in two residential phases, known as Phase 2A and Phase 2B. Phase 2A will include the 16 units fronting Renaud Road, Enclave Walk and Pin Cherry Grove. Compass Street will also be constructed to the Phase 2A limit.

As part of the Phase 2A works, three watermain connections will be required, connecting to the existing 300 mm diameter Renaud Road watermain. Please refer to Figure 1 on the following page for the layout of the proposed watermains for Phase 2A.

Phase 2B includes the balance of the site, namely Yellow Birch Street and Locust Ridge. The Phase 2B works will also include the completion of Compass Street (by others) and the completion of Belcourt Boulevard, including watermains, to the site limits. Beyond the extent of the proposed site, stubs will be left for future connections by adjacent land owners. Please refer to Figure 1 for the layout of the proposed watermains for both Phase 2A and 2B.

Both of the above scenarios were modeled using the H2O Map software program to verify that the proposed system meets all City of Ottawa and fire flow requirements. The results are included in Appendix A.

2.5 Results

Based on the hydraulic modeling data, the following objectives were met, based on the requirements of the City of Ottawa water distribution guidelines:

Pressures > 276 kPa during maximum hourly conditions.

Pressures > 140 kPa during periods of maximum day and fire demands.

Pressures < 552 kPa in occupied areas.

The above noted conditions are met in both the interim Phase 2A scenario, as well as the ultimate Phase 2A and 2B buildout scenario.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : TRAILSEDGE II
LOCATION : CITY OF OTTAWA
DEVELOPER : MINTO COMMUNITIES INC.

FILE: 31855.5.7
DATE: 2014-07-24
DESIGN: RPK
PAGE: 1 OF 1

NODE	RESIDENTIAL						NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS				GROSS RES. (Ha)	POP'N	COM (Ha)	IND (Ha)	INS (Ha)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/s)
	SF	SD	TH	APT															
PHASE 2A ONLY																			
1000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
2000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
3000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
4000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
5000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
10						0			0.63	0.00	0.11	0.11	0.00	0.16	0.16	0.00	0.30	0.30	167
20	2					7				0.03		0.03	0.07		0.07	0.15		0.15	167
40	4					14				0.06		0.06	0.14		0.14	0.30		0.30	167
50	8					27				0.11		0.11	0.28		0.28	0.61		0.61	167
60	12					41				0.17		0.17	0.41		0.41	0.91		0.91	167
70	13					44				0.18		0.18	0.45		0.45	0.98		0.98	167
80	15					51				0.21		0.21	0.52		0.52	1.14		1.14	167
90	11					37				0.15		0.15	0.38		0.38	0.83		0.83	167
100	8					27				0.11		0.11	0.28		0.28	0.61		0.61	167
110	6					20				0.08		0.08	0.21		0.21	0.45		0.45	167
120	10					34				0.14		0.14	0.34		0.34	0.76		0.76	167
180	4					14				0.06		0.06	0.14		0.14	0.30		0.30	167
190						0				0.00		0.00	0.00		0.00	0.00		0.00	167
TOTALS	93					316						1.39			3.37			7.34	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p/p/u
- Semi Detached (SD) 2.7 p/p/u
- Townhouse (TH) 2.7 p/p/u
- Apartment (APT) 1.8 p/p/u

AVERAGE DAILY DEMAND

- Residential 350 l/cap/day
- Commercial 60,000 l/ha/day
- Industrial 20,000 l/ha/day
- Institutional 15,000 l/ha/day

MAXIMUM DAILY DEMAND

- Residential 875 l/cap/day
- Commercial 90,000 l/ha/day
- Industrial 30,000 l/ha/day
- Institutional 22,500 l/ha/day

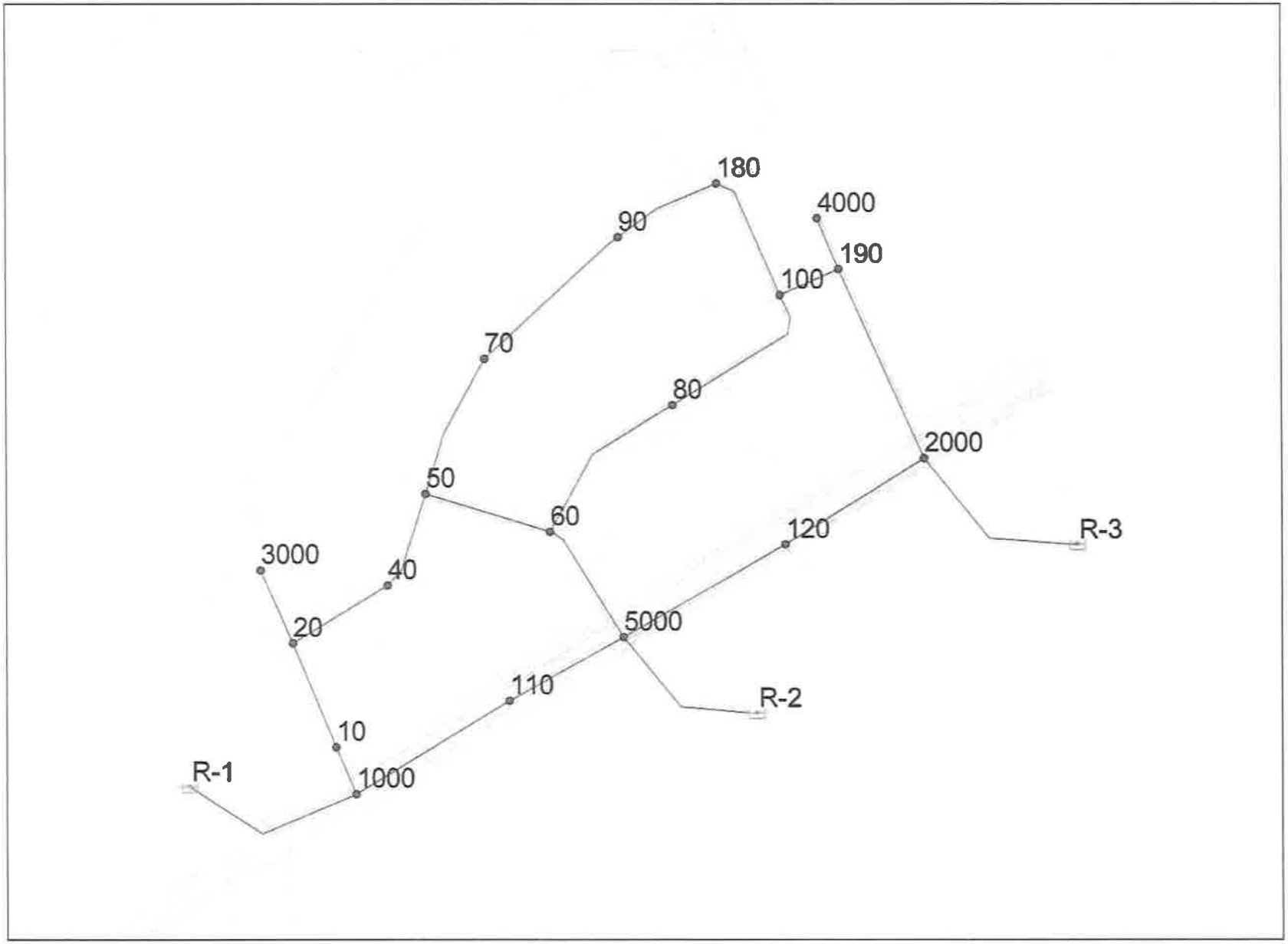
MAXIMUM HOURLY DEMAND

- Residential 1,925 l/cap/day
- Commercial 162,000 l/ha/day
- Industrial 54,000 l/ha/day
- Institutional 40,500 l/ha/day

FIRE DEMANDS

- SF 167 l/s
- SD 167 l/s
- TH 167 l/s
- APT 170 l/s
- ICI 250 l/s

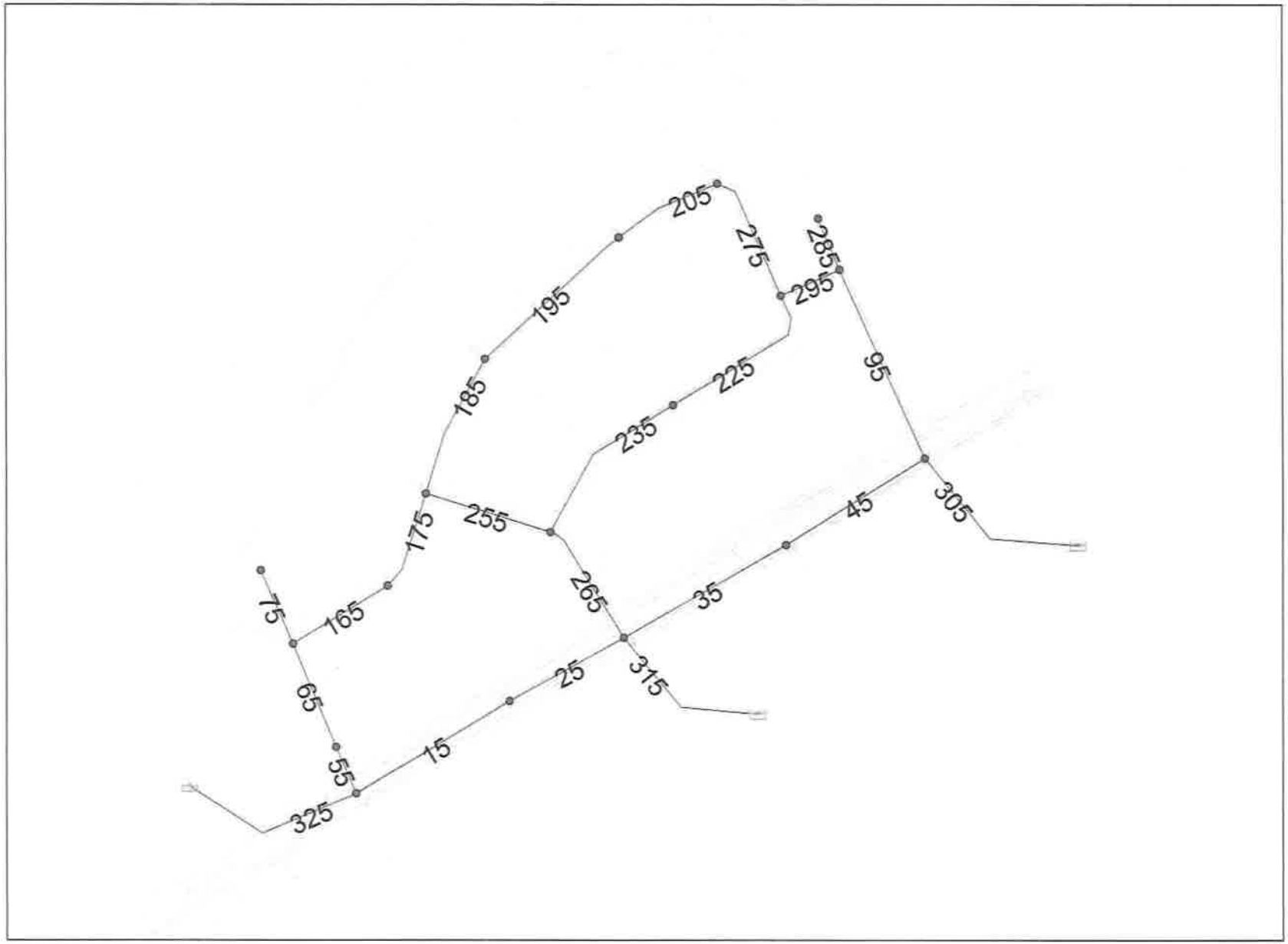
TRAILSEDGE II - Phase 2A - Node ID's



Prepared By: IBI Group

Date: Thursday, July 24, 2014

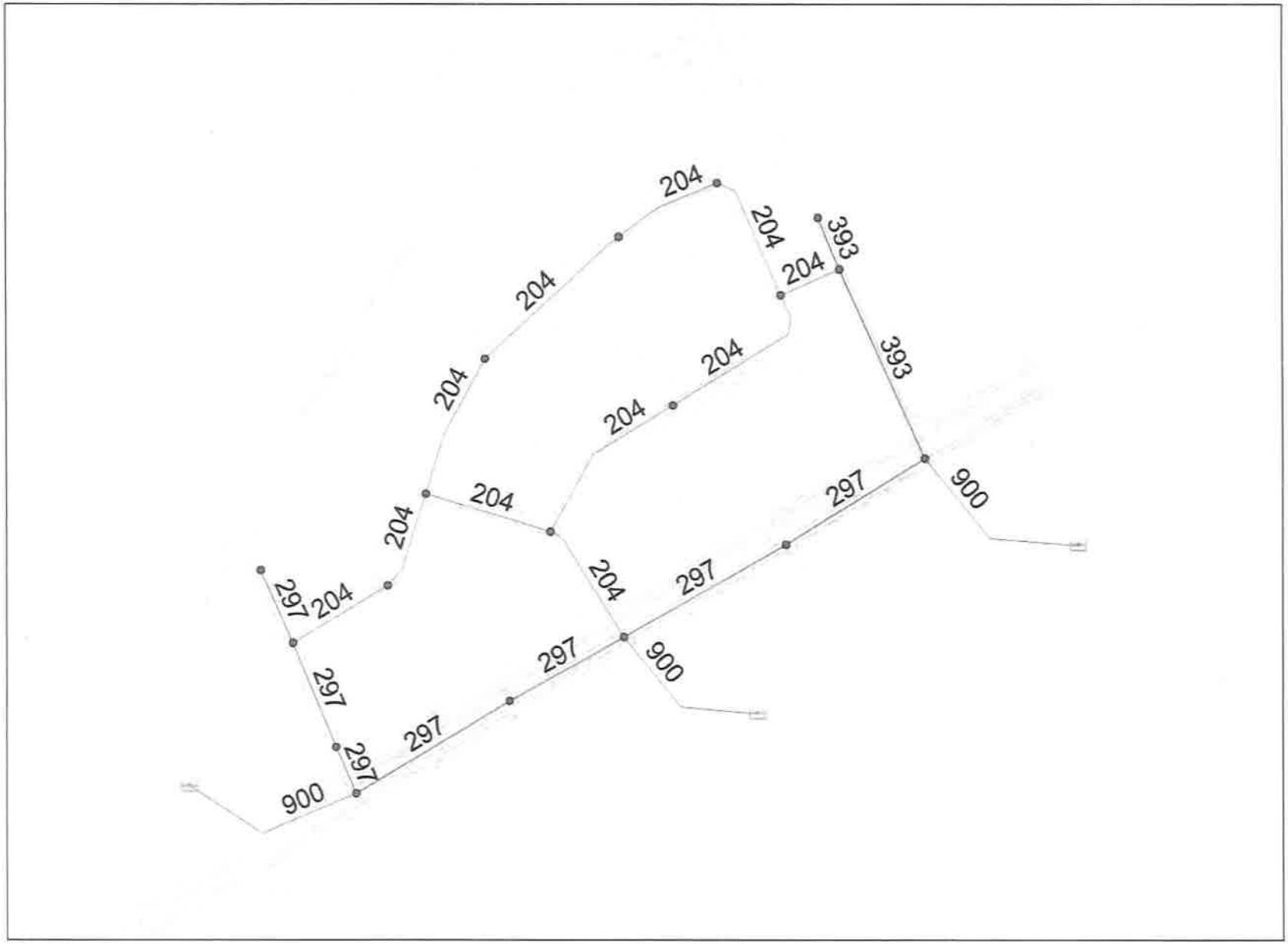
TRAILSEDGE II - Phase 2A - Pipe ID's



Prepared By: IBI Group

Date: Thursday, July 24, 2014

TRAILSEDGE II - Phase 2A - Pipe Sizes



Prepared By: IBI Group

Date: Thursday, July 24, 2014

Phase 2A - Junction Report - High Pressure Check (HGL = 134.7m)

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	10	0.11	87.23	134.70	465.17
2	100	0.11	87.60	134.70	461.54
3	1000	0.00	87.43	134.70	463.21
4	110	0.08	87.25	134.70	464.97
5	120	0.14	87.53	134.70	462.23
6	180	0.06	87.55	134.70	462.03
7	190	0.00	87.25	134.70	464.97
8	20	0.03	87.34	134.70	464.09
9	2000	0.00	87.69	134.70	460.66
10	3000	0.00	87.38	134.70	463.70
11	40	0.06	87.30	134.70	464.48
12	4000	0.00	87.46	134.70	462.91
13	50	0.11	87.35	134.70	463.99
14	5000	0.00	87.28	134.70	464.68
15	60	0.17	87.43	134.70	463.21
16	70	0.18	87.37	134.70	463.80
17	80	0.21	87.39	134.70	463.60
18	90	0.15	87.50	134.70	462.52

Phase 2A - Pipe Report - High Pressure Check (HGL = 134.7m)

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		15	1000	110	86.75	297.00	120.00	0.03	0.000	0.00	0.00
2		165	20	40	53.61	204.00	110.00	0.27	0.01	0.0000	0.00
3		175	40	50	48.89	204.00	110.00	0.21	0.01	0.0000	0.000
4		185	50	70	71.41	204.00	110.00	0.19	0.01	0.0000	0.000
5		195	70	90	87.50	204.00	110.00	0.01	0.000	0.00	0.00
6		205	90	180	54.62	204.00	110.00	-0.14	0.00	0.0000	0.000
7		225	100	80	85.59	204.00	110.00	0.13	0.00	0.0000	0.000
8		235	60	80	88.03	204.00	110.00	0.08	0.00	0.00000	0.000
9		25	110	5000	63.21	297.00	120.00	-0.05	0.000	0.00	0.00
10		255	50	60	62.91	204.00	110.00	-0.08	0.00	0.00000	0.000
11		265	60	5000	62.86	204.00	110.00	-0.34	0.01	0.0000	0.00
12		275	180	100	64.35	204.00	110.00	-0.20	0.01	0.0000	0.000
13		285	190	4000	26.83	393.00	120.00	0.00	0.00	0.00	0.00
14		295	190	100	30.96	204.00	110.00	0.44	0.01	0.0000	0.00
15		305	R-3	2000	0.10	900.00	130.00	0.51	0.000	0.00	0.00
16		315	R-2	5000	0.10	900.00	130.00	0.45	0.000	0.00	0.00
17		325	R-1	1000	90.47	900.00	130.00	0.44	0.000	0.00	0.00
18		35	5000	120	90.18	297.00	120.00	0.07	0.000	0.00	0.00
19		45	120	2000	78.85	297.00	120.00	-0.07	0.00	0.00	0.00
20		55	1000	10	24.60	297.00	120.00	0.41	0.01	0.00000	0.000
21		65	10	20	54.42	297.00	120.00	0.30	0.00	0.00000	0.000
22		75	20	3000	38.71	297.00	120.00	0.00	0.00	0.00	0.00
23		95	2000	190	100.01	393.00	120.00	0.44	0.00	0.00000	0.0000

Phase 2A - Max Day + F/F - Fireflow Report (HGL = 116.9m, 115.8m, 114.7m)

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		10	167.16	100	269.00	114.68	4,838.33	1,180.72	10	139.98	101.51	1,180.78	1,180.78
2		100	167.28	100	249.95	113.11	455.27	455.30	100	139.96	101.88	455.31	455.27
3		110	167.21	100	269.45	114.75	95,819.49	1,151.69	110	139.98	101.53	1,151.75	1,151.75
4		120	167.34	120	265.38	114.61	1,017.51	1,017.46	120	139.97	101.81	1,017.51	1,017.51
5		180	167.14	180	216.66	109.66	266.73	266.73	180	139.96	101.83	266.73	266.73
6		20	167.07	100	267.68	114.66	2,781.61	691.11	20	139.97	101.62	691.12	691.12
7		40	167.14	40	249.99	112.81	378.73	378.72	40	139.96	101.58	378.73	378.73
8		50	167.28	50	250.40	112.90	398.86	398.86	50	139.96	101.63	398.86	398.86
9		60	167.41	60	253.79	113.33	452.39	452.39	60	139.96	101.71	452.39	452.39
10		70	167.45	70	215.30	109.34	258.49	258.49	70	139.96	101.65	258.49	258.49
11		80	167.52	80	227.85	110.64	296.41	296.41	80	139.96	101.67	296.41	296.41
12		90	167.38	90	206.22	108.54	242.06	242.06	90	139.96	101.78	242.06	242.06

Phase 2A - Peak Hour - Junction Report - (HGL = 127.3m)

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	10	0.30	87.23	127.30	392.65
2	100	0.61	87.60	127.30	389.01
3	1000	0.00	87.43	127.30	390.69
4	110	0.45	87.25	127.30	392.46
5	120	0.76	87.53	127.30	389.71
6	180	0.30	87.55	127.30	389.49
7	190	0.00	87.25	127.30	392.46
8	20	0.15	87.34	127.30	391.57
9	2000	0.00	87.69	127.30	388.15
10	3000	0.00	87.38	127.30	391.18
11	40	0.30	87.30	127.30	391.95
12	4000	0.00	87.46	127.30	390.40
13	50	0.61	87.35	127.30	391.46
14	5000	0.00	87.28	127.30	392.16
15	60	0.91	87.43	127.30	390.67
16	70	0.98	87.37	127.30	391.25
17	80	1.14	87.39	127.30	391.06
18	90	0.83	87.50	127.30	389.98

H_20 MAP Hydraulic Analysis

Phase 2A and 2B

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : TRAILSEDGE II
LOCATION : CITY OF OTTAWA
DEVELOPER : MINTO COMMUNITIES INC.

FILE: 31855.5.7
DATE: 2014-07-24
DESIGN: RPK
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS SF	SD	TH	APT	GROSS RES. (Ha)	POP'N	NON-RESIDENTIAL COM (Ha)	IND (Ha)	INS (Ha)	AVERAGE DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM HOURLY DEMAND (l/s) Res.	Non-res.	Total	FIRE DEMAND (l/s)
Phase 2A and 2B																			
1000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
2000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
3000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
4000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
5000						0				0.00		0.00	0.00		0.00	0.00		0.00	n/a
10						0			0.63	0.00	0.11	0.11	0.00	0.16	0.16	0.00	0.30	0.30	167
20	2					7				0.03		0.03	0.07		0.07	0.15		0.15	167
30	9					31				0.12		0.12	0.31		0.31	0.68		0.68	167
40	4					14				0.06		0.06	0.14		0.14	0.30		0.30	167
50	8					27				0.11		0.11	0.28		0.28	0.61		0.61	167
60	12					41				0.17		0.17	0.41		0.41	0.91		0.91	167
70	13					44				0.18		0.18	0.45		0.45	0.98		0.98	167
80	15					51				0.21		0.21	0.52		0.52	1.14		1.14	167
90	11					37				0.15		0.15	0.38		0.38	0.83		0.83	167
100	8					27				0.11		0.11	0.28		0.28	0.61		0.61	167
110	6					20				0.08		0.08	0.21		0.21	0.45		0.45	167
120	10					34				0.14		0.14	0.34		0.34	0.76		0.76	167
130	7					24				0.10		0.10	0.24		0.24	0.53		0.53	167
140	20					68				0.28		0.28	0.69		0.69	1.52		1.52	167
150	4					14				0.06		0.06	0.14		0.14	0.30		0.30	167
160	5					17				0.07		0.07	0.17		0.17	0.38		0.38	167
180	4					14				0.06		0.06	0.14		0.14	0.30		0.30	167
190						0				0.00		0.00	0.00		0.00	0.00		0.00	167
200	2					7				0.03		0.03	0.07		0.07	0.15		0.15	167
TOTALS	140					476						2.04			4.98			10.90	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p/p/u
- Semi Detached (SD) 2.7 p/p/u
- Townhouse (TH) 2.7 p/p/u
- Apartment (APT) 1.8 p/p/u

AVERAGE DAILY DEMAND

- Residential 350 l/cap/day
- Commercial 60,000 l/ha/day
- Industrial 20,000 l/ha/day
- Institutional 15,000 l/ha/day

MAXIMUM DAILY DEMAND

- Residential 875 l/cap/day
- Commercial 90,000 l/ha/day
- Industrial 30,000 l/ha/day
- Institutional 22,500 l/ha/day

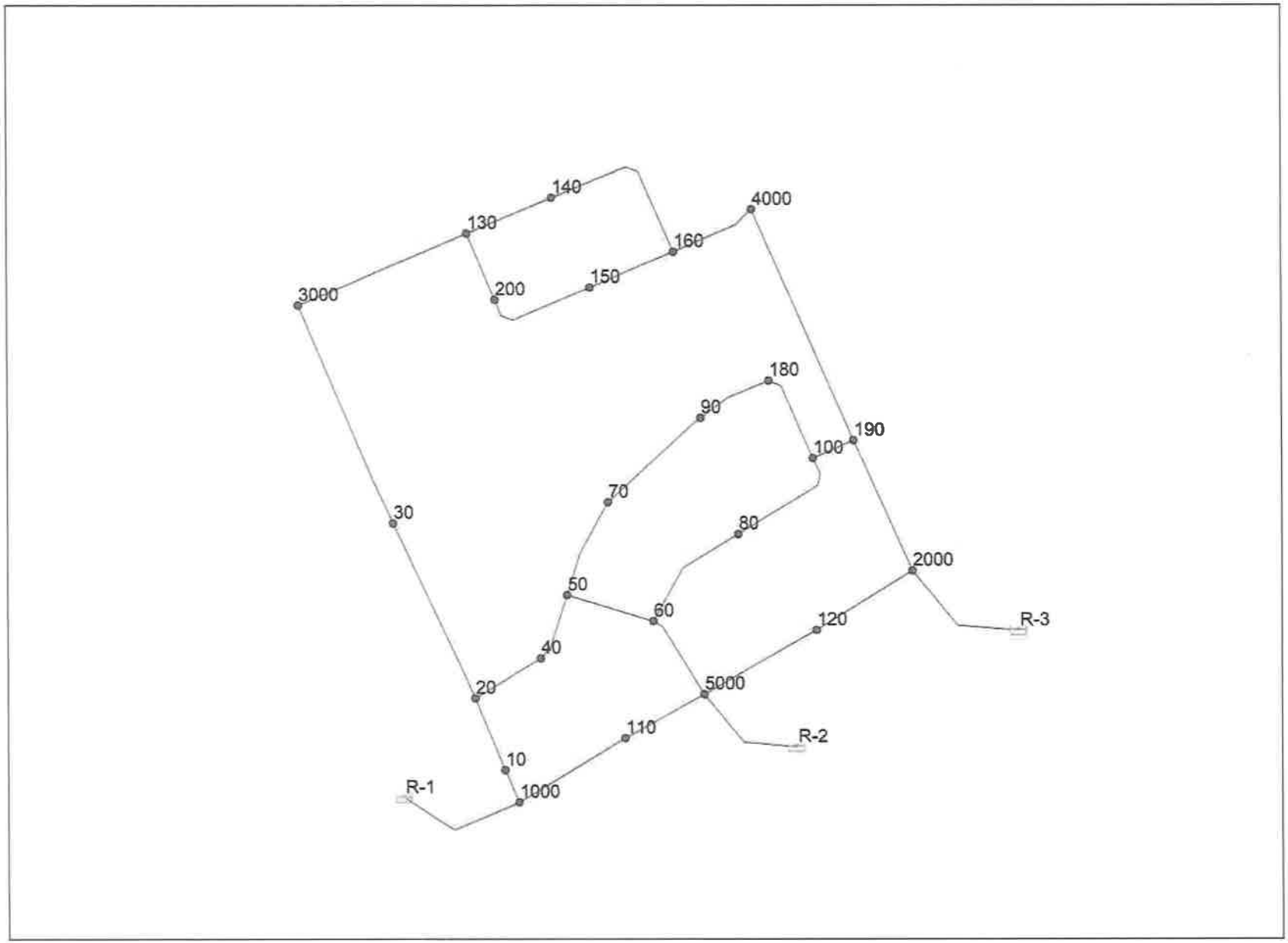
MAXIMUM HOURLY DEMAND

- Residential 1,925 l/cap/day
- Commercial 162,000 l/ha/day
- Industrial 54,000 l/ha/day
- Institutional 40,500 l/ha/day

FIRE DEMANDS

- SF 167 l/s
- SD 167 l/s
- TH 167 l/s
- APT 170 l/s
- ICI 250 l/s

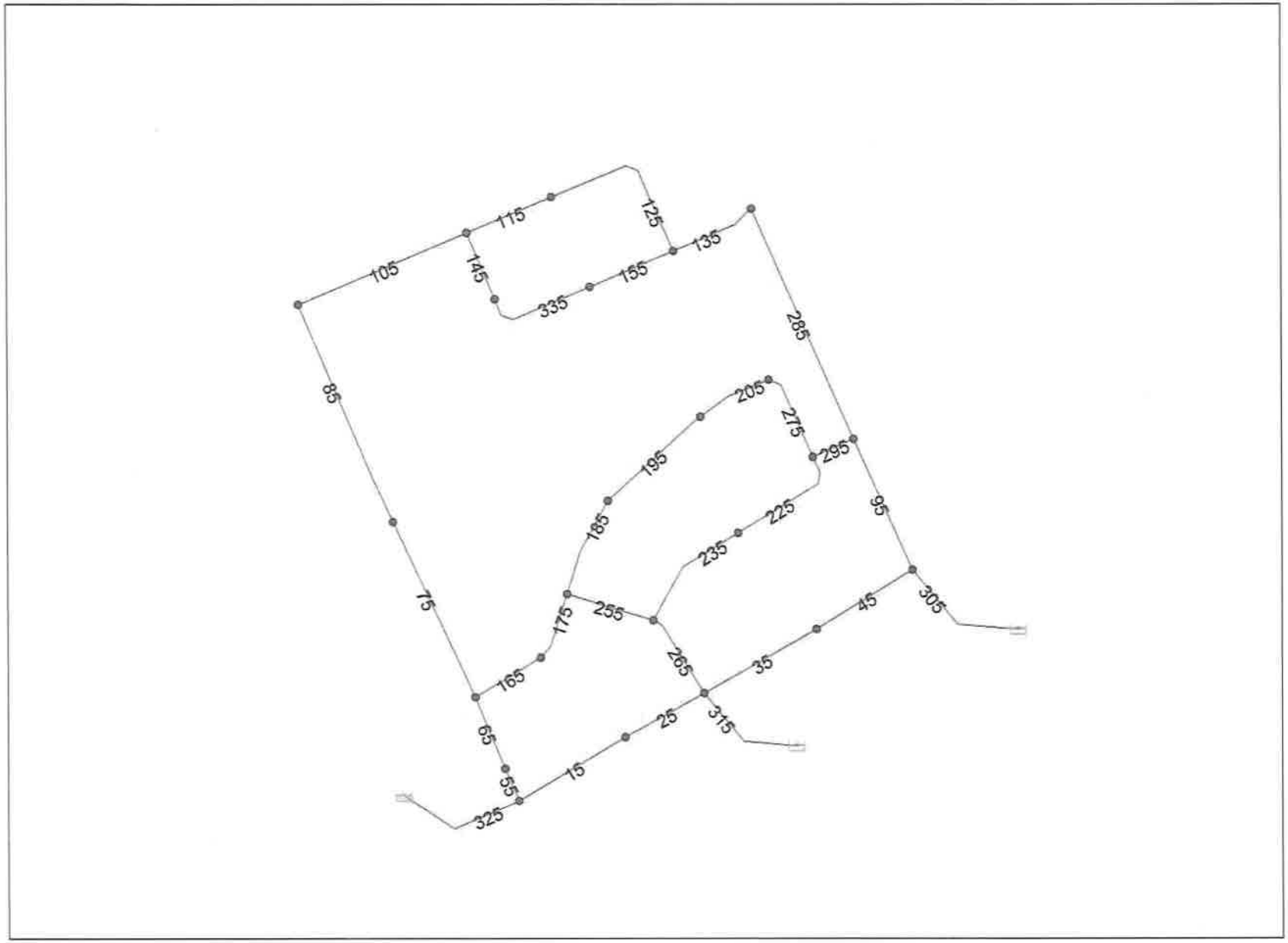
TRAILSEDGE II - Phase 2A and 2B - Node ID's



Prepared By: IBI Group

Date: Thursday, July 24, 2014

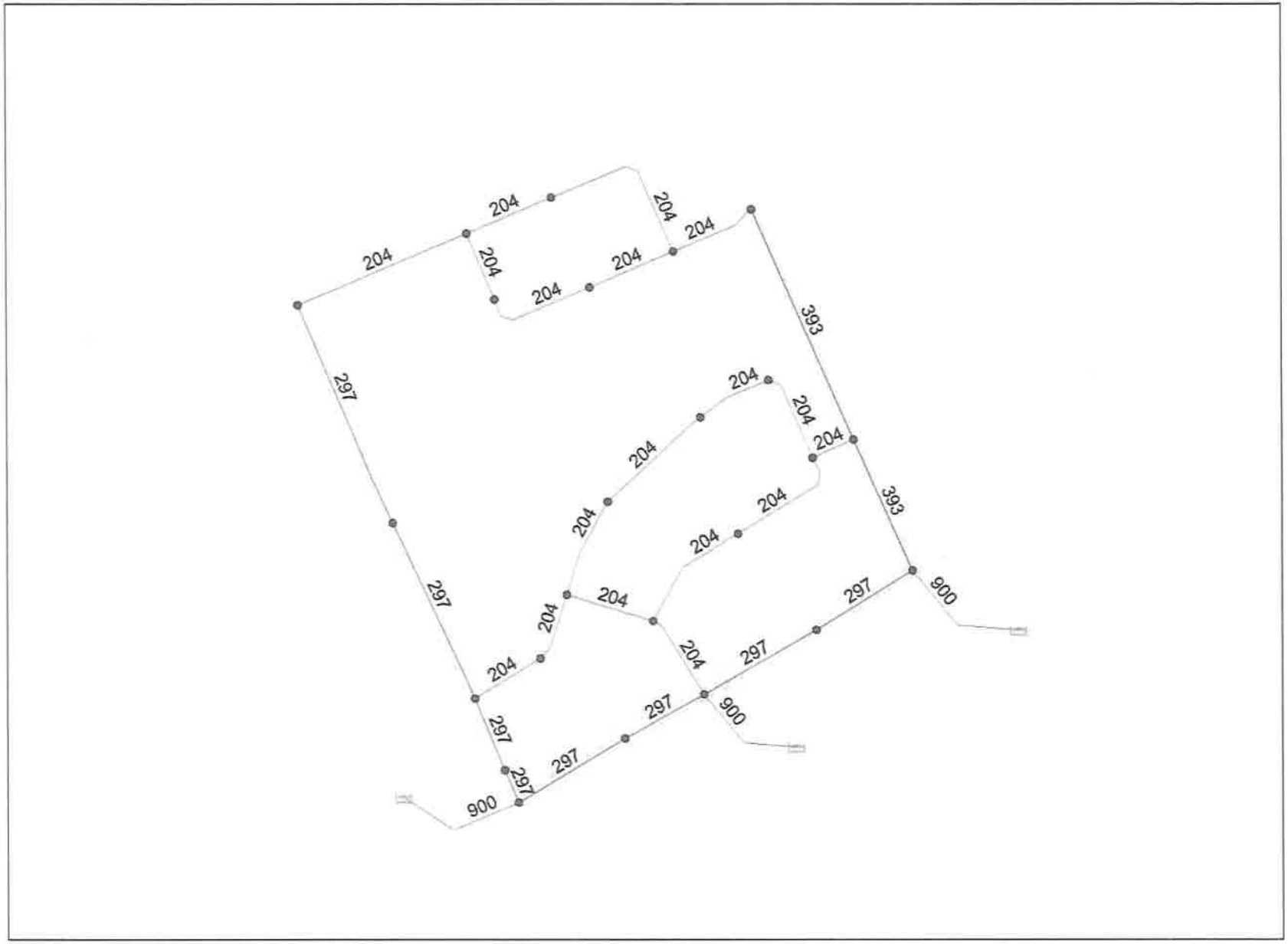
TRAILSEDGE II - Phase 2A and 2B - Pipe ID's



Prepared By: IBI Group

Date: Thursday, July 24, 2014

TRAILSEDGE II - Phase 2A and 2B - Pipe Sizes



Prepared By: IBI Group

Date: Thursday, July 24, 2014

Phase 2A and 2B - Junction Report - High Pressure Check (HGL = 134.7m)

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	10	0.11	87.23	134.70	465.17
2	100	0.11	87.60	134.70	461.54
3	1000	0.00	87.43	134.70	463.21
4	110	0.08	87.25	134.70	464.97
5	120	0.14	87.53	134.70	462.23
6	130	0.10	87.62	134.70	461.35
7	140	0.28	87.10	134.70	466.44
8	150	0.06	87.38	134.70	463.70
9	160	0.07	87.44	134.70	463.11
10	180	0.06	87.55	134.70	462.03
11	190	0.00	87.25	134.70	464.97
12	20	0.03	87.34	134.70	464.09
13	200	0.03	87.45	134.70	463.01
14	2000	0.00	87.69	134.70	460.66
15	30	0.12	87.10	134.70	466.44
16	3000	0.00	87.38	134.70	463.70
17	40	0.06	87.30	134.70	464.48
18	4000	0.00	87.46	134.70	462.91
19	50	0.11	87.35	134.70	463.99
20	5000	0.00	87.28	134.70	464.68
21	60	0.17	87.43	134.70	463.21
22	70	0.18	87.37	134.70	463.80
23	80	0.21	87.39	134.70	463.60
24	90	0.15	87.50	134.70	462.52

Phase 2A and 2B - Pipe Report - High Pressure Check (HGL = 134.7m)

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		105	3000	130	127.79	204.00	110.00	0.19	0.01	0.0000	0.000
2		115	130	140	64.17	204.00	110.00	0.13	0.00	0.0000	0.000
3		125	140	160	126.72	204.00	110.00	-0.15	0.00	0.0000	0.000
4		135	160	4000	62.75	204.00	110.00	-0.35	0.01	0.0000	0.00
5		145	130	200	50.08	204.00	110.00	-0.04	0.00	0.00	0.00
6		15	1000	110	86.75	297.00	120.00	0.03	0.000	0.00	0.00
7		155	150	160	63.45	204.00	110.00	-0.13	0.00	0.0000	0.000
8		165	20	40	53.61	204.00	110.00	0.25	0.01	0.0000	0.000
9		175	40	50	48.89	204.00	110.00	0.19	0.01	0.0000	0.000
10		185	50	70	71.41	204.00	110.00	0.18	0.01	0.0000	0.000
11		195	70	90	87.50	204.00	110.00	0.00	0.000	0.00	0.00
12		205	90	180	54.62	204.00	110.00	-0.15	0.00	0.0000	0.000
13		225	100	80	85.59	204.00	110.00	0.12	0.00	0.0000	0.000
14		235	60	80	88.03	204.00	110.00	0.09	0.00	0.00000	0.000
15		25	110	5000	63.21	297.00	120.00	-0.05	0.000	0.00	0.00
16		255	50	60	62.91	204.00	110.00	-0.11	0.00	0.00000	0.000
17		265	60	5000	62.86	204.00	110.00	-0.37	0.01	0.000	0.00
18		275	180	100	64.35	204.00	110.00	-0.21	0.01	0.0000	0.000
19		285	190	4000	175.51	393.00	120.00	0.35	0.00	0.00000	0.0000
20		295	190	100	30.96	204.00	110.00	0.44	0.01	0.0000	0.00
21		305	R-3	2000	0.10	900.00	130.00	0.86	0.00	0.00	0.00
22		315	R-2	5000	0.10	900.00	130.00	0.49	0.000	0.00	0.00
23		325	R-1	1000	90.47	900.00	130.00	0.73	0.00	0.00	0.00
24		335	200	150	79.03	204.00	110.00	-0.07	0.00	0.00000	0.000
25		35	5000	120	90.18	297.00	120.00	0.07	0.000	0.00	0.00
26		45	120	2000	78.85	297.00	120.00	-0.07	0.00	0.00	0.00
27		55	1000	10	24.60	297.00	120.00	0.70	0.01	0.0000	0.000
28		65	10	20	54.42	297.00	120.00	0.59	0.01	0.0000	0.000
29		75	20	30	135.38	297.00	120.00	0.31	0.00	0.0000	0.000
30		85	30	3000	165.50	297.00	120.00	0.19	0.00	0.0000	0.000
31		95	2000	190	100.01	393.00	120.00	0.78	0.01	0.0000	0.000

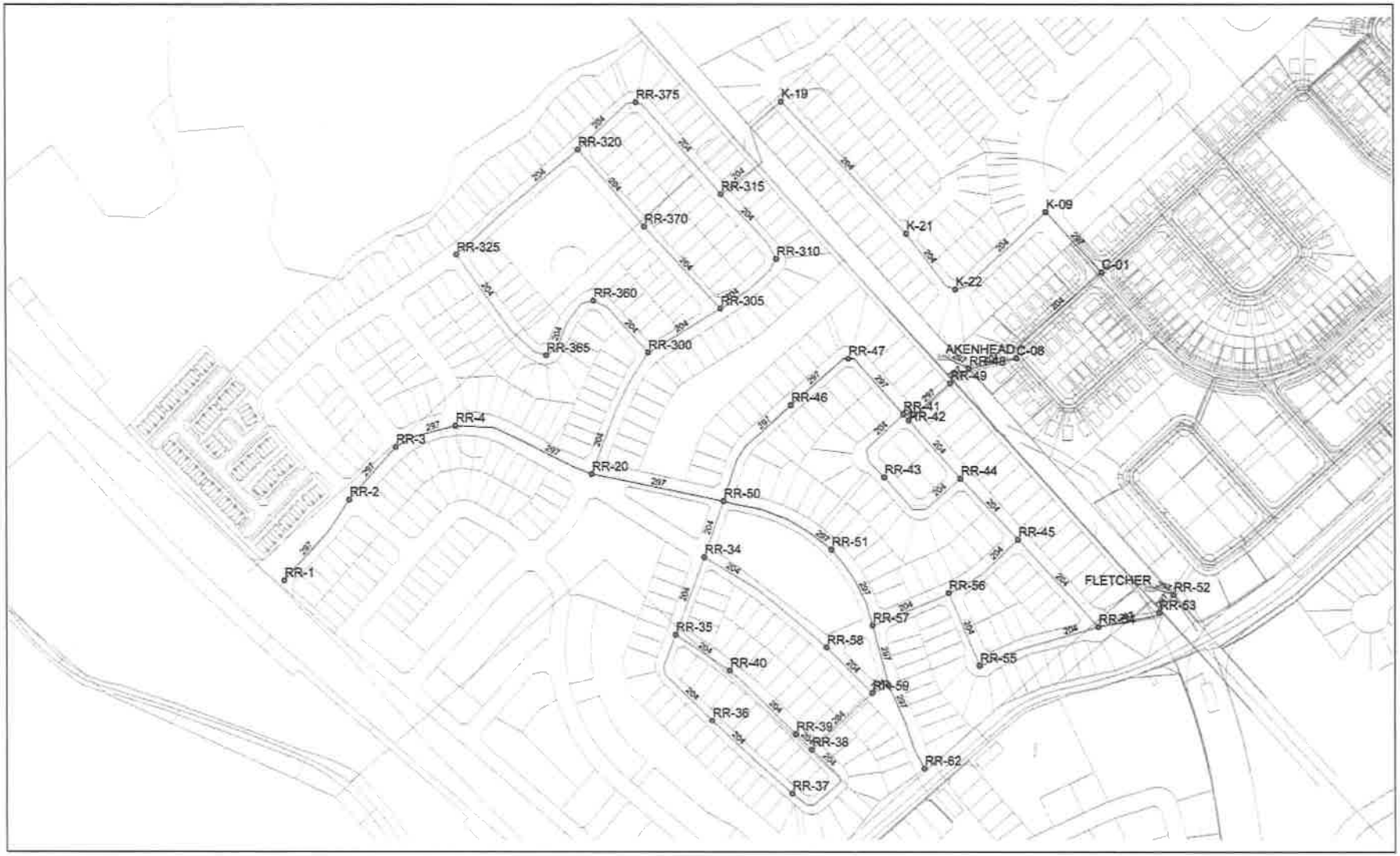
Phase 2A and 2B - Max Day + F/F - Fireflow Report (HGL = 116.9m, 115.8m, 114.7m)

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		10	167.16	100	269.14	114.70	4,713.45	1,255.47	10	139.98	101.51	1,255.54	1,255.54
2		100	167.28	100	250.29	113.14	457.50	457.49	100	139.96	101.88	457.50	457.50
3		110	167.21	100	269.77	114.78	89,424.30	1,151.57	110	139.98	101.53	1,151.63	1,151.63
4		120	167.34	120	265.38	114.61	1,017.51	1,017.46	120	139.97	101.81	1,017.51	1,017.51
5		130	167.24	130	213.44	109.40	257.94	257.94	130	139.96	101.90	257.94	257.94
6		140	167.69	140	196.85	107.19	223.62	223.62	140	139.96	101.38	223.62	223.62
7		150	167.14	150	195.91	107.37	223.59	223.59	150	139.96	101.66	223.59	223.59
8		160	167.17	160	225.87	110.49	292.13	292.13	160	139.96	101.72	292.14	292.13
9		180	167.14	180	216.64	109.66	266.78	266.78	180	139.96	101.83	266.78	266.78
10		20	167.07	130	267.17	114.60	1,154.62	775.76	20	139.97	101.62	775.77	775.77
11		200	167.07	200	196.03	107.45	223.76	223.76	200	139.96	101.73	223.76	223.76
12		30	167.31	30	258.57	113.49	441.37	441.37	30	139.96	101.38	441.37	441.37
13		40	167.14	40	248.47	112.66	379.70	379.70	40	139.96	101.58	379.70	379.70
14		50	167.28	50	249.60	112.82	397.42	397.39	50	139.96	101.63	397.39	397.39
15		60	167.41	60	253.63	113.31	451.67	451.66	60	139.96	101.71	451.67	451.67
16		70	167.45	70	214.79	109.29	257.89	257.89	70	139.96	101.65	257.89	257.89
17		80	167.52	80	227.76	110.63	296.37	296.37	80	139.96	101.67	296.37	296.37
18		90	167.38	90	206.00	108.52	241.83	241.83	90	139.96	101.78	241.83	241.83

Phase 2A and 2B - Peak Hour - Junction Report (HGL = 127.3m)

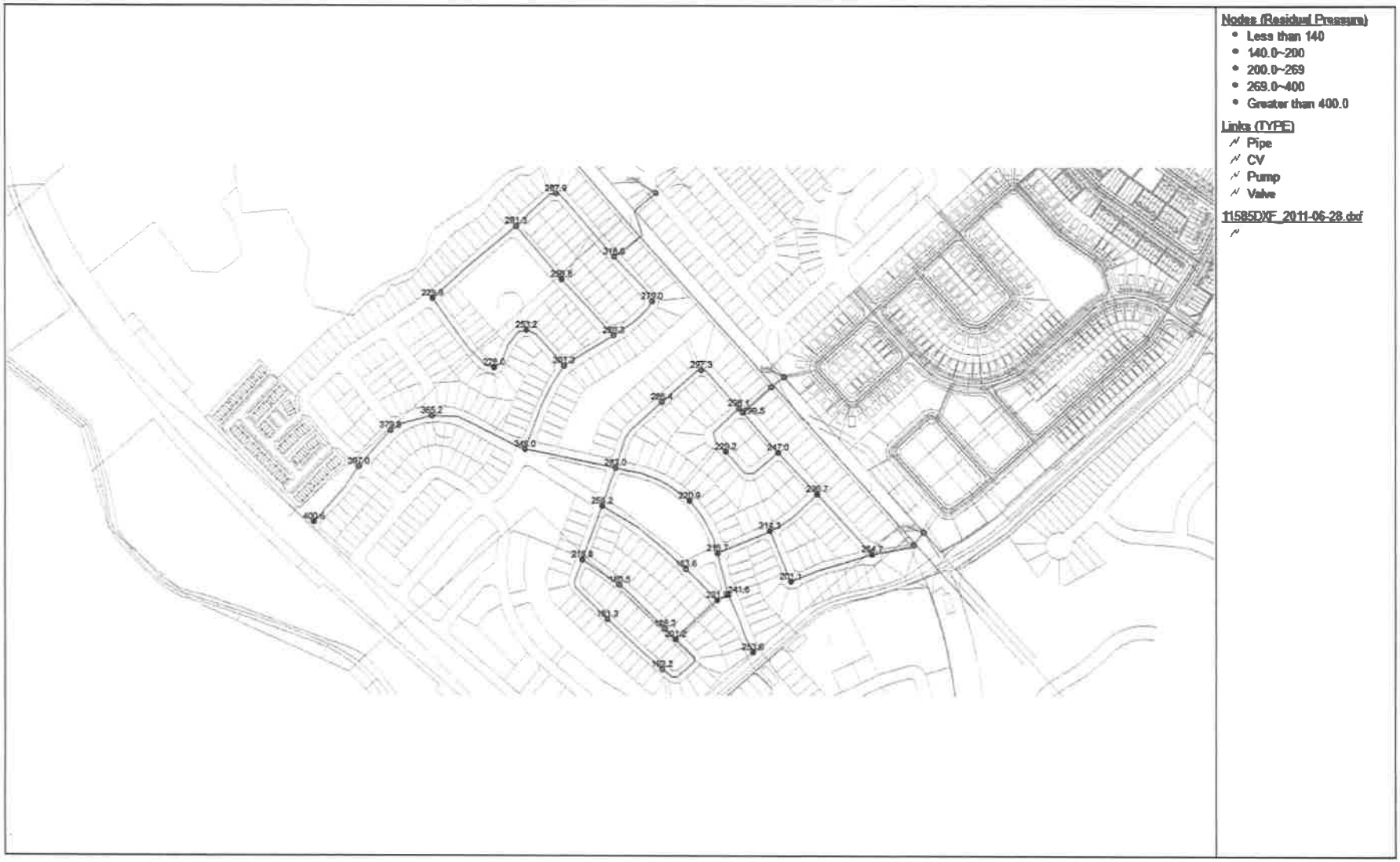
	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	10	0.30	87.23	127.30	392.65
2	100	0.61	87.60	127.30	389.01
3	1000	0.00	87.43	127.30	390.69
4	110	0.45	87.25	127.30	392.46
5	120	0.76	87.53	127.30	389.71
6	130	0.53	87.62	127.30	388.80
7	140	1.52	87.10	127.30	393.89
8	150	0.30	87.38	127.30	391.15
9	160	0.38	87.44	127.30	390.57
10	180	0.30	87.55	127.30	389.49
11	190	0.00	87.25	127.30	392.45
12	20	0.15	87.34	127.30	391.57
13	200	0.15	87.45	127.30	390.46
14	2000	0.00	87.69	127.30	388.15
15	30	0.68	87.10	127.30	393.91
16	3000	0.00	87.38	127.30	391.17
17	40	0.30	87.30	127.30	391.95
18	4000	0.00	87.46	127.30	390.39
19	50	0.61	87.35	127.30	391.45
20	5000	0.00	87.28	127.30	392.16
21	60	0.91	87.43	127.30	390.67
22	70	0.98	87.37	127.30	391.25
23	80	1.14	87.39	127.30	391.06
24	90	0.83	87.50	127.30	389.97

RR PHASE 3B



Date: Wednesday, July 16, 2014

RR PHASE 3B MAX DAY + FIRE- RESIDUAL PRESSURE



Date: Wednesday, July 16, 2014

Appendix B Wastewater Servicing

B.1 Sanitary Sewer Design Sheet

Stantec

SUBDIVISION: **Trails Edge Block 121**

DATE: 2026-10-17
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: MW

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401760

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / APARTMENT	1.8				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE						
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
Renaud Road (South)																																	
R24A	24	23	0.16	0	7	0	19	0.16	19	3.71	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.16	0.1	0.3	41.2	200	PVC	SDR 35	0.65	27.0	**1.03%**	0.85
R9B	9	23	0.15	0	12	0	32	0.15	32	3.68	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	0.15	0.0	0.4	33.5	200	PVC	SDR 35	0.65	27.0	**1.61%**	0.85
R23A	23	22	0.02	0	1	0	3	0.32	54	3.65	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.02	0.32	0.1	0.7	10.4	200	PVC	SDR 35	0.35	19.6	**3.79%**	0.62
R22A	22	21	0.08	0	4	0	11	0.40	65	3.63	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.08	0.40	0.1	0.9	24.2	200	PVC	SDR 35	0.42	21.7	**4.12%**	0.68
	21	20	0.00	0	0	0	0	0.40	65	3.63	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.40	0.1	0.9	14.9	200	PVC	SDR 35	0.33	19.3	**4.65%**	0.61
To Compass Street (East)																												200					
R4A	4	3	0.09	0	4	0	11	0.09	11	3.73	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.09	0.09	0.0	0.2	32.1	200	PVC	SDR 35	1.00	33.4	**0.48%**	1.05
R10A	10	9	0.15	0	10	0	27	0.15	27	3.69	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	0.15	0.1	0.4	41.7	200	PVC	SDR 35	0.65	27.0	**1.39%**	0.85
R9A	9	7	0.12	0	9	0	24	0.27	51	3.65	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.12	0.27	0.1	0.7	33.5	200	PVC	SDR 35	0.40	21.1	**3.30%**	0.67
R8A	8	7	0.08	0	4	0	11	0.08	11	3.73	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.08	0.08	0.0	0.2	29.3	200	PVC	SDR 35	0.65	27.0	**0.59%**	0.85
R7A	7	3	0.30	0	15	0	41	0.66	103	3.59	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.30	0.66	0.2	1.4	60.0	200	PVC	SDR 35	0.40	21.1	**6.68%**	0.67
	3	2	0.00	0	0	0	0	0.75	113	3.58	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.75	0.2	1.6	19.3	200	PVC	SDR 35	0.40	21.1	**7.40%**	0.67
R2A	2	1	0.04	0	2	0	5	0.79	119	3.58	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.04	0.79	0.3	1.6	30.0	200	PVC	SDR 35	0.40	21.1	**7.75%**	0.67
R11A	11	1	0.11	0	6	0	16	0.11	16	3.71	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.11	0.11	0.0	0.2	33.4	200	PVC	SDR 35	0.65	27.0	**0.85%**	0.85
	1	206A	0.00	0	0	0	0	0.90	135	3.56	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.90	0.3	1.9	10.3	200	PVC	SDR 35	0.40	21.1	**8.77%**	0.67
	206A	205A	0.00	0	0	0	0	0.90	135	3.56	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.90	0.3	1.9	11.9	200	PVC	SDR 35	0.67	27.4	**6.78%**	0.86
																												200					

B.2 Background Report Excerpts

REPORT
PROJECT: 31855-5.2.2

DESIGN BRIEF
MINTO TRAILSEDGE PHASE II

Prepared for MINTO COMMUNITIES INC.
by IBI GROUP
REVISED FEB 2015
REVISED MAY 2015

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

The proposed lands were designed, as part of the EUC, to be serviced by the Forest Valley Pumping Station (FVPS) which was commissioned in 2005. The EUC Infrastructure Servicing Update shows the lands ultimately being serviced by the existing 600mm diameter sanitary trunk sewer on Renaud Road, currently constructed up to the intersection of Glen Livett Avenue. This sewer has also been sized to collect wastewater from future lands to the north and east of the proposed site as part of the EUC Infrastructure Servicing Update recommendations.

3.2 Proposed Wastewater Plan

As mentioned in Section 3.1, wastewater flows from the Trailsedge development, east of Glen Livett Avenue, are to be directed to the Renaud Road Trunk Sanitary Sewer. A 525 mm sanitary sewer will be extended easterly from an existing cap on Renaud Road to Street 'A'. The Trunk sewer is proposed to run north on Street 'A' from Renaud Road to Street 'I', where a stubs for future connections are provided to the north and south. The trunk runs east on Street 'I' and south on Street 'J' towards the Belcourt Boulevard extension. Capped stubs are provided on Belcourt Boulevard for future connections to the North and South.

Proposed houses on Renaud Road are serviced by a new a Sanitary sewer which drains towards Street 'M', and ultimately towards Street 'A'. The new sanitary sewer on Renaud Road, east of Street 'A', is designed at a depth to adequately service the proposed units on the North side by gravity. Connections from existing houses on the south may be permitted, although pumping may be required.

Additionally, the Notre Dame Des Champs French Catholic School currently under construction is approved with a temporary outlet to the south through existing Ashcroft Eastboro lands. Residual capacity calculations have been completed by Genivar on behalf of the school board. However, the ultimate outlet for school block is to Renaud Road. The school has provided a capped stub to its north property line for connection to Renaud. A manhole with drop pipe is provided on the Renaud Road trunk sanitary sewer at the connection location.

3.3 Design Criteria

All sanitary sewers within the proposed development are designed in accordance with current City of Ottawa criteria, including, but not limited to the following:

Population:	3.4 persons per single family unit
	2.7 persons per semi detached or townhouse unit
Domestic Flow:	350 l/cap per day
Domestic Peak Factor:	Harmon Formula
Institutional:	50,000 l/d/Ha
Institutional Peak Factor:	1.5
Extraneous Flow:	0.28 l/s/Ha
Minimum Pipe Size:	200 mm diameter
Maximum Velocity:	3.0 m/s
Minimum Velocity:	0.6 m/s

Detailed design sheets and corresponding drainage area plans have been prepared and are located in **Appendix B**.

IBI GROUP
IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: TRAILSEDGE II
LOCATION: CITY OF OTTAWA
CLIENT: MINTO COMMUNITIES INC.

LOCATION				RESIDENTIAL									ICI AREAS					INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
				UNIT TYPES					POPULATION		CUMULATIVE FLOW		AREA (ha)														
													INSTITUTION		COMMERCIAL												
STREET	AREA #	FROM MH	TO MH	SF	SD	TH	APT	Area (Ha)	IND	CUM	Peaking Factor	Peak Flow (L/s)	IND	CUM	IND	CUM	Pk. Flow (L/s)	Incr. Area (Ha)	Cum. Area (Ha)	Flow (L/s)	(L/s)	Capacity (L/s)	Pipe Size (mm)	Length (m)	Slope (%)	Vel (full) (m/s)	Avail. Cap. L/s	Avail. Cap. (%)
	Stub 1A	Stub 1A	MH35A	0				40.48	2223.0	2223.0	3.55	31.97	0.80	0.80	1.52	1.52	2.01	42.80	42.80	11.98	45.97	70.84	375	26.86	0.15	0.62	24.87	35.11
Axis Street		MH35A	Stub W	0				0.00	0.0	0.0	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.63	200	32.31	0.70	0.88	28.63	100.00
Belcourt Boulevard	35A, 35B	MH35A	MH54A	0				1.15	0.0	2223.0	3.55	31.97	0.00	0.80	0.00	1.52	2.01	1.15	43.95	12.31	46.29	70.84	375	82.31	0.15	0.62	24.55	34.66
Belcourt Boulevard	54	MH54A	MH55A	0				0.24	0.0	2223.0	3.55	31.97	0.00	0.80	0.00	1.52	2.01	0.24	44.19	12.37	46.36	70.84	375	76.74	0.15	0.62	24.48	34.56
	Stub 1B	Stub 1B	MH55A	0				6.38	509.0	509.0	3.97	8.19	0.00	0.00	0.00	0.00	0.00	6.38	6.38	1.79	9.98	50.44	300	15.90	0.25	0.69	40.46	80.22
Belcourt Boulevard	55	MH55A	MH55C	0				0.21	0.0	2732.0	3.48	38.48	0.00	0.80	0.00	1.52	2.01	0.21	50.78	14.22	54.71	70.84	375	68.67	0.15	0.62	16.13	22.77
Belcourt Boulevard	55C	MH55C	MH56A					0.15	0.0	2732.0	3.48	38.48	0.00	0.80	0.00	1.52	2.01	0.15	50.93	14.26	54.75	70.84	375	52.59	0.15	0.62	16.09	22.71
		Trunk 2	MH56A	0				27.73	1480.0	1480.0	3.68	22.09	3.43	3.43		0.00	2.98	31.16	31.16	8.72	33.79	50.44	300	24.10	0.25	0.69	16.65	33.01
Locust Ridge	56, 56B, 56C	MH56A	MH 101A	0					0.0	4212.0	3.31	56.53	0.00	4.23		1.52	4.99	0.92	82.86	23.20	84.72	103.03	450	57.60	0.12	0.63	18.31	17.77
Yellow Birch Street	112A	MH 112A	MH 101A	5					17.0	17.0	4.00	0.28	0.00	0.00		0.00	0.00	0.28	0.28	0.08	0.36	34.22	200	66.00	1.00	1.06	33.86	98.95
Locust Ridge	101	MH 101A	MH102A	4					13.6	4242.6	3.31	56.89	0.00	4.23		1.52	4.99	0.39	83.53	23.39	85.27	103.03	450	63.27	0.12	0.63	17.76	17.24
Locust Ridge	102	MH102A	MH 103A	5					17.0	4259.6	3.31	57.09	0.00	4.23		1.52	4.99	0.58	84.11	23.55	85.63	103.03	450	61.68	0.12	0.63	17.40	16.89
Locust Ridge	103	MH 103A	MH 104A	0					0.0	4259.6	3.31	57.09	0.00	4.23		1.52	4.99	0.02	84.13	23.56	85.64	103.03	450	11.48	0.12	0.63	17.39	16.88
Locust Ridge	104	MH 104A	MH 105A	0					0.0	4259.6	3.31	57.09	0.00	4.23		1.52	4.99	0.08	84.21	23.58	85.66	103.03	450	65.88	0.12	0.63	17.37	16.86
Yellow Birch Street	112B	MH 112A	MH 113A	2					6.8	6.8	4.00	0.11	0.00	0.00		0.00	0.00	0.18	0.18	0.05	0.16	27.59	200	11.39	0.65	0.85	27.43	99.42
Yellow Birch Street	113	MH 113A	MH 114A	10					34.0	40.8	4.00	0.66	0.00	0.00		0.00	0.00	0.42	0.60	0.17	0.83	24.19	200	57.72	0.50	0.75	23.36	96.58
Yellow Birch Street	114	MH 114A	MH 105A	12					40.8	81.6	4.00	1.32	0.00	0.00		0.00	0.00	0.53	1.13	0.32	1.64	24.19	200	66.44	0.50	0.75	22.55	93.24
Yellow Birch Street	105	MH 105A	MH 106A	0					0.0	4341.2	3.30	58.06	0.00	4.23	0.00	1.52	4.99	0.10	85.44	23.92	86.97	103.03	450	62.56	0.12	0.63	16.06	15.58
Yellow Birch Street	106	MH 106A	STUB	0					0.0	4341.2	3.30	58.06	0.00	4.23	0.00	1.52	4.99	0.11	85.55	23.95	87.01	103.03	450	48.05	0.12	0.63	16.02	15.55
Refer to DSEL Detail Design for Sanitary Sewer between MH 204A and Stub on Yellow Birch Street																												
Compass Street		MH 204A	MH 205A	0					0.0	5396.8	3.21	70.27	0.00	4.23		1.52	4.99	0.18	105.60	29.57	104.83	148.80	525	75.68	0.11	0.67	43.97	29.55
Enclave Walk	301	MH 301A	MH 303A	17					57.8	57.8	4.00	0.94	0.00	0.00		0.00	0.00	0.82	0.82	0.23	1.17	27.59	200	114.47	0.65	0.85	26.42	95.76
Enclave Walk	303	MH 303A	MH 304A	1					3.4	61.2	4.00	0.99	0.00	0.00		0.00	0.00	0.10	0.92	0.26	1.25	24.19	200	38.40	0.50	0.75	22.94	94.84
Pin Cherry Grove	409	MH 314A	MH 304A	7					23.8	23.8	4.00	0.39	0.00	0.00		0.00	0.00	0.33	0.33	0.09	0.48	27.59	200	39.96	0.65	0.85	27.11	98.25
Pin Cherry Grove	304	MH 304A	MH 305A	9					30.6	115.6	4.00	1.87	0.00	0.00		0.00	0.00	0.42	1.67	0.47	2.34	20.24	200	72.34	0.35	0.62	17.90	88.45
Enclave Walk	307	MH 307A	MH 308A	6					20.4	20.4	4.00	0.33	0.00	0.00		0.00	0.00	0.31	0.31	0.09	0.42	27.59	200	65.34	0.65	0.85	27.17	98.49
Enclave Walk	308	MH 308A	MH 309A	1					3.4	23.8	4.00	0.39	0.00	0.00		0.00	0.00	0.09	0.40	0.11	0.50	27.59	200	11.33	0.65	0.85	27.09	98.18
Enclave Walk	309	MH 309A	MH 310A	3					10.2	34.0	4.00	0.55	0.00	0.00		0.00	0.00	0.31	0.71	0.20	0.75	20.24	200	31.99	0.35	0.62	19.49	96.30
Enclave Walk	310	MH 310A	MH 311A	4					13.6	47.6	4.00	0.77	0.00	0.00		0.00	0.00	0.32	1.03	0.29	1.06	20.24	200	30.19	0.35	0.62	19.18	94.77
Enclave Walk	311	MH 311A	MH 312A	14					47.6	95.2	4.00	1.54	0.00	0.00		0.00	0.00	1.00	2.03	0.57	2.11	20.24	200	81.91	0.35	0.62	18.13	89.58
Enclave Walk	312	MH 312A	MH 313A	5					17.0	112.2	4.00	1.82	0.00	0.00		0.00	0.00	0.32	2.35	0.66	2.48	20.24	200	42.02	0.35	0.62	17.76	87.76
Enclave Walk	313	MH 313A	MH 305A	2					6.8	119.0	4.00	1.93	0.00	0.00		0.00	0.00	0.20	2.55	0.71	2.64	20.24	200	28.42	0.35	0.62	17.60	86.94
Enclave Walk	305	MH 305A	MH 306A	4					13.6	248.2	4.00	4.02	0.00	0.00		0.00	0.00	0.37	4.59	1.29	5.31	21.64	200	45.01	0.40	0.67	16.33	75.48
Enclave Walk	306A,306B	MH 306A	MH 205A	4				0.12	21.4	269.6	4.00	4.37	0.00	0.00		0.00	0.00	0.47	5.06	1.42	5.79	21.64	200	65.82	0.40	0.67	15.85	73.26
Institutional Block 249	206	MH 206A	MH 205A	0					0.0	0.0	4.00	0.00	0.79	0.79		0.00	0.69	0.63	0.63	0.18	0.86	24.19	200	14.50	0.50	0.75	23.33	96.44
Compass Street		MH 205A	MH 411A	0					0.0	5666.4	3.19	73.32	0.00	5.02		1.52	5.68	0.18	111.47	31.21	110.21	148.80	525	81.85	0.11	0.67	38.59	25.94
School Block	STUB 2B	MH 406A	MH 408A	4					0.0	0.0	4.00	0.00	0.00	0.00	5.07	5.07	4.40	5.07	5.07	1.42	5.82	34.22	200	11.93	1.00	1.06	28.40	82.99
Renaud Road	STUB 2A, 408A-N	MH408A	MH 409A	11				1.79	153.8	153.8	4.00	2.49	0.00	0.00		5.07	4.40	2.35	7.42	2.08	8.97	21.64	200	120.00	0.40	0.67	12.67	58.56
Renaud Road	409A-C	MH 409A	MH 410A	7				0.34	45.9	199.7	4.00	3.24	0.00	0.00		5.07	4.40	0.86	8.28	2.32	9.96	21.64	200	120.00	0.40	0.67	11.68	53.98
Renaud Road	410A-C	MH 410A	MH 411A	6				1.08	90.6	290.3	4.00	4.70	0.00	0.00		5.07	4.40	1.39	9.67	2.71	11.81	21.64	200	120.00	0.40	0.67	9.83	45.43
EXISTING NDC SCHOOL BLOCK	411C	EX MH	MH 411B	0					0.0	0.0	4.00	0.00	1.98	1.98		0.00	1.72	1.98	1.98	0.55	2.27	48.39	200	16.68	2.00	1.49	46.12	95.30
EXISTING NDC SCHOOL BLOCK		MH 411B	MH 411A	1					3.4	3.4	4.00	0.06	2.98	2.98		0.00	2.59	0.00	1.98	0.55	3.20	48.39	200	14.35	2.00	1.49	45.19	93.38
Renaud Road	412C	MH411A	MH413A	0					0.0	5960.1	3.17	76.62	0.00	2.98		5.07	6.99	0.29	123.41	34.55	118.16	202.56	600	120.76	0.10	0.69	84.40	41.67
High Level Sanitary	413A,413B	MH413A	EX MH	0					0.0	0.0	4.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	1.07	0.30	0.30	27.59	200	127.58	0.65	0.85	27.29	98.91
Renaud Road	413C	MH413A	EX MH	0					0.0	5960.1	3.17	76.62	0.00	2.98		5.07	6.99	0.32	124.80	34.94	118.55	202.56	600	127.58	0.10	0.69	84.01	41.47
									5960.1	TRUE								124.95	FALSE									

Designed:	RM
Checked:	DGY

Revision	Date
Trailsedge - Revised per City Comments	9/16/2014
Trailsedge - Revised per City Comments	7/25/2014
Revised for Renaud Road Cost Sharing	7/8/2014
Trailsedge - Issued to City for Review	3/20/2014
Renaud Road Submissions #2	3/13/2014
Renaud Road Submission #1	12/12/2013
Issued for City Review	2/1/2012

Dwg Reference:	File Reference:	Date:	Sheet No.
31855-501	31855 - 5.7	9/6/2012	1

Population Per Unit:
- 3.4 Singles
- 2.7 Townhouse / Semi-Detached
- 2.3 Stacked Towns
- 65.0 Low/Medium Density (65 p/Ha)

Avg. Per Capita Flow Rate: 350 L/day
Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands
Note: Commercial flow was calculated using as an equivalent population.
(area * commercial flow) / avg per capita flow rate

ICI Rates
- Institutional 50,000 L/Ha/day
- Commercial 50,000 L/Ha/day
- Industrial 35,000 L/Ha/day

Infiltration Allowance: 0.28 l/sec/Ha

Assumed pipe roughness coefficient = 0.013



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2015

Plan Number _____

LEGEND :

- AREA NUMBER
- POPULATION
- AREA IN HECTARES
- AREA NUMBER
- NON RESIDENTIAL USE
  INST - INSTITUTION
  COM - COMMERCIAL
- AREA IN HECTARES

EXTERNAL FLOW

A = 51.69	AREA Ha
POP. = 3748	POPULATION
INST. = 2.88	INSTITUTION AREA
COM = 1.61	COMMERCIAL AREA

RESIDENTIAL POP
3.4 PPU SINGLE
2.7 PPU TOWNS / SEMI
65 PPHa VACANT LANDS

COMMERCIAL 50 000 l/Ha/d
INSTITUTION 50 000 l/Ha/d
INFILTRATION ALLOWANCE 0.28l/s/Ha

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	ISSUED FOR MOE	DGY	15: 05: 04
8	REVISED PER CITY COMMENTS	DGY	15: 02: 12
7	REVISED PER CITY COMMENTS	DGY	15: 01: 26
6	REVISED PER CITY COMMENTS	DGY	14: 11: 07
5	REVISED PER CITY COMMENTS	DGY	14: 09: 16
4	REVISED PER CITY COMMENTS	DGY	14: 07: 28
3	REVISED PER NEW LEGAL	DGY	14: 04: 02
2	REVISED PER MASTER SERVICING STUDY	DGY	14: 03: 24
1	ISSUED FOR CITY REVIEW	DGY	13: 02: 01

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title

TRAILSEDGE II
1578051 ONTARIO INC.

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2015/05/04
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale: 1 : 1000

Design	Date
R.M.	FEB 2014
Drawn: E.H.	Checked: D.G.Y.
Project No.: 31855	Drawing No.: 501

D07-16-07-0018PH3

16688

J:\31855-TrailEdge\5.0 Drawings\5Plot\Yannoulopoulos\501 SANITARY DRAINAGE AREA PLAN.dwg Layout: Name: SANITARY DRAINAGE AREA PLAN Plot Style: AIA STANDARD-TULLCTB Plot Scale: 1:25.4 Plotted At: 5/4/2015 11:33 AM Last Saved By: emenia

Appendix C Stormwater Management

C.1 Storm Sewer Design Sheet

Stantec

Trailsedge West - Block 121

DATE: 2026-10-29
REVISION: 3
DESIGNED BY: WAJ
CHECKED BY: -

FILE NUMBER: 160401760

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	TIME OF FLOW (min)
L203A	203	202	0.09	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.071	0.071	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	15.1	32.6	300	300	CIRCULAR	PVC	SDR 35	0.65	77.5	**19.53%**	1.10	0.76
																				10.76																		
L204A	204	202	0.09	0.00	0.00	0.00	0.00	0.76	0.00	0.00	0.00	0.068	0.068	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	14.6	24.7	300	300	CIRCULAR	PVC	SDR 35	0.65	77.5	**18.82%**	1.10	0.58
																				10.58																		
	202	201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.139	0.000	0.000	0.000	0.000	0.000	0.000	10.76	74.01	100.34	117.61	171.90	0.0	0.0	28.6	10.4	300	300	CIRCULAR	PVC	SDR 35	0.40	60.8	**47.11%**	0.86	0.24
L201A	201	200	0.10	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.081	0.220	0.000	0.000	0.000	0.000	0.000	0.000	11.00	73.17	99.20	116.26	169.92	0.0	0.0	44.8	38.3	375	375	CIRCULAR	PVC	SDR 35	0.40	104.3	**42.96%**	0.99	0.79
																				11.79									525	525								
L102A	102	101	0.05	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.031	0.031	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	6.7	23.7	300	300	CIRCULAR	PVC	SDR 35	0.40	60.8	**11.00%**	0.86	0.84
																				10.84																		
L106A	106	105	0.11	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.095	0.095	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	20.2	32.6	300	300	CIRCULAR	PVC	SDR 35	0.35	56.9	**35.48%**	0.81	0.88
L105A	105	103	0.10	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.080	0.175	0.000	0.000	0.000	0.000	0.000	0.000	10.88	73.60	99.79	116.95	170.93	0.0	0.0	35.7	33.5	300	300	CIRCULAR	PVC	SDR 35	0.35	56.9	**62.75%**	0.81	0.75
																				11.63																		
L104A	104	103	0.08	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.058	0.058	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	12.3	20.1	300	300	CIRCULAR	PVC	SDR 35	0.40	60.8	**20.29%**	0.86	0.60
																				10.60																		
L103A	103	101	0.14	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.101	0.333	0.000	0.000	0.000	0.000	0.000	0.000	11.63	71.07	96.31	112.86	164.92	0.0	0.0	65.8	63.0	375	375	CIRCULAR	PVC	SDR 35	0.30	89.7	**73.35%**	0.85	1.28
																				12.91																		
L101A	101	100	0.08	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.066	0.430	0.000	0.000	0.000	0.000	0.000	0.000	12.91	67.18	90.97	106.57	155.69	0.0	0.0	80.3	15.7	450	450	CIRCULAR	CONCRETE	100-D	0.20	133.0	**60.35%**	0.81	0.36
	100	100A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.430	0.000	0.000	0.000	0.000	0.000	0.000	13.27	66.18	89.60	104.96	153.33	0.0	0.0	79.1	25.2	450	450	CIRCULAR	CONCRETE	100-D	0.20	133.0	**59.45%**	0.81	0.58
	100A	409	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.430	0.000	0.000	0.000	0.000	0.000	0.000	13.85	64.63	87.48	102.47	149.67	0.0	0.0	77.2	6.4	450	450	CIRCULAR	CONCRETE	100-D	0.20	133.0	**58.06%**	0.81	0.15
	409	409A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.430	0.000	0.000	0.000	0.000	0.000	0.000	13.99	64.25	86.96	101.86	148.77	0.0	0.0	76.8	12.0	450	450	CIRCULAR	CONCRETE	100-D	0.51	212.4	**36.15%**	1.29	0.20
																				14.19									1500	1500								

C.2 Sample PCSWMM Output Files

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           03/05/2026
START_TIME           00:00:00
REPORT_START_DATE    03/05/2026
REPORT_START_TIME    00:00:00
END_DATE             03/06/2026
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         1
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              8

[FILES]
;;Interfacing Files
USE HOTSTART "C:\Users\wajohnson\OneDrive -
Stantec\Desktop\PCSWMM\160401760\2026-10-28\hotstart\Block 121_100C_HSF.HSF"

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
RG-1             INTENSITY 0:10     1.0      TIMESERIES 100YRCHI

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width
%Slope   CurbLen  SnapPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
410A-1           RG-1             RENAUD-E         0.088629 67.143   76       3
    0
410C-1           RG-1             RENAUD-W         0.057447 62.857   46       3
    0
L101A            RG-1             C101A-1          0.077723 88.571   28       6
    0
L102A            RG-1             C102A-1          0.04762  61.429   22       3
    0
L103A            RG-1             C103A-1          0.144792 74.286   50       2
    0
L104A            RG-1             C104A-1          0.078326 77.143   27       5
    0
L105A            RG-1             C105A-1          0.101915 85.714   44       4
    0
L106A            RG-1             C106A-1          0.107765 94.286   66       5
    0
L201A            RG-1             C201A-1          0.102077 82.857   36       3
    0
L203A            RG-1             C203A-1          0.087589 87.143   36       5
    0
L204A            RG-1             C204A-1          0.086634 80       32       3
    0
MEL-1            RG-1             MELODIE          0.059939 81.429   41       6
    0
NORTH-1          RG-1             CREEK            0.091667 14.286   68       3
    0
NORTH-2          RG-1             CREEK            0.062414 7.143    91       7
    0
S404-1           RG-1             COMPASS          0.084853 62.857   71       6
    0
WEST-1           RG-1             MELODIE          0.017276 0        91       30
    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
410A-1           0.013      0.25       1.57       4.67       0          OUTLET
410C-1           0.013      0.25       1.57       4.67       0          OUTLET
```

```
L101A            0.013      0.25       1.57       4.67       0          OUTLET
L102A            0.013      0.25       1.57       4.67       0          OUTLET
L103A            0.013      0.25       1.57       4.67       0          OUTLET
L104A            0.013      0.25       1.57       4.67       0          OUTLET
L105A            0.013      0.25       1.57       4.67       0          OUTLET
L106A            0.013      0.25       1.57       4.67       0          OUTLET
L201A            0.013      0.25       1.57       4.67       0          OUTLET
L203A            0.013      0.25       1.57       4.67       0          OUTLET
L204A            0.013      0.25       1.57       4.67       0          OUTLET
MEL-1            0.013      0.25       1.57       4.67       0          OUTLET
NORTH-1          0.013      0.25       1.57       4.67       0          OUTLET
NORTH-2          0.013      0.25       1.57       4.67       0          OUTLET
S404-1           0.013      0.25       1.57       4.67       0          OUTLET
WEST-1           0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
410A-1           76.2       13.2       4.14       7          0
410C-1           76.2       13.2       4.14       7          0
L101A            76.2       13.2       4.14       7          0
L102A            76.2       13.2       4.14       7          0
L103A            76.2       13.2       4.14       7          0
L104A            76.2       13.2       4.14       7          0
L105A            76.2       13.2       4.14       7          0
L106A            76.2       13.2       4.14       7          0
L201A            76.2       13.2       4.14       7          0
L203A            76.2       13.2       4.14       7          0
L204A            76.2       13.2       4.14       7          0
MEL-1            76.2       13.2       4.14       7          0
NORTH-1          76.2       13.2       4.14       7          0
NORTH-2          76.2       13.2       4.14       7          0
S404-1           76.2       13.2       4.14       7          0
WEST-1           76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
200              84.136     FIXED      84.52            NO
409A             83.7       FIXED      84.15            NO
COMPASS          86.6       FREE                        NO
CREEK            0          FREE                        NO
MELODIE          86.79      FREE                        NO
OF1              87.13      FREE                        NO
OF2              87.15      FREE                        NO
RENAUD-E         87.46      FREE                        NO
RENAUD-W         87.06      FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params
      SurDepth Fevap    Psi      Ksat     IMD

;;-------------- -------- ---------- ---------- ------------
---------------------------- -------- -------- -------- -------- --------
100              83.885   3.162      0          FUNCTIONAL  0          0
1.13     0        0
100A             83.804   3.417      0          FUNCTIONAL  0          0
1.13     0        0
101              83.976   3.106      0          FUNCTIONAL  0          0
1.13     0        0
102              84.221   2.913      0          FUNCTIONAL  0          0
1.13     0        0
103              84.238   2.928      0          FUNCTIONAL  0          0
1.13     0        0
104              84.393   2.704      0          FUNCTIONAL  0          0
1.13     0        0
105              84.43    2.762      0          FUNCTIONAL  0          0
1.13     0        0
106              84.604   2.668      0          FUNCTIONAL  0          0
1.13     0        0
201              84.289   3.008      0          FUNCTIONAL  0          0
1.13     0        0
202              84.406   2.838      0          FUNCTIONAL  0          0
1.13     0        0
203              84.647   2.654      0          FUNCTIONAL  0          0
1.13     0        0
204              84.596   2.526      0          FUNCTIONAL  0          0
1.13     0        0
409              83.761   3.199      0          FUNCTIONAL  0          0
1.13     0        0
C101A-1            85.62    1.63       0          TABULAR     C101A
      0        0
C102A-1            85.67    1.63       0          TABULAR     C102A
      0        0
C103A-1            85.72    1.63       0          TABULAR     C103A
      0        0
C104A-1            85.62    1.61       0          TABULAR     C104A
      0        0
C105A-1            85.62    1.73       0          TABULAR     C105A
      0        0
C106A-1            85.65    1.63       0          TABULAR     C106A
      0        0
C201A-1            85.69    1.63       0          TABULAR     C201A
      0        0
C203A-1            85.69    1.63       0          TABULAR     C203A
      0        0
C204A-1            85.65    1.63       0          TABULAR     C204A
      0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
 OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ----------
```

```
---------- ---------- ---------- ----------
Pipe_16          409              409A             12.663     0.013      83.761
 83.7       0          0
Pipe_16_(1)      100A             409              6.38       0.013      83.804
 83.791     0          0
Pipe_17          100              100A             25.242     0.013      83.885
 83.834     0          0
Pipe_18          101              100              15.723     0.013      83.976
 83.945     0          0
Pipe_19          102              101              23.743     0.013      84.221
 84.126     0          0
Pipe_20          103              101              62.995     0.013      84.238
 84.051     0          0
Pipe_21          105              103              33.469     0.013      84.43
 84.313     0          0
Pipe_22_(1)      204              202              24.659     0.013      84.596
 84.436     0          0
Pipe_23          202              201              10.363     0.013      84.406
 84.364     0          0
Pipe_24          201              200              38.297     0.013      84.289
 84.136     0          0
Pipe_25          203              202              32.564     0.013      84.647
 84.436     0          0
Pipe_26          106              105              32.623     0.013      84.604
 84.49      0          0
Pipe_27          104              103              20.07      0.013      84.393
 84.313     0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
   Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- ----------
C101A-1IC        C101A-1          101              SIDE         85.62      0.572
   NO       0
C103A-1IC        C103A-1          103              SIDE         85.72      0.572
   NO       0
C104A-1IC        C104A-1          104              SIDE         85.62      0.572
   NO       0
C105A-1IC        C105A-1          105              SIDE         85.62      0.572
   NO       0
C106A-1IC        C106A-1          106              SIDE         85.65      0.572
   NO       0
C201A-1IC        C201A-1          201              SIDE         85.69      0.572
   NO       0
C203A-1IC        C203A-1          203              SIDE         85.69      0.572
   NO       0
C204A-1IC        C204A-1          204              SIDE         85.65      0.572
   NO       0

[WEIRS]
```

```
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
   Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- -------- ---------- ---------- ---------- ----------
----------
W1               C101A-1            OF2              TRANSVERSE   87.15      1.67
   NO       0        0          YES
W10              C104A-1            OF1              TRANSVERSE   87.13      1.67
   NO       0        0          YES
W11              C105A-1            C104A-1          TRANSVERSE   87.15      1.67
   NO       0        0          YES
W12              C204A-1            C105A-1          TRANSVERSE   87.18      1.67
   NO       0        0          YES
W13              C201A-1            C204A-1          TRANSVERSE   87.22      1.67
   NO       0        0          YES
W14              C106A-1            C105A-1          TRANSVERSE   87.18      1.67
   NO       0        0          YES
W15              C203A-1            C204A-1          TRANSVERSE   87.22      1.67
   NO       0        0          YES
W2               C102A-1            C101A-1          TRANSVERSE   87.2       1.67
   NO       0        0          YES
W3               C103A-1            C101A-1          TRANSVERSE   87.25      1.67
   NO       0        0          YES

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ----------------
---------------- ---------- --------
C102A-1IC        C102A-1          102              85.67      FUNCTIONAL/HEAD
5.716            0.5        NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
Pipe_16          CIRCULAR     0.45             0          0          0          1

Pipe_16_(1)      CIRCULAR     0.45             0          0          0          1

Pipe_17          CIRCULAR     0.45             0          0          0          1

Pipe_18          CIRCULAR     0.45             0          0          0          1

Pipe_19          CIRCULAR     0.3              0          0          0          1

Pipe_20          CIRCULAR     0.375            0          0          0          1

Pipe_21          CIRCULAR     0.3              0          0          0          1
```

```
Pipe_22_(1)      CIRCULAR     0.3             0          0          0          1

Pipe_23          CIRCULAR     0.3             0          0          0          1

Pipe_24          CIRCULAR     0.375           0          0          0          1

Pipe_25          CIRCULAR     0.3             0          0          0          1

Pipe_26          CIRCULAR     0.3             0          0          0          1

Pipe_27          CIRCULAR     0.3             0          0          0          1

C101A-1IC        CIRCULAR     0.083           0          0          0
C103A-1IC        CIRCULAR     0.102           0          0          0
C104A-1IC        CIRCULAR     0.083           0          0          0
C105A-1IC        CIRCULAR     0.094           0          0          0
C106A-1IC        CIRCULAR     0.102           0          0          0
C201A-1IC        CIRCULAR     0.094           0          0          0
C203A-1IC        CIRCULAR     0.083           0          0          0
C204A-1IC        CIRCULAR     0.083           0          0          0
W1               RECT_OPEN    0.25            3          0          0
W10              RECT_OPEN    0.27            3          0          0
W11              RECT_OPEN    0.25            3          0          0
W12              RECT_OPEN    0.25            3          0          0
W13              RECT_OPEN    0.25            3          0          0
W14              RECT_OPEN    0.25            3          0          0
W15              RECT_OPEN    0.25            3          0          0
W2               RECT_OPEN    0.25            3          0          0
W3               RECT_OPEN    0.25            3          0          0

[LOSSES]
;;Link            Kentry     Kexit      Kavg       Flap Gate  Seepage
;;--------------- ---------- ---------- ---------- ---------- ----------
Pipe_16_(1)      0          0.157      0          NO         0
Pipe_17          0          0.229      0          NO         0
Pipe_18          0          1.323      0          NO         0
Pipe_19          0          0.034      0          NO         0
Pipe_20          0          1.323      0          NO         0
Pipe_21          0          0.022      0          NO         0
Pipe_22_(1)      0          0.47       0          NO         0
Pipe_23          0          0.353      0          NO         0
Pipe_25          0          0.353      0          NO         0
Pipe_26          0          1.344      0          NO         0
Pipe_27          0          1.323      0          NO         0

[CURVES]
;;Name            Type       X-Value    Y-Value
;;--------------- ---------- ---------- ----------
C101A            Storage    0          0
C101A                       1.38       0
C101A                       1.53       60

C102A            Storage    0          0
C102A                       1.38       0
C102A                       1.53       41

C103A            Storage    0          0
C103A                       1.38       0
C103A                       1.53       108

C104A            Storage    0          0
C104A                       1.38       0
C104A                       1.51       82

C105A            Storage    0          0
C105A                       1.38       0
C105A                       1.53       89

C106A            Storage    0          0
C106A                       1.38       0
C106A                       1.53       91

C201A            Storage    0          0
C201A                       1.38       0
C201A                       1.53       85

C203A            Storage    0          0
C203A                       1.38       0
C203A                       1.53       99

C204A            Storage    0          0
C204A                       1.38       0
C204A                       1.53       105

[TIMESERIES]
;;Name            Date       Time       Value
;;--------------- ---------- ---------- ----------
100YRCHI                    0:00       0
100YRCHI                    0:10       6.05
100YRCHI                    0:20       7.54
100YRCHI                    0:30       10.16
100YRCHI                    0:40       15.97
100YRCHI                    0:50       40.65
100YRCHI                    1:00       178.56
100YRCHI                    1:10       54.05
100YRCHI                    1:20       27.32
100YRCHI                    1:30       18.24
100YRCHI                    1:40       13.74
100YRCHI                    1:50       11.06
100YRCHI                    2:00       9.29
100YRCHI                    2:10       8.02
100YRCHI                    2:20       7.08
```

```
100YRCHI                2:30        6.35
100YRCHI                2:40        5.76
100YRCHI                2:50        5.28
100YRCHI                3:00        4.88

100YRCHI+20             0:00        0
100YRCHI+20             0:10        7.26
100YRCHI+20             0:20        9.048
100YRCHI+20             0:30        12.192
100YRCHI+20             0:40        19.164
100YRCHI+20             0:50        48.78
100YRCHI+20             1:00        214.272
100YRCHI+20             1:10        64.86
100YRCHI+20             1:20        32.784
100YRCHI+20             1:30        21.888
100YRCHI+20             1:40        16.488
100YRCHI+20             1:50        13.272
100YRCHI+20             2:00        11.148
100YRCHI+20             2:10        9.624
100YRCHI+20             2:20        8.496
100YRCHI+20             2:30        7.62
100YRCHI+20             2:40        6.912
100YRCHI+20             2:50        6.336
100YRCHI+20             3:00        5.856

2YRCHI                  0:00        0
2YRCHI                  0:10        2.81
2YRCHI                  0:20        3.5
2YRCHI                  0:30        4.69
2YRCHI                  0:40        7.3
2YRCHI                  0:50        18.21
2YRCHI                  1:00        76.81
2YRCHI                  1:10        24.08
2YRCHI                  1:20        12.36
2YRCHI                  1:30        8.32
2YRCHI                  1:40        6.3
2YRCHI                  1:50        5.09
2YRCHI                  2:00        4.29
2YRCHI                  2:10        3.72
2YRCHI                  2:20        3.29
2YRCHI                  2:30        2.95
2YRCHI                  2:40        2.68
2YRCHI                  2:50        2.46
2YRCHI                  3:00        2.28

5YRCHI                  0:00        0
5YRCHI                  0:10        3.68
5YRCHI                  0:20        4.58
5YRCHI                  0:30        6.15
5YRCHI                  0:40        9.61
5YRCHI                  0:50        24.17
5YRCHI                  1:00        104.19
5YRCHI                  1:10        32.04
5YRCHI                  1:20        16.34
5YRCHI                  1:30        10.96
5YRCHI                  1:40        8.29
5YRCHI                  1:50        6.69
5YRCHI                  2:00        5.63
5YRCHI                  2:10        4.87
5YRCHI                  2:20        4.3
5YRCHI                  2:30        3.86
5YRCHI                  2:40        3.51
5YRCHI                  2:50        3.22
5YRCHI                  3:00        2.98

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Node       200             MN
Node       409A            MN
Node       100             MN
Node       100A            MN
Node       101             MN
Node       102             MN
Node       103             MN
Node       104             MN
Node       105             MN
Node       106             MN
Node       201             MN
Node       202             MN
Node       203             MN
Node       204             MN
Node       409             MN
Node       C101A-1         MJ
Node       C102A-1         MJ
Node       C103A-1         MJ
Node       C104A-1         MJ
Node       C105A-1         MJ
Node       C106A-1         MJ
Node       C201A-1         MJ
Node       C203A-1         MJ
Node       C204A-1         MJ
Link       C102A-1IC       LMF80

[MAP]
DIMENSIONS       382146.6659      5032963.35315    382350.9821      5033147.81985
```

```
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
200              382209.4           5032982
409A             382333.4           5033125
COMPASS          382340.612         5033103.668
CREEK            382241.779         5033100.367
MELODIE          382159.452         5032991.836
OF1              382235.405         5033085.488
OF2              382293.362         5033103.095
RENAUD-E         382307.377         5033042.735
RENAUD-W         382240.389         5033001.928
100              382293.9           5033107
100A             382315.3           5033120
101              382302.1           5033093
102              382314.5           5033073
103              382248.7           5033060
104              382238.2           5033077
105              382220.2           5033042
106              382203.1           5033070
201              382189.4           5033015
202              382191.6           5033025
203              382174.6           5033053
204              382212.6           5033038
409              382321.7           5033120
C101A-1          382299.047         5033093.466
C102A-1          382312.883         5033070.62
C103A-1          382279.056         5033075.859
C104A-1          382241.916         5033073.934
C105A-1          382236.322         5033049.54
C106A-1          382213.304         5033057.244
C201A-1          382195.055         5033011.025
C203A-1          382184.785         5033040.187
C204A-1          382211.929         5033034.501
```

C.3 Background Report Excerpts

MASTER SERVICING STUDY

FOR

EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN

RICHCRAFT HOMES

CITY OF OTTAWA

PROJECT NO.: 14-733

JUNE 2020
FINAL SUBMISSION
© DSEL

		Stormwater Management Facility Design, Revision 2 (IBI Group, October 2012).	(Neighbourhood 5), Stormwater Management Facility Design, Revision 2 (IBI Group, October 2012).
Major System Stormwater Management Strategy	Storage up to 100 year storm event via surface storage on roads, storage on parks, oversized storm pipe storage.	Storage up to 100 year storm event. Institutional lands to provide storage via surface and roof storage. Medium Density block to provide storage via oversized sewers and manholes and surface storage.	Storage up to 100-year storm event. Institutional lands to provide storage via surface and roof storage. Medium Density block to provide storage via oversized sewers and manholes and surface storage.

11.5.4 Consideration of Alternative Implementation Details for Servicing Designs

Stormwater sewer sizing, minor and major flow routing, and preliminary grading were reviewed as part of MSS-level servicing design, to address all City of Ottawa and MECP requirements. Given the background infrastructure planning in this area and the predicted performance, no other logical or efficient alternative designs were advanced for additional analysis and evaluation, except for considerations related to Transitway drainage.

As noted in ***Section 11.2.4***, the preliminary Cumberland Transitway Designs (Stantec, Oct 2013) show an area of the Transitway east of Mer Bleue draining westwards towards EUC Pond 1, assuming a grade separated crossing of the BRT with Mer Bleue. This is consistent with the MSU (Stantec, 2006), but seems inconsistent with the Mer Bleue CDP ISS (IBI, April 2006) and seems inconsistent with the Avalon West (Neighbourhood 5), Stormwater Management Facility Design, Revision 2 (IBI Group, October 2012). In this MSS, the EUC Pond 1 boundary is shown consistent with the Oct 2012 Avalon West SWMF boundary, but the results of ***Section 11.2.5*** indicate that there is sufficient capacity within the proposed EUC Pond 1 to accommodate this area in the future, if necessary. As such, at detailed design of the Transitway, storm sewers within this area can be considered draining west to EUC Pond 1, provided that 10-year capture and storage up to the 100-year design storm is provided for the Transitway as a whole, that the ***Section 14*** requirements surrounding minor amendments are met, and that the pond operating characteristics are updated accordingly, meeting all targets established in this MSS.

11.6 Water Balance and Infiltration Measures

Per the *Existing Conditions Water Budget* (Palmer, December 2014) (***Appendix F***), pre-development infiltration rates are to be preserved for the limited exposed bedrock areas within the EUC Phase 3 CDP area. Generally speaking, the protection of the Innes Park Woods and associated buffer ensure that the infiltration rates in this area will remain unchanged. Per the *Existing Conditions Water Budget* (Palmer, December 2014), no mitigation for changes to infiltration are recommended for the area of surficial sand anticipated to be encountered near the stormwater management pond. However, as a best practice, the

© DSEL

western part of the Significant Woodland where sand is most likely to be encountered will remain in place to promote infiltration.

Site-specific infiltration testing has been undertaken in the EUC Phase 3 Area CDP study area, with the purpose of refining the findings of the *Existing Conditions Water Budget* (Palmer, December 2014) and informing the proposed stormwater management plan design. The results found that while water can easily seep into the topsoil layer, the vertical movement is restricted by the low permeability of the clay soils and the perched water table; therefore, infiltration volumes for any Low Impact Development (LID) measures would be limited. Furthermore, per available groundwater and bedrock mapping (Paterson Group, July 7, 2019), parts of the study area are not expected to meet MECP clearance from groundwater and bedrock guidelines for use of LIDs as significant components of the stormwater management system. In addition, specific land uses within the employment lands could be considered light industrial, which may not be recommended as a target land use to promote infiltration. See ***Appendix F*** for additional details.

Based on the site-specific constraints, the Mud Creek Cumulative Impact Study (Stantec, April 2020) found that the implementation of LIDs would have little impact on the erosion protection requirements for Mud Creek, and as such has recommended that the requirement for LIDs in the EUC MUC CDP study area west of Mer Bleue include:

- A tree planting program in parkland, which is addressed in the CDP (Fotenn, May 2020);
- Using infiltration trenches in backyards of singles and townhomes where feasible, which is addressed in this MSS (DSEL, June 2020); and,
- Setting right-of-way widths for the majority of local roadways at 18 m (not 16.5 m) to ensure healthy street trees that will be effective in providing evapotranspiration in post-development conditions, which is addressed in the CDP (Fotenn, May 2020) and MTS (Castleglenn, May 2020).

As noted above, as part of the development of low density and medium density residential uses, shallow rear yard swales with perforated pipes in rear yards are to be provided, in accordance with City standards.

Additional low impact development practices may be required to be implemented in parks, institutional, commercial, and employment land use parcels for the areas East of Mer Bleue, in accordance with MECP and City of Ottawa guidelines for development, where required at the time of site-specific planning.

11.7 Commitments for Detailed Design

The minor and major sewer systems and associated stormwater management facilities will be designed to support phased developments within the EUC Phase 3 Area. All proposed storm sewer infrastructure will be designed in accordance with the *Ottawa Sewer Design Guidelines*. The EUC Pond 1 North Forebays and North Main Cell modifications will be completed according to City guidelines and the *MOE SWMP Design Manual*, further detailing inlet and outlet structures, orifice sizing, and pond block design – including amenity space and multi-use pathways. Pond side slopes design is to be approved by a licensed Geotechnical Engineer prior to construction.

© DSEL

4 STORMWATER MANAGEMENT

4.1 Overall Stormwater Management Approach

4.1.1 External Residential, Commercial and Institutional Lands

The proposed storm sewer system for the external lands will be accommodated in accordance with the EUC Servicing Report (Stantec, 2006) and the Servicing Update being prepared by DSEL. These areas will drain internally (through the proposed developments) and discharge to the existing SWM facility on the west side of Compass Street.

4.1.2 Existing Residential on Renaud Road

In accordance with the EUC Servicing Report (2006), runoff from Renaud Road and a portion of Mer Blue are to be accommodated by the Renaud Road trunk sewer. The proposed storm sewer system has been designed to service the existing residential lots on the south side of Renaud Road. The drainage Boundary and runoff coefficient for these lands is consistent with the EUC Servicing Report.

Additionally, a portion of storm sewer is proposed on Renaud Road between the NDC school block and Glenlivett Avenue. As part of works previously constructed, a 750 mm storm stub was provided at the intersection of Renaud Road and Glenlivett Avenue. This stub was sized to collect storm runoff from Street 'N' connecting to Renaud Road approximately 40 m east of Glenlivett Avenue. These lands are owned by Richcraft Homes. As part of its detailed design, the proposed residential flows were re-routed and conveyed internally. The connection to Renaud Road from Richcraft lands is not required. A drop manhole and local sewer have been provided in this section of Renaud Road to provide drainage for the street and for the existing properties on the north and south side of Renaud Road. Refer to EUC (Stantec, 2006) and Servicing Update by DSEL.

4.1.3 Existing Notre Dame Des Champs School

The proposed storm sewer system is also designed to receive flows from the existing Notre Dame Des Champs (NDC) School. The drainage boundary and runoff coefficient for these lands is consistent with the EUC and servicing update by DSEL.

The existing school block has two storm outlets into the existing Renaud Road roadside ditch. Headwalls are provided for each of the separate outlets, one specific to the building and the other specific to site drainage.

Two separate connections are proposed as part of the Renaud Road works for the school block accepting flows of 72.5 l/s and 87 l/s with storage of 374 m^3 as per the servicing Report for the NDC French Catholic School, prepared by Genivar.

4.2 Objectives

The purpose of this evaluation is to prepare the dual drainage design, including the minor and major system, of the Trails Edge Phase II development. The evaluation includes assessment of the cascading major flow, sizing of inlet control devices, maximum depth and velocity of flow on the surface and hydraulic grade line analysis. The evaluation and design takes into consideration the Stormwater Management Report for the Trails Edge West Subdivision (JFSA Dec 2014, updated Feb 2015), the City of Ottawa Sewer Design Guidelines (OSDG) (November 2004), the January 2012 Technical Bulletin ISDTB-2012-1, June 2012 Technical Bulletin ISDTB-2012-4 and the notes from the Stormwater Sub-Committee Meeting #9 (November 19, 2013).

In accordance with the Stormwater Report for the Trails Edge West Subdivision (JFSA 2015) it should be noted that some pipes function as HGL relief pipes and convey 5 year flows and HGL relief from the main trunk. Connections to manholes are at springline rather than obvert to obvert where Belcourt Boulevard and Compass Street connect to HGL relief pipes.

Modelling and analysis for Renaud Rd has been undertaken in conjunction with the evaluation of the Trails Edge Phase II development. As such, subsequent sections include details of the subdivision and Renaud Rd.

4.3 Dual Drainage Design

The subject site is designed with dual drainage features, accommodating minor and major system flow. Minor flow from the subject site will be conveyed via two trunk sewers within the north and south portions of the site to EUC Pond 1. Major flow from the subject site will be conveyed via street segments through the site to either the ravine (former Mud Creek) or directly into EUC Pond 1 (see **Drawing 700**).

Minor System

The minor system from the subject site is tributary to the southern inlet of EUC Pond 1. On-site detention is available within the subject site. Inlet control devices (ICDs) are proposed to limit the flow into the minor system during the 100 year event.

Inlet control devices (ICDs) are proposed to limit the flow into the minor system during the 100 year event. The 5 year flow restriction was based on the 5 year 3 hour Chicago (10 minute time step) modeled flow. During the 100 year 3 hour Chicago storm event, the flow into the minor system was increased by approximately 12% from the 5 year modeled flow. The purpose of the increased inflow into the system is to account for the additional flows captured by standard inlet control devices during the 100 year storm event with ponding. Additional details are provided in **Section 4.4.3**.

Street Segments

Due to the existing flat topography, the majority of street segments within the subject site have a saw-tooth road grade pattern with on-site detention. The saw-tooth road grade pattern on the subject site includes more catchbasins and low points with shallower ponding depth (on average 150 mm across the subject site). Renaud Road is continuous grade with several low points in the road for ponding.

The grading pattern was designed to minimize the ponding depth to ensure that a maximum of 300 mm depth of water during cascading conditions was maintained. As noted previously, inflow into the minor system will be controlled by ICDs to meet the flow allowance of the downstream system. Further details regarding the street segment minor and major system design is presented in **Sections 4.4.3** and **4.4.4**, respectively.

Major flow from the site will cascade via street segments to either the ravine (former Mud Creek) or via Compass Street to the southern sediment forebay (see **Drawing 700**).

Rear Yards

Rear yards within the subject site have minor inflow restrictions with major flow cascading to a street segment. ICDs will control the inflow into the minor system from rear yards. Further discussion regarding the rear yard minor and major system design is presented in **Sections 4.4.3 and 4.4.4**, respectively.

Summary of Dual Drainage Design

The overall sewer design and rational method spreadsheet for the 5 year storm event and corresponding drainage area plan are enclosed in **Appendix C**. The rational method design indicates that the 5 year rational flow is conveyed in the system under free flow conditions, thus ensuring some spare capacity.

4.4 Hydrological Evaluation

Hydrological analysis of the proposed dual drainage system, for the subject site, was conducted using DDSWMM. This technique offers a single storm event flow generation and routing. Land use, selected modeling routines, and input parameters are discussed in the following sections. A model schematic is presented in **Drawing 700** and model files are included in **Appendix C**. It should be noted that hydrographs generated by the DDSWMM model were downloaded to the XPSWMM model to evaluate the hydraulic performance of the proposed system.

4.4.1 Land Use

The subject site will be developed with single family units, a school and a park. The DDSWMM schematic is presented in **Drawing 700**.

4.4.2 Storms and Drainage Area Parameters

The main hydrological parameters for the subject site are summarized below and in Table 4.1. Supporting calculations are presented in **Appendix C**.

Design Storms

The site was evaluated using the following storm events:

- 5 and 100 year 3 hour Chicago storm event (10 minute time step), as per the OSDG;
- July 1, 1979 Historical storm (5 minute time step) as per the OSDG;
- August 4, 1988 Historical storm (5 minute time step) as per the OSDG;
- August 8, 1996 Historical storm (5 minute time step) as per the OSDG; and
- 100 year 3 hour Chicago storm event (10 minute time step) with 20% increase for Climate Change consideration, as per the January 2012 Technical Bulletin ISDTB-2012-1.

It should be noted the storms used are consistent with those used to evaluate the storm sewer system in the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015).

Area and Imperviousness

Catchment areas are based on the rational method spreadsheet, with some minor modifications for modeling purposes. See **Drawing 700** for the catchment areas used in the DDSWMM modeling for the subject site.

Imperviousness for the subject site was determined by obtaining the footprint of the model units intended for the site and placing the maximum footprint on the lots. The imperviousness ratios for single family units were calculated for a typical single family unit street segment and rear yard segment (calculations are enclosed in **Appendix C**). Runoff coefficient values used in the rational method design are based on these values.

Infiltration

Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.

Subcatchment Width

The catchment width was based on the conveyance route length of the drainage area and multiplied by two. The multiplier of two was only used if the drainage area had runoff contribution from both sides of the drainage area.

Slope

The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).

Initial Abstraction (Detention Storage)

Detention storage depths of 1.5 mm and 4.67 mm were used for impervious and pervious areas, respectively. These values are consistent with the OSDG.

Manning's roughness

Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.

Baseflow

No baseflow components were assumed for any of the areas contributing runoff to the minor system within the DDSWMM model.

4.4.3 Minor System Capture

The minor system for the subject site is tributary to the southern inlet of EUC Pond 1. The street segments within the subject site have a saw-tooth road grade pattern with on-site detention. Inlet control devices (ICDs) are proposed to limit the flow into the minor system during the 100 year event.

Inlet control devices (ICDs) are proposed to limit the 5 year flow into the minor system during the 100 year event. The 5 year flow restriction was based on the 5 year 3 hour Chicago (10 minute time step) modeled flow. During the 100 year 3 hour Chicago storm event, the flow into the minor system was increased by approximately 12% from the 5 year modeled flow. The purpose of the increased inflow into the system is to account for the additional flows captured by standard inlet control devices during the 100 year storm event.

Street and rear yard segments were considered independently. The restricted inflow from street segments during the 100 year storm event is 2827 l/s, which is a flow rate of 317 l/s/ha on an average basis. From the rear yards, the restricted inflow is 1719 l/s, which is a flow rate of 157 l/s/ha on an average basis. The total minor system inflow from street and rear yard segments in the subject site is 4546 l/s during the 100 year storm event, which is a flow rate of 229 l/s/ha, on an average basis.

For those areas within the subject site which are designated institutional, park or commercial, the minor system inflow rate is 5 year modeled flow increased by 12%. Major flow will be stored on-site without overflow to the street or rear yard segments. Further discussion is provided in **Section 4.4.4**.

The minor system inflow rate along Renaud Road, within the subject site, was optimised to account for continuous grade and the requirement for curb inlets. As such, ICDs have been sized on continuous grade to match the actual flow entering the minor system based on approach-capture curves. At low points in the road, ICDs have been sized to capture overflow from upstream street segments while ensuring that there is no ponding during the five year storm event.

The minor system inflow rate along Belcourt Boulevard, within the subject site, was increased to capture additional flow due to a significant amount of major flow cascading from Area A055a (see **Drawing 700**). Further discussion is provided in **Section 4.4.6**.

Table 4.3 summarizes and compares 5 year modeled flow versus the ICD (100 year) flow. Calculations to support custom ICD sizes, including flows and head, are presented in **Appendix C**. The minor system HGL analysis was evaluated using XPSWMM and discussed in **Section 4.6**.

4.4.4 Major System

As noted in **Section 4.3**, the major system was modeled with DDSWMM. The subject site has a saw-tooth design grade pattern with catchbasins installed with inlet control devices (ICDs) at the low points. The flow is attenuated within these localized low points with potential overflow cascading to the next segment downstream. The total volume at each low point, up to the overflow depth, is the maximum static storage. It should be noted that the site provides significant increase in storage capacity over the depth which would be applicable during overflow conditions. Rear yard segments have a saw-tooth pattern with some storage available, but the storage is not accounted for as part of the analysis.

All major flow from the site is directed west toward EUC Pond 1. One major overland flow route to EUC Pond 1 is to the ravine transecting the development site. Major flow from east of Belcourt Boulevard will be conveyed to the ravine via a culvert to be located beneath the road. Some major flow from the subject site will be directed to the ravine as shown in **Drawing 700**. The second major overland flow route to EUC Pond 1 is via Compass Street to the improved Mud Creek channel which eventually discharges to the southern sediment forebay.

Major System Storage Attenuation and Routing

For street segments, the cascading overflow to the next segment or low point, utilizes the static storage available plus an additional amount of storage equivalent to the depth required for the flow to carry over the high point. The attenuation in street sags was evaluated to account for static storage and, if overflow occurs, dynamic storage. Within this report it is referred to as double routing.

The DDSWMM model does not have a direct way of coding double routing since it does not allow the user to code dynamic storage over the high point. For this analysis, an alternative method was employed where the overflow from a street segment (regular static storage at a sag) is conveyed to a dummy segment. In other words, a regular low point segment was provided with a downstream dummy segment for further flow attenuation to account for the dynamic ponding during overflow.

The dummy segment does not have any drainage area attributes associated with it since it is a segment for routing. In addition, there is no inflow to the minor system from these dummy segments. The overflow hydrograph from the upstream catchment is routed in the dummy

segment to the next "real" downstream segment. The dummy segments have specific characteristics which are noted below:

- Segment Length – equivalent to length of maximum static storage from the street segment contributing to it.
- Road Type – equivalent to appropriate right-of-way characteristics from the segment contributing to it, but with a longitudinal slope is 0.01% (0.0001 m/m).

The double routing method noted above, and applied to DDSWMM, is a recommended double routing method presented within the February 2014 City of Ottawa Technical Bulletin.

The dummy segments for major system routing were applied to the analysis of the subject site. The segments are referenced as D1, D2, D3, etc. within the DDSWMM modelling file. The DDSWMM schematic presented in **Drawing 700** does not show the dummy segments, but DDSWMM computer output file shows the dummy segments immediately following the corresponding major segment which cascades into that dummy segment.

4.4.5 External Areas

As noted in **Section 4.1**, the subject site is bounded on three sides by development areas which contribute minor and major flow to the subject site (see **Drawing 700**). Major flow from the eastern and northern development areas cascade onto street segments within the subject site. These areas, including the subject site, have been modeled under interim conditions B (Stormwater Management Report for the Trails Edge West Subdivision, JFSA 2015) at a conceptual level. The Interim B condition presumes that Brian Colburn Boulevard extension will be constructed and this is the scenario that is used in the analysis for the subject site.

The detail modeling of the subject site under ultimate conditions and the conceptual model of the surrounding areas (under Interim B conditions) have been consolidated into one model. Further details regarding the modeling of the external areas which contribute minor and major flow to Trails Edge Phase II is presented in the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015).

The consolidated DDSWM model is separated into 4 separate models as listed below and as shown on **Drawing 700B**.

- East of Belcourt Extension, South of Transitway Corridor
- West of Belcourt Extension, South of Transitway Corrido
- North of Transitway Corridor (Interim A, Interim B and Ultimate Conditions)
    - Input hydrographs are provided by a SWMHYMO model for the north drainage area to SWM Facility 1
- IBI Belcourt Extension and Renaud Road south of the Transitway Corridor, Development between Belcourt Extension and Compass Street

There is limited capacity to convey overland flow on Belcourt Blvd and the external major flow entering at Axis Street and Street A would overwhelm the capacity of the street to convey flow within the 0.30 m depth requirements as per the City of Ottawa. As such, the upstream drainage areas of A2090a and A112a (East model) have been modified to provide full capture of major system cascading overflow. These flows have been incorporated into the model as minor system flows and zero overland flow. Details on this major system capture have been provided by JFSA and are provided in **Appendix C**.

The hydraulic evaluation undertaken in XPSWMM for the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015) under interim conditions was modified to include the design of the trunk sewers and the lateral sewers for the subject site. This is discussed in further detail in **Section 4.6.**

The hydraulic boundary conditions for the proposed Renaud Road trunk sewer and storm water inlet to Mud Creek (XPSWMM Node Chan2) are consistent with the values presented within the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015). Comparison of the hydraulic grade line at Mud Creek is presented in the below table.

Table 4.1. Hydraulic Grade Line

NODE	HGL (M)	
	JFSA	IBI
Chan2 (Mud Creek)	84.059	83.98

The following table provides comparison of the parameters used in the design of the subject site under the DSEL Servicing study versus the current IBI detailed design.

Table 4.2. Design Parameter Comparison

DESIGN PARAMETER	DSEL	IBI
	VALUE	
Stormwater Management Models:	DDSWMM (release 2.1), SWMHYMO (version 5.02), and XPSWMM (version 10)	DDSWMM (release 2.1), SWMHYMO (version 4.02), and XPSWMM (version 10)
Minor System Design:	1:5 year	1:5 year
Major System Design:	1:100 year	1:100 year
Max. Allowable Flow Depth:	30 cm above gutter	30 cm above gutter
Extent of Major System:	Must be contained within the municipal right-of-way	Must be contained within the municipal right-of-way
Model Parameters:	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm (as per 2004 City of Ottawa Guidelines)	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm (as per 2004 City of Ottawa Guidelines)
Imperviousness:	Detailed Areas: based on development layout and taken as fully effective in the front lot portion and half effective in the rear lot portion of each house. Undetailed Areas: based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.	Based on detailed design runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Design Storms:	Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes. Based on 2004 City of Ottawa Sewer Design Guidelines	Chicago 3-hour Design Storms 5 YR 100 YR

DESIGN PARAMETER	DSEL	IBI
	VALUE	
Historical Events:	July 1st, 1979, August 4th, 1988 and August 8th, 1996 events per 2004 City of Ottawa Sewer Design Guidelines	July 1st, 1979, August 4th, 1988 and August 8th, 1996 events per 2004 City of Ottawa Sewer Design Guidelines
Climate Change Street Test:	20% increase in the 100-year, 3-hour Chicago storm, as per January 2012 City of Ottawa Technical Bulletin ISTB-2012-1	20% increase in the 100-year, 3-hour Chicago storm, as per January 2012 City of Ottawa Technical Bulletin ISTB-2012-1
Manning's Roughness Coeff.:	0.013 for concrete pipes (free flow)	0.013 for concrete pipes (free flow)
Minor System Losses:	Refer to appendix J, Attachment E for manhole loss coefficients	Minor system losses within the subject site were accounted for in accordance with Appendix 6-B of the OSDG
Freeboard in HGL Analysis	0.3 m between underside of footing elevation and 100-year hydraulic gradeline	0.3 m between underside of footing elevation and 100-year hydraulic gradeline
Downstream HGL:	Free outfall conditions assumed at SWM Pond Outlet	As per DSEL modeling

Table 4.3 summarizes the main hydrological parameters used in the DDSWMM model of the subject site. The drainage area plan (DDSWMM schematic) is presented in **Drawing 700**. A summary of all the parameters used in the DDSWMM model and the model output files are enclosed in **Appendix C**.

4.4.6 Summary of Modeling Output Files

For ease of review, the following is a reference list of the computer modeling output files for the subject site including names and storm event evaluated. The modeling output files are found on the enclosed CD.

DDSWMM

- 5 YR CHICAGO DDSWMM OUTPUT (TE-005CH.dat/out)
- 100 YR CHICAGO DDSWMM OUTPUT (TE-100CH.dat/out)
- JULY 79 DDSWMM OUTPUT (TE-1979.dat/out)
- AUGUST 88 DDSWMM OUTPUT (TE-1988.dat/out)
- AUGUST 96 DDSWMM OUTPUT (TE-1996.dat/out)
- 100 YR CH INCREASE 20 DDSWMM OUTPUT (TE-100CH+20%.dat/out)

SWMHYMO

- SWMHYMO (31855vxd.dat/out)

XPSWMM

- 5 YEAR CHICAGO XPSWMM OUTPUT (H005C_B.xp/out)
- 100 YEAR CHICAGO XPSWMM OUTPUT (H100C_B.xp/out)
- JULY 79 STORM XPSWMM OUTPUT (H11979_B.xp/out)
- AUGUST 88 STORM XPSWMM OUTPUT (H1988_B.xp/out)
- AUGUST 96 STORM XPSWMM OUTPUT (H1996_B.xp/out)
- 100 YEAR CH INCREASE 20 XPSWMM (H100C+20%_B.xp/out)

Table 4.3. Hydrological Parameters and Modeling Results

(DDSWMM Output – See below for file names)

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Sub-catchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
Trails Edge Phase II											
Street Segments											
S112A	0.14	S112B	112	N112	73	60	60	Swale	1.85	35	39
S113	0.34	S112B	113	N113	73	65	130	Swale	23.5	84	94
S112B	0.06	S101	112	N112	73	60	60	Swale	0.15	15	17
S101	0.2	EXT2A	101	N101	73	60	60	Swale	16.35	49	55
S102	0.18	S101	102	N102	73	65	65	Swale	10.12	44	49
S106	0.15	S104	106	N106	73	74	74	Swale	21.4	37	41
S114	0.29	S104	114	N114	73	70	140	Swale	4.97	72	81
S104	0.1	S102	104	N104	73	64	64	Swale	22.67	25	28
S307	0.25	S311	307	N307	73	73	73	Swale	48.26	61	68
S311	0.43	S312	311	N311	73	96	192	Swale	28.78	107	120
S312	0.35	S306	312	N312	73	88	176	Swale	14.86	87	97
S306	0.39	S203	306	N306	73	107	214	Swale	57.34	98	142
S301	0.36	S303	301	N301	73	96	192	Swale	40.08	90	101
S303	0.31	S304	303	N303	73	82	164	Swale	48.74	78	87
S304	0.28	S306	304	N304	73	68	136	Swale	34.52	70	78
S314	0.17	S304	314	N314	73	44	88	Swale	2.25	42	48
S404	0.16	S203	404	N404	70	75	75	Swale	10.99	72	104‡
									Total flow for Street Segments (l/s)		**1249**
Rear Yard Segments											
BLK246	2.89	R114	106	N106	64	325	650	Swale	233.6€	613	613
R114	0.11	R113	114	N114	49	75	75	Swale	0	20	20
R113	0.13	R112A	113	N113	49	85	85	Swale	0	23	23
R112A	0.17	S112A	112	N112	49	112	112	Swale	0	30	30
P104	0.42	Park	104	N104	0	47	95	Swale	67.0€	9	9
R112B	0.09	R104	112	N112	49	35	70	Swale	0	16	16
R104	0.22	S104	104	N104	49	80	160	Swale	0	39	39
EXT2B	0.72	EXT2A	Ext2B	DExt2B	49	81	162	Swale	0	119	0β
R301B	0.16	S301	301	N301	49	70	140	Swale	0	29	29
R312A	0.33	R312B	312	N312	49	90	180	Swale	0	58	58
R312B	0.11	S312	312	N312	49	50	50	Swale	0	19	19
R301A	0.15	R301C	301	N301	49	57	114	Swale	0	27	27
R301C	0.12	R301D	301	N301	49	44	88	Swale	0	21	21
R301D	0.1	S303	301	N301	49	50	100	Swale	0	18	18
R305	0.17	S306	305	N305	49	75	150	Swale	0	31	31
R402B	0.13	R305	402	N402	49	40	80	Swale	0	23	23

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Sub-catchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
R402A	0.13	S404	402	N402	49	15	29	Swale	0	22	22
410F	0.52	CDUM	410C	N410C	64	59	117	Swale	0	110	110
21	0.63	CDUM	404	N404	86	71	142	Swale	0	175	175
R410A	1.83	S410A	410B	N410B	42	206	412	Swale	374£	263	73£
R410B	0.48	S410C	410B	N410B	42	54	108	Swale	0	69	87
402I	0.76	ODUM	402I	D402I	63	86	171	Swale	54.3€	159	159
R410G	0.55	S410D	410C	N410C	64	62	124	Swale	0	117	117
									Total flow for rear Yard Segments (l/s)		**1719**
Renaud Rd											
S400e	0.03	S400B	400	N400	71	17	17	Swale	1.35	7	8
S400A	0.1	S400C	400	N400	71	60	60	Swale	0	25	12§
S400B	0.1	S400D	400	N400	71	45	45	Swale	0	24	12§
S400C	0.12	S401A	400	N400	71	39	39	Swale	0	43	17§
S400D	0.07	S401B	400	N400	71	30	30	Swale	0	32	14§
S401A	0.06	S401C	401	N401	71	23	23	Swale	0	45	18§
S401B	0.11	S401C	401	N401	71	41	41	Swale	0	48	18§
S401C	0.29	S402A	401	N401	71	82	82	Swale	48.85	133	327‡
S401E	0.02	S402A	401	N401	71	17	17	Swale	0	5	6
S402A	0.51	S402C	402	N402	71	66	66	Swale	18.12	113	127
S402C	0.34	S402G	402	N402	71	54	54	Swale	12.8	77	86
S402G	0.11	S404	402	N402	71	28	28	Swale	0	26	12§
S410A	0.21	S410B	410B	N410B	86	75	75	Swale	13.35	60	67
S410B	0.09	S404	410	N410	86	31	31	Swale	0	26	12§
S410C	0.11	S410D	410C	N410C	86	47	47	Swale	0	32	20§
S410D	0.08	S410E	410C	N410C	86	30	30	Swale	0	43	30§
S410E	0.1	Renaud	410C	N410C	86	36	36	Swale	0	59	32§
									Total flow for Renaud Rd. (l/s)		**818**
Belcourt Boulevard											
S3901E	0.27	S54E	3901	N3901	86	120	120	Swale	12.82	78	87
S3901W	0.19	S54W	3901	N3901	86	120	120	Swale	13.31	55	62
S3900B	0.22	S54E	3900	N3900	86	72	72	Swale	61.11	62	69
S54E	0.17	S55AE	54	N54	86	87	87	Swale	11.82	49	55
S54W	0.11	S55AW	54	N54	86	87	87	Swale	7.62	32	36
S55AE	0.12	S55BE	55	N55	86	70	70	Swale	8.35	35	39
S55AW	0.096	S55BW	55	N55	86	70	70	Swale	7.62	32	36
S55BE	0.11	S56E	55B	N55B	86	70	70	Swale	7.64	32	48‡
S55BW	0.096	S56W	55B	N55B	86	70	70	Swale	7.64	28	31
S55C	0.08	S56W	55B	N55B	86	45	90	Swale	0.08	23	26
S56E	0.17	S56W	56	N56	86	110	110	Swale	0.99	49	55
S56W	0.097	EXT2A	56	N56	86	65	65	Swale	9.28	28	31

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Sub-catchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
S500C	0.31	S307	500C	N500C	86	100	200	Swale	52.09	90	101
S500	0.26	S500C	500	N500	86	81	162	Swale	13.55	75	84
									Total flow for Belcourt Boulevard (l/s)		**760**

Notes: * 5 year modeled flow is from the DDDSWMM output file 5 YR CHICAGO DDSWMM OUTPUT (TE-005CH.dat/out) presented in **Appendix C**.
† ICD flow is from the DDSWMM output file 100 YR CHICAGO DDSWMM OUTPUT (TE-100CH.dat/out) presented on the CD in **Appendix C**.
$ The minor flow restriction has been reduced to account for the actual capture rate through the grill using curb inlets on a continuous grade
‡ The minor flow restriction has been increased to allow full capture of overflow from upstream segments on continuous grade during the 5 year storm event without ponding.
€ Storage is based on the requirement to retain the 100-year Chicago major flow on-site
£ Storage and ICD flow as per the servicing Report for the NDC French Catholic School, prepared by Genivar
β The flows produced by drainage area EXT-2B flow overland to EXT-2A.

The size of the inlet control devices (ICDs) was optimized using DDSWMM. ICDs are incorporated into the stormwater management design to protect the minor system from surcharge during major storm events. All ICD sizes, including flow and head, are presented in **Appendix C**.

4.5 Simulation Results

As noted previously in **Section 4.4**, minor system hydrographs generated in DDSWMM were imported to the applicable manholes in the XPSWMM model for hydraulic grade line analysis (refer to **Section 4.6**).

The storage available on-site and the results of the DDSWMM evaluation for the subject site are presented in **Table 4.4**. The ponding plan for the subject site is presented on **Drawing 400**. The DDSWMM output files are presented on the CD in **Appendix C**.

Table 4.4 Summary of On-Site Storage
(DDSWMM Output File Names listed below)

Major System Segment ID	Max. Available Storage (m^3)	Storage Used (m^3)				
		5 year 3 hour Chicago*	100 year 3 hour Chicago†	July 1, 1979 Historical‡	August 4, 1988 Historical¥	100 year 3 hour Chicago - Increased 20%€
BLK246	233.6	0.0	233.6	67.1	55.2	233.6
S112A	1.9	0.0	1.9	1.9	1.9	1.9
S113	23.5	0.0	21.5	0.4	1.8	23.5
S112B	0.2	0.0	0.2	0.2	0.2	0.2
S101	16.4	0.0	16.4	1.6	2.9	16.4
S102	10.1	0.0	10.1	0.3	0.9	10.1

Major System Segment ID	Max. Available Storage (m^3)	Storage Used (m^3)				
		5 year 3 hour Chicago*	100 year 3 hour Chicago†	July 1, 1979 Historical‡	August 4, 1988 Historical¥	100 year 3 hour Chicago - Increased 20%€
P104	67.0	0.1	66.9	67.0	67.0	67.0
S106	21.4	0.0	10.1	0.2	0.9	17.9
S114	5.0	0.0	5.0	0.3	1.6	5.0
S104	22.7	0.0	22.7	13.5	12.3	22.7
S3901E	12.8	0.0	12.8	0.0	0.3	12.8
S3900B	61.1	0.0	13.6	0.0	0.2	23.5
S54E	11.8	0.0	10.7	0.0	0.2	11.8
S55AE	8.4	0.0	8.4	0.0	0.1	8.4
S55BE	7.6	0.0	7.6	0.0	0.0	7.6
S55C	0.1	0.0	0.1	0.0	0.1	0.1
S56W	9.3	0.0	9.3	0.0	0.1	9.3
S3901W	13.3	0.0	12.2	0.0	0.3	13.3
S54W	7.6	0.0	7.3	0.0	0.2	7.6
S55AW	7.6	0.0	4.0	0.0	0.0	7.6
S55BW	7.6	0.0	6.0	0.0	0.1	7.6
S56E	1.0	0.0	1.0	0.0	0.3	1.0
S500C	52.1	0.0	19.4	0.0	0.4	49.8
S500	13.6	0.0	13.6	0.0	0.2	13.6
S307	48.3	0.0	15.4	0.3	1.1	27.6
S311	28.8	0.0	28.0	0.3	2.0	28.8
S312	14.9	0.0	14.9	12.0	14.8	14.9
S306	57.3	0.0	57.3	0.0	0.6	57.3
S301	40.1	0.0	35.2	4.2	6.6	40.1
S303	48.7	0.0	48.7	10.2	12.4	48.7
S304	34.5	0.0	24.5	0.2	1.7	34.5
S314	2.3	0.0	2.3	0.1	1.1	2.3
S400e	1.4	0.0	1.4	0.1	0.3	1.4
S401C	48.9	0.0	0.0	0.0	0.0	5.4
S402A	18.1	0.0	18.1	1.6	3.4	18.1
S402C	12.8	0.0	12.8	0.8	2.0	12.8
S404	11.0	0.0	11.0	3.6	0.2	11.0
S410A	13.4	0.0	12.8	13.4	13.4	13.4
R410A	374.0	113.2	374.0	374.0	374.0	374.0
402I	54.3	0.0	54.3	16.0	18.8	54.3

Notes: * 5 year modeled flow is from the DDSWMM output file 5 YR CHICAGO DDSWMM OUTPUT (TE-005CH.dat/out) presented on the CD in **Appendix C**.
† 100 year modeled flow is from the DDSWMM output file 100 YR CHICAGO DDSWMM OUTPUT (TE-100CH.dat/out) presented on the CD in **Appendix C**.

‡ July 1, 1979 historical storm modeled flow is from the DDSWMM output file JULY 79 DDSWMM OUTPUT (TE-1979.dat/out) presented on the CD in **Appendix C**.
¥ August 4, 1988 historical storm modeled flow is from the DDSWMM output file entitled AUGUST 88 DDSWMM OUTPUT (TE-1988.dat /out) and presented on the CD in **Appendix C**.
§ August 8, 1996 historical storm modeled flow is from the DDSWMM output file entitled AUGUST 96 DDSWMM OUTPUT (TE-1996.dat/out) and presented on the CD in **Appendix C**.
€ The modeled flow from the 100 year storm increased by 20% is from the DDSWMM output file 100 YR CH INCREASE 20 DDSWMM OUTPUT (TE-100CH+20%.dat/out) presented on the CD in **Appendix C**.

The results of the on-site detention analysis indicate that during the 5 year storm event, there is no ponding on the subject site.

Tables 4.5 and 4.6 summarize the cascading flows on the subject site for the 100 year 3 hour Chicago storm event and the 100 year Chicago storm increased by 20%, respectively. The cascading overflow is the flow exiting a drainage area when maximum minor system inflow and maximum available ponding has been utilized. The overflow is obtained from the respective DDSWMM output file and is noted in the title in the tables below.

To determine velocity of the cascading overflow, SWMHYMO was used. The 24 m, 18 m, and 30.5 m ROW sections were entered into the model with the appropriate longitudinal slopes to obtain the maximum velocity of flow using the Route Channel routine. The typical road cross sections and output files are provided in **Appendix C**.

To determine depth of the cascading overflow, the *Calculation Sheet: Overflow From Typical Road Ponding Area* provided at the November 19, 2013 Stormwater Sub-Committee Meeting #9 were used. The exception to this is where the road is on grade in which case the depths were obtained from the SWMHYMO model. The tables and communication with J.F. Sabourin and Associates is provided in **Appendix C**.

Table 4.5. Summary of Cascading Flow during the 100 Year 3 hour Chicago Storm (100 YR CHICAGO DDSWMM OUTPUT TE-100CH.dat/out)

Major System Segment ID (Dummy Segment ID)	Street Name	Road Allowance	Longitudinal Slope (%)	Overflow (l/s)*	Velocity (m/s)	Depth (m)	Velocity x Depth (m^2/s)	Max. Depth of Ponding (m)	Max. Depth of Ponding plus Overflow Depth (m) – if applicable
S3901E (D9)	Belcourt Blvd	24 m	0.50	1	0.110	0.015	0.00	0.15	0.17
S3900B (D11)	Belcourt Blvd	½ of 24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S54E (D12)	Belcourt Blvd	½ of 24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S55AE (D13)	Belcourt Blvd	½ of 24 m	0.50	95	0.681	0.115	0.08	0.15	0.26
S55BE (D14)	Belcourt Blvd	½ of 24 m	0.53	212	0.850	0.150	0.13	0.15	0.30
S500 (D18)	Belcourt Blvd	24 m	0.56	0	n/a	n/a	n/a	0.15	0.15
S500C	Belcourt Blvd	24 m	-	0	n/a	n/a	n/a	0.27	0.27
S400A	Renaud Rd	24 m	0.51	38	0.546	0.065	0.04	n/a	0.06
S400B	Renaud Rd	24 m	0.51	37	0.542	0.064	0.03	n/a	0.06
S400C	Renaud Rd	24 m	0.51	73	0.643	0.082	0.05	n/a	0.08
S400D	Renaud Rd	24 m	0.51	53	0.593	0.073	0.04	n/a	0.07
S401A	Renaud Rd	24 m	0.51	81	0.660	0.085	0.06	n/a	0.09
S401B	Renaud Rd	24 m	0.51	84	0.666	0.087	0.06	n/a	0.09

Major System Segment ID (Dummy Segment ID)	Street Name	Road Allowance	Longitudinal Slope (%)	Overflow (l/s)*	Velocity (m/s)	Depth (m)	Velocity x Depth (m^2/s)	Max. Depth of Ponding (m)	Max. Depth of Ponding plus Overflow Depth (m) – if applicable
S401C (D28)	Renaud Rd	24 m	0.55	0	n/a	n/a	n/a	0.21	0.21
S402A (D29)	Renaud Rd	24 m	0.50	5	0.264	0.030	0.01	0.17	0.20
S402C (D30) + S402G + S410B	Renaud Rd	24 m	1.70	77	0.855	0.132	0.11	0.17	0.30
S410A (D32)	Renaud Rd	24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S410C	Renaud Rd	24 m	0.64	96	0.630	0.067	0.04	n/a	0.07
S410D	Renaud Rd	24 m	0.64	210	0.770	0.090	0.07	n/a	0.09
S410E	Renaud Rd	24 m	0.64	222	0.780	0.091	0.07	n/a	0.09
S301 (D23)	Enclave Walk	18 m	0.77	0	n/a	n/a	n/a	0.25	0.25
S303(D24) + S314 (D26)	Enclave Walk	18 m	1.04	23	0.525	0.051	0.03	0.24	0.29
S304(D25) + S312 (D21)	Enclave Walk	18 m	0.60	98	0.619	0.089	0.06	0.18	0.27
S307 (D19)	Enclave Walk	18 m	0.67	0	n/a	n/a	n/a	0.25	0.25
S311 (D20)	Enclave Walk	18 m	1.08	0	n/a	n/a	n/a	0.20	0.20
S404(D31) + S306 (D22)	Compass Street	24 m	0.50	19	0.439	0.048	0.02	0.25	0.30
S112A(D1) + S112B (D3)	Locust Ridge	18 m	0.95	141	0.806	0.101	0.08	0.15	0.25
S113 (D2)	Locust Ridge	18 m	0.56	0	n/a	n/a	n/a	0.18	0.18
S114(D7) + S106 (D6)	Locust Ridge	18 m	0.56	28	0.437	0.056	0.02	0.19	0.25
S104 (D8)	Locust Ridge	18 m	0.54	52	0.509	0.071	0.04	0.20	0.27
S102 (D5)	Locuse Ridge	18 m	0.61	17	0.400	0.046	0.02	0.14	0.19
S3901W (D37)	Belcourt Blvd	24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S54W (D38)	Belcourt Blvd	½ of 24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S55AW (D39)	Belcourt Blvd	½ of 24 m	0.50	0	n/a	n/a	n/a	0.15	0.15
S55BW (D40)	Belcourt Blvd	½ of 24 m	0.53	0	n/a	n/a	n/a	0.15	0.15

Notes: *Major system segment overflow from the 100 year 3 hour Chicago storm event was taken from the results of the DDSWMM model entitled 100 YR CHICAGO DDSWMM OUTPUT (TE-100CH.dat/out) and presented on the CD in **Appendix C**.
† Depth of the cascading overflow was determined from the *Calculation Sheet: Overflow From Typical Road Ponding Area* provided at the November 19, 2013 Stormwater Sub-Committee Meeting #9. Tables and communication with J.F. Sabourin and Associates is provided in **Appendix C**.
ç Depth of the cascading overflow on continuous grade was determined using the SWMHYMO model (31855VXD.dat/out).

During the 100-year storm event flow needs to be conveyed from the east side of Belcourt Blvd to the west side of Belcourt Blvd in drainage area S56. A weir calculation was used to determine the maximum flow that could be conveyed through the 4.0 m depressed median is 0.32 cms. During the 100-year storm event, the total flow in drainage area S56 including upstream inflows is 0.14 cms well within the capacity of the depressed median.

Once the flow has reached the west side of Belcourt Blvd, a 5.0 m pathway conveys the flow into Mud Creek. A weir calculation was used to determine the maximum flow that could be conveyed is 0.70 cms. The 100-year flow of 0.10 cms can be conveyed by the pathway into Mud Creek.

Supporting calculations can be found in **Appendix C**.

Table 4.6. Summary of Cascading Flow during the 100 Year 3 Hour Chicago Storm Increased by 20%
(100 YR CHICAGO INCREASED BY 20% DDSWMM OUTPUT TE-100CH+20%.dat/out)

Major System Segment ID (Dummy Segment ID)	Street Name	Road Allowance	Longitudinal Slope (%)	Overflow (l/s)*	Velocity (m/s)	Depth (m)	Velocity x Depth (m^2/s)	Max. Depth of Ponding (m)	Max. Depth of Ponding plus Overflow Depth (m) – if applicable
S3901E (D9)	Belcourt Blvd	24 m	0.50	34	0.525	0.064	0.033	0.150	0.21
S3900B (D11)	Belcourt Blvd	½ of 24 m	0.50	0	n/a	n/a	n/a	0.150	0.15
S54E (D12)	Belcourt Blvd	½ of 24 m	0.50	27	0.494	0.072	0.035	0.150	0.22
S55AE (D13)	**Belcourt Blvd**	**½ of 24 m**	**0.50**	**236**	**0.854**	**0.161**	**0.138**	**0.150**	**0.31**
S55BE (D14)	**Belcourt Blvd**	**½ of 24 m**	**0.53**	**482**	**1.033**	**0.204**	**0.210**	**0.150**	**0.35**
S500 (D18)	Belcourt Blvd	24 m	0.56	44	0.492	0.066	0.033	0.150	0.22
S500C	Belcourt Blvd	24 m	-	0	n/a	n/a	n/a	0.27	0.27
S400A	Renaud Rd	24 m	0.51	50	0.584	0.072	0.042	n/a	0.07
S400B	Renaud Rd	24 m	0.51	53	0.593	0.073	0.043	n/a	0.07
S400C	Renaud Rd	24 m	0.51	97	0.691	0.092	0.064	n/a	0.09
S400D	Renaud Rd	24 m	0.51	76	0.650	0.083	0.054	n/a	0.08
S401A	Renaud Rd	24 m	0.51	112	0.716	0.097	0.069	n/a	0.10
S401B	Renaud Rd	24 m	0.51	118	0.725	0.099	0.072	n/a	0.10
S401C (D28)	Renaud Rd	24 m	0.55	0	n/a	n/a	n/a	0.210	0.21
S402A (D29)	Renaud Rd	24 m	0.50	81	0.550	0.083	0.046	0.170	0.25
S402C (D30) + S402G + S410B	**Renaud Rd**	**24 m**	**1.70**	**401**	**1.304**	**0.148**	**0.193**	**0.170**	**0.32**
S410A (D32)	Renaud Rd	24 m	0.50	204	0.716	0.118	0.084	0.150	0.27
S410C	Renaud Rd	24 m	0.64	155	0.711	0.080	0.057	n/a	0.08
S410D	Renaud Rd	24 m	0.64	335	0.865	0.107	0.093	n/a	0.11
S410E	Renaud Rd	24 m	0.64	356	0.878	0.110	0.096	n/a	0.11
S301 (D23)	Enclave Walk	18 m	0.77	18	0.439	0.047	0.021	0.250	0.30
S303(D24) + S314 (D26)	**Enclave Walk**	**18 m**	**1.04**	**87**	**0.738**	**0.085**	**0.062**	**0.240**	**0.32**
S304(D25) + S312 (D21)	**Enclave Walk**	**18 m**	**0.60**	**205**	**0.749**	**0.118**	**0.088**	**0.220**	**0.34**
S307 (D19)	Enclave Walk	18 m	0.67	0	n/a	n/a	n/a	0.250	0.25
S311 (D20)	Enclave Walk	18 m	1.08	8	0.395	0.035	0.014	0.200	0.24
S404(D31) +	**Compass**	**24 m**	**0.50**	**306**	**0.771**	**0.137**	**0.106**	**0.250**	**0.39**

Major System Segment ID (Dummy Segment ID)	Street Name	Road Allowance	Longitudinal Slope (%)	Overflow (l/s)*	Velocity (m/s)	Depth (m)	Velocity x Depth (m^2/s)	Max. Depth of Ponding (m)	Max. Depth of Ponding plus Overflow Depth (m) – if applicable
S306 (D22)	**Street**								
S112A(D1) + S112B (D3)	**Locust Ridge**	**18 m**	**0.95**	**1056**	**1.439**	**0.210**	**0.302**	**0.150**	**0.36**
S113 (D2)	Locust Ridge	18 m	0.56	4	0.256	0.028	0.007	0.180	0.21
S114(D7) + S106 (D6)	Locust Ridge	18 m	0.56	54	0.520	0.072	0.037	0.190	0.26
S104 (D8)	Locust Ridge	18 m	0.54	120	0.628	0.096	0.061	0.200	0.30
S102 (D5)	Locuse Ridge	18 m	0.61	97	0.622	0.089	0.055	0.140	0.23
S3901W (D37)	Belcourt Blvd	24 m	0.50	23	0.473	0.054	0.026	0.150	0.20
S54W (D38)	Belcourt Blvd	½ of 24 m	0.50	18	0.446	0.050	0.022	0.150	0.20
S55AW (D39)	Belcourt Blvd	½ of 24 m	0.50	2	0.235	0.023	0.005	0.150	0.17
S55BW (D40)	Belcourt Blvd	½ of 24 m	0.53	1	0.211	0.015	0.003	0.150	0.17

Notes: * Major system segment overflow from the 100 year 3 hour Chicago increased by 20% storm event was taken from the results of the DDSWMM model entitled 100 YR CH INCREASE 20 DDSWMM OUTPUT (TE-100CH+20%.dat/out) and presented on the CD in **Appendix C**.
† Depth of the cascading overflow was determined from the *Calculation Sheet: Overflow From Typical Road Ponding Area* provided at the November 19, 2013 Stormwater Sub-Committee Meeting #9. Tables and communication with J.F. Sabourin and Associates is provided in **Appendix C**.
ç Depth of the cascading overflow on continuous grade was determined using the SWMHYMO model (31855VXD.dat/out).

In all locations within the subject site and under all storm events, the v x d product is less than the maximum allowable product of 0.6 m^2/s per the OSDG.

At each location for each storm event presented, the maximum depth of ponding plus overflow on the street is less than the maximum allowable 300 mm.

During the 100 year storm event increased by 20%, the summation of depth of ponding and depth of cascading flow is more than 0.30 m in seven (7) locations throughout the subject site. These areas are noted in **Table 4.6** in bold. However, at three (3) locations within the subject site the total depth exceeds 0.35 m. The street segments are S112A+S112B, S404+S306, and S55B.

As noted previously, major flow from upstream development areas will cascade into Trails Edge Phase II. During detail design of the external development areas to Trails Edge Phase II, an evaluation of the major flow route through the site should be undertaken if the major flows are greater than presented in the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015).

The following table summarizes the elevation of the top of grate, ponding depth, and the garage elevations for the street segments where summation of depth of ponding and depth of cascading flow is exceeds 0.30 m.

Table 4.7 Summary of Extent of Cascading Flow in Relation to Property Lines and Garage Elevations – Interim Conditions for 100 Year 3 Hour Chicago increased by 20%

(100 YR CHICAGO INCREASED BY 20% DDSWMM OUTPUT TE-100CH+20%.dat/out)

Major System Segment ID	Top of Grate (m)	Ponding Depth (m)	Elevation at Closest Garage (m) (FOUNDATION)	Extent of Ponding and Cascading Depth (m)*
S55AE	87.58	0.31	n/a	87.89
S55BE	87.53	0.35	n/a	87.88
S402C + S402G+S410B	87.24	0.32	87.6	87.56
S303 + S314	86.82	0.32	87.28	87.14
S304 + S312	86.52	0.34	86.78 (87.03)	86.86
S404 + S306	86.39	0.39	86.8	86.78
S112A+S112B	87.2	0.36	87.7	87.56

Note: * Extent of ponding and cascading depth is the addition of the low point elevation for each major system segment with the cascading depth presented in Table 4.7 (i.e., for S401B: 87.17 + 0.35 = 87.52 m).

During the 100 year storm event increased by 20%, the major system will cascade from each street segment noted in **Table 4.7** and remain outside the lowest garage elevation at the low point. For street segment S304+S312 the major flow will encroach beyond the garage elevation but not beyond the foundation. For the remainder of the street segments, the major system cascading flow will not encroach the property line.

An evaluation of the overflow from drainage area S56W into Mud Creek via the 5.0 m conveyance pathway has been completed for the 100-year + 20% storm event. A weir calculation was used to determine the maximum flow that could be conveyed is 0.70 cms. The 100-year + 20% flow of 0.30 cms can be conveyed by the pathway into Mud Creek. Supporting calculations can be found in **Appendix C**.

4.6 Hydraulic Grade Line Analysis

The evaluation of the hydraulic grade line (HGL) was completed using XPSWMM. As noted in **Section 4.1**, an XPSWMM model was created for EUC Pond 1; the minor system (trunks only) and the major conveyance routes (ravines). EUC Pond 1 services the Trails Edge development, including the subject site, and the Orleans Business Park. The XPSWMM model was modified to include the detail design of the laterals and trunk sewers in the subject site (see **Appendix C** for a schematic of the overall system).

Minor system losses within the subject site were accounted for in accordance with Appendix 6-B of the OSDG. A summary of the minor losses used for the hydraulic evaluation are presented in **Appendix C**.

It should also be noted that the trunk sewers adjacent to the subject site are interconnected via two flow splitters. The first flow splitter is located within Belcourt Boulevard at MH 210 (XPSWMM Node 210 and the second flow splitter is located at MH 3900 to MH 54 (see XPSWMM schematic in **Appendix C**). **Drawing 700** presents the locations of the flow splitter manholes. The flow splitters were modeled as part of the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015).

The minor system hydrographs for the proposed development and surrounding areas were exported from the DDSWM evaluation. XPSWMM simulations were conducted for the 5 year 3

hour Chicago storm; 100 year 3 hour Chicago storm; July 1, 1979, August 4, 1988 and August 8, 1996 Historical storms. A sensitivity evaluation of the hydraulic system was also undertaken using the 20% increased 100 year 3 hour Chicago storm event. The hydraulic grade line values, flow and velocity for all above noted storm events for all storm sewers within the subject site are presented in **Table 4.7**, along with a comparison of under-side of footing (USF) elevations, where available. XPSWMM model output files are provided in **Appendix C**.

Table 4.8: Hydraulic Grade Line Analysis

XPSWMM			USF (m)	5 year 3 hour Chicago[ε]				100 year 3 hour Chicago[†]				July 1, 1979 Historical Storm[‡]				August 4, 1988 Historical Storm[¥]				August 8, 1996 Historical Storm[§]				Sensitivity Evaluation - 100 year 3 hour Chicago - increased 20%[€]			
U/S MH	D/S MH	Pipe			SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)
N3901	N3900	P3901	N/A	85.85	N/A	0.13	1.06	85.89	N/A	0.15	1.11	85.86	N/A	0.13	1.07	85.88	N/A	0.15	1.11	85.86	N/A	0.13	1.07	86.12	N/A	0.15	1.11
N54	N55	P54	N/A	84.98	N/A	8.15	1.82	85.62	N/A	10.86	1.91	85.44	N/A	10.11	1.84	85.36	N/A	9.79	1.84	85.17	N/A	9.10	1.87	85.90	N/A	11.96	1.98
N55	N56	P55	N/A	84.86	N/A	8.71	1.93	85.49	N/A	11.95	2.08	85.33	N/A	11.16	2.02	85.24	N/A	10.73	2.00	85.05	N/A	9.73	1.96	85.74	N/A	13.18	2.20
N56	N57	P56_A	N/A	84.73	N/A	11.83	2.19	85.33	N/A	18.46	2.70	85.19	N/A	16.36	2.49	85.11	N/A	15.52	2.43	84.93	N/A	13.94	2.34	85.52	N/A	20.72	2.90
N57	Chan1	L560	N/A	84.65	N/A	12.44	2.41	85.22	N/A	19.60	2.96	85.09	N/A	17.45	2.74	85.01	N/A	16.54	2.67	84.83	N/A	14.80	2.57	85.40	N/A	21.92	3.15
N404	N406	P404	n/a	83.66	N/A	1.57	1.42	84.27	N/A	3.30	1.78	84.20	N/A	2.62	1.43	84.18	N/A	2.91	1.59	83.85	N/A	2.05	1.36	84.79	N/A	4.69	2.57
N406	N407	P406	n/a	83.58	N/A	1.99	1.32	84.09	N/A	4.05	1.57	84.05	N/A	3.25	1.25	83.99	N/A	3.41	1.32	83.75	N/A	2.46	1.09	84.28	N/A	5.63	2.09
N407	Chan2	L38	88.15	83.57	4.58	1.96	1.32	84.06	4.09	4.04	1.57	84.01	4.14	3.24	1.24	83.95	4.20	3.40	1.31	83.73	4.42	2.44	1.06	84.22	3.93	5.63	2.13
N56	N101	P56_B	N/A	84.73	N/A	0.42	1.43	85.33	N/A	0.52	1.78	85.19	N/A	0.49	1.68	85.11	N/A	0.53	1.82	84.93	N/A	0.52	1.78	85.52	N/A	0.55	1.86
N103	N104	P103	89.5	84.16	5.34	0.48	1.52	84.56	4.94	0.68	1.59	84.51	4.99	0.63	1.58	84.45	5.05	0.63	1.63	84.26	5.24	0.61	1.67	84.73	4.77	0.71	1.60
N104	N105	P104	N/A	83.98	N/A	0.51	0.98	84.50	N/A	0.74	0.93	84.45	N/A	0.70	0.91	84.40	N/A	0.71	0.95	84.17	N/A	0.67	0.98	84.66	N/A	0.78	0.92
N105	N106	P105	N/A	83.89	N/A	0.63	0.84	84.43	N/A	0.98	0.85	84.38	N/A	0.92	0.80	84.33	N/A	0.90	0.80	84.10	N/A	0.81	0.85	84.59	N/A	1.01	0.86
N106	19	P106	N/A	83.86	N/A	1.02	1.36	84.41	N/A	1.62	1.48	84.36	N/A	1.56	1.40	84.31	N/A	1.54	1.38	84.07	N/A	1.39	1.44	84.57	N/A	1.65	1.49
N310	N311	P310	85.46	84.33	1.13	0.06	1.00	84.47	0.99	0.08	1.02	84.35	1.11	0.07	1.01	84.36	1.10	0.07	1.01	84.34	1.12	0.06	1.03	84.79	0.67	0.09	1.04
N311	N312	P311	85.26	84.16	1.10	0.15	0.80	84.43	0.83	0.19	0.80	84.27	0.99	0.18	0.78	84.27	0.99	0.18	0.77	84.21	1.06	0.17	0.79	84.74	0.52	0.19	0.81
N312	**N313**	**P312**	**84.96**	**84.07**	**0.89**	**0.29**	**1.11**	**84.37**	**0.59**	**0.36**	**1.10**	**84.25**	**0.71**	**0.35**	**1.10**	**84.20**	**0.76**	**0.35**	**1.06**	**84.12**	**0.84**	**0.33**	**1.11**	**84.69**	**0.27**	**0.36**	**1.13**
N313	N305	P313	84.96	83.97	0.99	0.29	1.13	84.31	0.65	0.36	1.13	84.20	0.76	0.34	1.10	84.14	0.82	0.35	1.09	84.03	0.93	0.33	1.12	84.60	0.36	0.36	1.14
N305	N306	P305	84.91	83.91	1.00	0.65	1.29	84.27	0.64	0.80	1.36	84.17	0.74	0.77	1.32	84.10	0.81	0.77	1.28	83.97	0.94	0.74	1.34	84.54	0.37	0.80	1.37
N306	N406	P306	84.86	83.74	1.12	0.73	1.44	84.18	0.68	0.94	1.58	84.10	0.76	0.87	1.49	84.00	0.86	0.88	1.39	83.79	1.07	0.83	1.51	84.43	0.44	0.94	1.58
N401	**N402**	**P401**	**85.71**	**83.87**	**1.84**	**1.38**	**1.35**	**84.68**	**1.03**	**2.72**	**1.52**	**84.46**	**1.25**	**2.09**	**1.16**	**84.57**	**1.14**	**2.61**	**1.41**	**84.09**	**1.62**	**1.83**	**1.35**	**85.84**	**-0.13**	**3.98**	**2.17**
N402	**N403**	**P402**	**85.56**	**83.78**	**1.78**	**1.42**	**1.29**	**84.53**	**1.03**	**2.95**	**1.55**	**84.37**	**1.19**	**2.24**	**1.23**	**84.42**	**1.14**	**2.68**	**1.44**	**83.99**	**1.57**	**1.88**	**1.28**	**85.71**	**-0.15**	**4.22**	**2.31**
N403	N404	L403	n/a	83.71	N/A	1.39	1.18	84.38	N/A	2.93	1.55	84.27	N/A	2.24	1.21	84.28	N/A	2.68	1.44	83.92	N/A	1.86	1.22	85.05	N/A	4.41	2.40
N501	N57	P501	n/a	84.67	N/A	1.28	3.01	85.20	N/A	1.70	3.30	85.10	N/A	1.47	3.10	85.05	N/A	1.47	2.63	84.85	N/A	1.67	3.37	85.51	N/A	1.70	3.18
N500C	N501	P500C	n/a	85.03	N/A	0.15	1.10	85.27	N/A	0.20	1.17	85.14	N/A	0.17	1.12	85.06	N/A	0.18	1.15	85.04	N/A	0.16	1.12	85.50	N/A	0.20	1.17
N500	N500C	P500	n/a	85.28	N/A	0.07	0.90	85.37	N/A	0.09	0.95	85.29	N/A	0.08	0.92	85.30	N/A	0.08	0.93	85.29	N/A	0.07	0.91	85.61	N/A	0.09	0.95
N400	**N401**	**P400**	**86.06**	**83.95**	**2.11**	**1.35**	**1.39**	**84.78**	**1.28**	**2.64**	**1.61**	**84.51**	**1.55**	**1.99**	**1.17**	**84.68**	**1.38**	**2.57**	**1.39**	**84.16**	**1.90**	**1.82**	**1.46**	**86.11**	**-0.05**	**3.68**	**2.01**
N399	N400	P399	n/a	84.05	N/A	1.35	1.45	84.87	N/A	2.72	1.74	84.57	N/A	1.97	1.28	84.78	N/A	2.58	1.40	84.24	N/A	1.90	1.56	86.35	N/A	3.66	1.99
N412	N404	P412	85.76	83.85	1.91	0.21	3.00	84.28	1.48	0.24	1.50	84.21	1.55	0.23	1.49	84.19	1.57	0.23	1.47	83.86	1.90	0.22	2.03	84.91	0.85	0.29	1.51
N410	N412	P410	n/a	84.31	N/A	0.21	1.88	84.36	N/A	0.24	1.94	84.35	N/A	0.23	1.92	84.33	N/A	0.23	1.92	84.33	N/A	0.22	1.92	84.83	N/A	0.28	1.94
N410B	N410	P410B	n/a	84.82	N/A	0.20	1.77	84.84	N/A	0.23	1.82	84.84	N/A	0.22	1.81	84.84	N/A	0.22	1.81	84.83	N/A	0.22	1.81	84.91	N/A	0.25	1.82
N309	N310	P309	85.66	84.49	1.17	0.06	1.00	84.54	1.12	0.07	1.04	84.51	1.15	0.07	1.04	84.51	1.15	0.07	1.04	84.50	1.16	0.06	1.03	84.82	0.84	0.09	1.05
N308	N309	P308	85.76	84.50	1.26	0.06	1.47	84.53	1.23	0.07	1.56	84.51	1.25	0.07	1.55	84.51	1.25	0.07	1.56	84.51	1.25	0.06	1.52	84.81	0.95	0.09	1.56
N307	N308	P307	85.51	84.85	0.66	0.06	0.98	84.88	0.63	0.07	1.02	84.87	0.64	0.07	1.02	84.88	0.63	0.07	1.02	84.87	0.64	0.06	1.00	84.92	0.59	0.07	1.04
N304	N305	P304	85.11	84.01	1.10	0.34	1.18	84.31	0.80	0.41	1.22	84.19	0.92	0.40	1.14	84.11	1.00	0.41	1.12	84.05	1.06	0.38	1.16	84.64	0.47	0.41	1.21
N303	N304	P303	85.01	84.04	0.97	0.25	1.28	84.30	0.71	0.28	1.31	84.17	0.84	0.28	1.36	84.08	0.93	0.28	1.33	84.06	0.95	0.27	1.37	84.60	0.41	0.29	1.31
N301	N303	P301	85.36	84.58	0.78	0.18	1.45	84.60	0.76	0.20	1.49	84.60	0.76	0.20	1.49	84.60	0.76	0.20	1.49	84.59	0.77	0.19	1.48	84.71	0.65	0.20	1.49

XPSWMM			USF (m)	5 year 3 hour Chicago£				100 year 3 hour Chicago†				July 1, 1979 Historical Storm‡				August 4, 1988 Historical Storm¥				August 8, 1996 Historical Storm§				Sensitivity Evaluation - 100 year 3 hour Chicago - increased 20%€			
U/S MH	D/S MH	Pipe			SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)	HGL (m)	SB (m)*	Flow (cms)	Velocity (m/s)
N314	N304	P314	85.36	84.31	1.05	0.04	0.94	84.33	1.03	0.05	0.98	84.33	1.03	0.05	0.98	84.33	1.03	0.05	0.98	84.32	1.04	0.05	0.97	84.64	0.72	0.05	0.98
N114	N105	P115	85.71	84.78	0.93	0.22	1.41	84.81	0.90	0.25	1.47	84.81	0.90	0.25	1.46	84.81	0.90	0.25	1.48	84.80	0.91	0.24	1.45	84.81	0.90	0.25	1.47
N113	N114	P113	85.71	85.25	0.46	0.14	1.71	85.26	0.45	0.15	1.73	85.26	0.45	0.15	1.73	85.26	0.45	0.15	1.74	85.25	0.46	0.14	1.72	85.26	0.45	0.15	1.74
N112B	N113	P112_1	85.76	85.30	0.46	0.03	1.15	85.30	0.46	0.03	1.24	85.29	0.47	0.03	1.38	85.30	0.46	0.03	1.40	85.30	0.46	0.03	1.29	85.30	0.46	0.03	1.19
N102	N103	P102	85.56	84.32	1.24	0.48	1.66	84.77	0.79	0.68	1.83	84.67	0.89	0.63	1.74	84.61	0.95	0.63	1.81	84.41	1.15	0.60	1.82	84.94	0.62	0.72	1.93
N101	N102	P101	85.71	84.43	1.28	0.46	1.58	84.93	0.78	0.64	1.73	84.83	0.88	0.60	1.63	84.75	0.96	0.61	1.71	84.52	1.19	0.58	1.70	85.11	0.60	0.67	1.81
N112_2	N101	P112_2	85.76	84.65	1.11	0.06	0.91	85.01	0.75	0.07	0.95	84.94	0.82	0.07	0.94	84.83	0.93	0.07	0.93	84.67	1.09	0.07	0.94	85.20	0.56	0.07	0.95
N3900	39	39Weir	N/A	85.05	N/A	0.63	1.77	85.69	N/A	0.92	2.55	85.51	N/A	0.84	2.32	85.43	N/A	0.80	2.23	85.24	N/A	0.72	2.00	85.99	N/A	1.04	2.86

Notes: * SB is the safety board between the USF and HGL (USF – HGL).
£ Hydraulic results for the 5 year 3 hour Chicago storm event were taken from the results of the XPSWMM model entitled "E005C_A.xp/out" and presented on the CD in **Appendix C**.
† Hydraulic results for the 100 year 3 hour Chicago storm event were taken from the results of the XPSWMM model entitled "E100C_A.xp/out* and presented on the CD in **Appendix C**.
‡ Hydraulic results for the July 1, 1979 historical storm were taken from the results of the XPSWMM model entitled "E1979_A.xp/out" and presented on the CD in **Appendix C**.
¥ Hydraulic results for the August 4, 1988 historical storm were taken from the results of the XPSWMM model entitled "E1988 _A.xp/out" and presented on the CD in **Appendix C**.
§ Hydraulic results for the August 8, 1996 historical storm were taken from the results of the XPSWMM model entitled "E1996_A.xp/out" and presented on the CD in **Appendix C**.
€ Hydraulic results for the 100 year 3 hour Chicago storm event increased by 20% were taken from the results of the XPSWMM model entitled "E100C+20%_A.xp/out" and on the CD in **Appendix C**.

The results of the hydraulic evaluation indicate that the HGL in the storm sewers for the subject site are below the USF elevations, during all storm events. Specifically, the minimum 300 mm clearance between the USF and HGL is maintained. The velocity in the pipes is between 0.8 m/s and 3.0 m/s as per the OSDG.

The results of the sensitivity run (100 year 3 hour Chicago plus 20%) indicate that the HGL in the storm sewers is between the USF elevation and 270 mm above the USF elevation in 3 locations. These locations are indicated in bold in **Table 4.8**.

The hydraulic grade line for the minor system external to the site was evaluated and the results were compared to the USFs as reported in the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015). A summary of the hydraulic grade line values, flow and velocity for the areas external to the subject site is presented in **Appendix C**. The results indicate that the design of the subject site has minimal impact on the HGL compared to the Stormwater Management Report for the Trails Edge West Subdivision (JFSA 2015).

IBI GROUP
IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: TRAILSEDGE II
LOCATION: CITY OF OTTAWA
CLIENT: MINTO COMMUNITIES INC.

LOCATION STREET	Area #	FROM MH	TO MH	AREA (Ha) C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.54	C= 0.64	C= 0.65	C= 0.69	C= 0.70	C= 0.71	C= 0.80	IND 2.78AC	CUM 2.78AC	RATIONAL DESIGN FLOW: INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	SEWER DATA: CAP (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VEL (m/s)	AVAIL CAP (5yr) (L/s)	(%)
OUTLET TO Mudd Creek - Street 'A' South (1800 mm dia)																																				
													7.97		15.51	15.51	23.50	AC and Tc FROM DSEL MES REV. 6 , split using % flows from IBI SWM model (100% to MH400)									2,554.60	82.00	1500			0.12	1.400	2554.60	100.00%
Renaud Road	EXT400, 400E	BLKHD	400										0.39		0.76	16.27	23.50	0.99	24.49	63.40	74.16	108.16	1,031.43			63.50	1,031.43	2,554.60	83.00	1500			0.12	1.400	1523.17	59.62%
Renaud Road	400A-D	400	401										0.48		0.93	17.20	24.49	1.37	25.86	61.73	72.20	105.27	1,061.85			375.20	1,061.85	2,554.60	115.00	1500			0.12	1.400	1492.75	58.43%
Renaud Road	401A-E	401	402										0.96		3.61	20.81	25.86	1.13	26.98	59.56	69.66	101.55	1,239.69			253.90	1,239.69	2,554.60	94.55	1500			0.12	1.400	1314.92	51.47%
Renaud Road	402A-1,R402A-B	402	403					0.26	0.78						0.00	20.81	26.98	0.19	27.17	57.91	67.71	98.70	1,205.21				1,205.21	2,554.60	15.79	1500			0.12	1.400	1349.40	52.82%
Renaud Road		403	404																																	
SCHOOL - surface outlet	EXT	STUB	410B	REFER TO GENIVAR PROJECT 0808											1.96	1.96	39.70	0.38	40.06	44.42	51.90	75.55	86.94				86.94	91.46	17.26	375			0.23	0.802	4.52	4.94%
Renaud Road	410A	410B	410											0.21	0.47	2.42	10.00	0.53	10.53	104.19	122.14	178.56	252.58			73.00	252.58	401.29	57.41	525			0.80	1.796	148.71	37.06%
																											65.73	34.22	17.66	200			1.00	1.055	-31.54	-92.16%
SCHOOL - bldg outlet	EXT	STUB	410	REFER TO GENIVAR PROJECT 0808											0.63	0.63	10.00	0.28	10.28	104.19	122.14	178.56	65.75														
																										17.50	339.19	448.66	30.88	525			1.00	2.006	109.47	24.40%
Renaud Road	410B	410	412											0.09	0.20	3.26	10.00	0.26	10.26	104.19	122.14	178.56	339.19				334.84	878.93	8.52	675			1.00	2.374	542.09	61.82%
Renaud Road		412	404												0.00	3.26	10.26	0.06	10.32	102.86	120.57	176.25	334.84														
																											145.99	210.32	12.00	450			0.50	1.281	64.33	30.59%
Institutional Block 249	21	409	404											0.63	1.40	1.40	10.00	0.16	10.16	104.19	122.14	178.56	145.99														
												0.16			0.31	25.78	27.17	0.98	28.15	57.64	67.40	98.25	1,485.74			104.00	1,485.74	2,332.02	75.31	1500			0.10	1.278	846.29	36.29%
Compass Street	S404	404	406																																	
Enclave Walk	S307	307	308										0.25		0.49	0.49	10.00	1.12	11.12	104.19	122.14	178.56	51.41			68.00	51.41	115.68	68.17	375			0.40	1.015	64.27	55.56%
Enclave Walk		308	309												0.00	0.49	11.12	0.19	11.31	98.63	115.59	168.93	48.67				48.67	115.68	11.53	375			0.40	1.015	67.01	57.93%
Enclave Walk		309	310												0.00	0.49	11.31	0.56	11.87	97.75	114.56	167.42	48.24				48.24	115.68	34.32	375			0.40	1.015	67.45	58.30%
Enclave Walk		310	311												0.00	0.49	11.87	0.50	12.37	95.24	111.60	163.08	47.00				47.00	115.68	30.56	375			0.40	1.015	68.69	59.37%
Enclave Walk	S311	311	312										0.43		0.85	1.34	12.37	1.57	13.94	93.12	109.11	159.42	124.99			120.00	124.99	248.09	80.08	600			0.15	0.850	123.10	49.62%
Enclave Walk	S312, R312A-B	312	313						0.44				0.35		1.35	2.69	13.94	0.77	14.72	87.13	102.05	149.06	234.68			143.00	234.68	339.63	42.75	675			0.15	0.919	104.95	30.90%
Enclave Walk		313	305												0.00	2.69	14.72	0.51	15.23	84.47	98.93	144.48	227.53				227.53	339.63	28.05	675			0.15	0.919	112.10	33.01%
Enclave Walk	S301, R301A, B, C, D	301	303						0.53				0.36		1.51	1.51	10.00	1.47	11.47	104.19	122.14	178.56	156.94			196.00	156.94	283.76	112.37	525			0.40	1.270	126.82	44.69%
Enclave Walk	S303	303	304										0.31		0.61	2.12	11.47	0.46	11.94	97.00	113.67	166.11	205.45			87.00	205.45	480.32	36.08	675			0.30	1.300	274.86	57.23%
																											34.96	67.67	38.16	300			0.45	0.927	32.71	48.34%
Pin Cherry Grove	S314	314	304										0.17		0.34	0.34	10.00	0.69	10.69	104.19	122.14	178.56	34.96			48.00											
Pin Cherry Grove	S304	304	305										0.28		0.55	3.01	11.94	1.28	13.21	94.96	111.27	162.60	285.49			78.00	285.49	449.81	75.56	750			0.15	0.986	164.32	36.53%
Enclave Walk	R305	305	306						0.17						0.26	5.96	15.23	0.65	15.88	82.83	96.99	141.63	493.24			31.00	493.24	731.45	43.68	900			0.15	1.114	238.21	32.57%
Enclave Walk	S306	306	406										0.39		0.77	6.72	15.88	0.94	16.83	80.81	94.62	138.16	543.45			142.00	543.45	842.96	61.91	975			0.13	1.094	299.51	35.53%
																											2,538.01	3,792.13	27.23	1800			0.10	1.444	1254.12	33.07%
Compass Street		406	407												0.00	32.50	16.83	0.31	17.14	78.09	91.42	133.46	2,538.01				2,509.97	3,792.13	6.87	1800			0.10	1.444	1282.15	33.81%
Compass Street	OUTLET	407	HW												0.00	32.50	17.14	0.08	17.22	77.23	90.41	131.97	2,509.97													
				0.00	0.00	0.00	0.00	1.40	0.76	0.00	0.16	9.80	2.54	0.93	32.50	TRUE																				
OUTLET TO RENAUD ROAD (Ex 750mm dia)																																				
Renaud Road	410C-E	410C	STUB							1.07				0.29	2.58	2.58	10.00	1.19	11.19	104.19	122.14	178.56	268.66			106.20	268.66	375.37	120.00	525			0.70	1.680	106.72	28.43%
				0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.00	0.00	0.29	2.58	TRUE																				

IBI GROUP
IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: TRAILSEDGE II
LOCATION: CITY OF OTTAWA
CLIENT: MINTO COMMUNITIES INC.

LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW										SEWER DATA									
STREET	Area #	FROM MH	TO MH	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.54	C= 0.64	C= 0.65	C= 0.69	C= 0.70	C= 0.71	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	I (5) (mm/hr)	I (10) (mm/hr)	I (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAP (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VEL (m/s)	AVAIL CAP (5yr) (L/s)	(%)
OUTLET TO Mudd Creek - Belcourt (3000mm dia)																																			
Belcourt Boulevard	5500	500	500C											0.26	0.58	0.58	10.00	1.40	11.40	104.19	122.14	178.56	60.25			84.00	60.25	91.46	67.38	375			0.25	0.802	31.21	34.12%
Belcourt Boulevard	5500C	500C	501											0.31	0.69	0.69	11.40	1.12	12.52	97.34	114.07	166.70	67.11			101.00	67.11	224.33	67.36	525			0.25	1.004	157.22	70.08%
SCHOOL	EXT-501	EXT-501	501							5.01					9.05	9.05	12.31	0.27	12.58	93.39	109.42	159.88	845.49				845.49	988.85	17.90	1050			0.12	1.104	141.36	14.32%
Belcourt Boulevard	5501	501	MH501B												0.00	9.74	12.58	0.54	13.11	92.29	108.13	157.98	899.18				899.18	988.85	35.46	1050			0.12	1.104	87.67	8.88%
		MH501B	57												0.00	9.74	13.11	0.07	13.18	90.19	105.66	154.35	878.69				878.69	988.85	4.52	1050			0.12	1.104	108.17	10.96%
Belcourt Boulevard	53901	3901	3900											0.460	1.02	1.02	10.00	0.98	10.98	104.19	122.14	178.56	106.59			148.00	106.59	148.72	53.35	450			0.25	0.906	42.12	28.32%
	EXT-113, 53900B	EXT-113	3900											43.601	96.97	96.97	28.41	0.16	28.57	55.94	65.41	95.33	5,424.84			69.40	5,424.84	11,180.46	17.90	2700			0.10	1.892	5755.62	51.48%
Axis Street	HGL Relief Pipe	9901	STUB												0.00	0.00	10.00	0.56	10.56	104.19	122.14	178.56	0.00				0.00	1,103.33	41.26	1050			0.15	1.334	1103.33	100.00%
Belcourt Boulevard		3900	54												0.00	97.99	28.57	0.20	28.77	55.74	65.17	94.98	5,461.74				5,461.74	11,180.46	22.92	2700			0.10	1.892	5718.72	51.15%
Belcourt Boulevard	554	54	55											0.28	0.62	98.61	28.77	1.01	29.78	55.47	64.86	94.52	5,470.49			91.00	5,470.49	11,180.46	114.70	2700			0.10	1.892	5709.97	51.07%
	EXT-55	EXT-55	55							2.59		1.05		3.26	13.97	13.97	14.00	0.33	14.33	86.93	101.82	148.72	1,214.78				1,214.78	1,760.81	23.24	1350			0.10	1.192	546.03	31.01%
Belcourt Boulevard	555A	55	55B											0.22	0.49	113.08	29.70	0.26	29.96	54.30	63.48	92.50	6,139.61			72.00	6,139.61	11,180.46	29.89	2700			0.10	1.892	5040.86	45.09%
Belcourt Boulevard	555B-C	55B	56											0.27	0.60	113.68	30.70	1.04	31.74	53.09	62.06	90.43	6,035.16			94.00	6,035.16	11,180.46	118.40	2700			0.10	1.892	5145.30	46.02%
	EXT-2090	EXT-2090	56											22.014	48.96	48.96	27.09	0.31	27.40	57.75	67.53	98.44	2,827.46				2,827.46	6,875.59	30.96	2250			0.10	1.675	4048.13	58.88%
Belcourt Boulevard	556	56	BEND											0.27	0.60	163.24	31.74	0.20	31.94	51.89	60.66	88.38	8,471.08			88.00	8,471.08	14,807.43	24.18	3000			0.10	2.029	6336.35	42.79%
		BEND	57												0.00	163.24	31.94	0.05	31.99	51.67	60.40	88.00	8,455.02				8,455.02	14,807.43	5.58	3000			0.10	2.029	6372.41	43.04%
Belcourt Boulevard	EXT-10	57	BEND												0.00	172.98	31.99	0.05	32.04	51.62	60.34	87.90	8,929.06				8,929.06	14,807.43	5.98	3000			0.10	2.029	5878.37	39.70%
Belcourt Boulevard		BEND	HW												0.00	172.98	32.04	0.08	32.12	51.56	60.27	87.81	8,919.69				8,919.69	14,807.43	9.93	3000			0.10	2.029	5887.75	39.76%
				0.00	0.00	0.00	0.00	0.00	0.00	7.60	0.00	1.05	0.00	70.69	172.98	TRUE																			
OUTLET TO Mudd Creek - Street 'A' North (2100 mm dia)																																			
Yellow Birch Street	S112A-B, R112A-B	112	101					0.26					0.20		0.79	0.79	10.00	1.31	11.31	104.19	122.14	178.56	81.80			133.00	81.80	100.18	68.85	375			0.30	0.879	18.39	18.35%
Locust Ridge	HGL Relief pipe	56	101												0.00	0.00	10.00	1.33	11.33	104.19	122.14	178.56	0.00				0.00	230.96	63.08	600			0.13	0.791	230.96	100.00%
Locust Ridge	S101	101	102										0.20		0.38	1.18	11.33	1.23	12.53	97.77	114.57	167.44	115.35			55.00	115.35	316.18	63.08	675			0.13	0.856	200.83	63.52%
Locust Ridge	S102	102	103										0.18		0.36	1.54	12.53	1.26	13.79	92.47	108.34	158.29	141.96			49.00	141.96	316.18	64.65	675			0.13	0.856	174.22	55.10%
Locust Ridge		103	104												0.00	1.54	13.79	0.28	14.05	87.67	102.69	150.00	134.59				134.59	385.20	13.13	750			0.11	0.845	250.61	65.06%
Protected Tree Area	P104	CBMH002	MAIN	0.42											0.23	0.23	10.00	0.18	10.18	104.19	122.14	178.56	24.33			9.00	24.33	62.04	13.13	250			1.00	1.224	37.71	60.78%
Locust Ridge	S104,R104	104	105					0.22					0.10		0.53	2.30	13.79	1.08	14.87	87.67	102.69	150.00	201.32			67.00	201.32	944.84	68.21	1050			0.11	1.057	743.52	78.69%
Yellow Birch Street		112B	113												0.00	0.00	10.00	0.14	10.14	104.19	122.14	178.56	0.00				0.00	100.88	11.61	300			1.00	1.383	100.88	100.00%
Yellow Birch Street	S113, R113	113	114					0.13					0.34		0.87	0.87	10.14	0.75	10.89	103.46	121.28	177.29	89.62			117.00	89.62	153.03	60.03	375			0.70	1.342	63.41	41.44%
Yellow Birch Street	S114, R114	114	105					0.11					0.29		0.74	1.60	10.89	1.13	12.01	99.74	116.89	170.85	159.96			101.00	159.96	224.33	67.96	525			0.25	1.004	64.37	28.69%
Yellow Birch Street	S105,R105B	105	106												0.00	3.90	15.60	0.14	15.73	81.87	95.64	139.65	318.54				318.54	1,348.97	9.48	1200			0.11	1.155	1030.44	76.39%
SCHOOL	BLK 246	MH206	106						2.89						5.14	5.14	15.00	0.60	15.60	83.56	97.85	142.89	429.64			613.00	429.64	654.22	35.73	900			0.12	0.996	224.58	34.33%
Yellow Birch Street	S106, R106	106	STUB										0.19		0.30	9.34	15.73	1.42	17.16	81.26	95.15	138.92	758.78			570.00	758.78	1,348.97	98.63	1200			0.11	1.155	590.19	43.75%
				0.42	0.00	0.00	0.00	0.72	2.89	0.00	0.00	0.00	1.46	0.00	9.34	TRUE																			

Designed:	RM
Checked:	DGY
Dwg. Reference:	31855-500

Revision	Date
Trailsedge - Revised per City Comments/Issued to MOE	1/26/2015
Trailsedge - Revised per City Comments	9/16/2014
Trailsedge - Revised per City Comments Phase 2A only & Renaud Ashcroft Design	7/25/2014
Renaud Road Submission #3	4/30/2014
Trailsedge - Issued to City for Review	3/20/2014
Renaud Road Submission #2	3/13/2014
Renaud Road Submission #1	12/12/2013
Issued for City Review	2/2/2013

File Reference: 31855.5.7.1
Date: ######
Sheet No: 1 of 1

Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)

[i = 998.071 / (TC+6.053)^0.814]	5 YEAR
[i = 1174.184 / (TC+6.014)^0.816]	10 YEAR
[i = 1735.688 / (TC+6.014)^0.820]	100 YEAR

Mannings Coefficient (n) = 0.013

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2015

Plan Number _____

LEGEND :

- r12 / 0.08 0.64 — AREA NUMBER; RUNOFF COEFFICIENT; AREA IN HECTARES
- r12c / 0.36 0.45 — 100 YEAR FLOW AREA NUMBER; RUNOFF COEFFICIENT; AREA IN HECTARES
- 0.36 / 0.58 — OFFSITE AREA IN HECTARES; RUNOFF COEFFICIENT
- 1.21 — OFFSITE AREA IN HECTARES
- TO MH300 AC=2.317 Tc=14.43 — EXTERNAL FLOW AREA x RUNOFF COEFFICIENT; TIME OF CONCENTRATION
- SPLIT FLOW SOUTH AC=2.44 Tc=24.70 — SPLIT FLOW AREA x RUNOFF COEFFICIENT; TIME OF CONCENTRATION
- EMERGENCY FLOW ROUTE FOR STORM ABOVE THE 1:100 EVENT
- MINOR FLOW ROUTE

MATCH LINE

MATCH LINE

REFER TO DETAILED DESIGN OF PARK BY DSEL

REFER TO DETAILED DESIGN OF OUTLET CHANNEL BY DSEL

No.	REVISIONS	By	Date
14			
13			
12			
11			
10	ISSUED FOR MOE	DGY	15:05:04
9	REVISED CB'S AT AXIS	DGY	15:02:23
8	REVISED PER CITY COMMENTS	DGY	15:02:12
7	REVISED PER CITY COMMENTS	DGY	15:01:26
6	REVISED PER CITY COMMENTS	DGY	14:11:07
5	REVISED PER CITY COMMENTS	DGY	14:09:16
4	REVISED PER CITY COMMENTS	DGY	14:07:28
3	REVISED PER NEW LEGAL	DGY	14:04:02
2	REVISED PER MASTER SERVICING STUDY	DGY	14:03:24
1	ISSUED FOR CITY REVIEW	DGY	13:02:01

minto

IBI GROUP
333 Preston Street
Tower I, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title

TRAILSEDGE II
1578051 ONTARIO INC.

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos 100
2015/05/04
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1 : 1000

Design	Date
R.M.	FEB 2014
Drawn	Checked
E.H.	D.Y.G.
Project No.	Drawing No.
31855	500

D07-16-07-0018PH3

16688

J:\31855-TrailsEdge\5.0 Drawings\5.05cad\layouts\500 - STORM DRAINAGE AREA PLAN.dwg (plot Name: 500 - STORM DRAINAGE AREA PLAN Plot Style: AIA STANDARD-FULL.ctb Plot Scale: 1:25.4 Plotted At: 5/4/2015 11:31 AM Last Saved By: ehrena Last Saved At: May 4,



LEGEND :

PONDING AREA

EMMERGENCY FLOW ROUTE FOR STORM ABOVE THE 1:100 EVEN

ROAD PONDING

S22	POND AREA #
86.27	POND ELEVATION (m)
0.30	POND DEPTH (m)
117.31	POND VOLUME (m^3)

REAR YARD PONDING

87.05	POND ELEVATION (m)
0.20	POND DEPTH (m)
20.49	POND AREA (m^2)

No.	REVISIONS	By	Date
14			
13			
12			
11			
10	ISSUED FOR MOE	DGY	15:05:04
9	REVISED CB'S AT AXIS	DGY	15:02:23
8	REVISED PER CITY COMMENTS	DGY	15:02:12
7	REVISED PER CITY COMMENTS	DGY	15:01:26
6	REVISED PER CITY COMMENTS	DGY	14:11:07
5	REVISED PER CITY COMMENTS	DGY	14:09:16
4	REVISED PER CITY COMMENTS	DGY	14:07:28
3	REVISED PER NEW LEGAL	DGY	14:04:02
2	REVISED PER MASTER SERVICING STUDY	DGY	14:03:24
1	ISSUED FOR CITY REVIEW	DGY	13:02:01

minto

IBI GROUP
333 Preston Street
Tower I, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title

TRAILSEDGE II
1578051 ONTARIO INC.

LICENCED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 90 2015/05/04 PROVINCE OF ONTARIO

N

Drawing Title

PONDING PLAN

Scale: 1 : 750

Design	Date
R.M.	FEB 2014
Drawn: E.H.	Checked: D.G.Y.
Project No.: 31855	Drawing No.: 400

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH
Signed _____
Date _____ 2015
Plan Number _____

D07-16-07-0018PH3

16688

A:\31855-TrailsEdge\3.0 Drawings\3Solve\Layouts\400 - PONDING PLAN.dwg Layout Name: 400 - PONDING PLAN Plot Style: AIA STANDARD-FULL.CTB Plot Scale: 1:25.4 Plotted At: 5/4/2015 11:30 AM Last Saved By: etienne Last Saved At: May 4,

DESIGN ALTERNATIVES TO HYBRID STORM DRAINAGE SYSTEMS NORTH OF THE HYDRO CORRIDOR TO MUNICIPAL STANDARDS ARE TO BE EVALUATED AS PART OF FUTURE STUDY IN CONJUNCTION WITH COMMUNITY DESIGN PLAN. DESIGN OPTIONS FOR CONSIDERATION INCLUDE DOING NOTHING, LIMITING RUNOFF FROM DEVELOPMENT AND MAINTAINING THE EXISTING POND, EXPANDING POND AND FOREBAY AND BUILDING NEW POND

REFER TO DWG No. 15B

MAJOR

10 YEAR

FORCE MAIN

FUTURE TRANSIT-WAY

FUTURE BRIAN COBURN BOULEVARD

FUTURE MIXED USE CENTRE

COMMERCIAL

HIGH DENSITY

MULTIPLE

SCHOOL

PARK

6.4Ha 0.51

1.1Ha 0.38

3.1Ha 0.80

EUC S.W.M. POND 1

NORTH FOREBAY PP# 80.1(f)

NORTH MAIN CELL PP# 80.1(f)

SOUTH MAIN CELL PP# 80.1(f)

SOUTH FOREBAY PP# 80.1(f)

1.2Ha 0.42

1.4Ha 0.42

3.9Ha 0.65

1.3Ha 0.65

6.4Ha 0.65

6.11Ha 0.65

3.0Ha 0.65

PAGE ROAD

NAVAN ROAD

(FOURTH LINE) RENAUD ROAD

18.3Ha 0.30

10.8Ha 0.70

0.9Ha 0.70

8.5Ha 0.80

2.9Ha 0.80

6.5Ha 0.80

13.4Ha 0.80

3.1Ha 0.70

7.2Ha 0.70

1.5Ha 0.65

1.5Ha 0.70

2.4Ha 0.65

0.8Ha 0.65

3.4Ha 0.40

21.7Ha 0.70

5.0Ha 0.70

5.6Ha 0.70

TRUNK 1C

0.4Ha 0.70

3.7Ha 0.70

4.7Ha 0.70

TRUNK 5

TRUNK 1 (WEST)

TRUNK 1 (EAST)

TRUNK 1A

TRUNK 1B

TRUNK 2C

TRUNK 2B

TRUNK 2A

TRUNK 3

TRUNK 4

BELCOURT EXTENSION

MER BLEUE ROAD

2.9Ha 0.65

3.2Ha 0.70

4.1Ha 0.70

4.3Ha 0.70

2.6Ha 0.70

3.0Ha 0.40

5.5Ha 0.70

13.4Ha 0.65

LEGEND

- STORM SEWER TRIBUTARY AREA
- STORM TRIBUTARY SUB-CATCHMENT BOUNDARY
- STORM SEWER TRUNK
- LOCAL STORM SEWER
- 10.54Ha / 0.65 — DRAINAGE AREA / RUN-OFF COEFFICIENT
- OVERLAND FLOW ROUTE

DSEL
david schaeffer engineering ltd

120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

TRAILS EDGE

CONCEPTUAL STORM SERVICING - ULTIMATE

DATE:	NOVEMBER 2013
SCALE:	1:6000
PROJECT No.:	10-459
FIGURE	14A

Summary of DDSWMM Modeling Parameters

The following outlines the modeling parameters used and the justification for those parameters for the DDSWMM modeling.

DDSWMM Input Parameters

Table 1. Summary of DDSWMM Modeling Parameters

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
Trails Edge Phase II											
Street Segments											
S112A	0.14	S112B	112	N112	73	60	60	Swale	1.85	35	39
S113	0.34	S112B	113	N113	73	65	130	Swale	23.5	84	94
S112B	0.06	S101	112	N112	73	60	60	Swale	0.15	15	17
S101	0.2	EXT2A	101	N101	73	60	60	Swale	16.35	49	55
S102	0.18	S101	102	N102	73	65	65	Swale	10.12	44	49
S106	0.15	S104	106	N106	73	74	74	Swale	21.4	37	41
S114	0.29	S104	114	N114	73	70	140	Swale	4.97	72	81
S104	0.1	S102	104	N104	73	64	64	Swale	22.67	25	28
S307	0.25	S311	307	N307	73	73	73	Swale	48.26	61	68
S311	0.43	S312	311	N311	73	96	192	Swale	28.78	107	120
S312	0.35	S306	312	N312	73	88	176	Swale	14.86	87	97
S306	0.39	S203	306	N306	73	107	214	Swale	57.34	98	142
S301	0.36	S303	301	N301	73	96	192	Swale	40.08	90	101
S303	0.31	S304	303	N303	73	82	164	Swale	48.74	78	87
S304	0.28	S306	304	N304	73	68	136	Swale	34.52	70	78
S314	0.17	S304	314	N314	73	44	88	Swale	2.25	43	48
S404	0.16	S203	404	N404	70	75	75	Swale	10.99	55	104‡
									Total Flow for Street Segments		1249
Rear Yards											
BLK246	2.89	R114	106	N106	64	325	650	Swale	233.6[€]	613	613
R114	0.11	R113	114	N114	49	75	75	Swale	0	20	20
R113	0.13	R112A	113	N113	49	85	85	Swale	0	23	23
R112A	0.17	S112A	112	N112	49	112	112	Swale	0	30	30
P104	0.42	Park	104	N104	0	47	95	Swale	67.0[€]	9	9
R112B	0.09	R104	112	N112	49	35	70	Swale	0	16	16
R104	0.22	S104	104	N104	49	80	160	Swale	0	39	39
EXT2B	0.72	EXT2A	Ext2B	DExt2B	49	81	162	Swale	0	119	0β
R301B	0.16	S301	301	N301	49	70	140	Swale	0	29	29

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
R312A	0.33	R312B	312	N312	49	90	180	Swale	0	58	58
R312B	0.11	S312	312	N312	49	50	50	Swale	0	19	19
R301A	0.15	R301C	301	N301	49	57	114	Swale	0	27	27
R301C	0.12	R301D	301	N301	49	44	88	Swale	0	21	21
R301D	0.1	S303	301	N301	49	50	100	Swale	0	18	18
R305	0.17	S306	305	N305	49	75	150	Swale	0	31	31
R402B	0.13	R305	402	N402	49	40	80	Swale	0	23	23
R402A	0.13	S404	402	N402	49	15	29	Swale	0	22	22
410F	0.52	CDUM	410C	N410C	64	59	117	Swale	0	110	110
21	0.63	CDUM	404	N404	86	71	142	Swale	0	175	175
R410A	1.83	S410A	410B	N410B	42	206	412	Swale	374[ε]	263	73£
R410B	0.48	S410C	410B	N410B	42	54	108	Swale	0	69	87
402I	0.76	ODUM	402I	D402I	63	86	171	Swale	54.3[ε]	159	159
R410G	0.55	S410D	410C	N410C	64	62	124	Swale	0	117	117
									Total flow for Rear Yard Segments (l/s)		**1719**
Renaud Road											
S400e	0.03	S400B	400	N400	71	17	17	Swale	1.35	7	8
S400A	0.1	S400C	400	N400	71	60	60	Swale	0	25	12§
S400B	0.1	S400D	400	N400	71	45	45	Swale	0	24	12§
S400C	0.12	S401A	400	N400	71	39	39	Swale	0	43	17§
S400D	0.07	S401B	400	N400	71	30	30	Swale	0	32	14§
S401A	0.06	S401C	401	N401	71	23	23	Swale	0	45	18§
S401B	0.11	S401C	401	N401	71	41	41	Swale	0	48	18§
S401C	0.29	S402A	401	N401	71	82	82	Swale	48.85	133	327‡
S401E	0.02	S402A	401	N401	71	17	17	Swale	0	5	6
S402A	0.51	S402C	402	N402	71	66	66	Swale	18.12	113	127
S402C	0.34	S402G	402	N402	71	54	54	Swale	12.8	77	86
S402G	0.11	S404	402	N402	71	28	28	Swale	0	26	12§
S410A	0.21	S410B	410B	N410B	86	75	75	Swale	13.35	60	67
S410B	0.09	S404	410	N410	86	31	31	Swale	0	26	12§
S410C	0.11	S410D	410C	N410C	86	47	47	Swale	0	32	20§
S410D	0.08	S410E	410C	N410C	86	30	30	Swale	0	44	30§
S410E	0.1	Renaud	410C	N410C	86	36	36	Swale	0	59	32§
									Total flow for Renaud Rd. (l/s)		**818**
Belcourt Boulevard											
S3901E	0.27	S54E	3901	N3901	86	120	120	Swale	12.82	78	87
S3901W	0.19	S54W	3901	N3901	86	120	120	Swale	13.31	55	62
S3900B	0.22	S54E	3900	N3900	86	72	72	Swale	61.11	62	69
S54E	0.17	S55AE	54	N54	86	87	87	Swale	11.82	49	55
S54W	0.11	S55AW	54	N54	86	87	87	Swale	7.62	32	36

Drainage Area		Downstream Segment ID	MH	XP-SWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m3)	Minor System Restriction	
Segment ID	Area (ha)									5 Year Modeled Flow (l/s)*	100 Year ICD Flow (l/s)†
S55AE	0.12	S55BE	55	N55	86	70	70	Swale	8.35	35	39
S55AW	0.096	S55BW	55	N55	86	70	70	Swale	7.62	32	36
S55BE	0.11	S56E	55B	N55B	86	70	70	Swale	7.64	32	48‡
S55BW	0.096	S56W	55B	N55B	86	70	70	Swale	7.64	28	31
S55C	0.08	S56W	55B	N55B	86	45	90	Swale	0.08	23	26
S56E	0.17	S56W	56	N56	86	110	110	Swale	0.99	49	55
S56W	0.097	EXT2A	56	N56	86	65	65	Swale	9.28	28	31
S500C	0.31	S307	500C	N500C	86	100	200	Swale	52.09	90	101
S500	0.26	S500C	500	N500	86	81	162	Swale	13.55	75	84
									Total flow for Belcourt Boulevard (l/s)		**760**

Notes: * 5 year modeled flow is the subject site modeled assuming full capture of the 5 year flow into the minor system without any ICD restriction. Values reported are from the DDSWMM output file "5 YR CHICAGO DDSWMM OUTPUT-2014-03-10.pdf" (TE-5CH.dat/out).

† ICD flow is from the DDSWMM output file "100 YR CHICAGO DDSWMM OUTPUT-2014-03-10.pdf" (TE-100CH.dat/out).

§The minor flow restriction has been reduced to account for the actual capture rate through the grill using curb inlets on a continuous grade

‡ The minor flow restriction has been increased to allow full capture of overflow from upstream segments on continuous grade during the 5 year storm event without ponding.

€ Storage is based on the requirement to retain the 100-year Chicago major flow on-site

£ Storage and ICD flow as per the servicing Report for the NDC French Catholic School, prepared by Genivar

β The flows produced by drainage area EXT-2B flow overland to EXT-2A.

FOR HYDROLOGICAL PARAMETERS:

1. Refer to **Drawing 700** for the DDSWMM model schematic.

2. Catchment areas are based on the rational method spreadsheet with some minor modifications for modeling purposes. See **Drawing 700** for the catchment areas used in the DDSWMM modeling for the subject site.

   Imperviousness for the subject site was determined by obtaining the footprint of the model units intended for the site and placing the maximum footprint on the lots. The imperviousness ratios for single family units were calculated for a typical single family unit street segment and rear yard segment.

3. Subcatchment width was measured from the segment length multiplied by 2 for those drainage areas where residences are located on both sides of the road (See **Figure 1**). For those drainage areas where there are no residences on one side of the road, the subcatchment width is equal to the segment length.

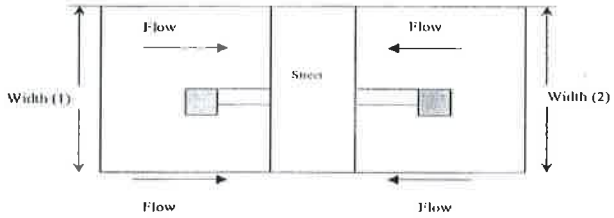


Figure 1. Schematic of Width Parameter for Typical Subdivision

(Reference: Figure 5.4, page 5.3 from the City of Ottawa Sewer Design Guidelines (November 2004)

For the Park, School (BLK246) and areas R410A, R410B, R410C, the subcatchment width of 225 m/ha was used.

4. Drainage area slope is based on the average of the impervious area slope (1%) and the pervious area slope (3%). The average slope is 2% (0.02 m/m).

5. Segment length for a street or rear yard is the measured length of the major system segment. See **Figure 2** for an example.

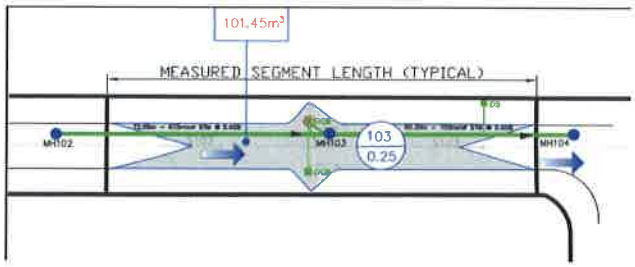


Figure 2. Segment Length for Street or Rear Yard (Typical)

6. Segment length for the dummy segment for routing is the measured length of the static ponding available in the street segment which drains to the dummy. **See Figure 3** for an example.

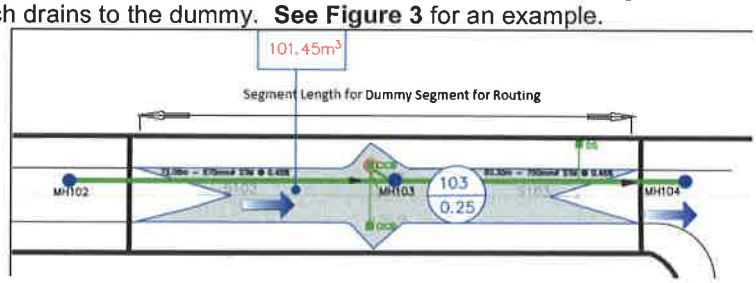


Figure 3. Segment Length for Dummy Segment for Routing (Typical)

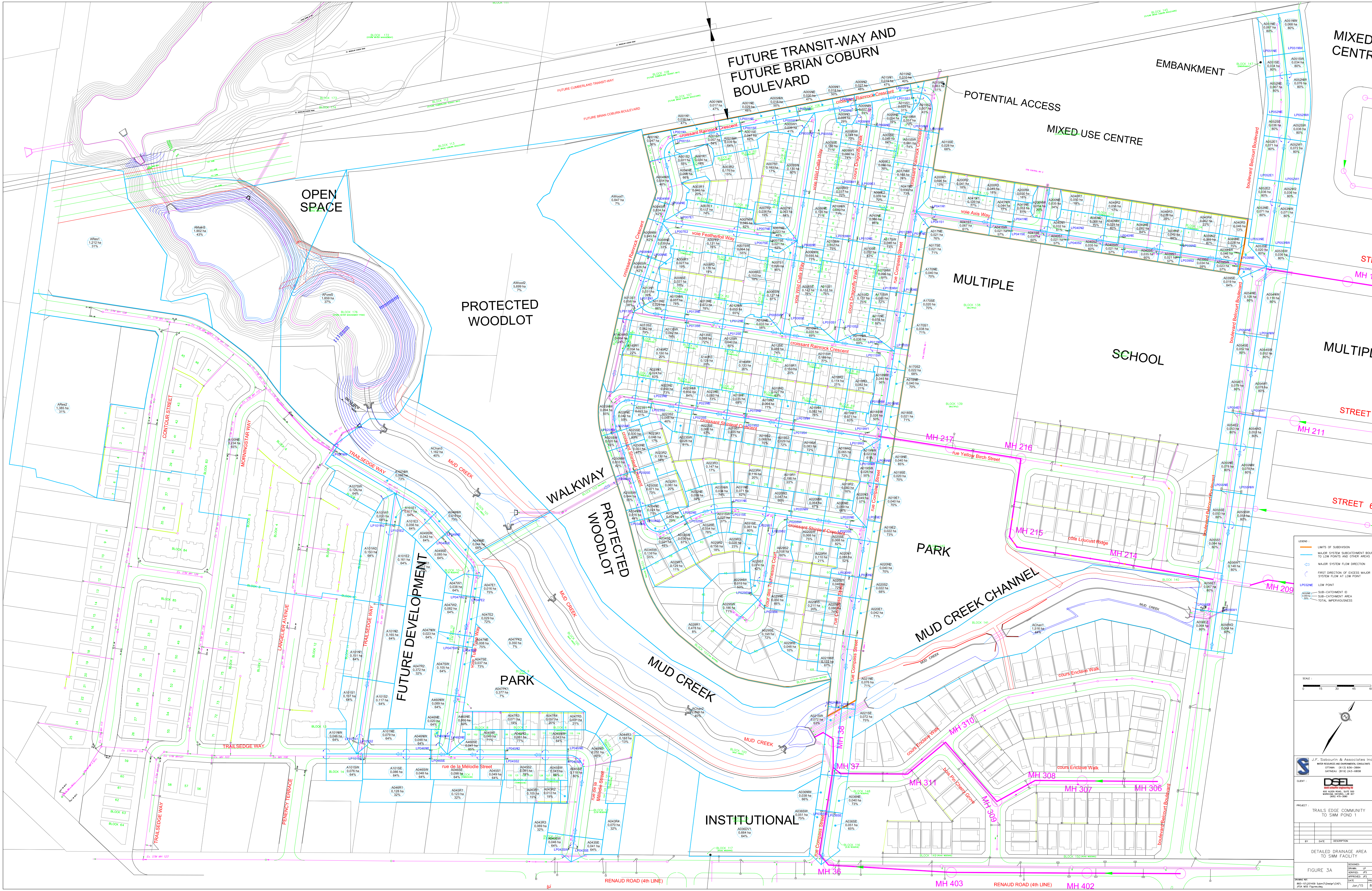
Infiltration

Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.

CATCH BASIN DATA TABLE

STRUCTURE ID	AREA ID	STRUCTURE	COVER	ELEVATION			OUTLET PIPE		HEAD	Dynamic Depth of Flow	Dynamic HEAD	FLOW	ICD TYPE	ORIFICE SIZE		
				TOP OF GRATE	INVERT		DIAMETER	TYPE						AREA	DIAMOND	CIRCULAR
					INLET	OUTLET	(mm)									
DCICB 3901A	S3901E	OPSD 705.020	S22 & S23	87.91		86.31	200	PVC DR-35	1.650	0.015	1.665	29				
DCICB 3901B	S3901E	OPSD 705.020	S22 & S23	87.91	86.21	86.11	250	PVC DR-35	1.825	0.015	1.840	58	Tempest HF & HF Sump			
DCICB 3901C	S3901W	OPSD 705.020	S22 & S23	88.09		86.49	200	PVC DR-35	1.600	0.000	1.600	62	Tempest HF & HF Sump			
DCICB 3900A		OPSD 705.020	S22 & S23	87.74		86.04	300	PVC DR-35	1.700	0.000	1.700					
DCICB 3900B	S3900B	OPSD 705.020	S22 & S23	87.74	85.94	85.84	375	PVC DR-35	1.863	0.000	1.863	69	Tempest HF & HF Sump			
DCICB 54A	S54E	OPSD 705.020	S22 & S23	87.65		86.00	250	PVC DR-35	1.655	0.000	1.655	55				
DCICB 54B	S54W	OPSD 705.020	S22 & S23	87.65	85.90	85.80	300	PVC DR-35	1.830	0.000	1.830	36	Tempest HF & HF Sump			
DCICB 55A	S55AE	OPSD 705.020	S22 & S23	87.58		85.98	200	PVC DR-35	1.500	0.115	1.615	39				
DCICB 55B	S55AW	OPSD 705.020	S22 & S23	87.58	85.88	85.78	250	PVC DR-35	1.675	0.000	1.675	36	Tempest HF & HF Sump			
DCICB 55C	S55BE	OPSD 705.020	S22 & S23	87.53		85.93	200	PVC DR-35	1.500	0.150	1.650	48				
DCICB 55D	S55BW	OPSD 705.020	S22 & S23	87.53	85.83	85.73	250	PVC DR-35	1.675	0.000	1.675	31	Tempest HF & HF Sump			
CB 55E	S55C	OPSD 705.010	S19	87.30		85.70	200	PVC DR-35	1.500	0.000	1.500	26	Tempest HF & HF Sump			
DCICB 500A		OPSD 705.020	S22 & S23	87.13		85.53	200	PVC DR-35	1.650	0.000	1.650					
DCICB 500B	S500	OPSD 705.020	S22 & S23	87.13	85.43	85.33	250	PVC DR-35	1.825	0.000	1.825	84	Tempest HF & HF Sump			
DCICB 500C		OPSD 705.020	S22 & S23	87.04		85.44	200	PVC DR-35	1.720	0.000	1.720					
DCICB 500D	S500C	OPSD 705.020	S22 & S23	87.00	85.34	85.24	250	PVC DR-35	1.895	0.000	1.895	101	Tempest HF & HF Sump			
DCICB 57A		OPSD 705.020	S22 & S23	87.27		86.19	200	PVC DR-35	1.050	0.070	1.120		Tempest HF & HF Sump			
DCICB 57B	S56E	OPSD 705.020	S22 & S23	87.16	86.09	85.71	250	PVC DR-35	1.505	0.070	1.575	55	Tempest HF & HF Sump			
CICB56A	S56W	OPSD 705.010	S22 & S23	87.32		85.67	250	PVC DR-35	1.585	0.100	1.685	31	Tempest LMF			
CBMH137	BLK246	OPSD 701.010	S28.1	85.82		83.90	525	PVC DR-35	1.662	0.000	1.662	613	Custom	0.176		473
DICB139	R106	OPSD 705.030	OPSD 403.010	86.50		84.80	300	PVC DR-35	1.550	0.000	1.550	94	Tempest HF & HF Sump	0.028		189
CB 101A	S112A	OPSD 705.010	S19	87.23		85.63	200	PVC DR-35	1.590	0.101	1.691					
CB 101B	S112B	OPSD 705.010	S19	87.18	85.53	85.43	250	PVC DR-35	1.645	0.101	1.746	56	Tempest HF & HF Sump			
CB 101C		OPSD 705.010	S19	87.00		85.40	200	PVC DR-35	1.680	0.120	1.800					
CB 101D	S101	OPSD 705.010	S19	87.00	85.30	85.20	250	PVC DR-35	1.855	0.120	1.975	55	Tempest HF & HF Sump			
CB 102A		OPSD 705.010	S19	87.08		85.48	200	PVC DR-35	1.640	0.046	1.686					
CB 102B	S102	OPSD 705.010	S19	87.08	85.38	85.28	250	PVC DR-35	1.815	0.046	1.861	49	Tempest HF & HF Sump			
CBMH104	P104	OPSD 701.010	S19	96.64		94.99	250	PVC DR-35	1.875	0.000	1.875	9	Tempest LMF			
CB 104A		OPSD 705.010	S19	87.12		85.52	200	PVC DR-35	1.710	0.071	1.781					
CB 104B	S104	OPSD 705.010	S19	87.12	85.42	85.32	250	PVC DR-35	1.885	0.071	1.956	28	Tempest HF & HF Sump			
CB 113A		OPSD 705.010	S19	87.33		85.73	200	PVC DR-35	1.680	0.000	1.680					
CB 113B	S113	OPSD 705.010	S19	87.33	85.63	85.53	250	PVC DR-35	1.855	0.000	1.855	94	Tempest HF & HF Sump			
CB 114A		OPSD 705.010	S19	87.34		85.74	200	PVC DR-35	1.630	0.056	1.686					
CB 114B	S114	OPSD 705.010	S19	87.34	85.64	85.54	250	PVC DR-35	1.805	0.056	1.861	81	Tempest HF & HF Sump			
CB 106A		OPSD 705.010	S19	87.25		85.65	200	PVC DR-35	1.690	0.056	1.746					
CB 106B	S106	OPSD 705.010	S19	87.25	85.55	85.45	250	PVC DR-35	1.865	0.056	1.921	41	Tempest HF & HF Sump			
CICB 404A		OPSD 705.010	S22 & S23	86.39		84.79	200	PVC DR-35	1.620	0.048	1.668					
CICB 404B	S404	OPSD 705.010	S22 & S23	86.39	84.69	84.59	250	PVC DR-35	1.795	0.048	1.843	104	Tempest HF & HF Sump			
CB 301A		OPSD 705.010	S19	86.77		85.17	200	PVC DR-35	1.750	0.000	1.750					
CB 301B	S301	OPSD 705.010	S19	86.77	85.07	84.97	250	PVC DR-35	1.925	0.000	1.925	101	Tempest HF & HF Sump			
CB 303A		OPSD 705.010	S19	86.62		85.02	200	PVC DR-35	1.740	0.051	1.791					
CB 303B	S303	OPSD 705.010	S19	86.62	84.92	84.82	250	PVC DR-35	1.915	0.051	1.966	87	Tempest HF & HF Sump			
CB 314A		OPSD 705.010	S19	86.82		85.22	200	PVC DR-35	1.570	0.051	1.621					
CB 314B	S314	OPSD 705.010	S19	86.82	85.12	85.02	250	PVC DR-35	1.745	0.051	1.796	48	Tempest HF & HF Sump			
CB 304A		OPSD 705.010	S19	86.47		84.87	200	PVC DR-35	1.720	0.089	1.809					
CB 304B	S304	OPSD 705.010	S19	86.47	84.77	84.67	250	PVC DR-35	1.895	0.089	1.984	78	Tempest HF & HF Sump			
CB 307A		OPSD 705.010	S19	87.07		85.47	200	PVC DR-35	1.750	0.000	1.750					
CB 307B	S307	OPSD 705.010	S19	87.07	85.37	85.27	250	PVC DR-35	1.925	0.000	1.925	68	Tempest HF & HF Sump			
CB 311A		OPSD 705.010	S19	86.92		85.32	200	PVC DR-35	1.700	0.000	1.700					
CB 311B	S311	OPSD 705.010	S19	86.92	85.22	85.12	250	PVC DR-35	1.875	0.000	1.875	120	Tempest HF & HF Sump			
CB 312A		OPSD 705.010	S19	86.52		84.92	200	PVC DR-35	1.680	0.089	1.769					
CB 312B	S312	OPSD 705.010	S19	86.52	84.82	84.72	250	PVC DR-35	1.855	0.089	1.944	97	Tempest HF & HF Sump			
CB 306A		OPSD 705.010	S19	86.27		84.62	250	PVC DR-35	1.525	0.048	1.573					
CB 306B	S306	OPSD 705.010	S19	86.27	84.52	84.42	300	PVC DR-35	1.700	0.048	1.748	142	Tempest HF & HF Sump			
RYCB 112A	R112A	OPSD 705.010	S19	87.30		85.65	250	PVC DR-35	1.525	0.000	1.525	30	Tempest HF & HF Sump			
RYCB 112B	R112B	OPSD 705.010	S19	87.35		85.70	250	PVC DR-35	1.525	0.000	1.525	16	Tempest HF & HF Sump			
RYCB 113A	R113	OPSD 705.010	S19	87.35		85.70	250	PVC DR-35	1.525	0.000	1.525	23	Tempest HF & HF Sump			
RYCB 114A	R114	OPSD 705.010	S19	87.45		85.80	250	PVC DR-35	1.525	0.000	1.525	20	Tempest HF & HF Sump			
RYCB 104	R104	OPSD 705.010	S19	87.25		85.60	250	PVC DR-35	1.525	0.000	1.525	39	Tempest HF & HF Sump			
RYCB 301A	R301A	OPSD 705.010	S19	86.85		85.20	250	PVC DR-35	1.525	0.000	1.525	27	Tempest HF & HF Sump			
RYCB 301B	R301B	OPSD 705.010	S19	86.85		85.20	250	PVC DR-35	1.525	0.000	1.525	29	Tempest HF & HF Sump			
RYCB 301C	R301C	OPSD 705.010	S19	86.75		85.10	250	PVC DR-35	1.525	0.000	1.525	21	Tempest HF & HF Sump			
RYCB 301D	R301D	OPSD 705.010	S19	86.70		85.05	250	PVC DR-35	1.525	0.000	1.525	18	Tempest HF & HF Sump			
RYCB 312A	R312A	OPSD 705.010	S19	86.55		84.90	250	PVC DR-35	1.525	0.000	1.525	58	Tempest HF & HF Sump			
RYCB 312B	R312B	OPSD 705.010	S19	86.50		84.85	250	PVC DR-35	1.525	0.000	1.525	19	Tempest HF & HF Sump			
RYCB 305	R305	OPSD 705.010	S19	86.40		84.75	250	PVC DR-35	1.525	0.000	1.525	31	Tempest HF & HF Sump			

Note: Head elevation derived using maximum static ponding elevation, plus 100 year dynamic depth, less the invert plus 1/2 diameter of outletting pipe.
Capacity of inlets at sags have been determined using MTO Design Chart 4.19 Inlet Capacity at Road Sag (Appendix 7-A.9 from the City of Ottawa Design Guidelines)


FUTURE TRANSIT-WAY AND FUTURE BRIAN COBURN BOULEVARD
POTENTIAL ACCESS
EMBANKMENT
MIXED USE CENTRE
OPEN SPACE
PROTECTED WOODLOT
MULTIPLE
SCHOOL
WALKWAY
FUTURE DEVELOPMENT
PARK
MUD CREEK
MUD CREEK CHANNEL
INSTITUTIONAL
croissant Rainrock Crescent
voie Featherfoil Way
voie Wild Calla Way
cours Dragonfly Walk
rue Compass Street
voie Axis Way
croissant Shinleaf Crescent
cour des Tournesols Court
rue Yellow Birch Street
côte Loucust Ridge
cours Enclave Walk
bois Pin Cherry Grove
boulevard Belcourt Boulevard
STREET 6
TRAILSEDGE WAY
CONTOUR STREET
MORNINGSTAR WAY
LANGELIER AVENUE
PENENCY TERRACE
rue de la Mélodie Street
voie Tulip Tree Way
RENAUD ROAD (4th LINE)
FUTURE CUMBERLAND TRANSIT-WAY
FUTURE BRIAN COBURN BOULEVARD
MH 217
MH 216
MH 215
MH 214
MH 211
MH 209
MH 113
MH 38
MH 37
MH 36
MH 310
MH 311
MH 309
MH 308
MH 307
MH 306
MH 403
MH 402
ARes1 1.212 ha 31%
ARes2 1.385 ha 31%
AMainS 1.902 ha 43%
AForeS 1.859 ha 37%
AWood1 0.847 ha 7%
AWood2 5.699 ha 7%
A100NE 3.234 ha 65%
AChan3 1.162 ha 40%
AChan2 2.658 ha 40%
AChan1 1.516 ha 44%
A047PK1 0.377 ha 7%
A047PK2 0.350 ha 7%
A036DV1 0.664 ha 64%
LEGEND :
LIMITS OF SUBDIVISION
MAJOR SYSTEM SUBCATCHMENT BOUNDARY TO LOW POINTS AND OTHER AREAS
MAJOR SYSTEM FLOW DIRECTION
FIRST DIRECTION OF EXCESS MAJOR SYSTEM FLOW AT LOW POINT
LP032NE LOW POINT
A032NE 0.059 ha 59% SUB-CATCHMENT ID SUB-CATCHMENT AREA TOTAL IMPERVIOUSNESS
SCALE : 0 15 30 45 60m
J.F. Sabourin & Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
OTTAWA (613) 836-3884
GATINEAU (819) 243-6858
CLIENT : DSEL
600 ALDEN ROAD, SUITE 500 MARKHAM, ONTARIO, L3R 0E7 (905) 475-3080
PROJECT : TRAILS EDGE COMMUNITY TO SWM POND 1
BY DATE DESCRIPTION BY
DETAILED DRAINAGE AREA TO SWM FACILITY
FIGURE 3A
DESIGNED:
DRAWN: LP
VERIFIED: JFS
APPROVED: JFS
DATE Jan/15
PROJECT No. 883-10
DRAWING REF. 883-10\201409 Subm3\Design\CAD\ JFSA MSS Figures.dwg

Stormwater Management Report for the Trails Edge West Subdivision

in the City of Ottawa
December 2012
Updated January 2015

1 INTRODUCTION AND OBJECTIVES

J.F. Sabourin and Associates Inc. (JFSA) were retained by David Schaeffer Engineering Ltd. (DSEL) to prepare a Stormwater Management (SWM) Plan for the Trails Edge West subdivision, part of the Trails Edge Community and located within the City of Ottawa. As shown by Figure 1, the proposed development is located east of Page Road, north of Renaud Road, west of Mer Bleue Road and south of the Hydro Easement. The Trails Edge Community is serviced by East Urban Community Stormwater Management (SWM) Pond 1, which discharges to Mud Creek.

The Trails Edge West subdivision has a total drainage area of 13.40 ha, including 13.30 ha of residential development and a 0.10 ha buffer block, all tributary to East Urban Community SWM Pond 1.

Under interim conditions, SWM Facility 1 has a drainage area of approximately 369.32 ha, including 13.40 ha of Trails Edge West, 26.15 ha of existing residential development, 5.34 ha of channel block, a 12.29 ha pond block, the 18.30 ha hydro easement, the 7.79 ha Brian Colburn Boulevard extension, 9.20 ha of the future transitway corridor (undeveloped), a 6.55 ha existing woodlot, 21.71 ha of external development west of the Belcourt Extension, 80.89 ha of future development east of the Belcourt extension, 14.83 ha of existing commercial development north of the hydro easement, and 152.88 ha of the future business park north of the hydro easement (undeveloped).

Interim conditions are further defined by Interim A conditions, wherein the 7.79 ha Brian Colburn Boulevard extension block remains undeveloped, and Interim B conditions, wherein the Brian Colburn Boulevard extension is constructed. It should be noted that the 80.89 ha future development east of Belcourt extension is not expected to be developed until after the Brian Colburn Boulevard extension is constructed under Interim B conditions; however, it has been modelled as developed under both Interim A and Interim B conditions in order to be conservative and consistent with previous studies.

As presented in the *Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan* memo (January 2014, JFSA), changes to the drainage area characteristics, modelling methods and City of Ottawa standards have resulted in

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

a need for increased storage in the existing SWM Facility 1. For interim conditions, existing Pond 1 will be modified to support the development of the Trails Edge Community south of the hydro easement. The south channel of Mud Creek to Pond 1 is to be constructed, and the south forebay and south main cell of the existing pond reconstructed. Under Interim B conditions only, a small portion of the north main cell will be filled by the proposed Brian Coburn Boulevard extension, and a 3000 mm diameter circular concrete culvert will be installed under Brian Coburn Boulevard to connect the north and south main cells. The existing north forebay will remain as-built. The existing controls currently installed for the pond as per the *EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings* (Stantec, January 2012) will be retained under interim conditions.

For the purposes of this report, only interim conditions will be evaluated. As noted above, the future business park north of the hydro easement, and the future Transitway corridor, will remain undeveloped under these interim conditions. These areas will be developed under ultimate conditions, and design alternatives to meet municipal standards and stormwater management requirements under ultimate conditions are to be evaluated as part of a future study by the proponent for those lands.

The purpose of the present study/report is to evaluate the major and minor system flows of the proposed development with respect to the City of Ottawa stormwater management guidelines and to check the adequacy of the proposed pipe sizes to convey the 5-year and the 100-year storm flows from within the development and from external areas. Background documents that were reviewed in preparing this report include the following:

- *Stormwater Management Planning and Design Manual,* Ministry of the Environment, March 2003.
- *Gloucester East Urban Community Infrastructure Servicing Study Update*, Stantec Consulting Ltd., March 2005.
- *East Urban Community Pond No. 1 Design Brief*, Stantec Consulting Ltd., April 2008.
- *Trails Edge Phase 1 Design Brief*, IBI Group, April 2010.
- *Trails Edge Phase 1 Stormwater Management Report*, IBI Group, June 2010.
- *EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings*, Stantec Consulting Ltd., January 2012.
- *City of Ottawa Sewer Design Guidelines*, City of Ottawa, October 2012.
- *Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan*, J.F. Sabourin and Associates Inc., January 2014.
- *City of Ottawa Technical Bulletin ISDTB-2014-01*, City of Ottawa, February 2014.
- *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge Subdivision*, David Schaeffer Engineering Ltd. and J.F. Sabourin and Associates Inc., March 2014.
- *Servicing Report for Trails Edge and Orleans Business Park*, David Schaeffer Engineering Ltd., March 2014.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

- *Trails Edge Subdivision / Proposed Modification of Mud Creek Channel Between Belcourt Extension and Compass Street*, J.F. Sabourin and Associates Inc., January 2015.

The DDSWMM, SWMHYMO and XPSWMM programs were used to model the major and minor systems, to ensure that all of the City of Ottawa's stormwater management requirements are satisfied. The general SWM design criteria and guidelines that are to be met are described in Section 2.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.



Figure 1: General Site Location

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

2 DESIGN CRITERIA AND GUIDELINES

The design criteria and guidelines used for the stormwater management of the subject subdivision are those that were developed in the background documents as well as those provided in the October 2012 *City of Ottawa Sewer Design Guidelines* and generally accepted stormwater management design guidelines.

During the course of the detailed design of the proposed development, it was determined that the proposed 13.40 ha Trails Edge West development has an average imperviousness of 53%. The total 369.32 ha interim conditions drainage area to SWM Facility 1 has an average imperviousness of 38%.

A detailed analysis of the proposed dual drainage system was required to confirm that the following general design criteria and guidelines for the minor and major systems would be met.

2.1 Minor System

a) Storm sewers on local roads are to be designed to provide a 5-year level of service. On arterial roads, a 10-year level of service is required.

b) The 100-year hydraulic grade line (HGL) within the minor system must be maintained at least 0.3 m below the underside of footing elevation where gravity house connections are installed.

c) For less frequent storms (i.e. larger than 1:5 year), the minor system shall, if required, be limited with the use of inlet control devices to prevent excessive hydraulic surcharges.

d) Road catchbasins on Compass Street, Axis Way and the Belcourt Extension are to be equipped with City standard type S22 side inlets. Grates for all other road catchbasins are to be City standard type S19 (fish), and grates for catchbasins in rear yards, park and open spaces with pedestrian traffic are to be City standard type S19, S30 and S31.

e) Single catchbasins are to be equipped with 200 mm minimum lead pipes and double catchbasins are to be equipped with 250 mm minimum lead pipes.

f) Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 6.0 m/s.

g) Minor system capture within those areas draining to Trails Edge Phase 1 (south of Mud Creek and west of Compass Street) is limited as per the *Trails Edge Phase 1 Stormwater Management Report* dated June 2010 by IBI Group (approx. 85 L/s/ha).

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

2.2 Major System

a) The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within municipal property.

b) Roof leaders shall be installed to direct the runoff to splash pads and on to grassed areas.

c) Flow across road intersections shall not be permitted for minor storms (generally 5-year or less).

d) For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets, rearyards, public space and parking areas shall not exceed 0.30 m at the gutter and should be retained within the right-of-way.

e) A minimum of 0.30 m freeboard is to be provided to building openings. When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas.

f) The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

3 ASSUMPTIONS AND SOURCE OF DATA USED IN THIS STUDY

Sources of information and assumptions made in this study are listed below:

- Stormwater management model: *DDSWMM (release 2.1), SWMHYMO (version 5.02) and XPSWMM (version 10)*
- Minor system design: *1:5 year (see rational method in Appendix A)*
- Major system design: *1:100 year*
- Max. flow depth on roads: *0.30 m above gutter*
- Extent of major system: *Must be contained within the municipal right-of-way*
- DDSWMM model parameters: *Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm (as per 2012 City of Ottawa Sewer Design Guidelines)*
  Detailed Area Imperviousness: based on development layout and taken as fully effective in the front lot portion and half effective in rear lot portion of each house.
  Lumped Area Imperviousness: based on runoff coefficient (C) where C = 0.7 x imperviousness ratio + 0.2.
- Design storms: *5- and 100-year 3-hour Chicago and 100-year 24-hour SCS Type II storms as per 2012 City of Ottawa Sewer Design Guidelines; peak averaged over 10 minutes.*
- Historical Events: *July 1st, 1979; August 4th, 1988; and August 8th, 1996 events as per 2012 City of Ottawa Sewer Design Guidelines.*
- Climate Change Stress Test: *20% increase in the 100-year 3-hour Chicago storm.*
- Street catchbasin covers: *City Standard Type S22 (side inlet) on Compass Street, Axis Way and the Belcourt Extension; City Standard Type S19 (fish) elsewhere. Type S19 approach flow-capture curves as per MTO design charts (equivalent to OPSD 400.010), Type S22 approach flow-capture curves as per 2012 City of Ottawa Guidelines.*
- Rearyard catchbasin covers: *City Standard Type S19, S30 and S31*
- Curb and gutter: *City Standard SC1.3 (mountable) and City Standard SC1.1 (barrier). In the absence of flow capture curves for these curb and gutters, OPSD 600.010 curb and gutters are assumed.*
- Manning's' roughness coeff.: *0.013 for concrete and PVC pipes (free flow).*
- Minor system losses: *Refer to Appendix C for manhole loss coefficients.*
- Underside of footing elevations: *As provided by DSEL.*
- Freeboard in HGL analysis: *0.3 m between underside of footing elevation and 100-year hydraulic gradeline.*
- Inlet Control Devices: *As required.*
- Extent of major system: *Must be contained within the municipal right-of-way.*

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

- Ponding Area Routing: *Double Routing Method, as per the February 2014 "City of Ottawa Technical Bulletin ISDTB-2014-01".*
- Depth of backyard swales: *As per DSEL's Grading Plan*
- Street and pipe dimensions: *As per DSEL's Plan and Profiles*
- Right-of-way characteristics: *As per DSEL's Details of Roads*
- Downstream HGL: *Free outfall conditions assumed at the pond outlet.*

4 PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

The proposed minor and major system drainage routes are shown in plan view in Figures 2 and 3, respectively. In accordance with the City of Ottawa standards, the minor system has been designed to accommodate the 5-year post development flows from within the site and from external areas.

A Rational Method design was conducted by DSEL (refer to Appendix A) in order to estimate minor system flows based on the City of Ottawa IDF relationship and selected runoff coefficients. Note that DSEL's Rational Method design sheets have been prepared on the understanding that the future development east of Belcourt extension will remain undeveloped under Interim A conditions (labeled "pre-development" conditions in Appendix A). As previously noted, the DDSWMM / XPSWMM modelling for this report treats this area as developed under both Interim A and Interim B conditions in order to be conservative and consistent with previous studies.

The minor system capture on the following areas should be limited to the 5-year Rational Method flows as per DSEL's design (estimated below):

Park Block 9 (A047PK1, 0. 377 ha, C = 0.25)	:	25 L/s
Existing Woodlot (AWood1, 0.847 ha, C = 0.25)	:	62 L/s
External Mixed Use Centre Block 135 (A041a, 3.73 ha, C = 0.80)	:	846 L/s
External Multiple Blocks 138/139 (by others; A018b/A018a, 1.86 ha, C=0.80)	:	366 L/s
External Park Block 140 (by others; A019a, 1.93 ha, C = 0.40)	:	229 L/s

Excess flows from these blocks will spill onto the street and be conveyed overland to Mud Creek, with the exception of the park blocks. Excess flows from Park Block 9 will spill onto the street and be conveyed overland to East Urban Community SWM Pond 3, and excess flows from external Park Block 140 will spill directly overland to Mud Creek.

Within the proposed development, standard Tempest Inlet Control Device (ICD) types A, B, C, D and E and lead pipe capacities will be used to limit minor system capture to the 5-year flow. Note that IPEX has changed these standard ICDs of Types A, B, C, D and F to "Tempest" ICDs of Types A, B, C, D and E (refer to Appendix B for details). For the previously approved

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

townhouse development draining to Trails Edge Phase 1 (south of Mud Creek and west of Compass Street), minor system capture is limited as per the *Trails Edge Phase 1 Stormwater Management Report* dated June 2010 by IBI Group (approx. 85 L/s/ha).

For modelling purposes, minor system capture rates on undetailed future residential development to the east of Trails Edge West were limited to 112% of the 5-year flows, as simulated in DDSWMM, with 30 m^3/ha of surface storage. The additional 12% capture is to account for the additional flows captured by standard inlet control devices during the 100-year storm.

Minor system capture rates in future (undetailed) school, high density, mixed use, multiples, institutional and commercial blocks south of the transitway corridor / hydro easement are to be limited to the 5-year flow with sufficient on-site storage to retain excess flows up to the 100-year return period.

Continuous overland flow routes have been provided on the internal streets of the proposed Trails Edge West subdivision in order to convey the major system flows to the pond. In general, the major system has been designed to accommodate the 100-year less the 5-year post-development flows from within the site and from external areas. Note that the 100-year major system flows on large lumped catchments may be significant due to the size of the drainage area; these areas will be further discretized and the actual major system flows identified at the appropriate detailed design stages for these areas.

The street segments within the proposed development have been designed using a 'saw tooth' or 'sagged' road profile. The runoff from within these segments will be conveyed to catchbasins located at the lowest point within the street segment. Flows in excess of the catchbasin capture rate will be temporarily stored within the 'sagged' street segments and released slowly to the storm sewers. When the storage on a specific street segment is surpassed, the excess water will flow towards the next downstream street sag, and eventually to the appropriate outlet. It should be noted that the major system would outlet without flooding any properties in the subdivision.

In the event that the drainage system's capacity to capture surface flows is exceeded, Figure 4 presents the maximum extent of static surface ponding on the streets based on grading. Note that the double routing method was used to model the attenuation provided by dynamic storage above static ponding areas, in accordance with the February 2014 *City of Ottawa Technical Bulletin ISDTB-2014-01*.

Details of 100-year street storage results (i.e. actual volume used and depth of water) are provided in Table D-7 of Appendix D. This information, combined with the dynamic flow depths calculated in DDSWMM, demonstrates that total 100-year depth of water (static and dynamic) on the street at these ponding areas would be retained within the right-of-way and would not exceed 30 cm within the proposed subdivision, or 35 cm with the previously approved townhouse development where minor system capture is limited to 85 L/s/ha by

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

existing infrastructure (per the February 2014 *City of Ottawa Technical Bulletin ISDTB-2014-01*).

Note that those ponding areas in the townhouse development with significant 5-year ponding and with 100-year total depths exceeding 30 cm, but less than the 35 cm requirement, are outside of the current study area. These areas are either designed by others, or are part of the future phase to be detailed at a later stage.

Note that Belcourt Extension and part of Compass Street are to be designed by IBI Group; static ponding depths on these roads, once available, will be set to meet City criteria for total water depth. Also note that no surface storage volumes were accounted for in the DDSWMM model in rear lot swales.

Table D-7 of Appendix D also presents the street storage climate change stress test results based on a 20% increase in the 100-year storm, as per the October 2012 *City of Ottawa Sewer Design Guidelines*. As shown in Table D-7, the maximum depth of water at any Trails Edge West ponding area under these conditions is calculated as 34.6 cm.

A 4.0 m wide overland flow route from Compass Street to the Mud Creek, with a curb cut of 4.0 m, is provided east of the channel. Similarly, a 3.0 m wide overland flow route from Shinleaf Crescent to Mud Creek, with a curb cut of 4.0 m, is provided north of the channel. Refer to Calculation Sheet 2 of Appendix D for the required capacity of the overland flow routes. Note that 100-year major system flows on the east side of the Belcourt Extension will be captured to separate 100-year intakes and discharge to Mud Creek to the west of the Belcourt Extension.

The DDSWMM and XPSWMM analyses, discussed in the next sections, have demonstrated that the proposed drainage system for the subdivision will have sufficient capacity to control the excess flow during a 100-year storm and safely capture and convey the 5-year flow to the pond.

4.1 Interim A and Interim B Conditions

Under Interim A conditions, 2.2 m^3/s (equal to the 5-year flow generated by the existing Costco site and associated interim SWM pond block) will be captured from the north to a ditch inlet catchbasin connected to the south trunk sewer on Compass Street. Excess flows will pond in the north existing areas under these conditions before spilling overland to the north main cell of the SWM facility. For the purposes of this analysis, it is assumed that a diversion ditch will be constructed with the extension of Brian Coburn under Interim B conditions to direct existing flows from the north to the north main cell of the pond, and the temporary ditch inlet catchbasin will be decomissioned.

In accordance with conceptual design information provided by the City of Ottawa, minor system capture on the future transitway corridor and Brian Coburn Boulevard extension will be

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

restricted to the 10-year flows, and minor system capture on the hydro easement will be restricted to the 5-year flows. It is understood that sufficient on-site storage will be provided to retain excess flows up to the 100-year return period on these areas under Interim B conditions. The captured flows from these areas will be conveyed to the south main cell of the SWM facility by a future storm sewer, with quality control provided by an oil-and-grit separator or separators.

4.2 Major System and DDSWMM Analysis

The DDSWMM computer program was used to model the major and minor system flows within the proposed development and from external areas. Note that as the DDSWMM program is most appropriate for use in modelling urban drainage, the large undeveloped drainage areas north of the hydro easement were instead modelled using SWMHYMO, and the generated hydrographs then input to DDSWMM.

The DDSWMM and SWMHYMO models presented in Appendix B were developed based on the information provided in Figures 2 and 3. Seven simulations were conducted, one for each of the following rainfall events (as per the October 2012 *City of Ottawa Sewer Design Guidelines*):

i) the 5-year, 3-hour Chicago storm;
ii) the 100-year, 3-hour Chicago storm;
iii) the 100-year, 24-hour SCS Type II storm;
iv) the July 1st, 1979 historical event;
v) the August 4th, 1988 historical event;
vi) the August 8th, 1996 historical event; and
vii) the 100-year, 3-hour Chicago storm + 20%.

Note that the purpose of simulating the 100-year, 3-hour Chicago storm with a 20% increase is to stress test the drainage system for potential flooding resulting from climate change, as per the October 2012 *City of Ottawa Sewer Design Guidelines.*

The DDSWMM model depression storage and infiltration parameters are as per the October 2012 *City of Ottawa Sewer Design Guidelines*. The percent imperviousness of the detailed Trails Edge West drainage areas were measured based on the development layout; impervious areas were taken as fully effective in the front and half effective in the rear of each lot to account for indirectly connected roof drainage. The percent imperviousness of undetailed drainage areas were calculated based on the runoff coefficient (C), where C = 0.7 x imperviousness ratio + 0.2.

The natural drainage areas north of the hydro easement were modelled in SWMHYMO with an SCS Curve Number of 78 (CN* = 70) based on hydrologic soil group D and a combination of woods, meadow and brush in fair condition. Time to peak values for the undeveloped areas were calculated using existing contour data and the Bransby Williams equation.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

On-site storage was modelled using a storage-discharge relationship with three points: the first with 0 L/s capture and 0 cu.m. storage; the second with maximum capture and negligible storage; and the third with maximum capture and maximum available storage. Note that where high surface storage on large undetailed areas produced instability in the DDSWMM-generated minor system capture hydrographs, the hydrograph flows were averaged over ten minute intervals to produce a smooth curve. The peaks of the hydrographs are unaffected by this instability, which only occurs after the time to peak has passed.

The models use actual catchbasin capture flow curves, and the inflows are limited by standard Tempest ICD types A, B, C, D and E and by lead pipe capacities. Note that 200 mm diameter lead pipes were assumed and are required between single catchbasins and the storm sewers, and 250 mm diameter lead pipes were assumed and are required between double or rearyard catchbasins and the storm sewers. Refer to Table D-6 of Appendix D for a summary of inlet controls. As may be seen from Table D-6, the selected controls are sufficient to capture the 5-year flows within proposed subdivision.

Table 1 presents a summary of the major system results simulated in DDSWMM and SWMHYMO during the 100-year Chicago storm. Note that the total water depths at low points shown in Table 1 were calculated as flow depth plus static ponding depth (per grading plan), as per Table D-7 of Appendix D. Dummy segments used in the double routing method for road ponding areas are also included in Table 1 for completeness; however, note that DDSWMM flow depths for dummy segments do not represent actual conditions, as dummy segments are intended for the purpose of replicating dynamic attenuation effects only.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
A001N1	0.017	4.5	0.000	0	A008R1	0.090	5.2	0.028	0
LP001N1	0.031	20.5	0.020	4.04	A008R2	0.082	5.1	0.000	0
A001N2	0.015	4.2	0.000	0	A008R3	0.040	2.8	0.000	0
A001NE	0.016	4.3	0.000	0	A008SE	0.068	7.5	0.000	0
LP001NE	0.023	15.0	0.020	0.75	A008SW	0.010	3.6	0.000	0
A001NW	0.008	3.2	0.000	0	A009E1	0.051	6.7	0.000	0
A001R1	0.009	0.6	0.008	0	LP009E1	0.069	16.5	0.036	1
A001S1	0.032	5.6	0.000	0	A009E2	0.019	4.6	0.000	0
LP001S1	0.037	21.0	0.020	6	A009N1	0.008	3.3	0.000	0
A001S2	0.006	2.9	0.000	0	LP009N1	0.020	13.7	0.010	1
A001SE	0.023	5.0	0.000	0	A009N2	0.012	3.8	0.000	0
LP001SE	0.041	16.2	0.020	2	A009N3	0.010	3.5	0.000	0
A001SW	0.018	4.6	0.000	0	LP009N3	0.012	12.9	0.010	1
A003R1	0.048	3.3	0.020	0	A009NE	0.026	5.1	0.000	0
A003R2	0.038	2.7	0.000	0	LP009NE	0.051	16.7	0.028	2
A004NE	0.057	7.0	0.000	0	A009NW	0.013	3.9	0.000	0
LP004NE	0.056	10.9	0.028	1	LP009NW	0.034	15.7	0.020	2
A004NW	0.082	8.0	0.000	0	A009SE	0.026	5.1	0.000	0
LP004NW	0.087	12.2	0.020	1	A009SW	0.021	4.8	0.000	0
A004SW	0.010	3.5	0.000	0	A009W1	0.047	6.5	0.000	0
A005NE	0.014	4.0	0.000	0	LP009W1	0.064	16.3	0.036	1
LP005NE	0.021	14.8	0.010	1	A009W2	0.018	4.5	0.000	0
A005NW	0.008	3.3	0.000	0	A010NE	0.049	6.6	0.000	0
A005SE	0.090	8.3	0.000	0	LP010NE	0.075	18.8	0.036	2
LP005SE	0.089	26.3	0.050	12.71	A010NW	0.049	6.6	0.000	0
A005SW	0.069	7.5	0.000	0	LP010NW	0.074	18.7	0.036	3
LP005SW	0.068	25.5	0.050	4.17	A010S1	0.089	8.2	0.000	0
A005W1	0.016	4.3	0.000	0	LP010S1	0.106	21.8	0.050	2
LP005W1	0.016	14.3	0.010	1	A010S2	0.089	8.3	0.000	0
A006NE	0.051	6.7	0.000	0	LP010S2	0.116	20.2	0.050	1
LP006NE	0.065	13.4	0.036	1	A010SE	0.027	5.3	0.000	0
A006NW	0.016	4.3	0.000	0	A010SW	0.026	5.1	0.000	0
A006SE	0.072	7.7	0.000	0	A010W1	0.018	4.6	0.000	0
LP006SE	0.072	20.6	0.036	3	A011NE	0.057	7.0	0.000	0
A006SW	0.067	7.5	0.000	0	A011NW	0.072	7.7	0.000	0
LP006SW	0.084	21.1	0.036	2	LP011NW	0.122	21.3	0.028	2
A007E1	0.071	7.6	0.000	0	A011SW	0.097	8.5	0.000	0
LP007E1	0.088	20.2	0.028	2	LP011SW	0.145	22.9	0.050	2
A007E2	0.067	7.5	0.000	0	A012NE	0.045	6.4	0.000	0
LP007E2	0.095	20.4	0.036	3	LP012NE	0.060	17.1	0.020	2
A007N1	0.034	5.7	0.000	0	A012NW	0.025	5.1	0.000	0
A007NE	0.043	6.3	0.000	0	A012SE	0.045	6.4	0.000	0
LP007NE	0.087	23.2	0.035	6	LP012SE	0.064	17.3	0.036	2
A007NW	0.053	6.8	0.000	0	A012SW	0.021	4.8	0.000	0
A007R1	0.051	3.6	0.000	0	A013N1	0.087	8.2	0.000	0
A007R2	0.058	4.1	0.020	0	LP013N1	0.115	24.1	0.020	2
A007S1	0.011	3.7	0.000	0	A013N2	0.037	6.0	0.000	0
A007SE	0.035	5.8	0.000	0	A013NE	0.050	6.6	0.000	0
LP007SE	0.061	22.2	0.035	6	LP013NE	0.068	16.5	0.028	1
A007SW	0.027	5.2	0.000	0	A013NW	0.019	4.6	0.000	0
A008NE	0.057	6.9	0.000	0	A013S1	0.053	6.7	0.000	0
LP008NE	0.115	19.1	0.020	2	LP013S1	0.158	12.3	0.028	1
A008NW	0.067	7.5	0.000	0	A013S2	0.044	6.3	0.000	0
LP008NW	0.071	17.6	0.020	2	A013SE	0.043	6.3	0.000	0

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
LP013SE	0.063	16.3	0.028	1	A019SW	0.011	3.7	0.000	0
A013SW	0.021	4.8	0.000	0	A019W1	0.038	6.0	0.000	0
A015N1	0.009	3.4	0.000	0	LP019W1	0.075	24.8	0.020	6
LP015N1	0.012	10.8	0.010	0.77	A019W2	0.033	5.7	0.000	0
A015N2	0.004	2.4	0.000	0	LP019W2	0.061	24.2	0.020	6
A015NE	0.027	5.2	0.000	0	A020E1	0.202	11.2	0.020	0
LP015NE	0.041	22.2	0.020	7.36	A020N1	0.027	5.2	0.000	0
A015NW	0.029	5.3	0.000	0	LP020N1	0.049	16.6	0.028	2
LP015NW	0.068	23.5	0.036	6	A020N2	0.250	12.2	0.000	0
A015S1	0.010	3.6	0.000	0	LP020N2	0.251	22.2	0.020	2
LP015S1	0.013	10.9	0.010	1	A020N3	0.023	4.9	0.000	0
A015S2	0.003	2.2	0.000	0	A020NE	0.029	5.4	0.000	0
A015SE	0.014	4.1	0.000	0	LP020NE	0.051	28.7	0.028	7.62
A015SW	0.040	6.1	0.000	0	A020NW	0.030	5.5	0.000	0
A017NE	0.046	6.4	0.000	0	LP020NW	0.052	16.7	0.028	1
LP017NE	0.051	15.6	0.020	2	A020S1	0.022	4.9	0.000	0
A017NW	0.088	8.2	0.000	0	A020S2	0.011	3.7	0.000	0
LP017NW	0.109	18.0	0.069	1	A020SE	0.036	5.9	0.000	0
A017SE	0.011	3.6	0.000	0	LP020SE	0.036	27.9	0.020	5.36
A017SW	0.023	5.0	0.000	0	A020SW	0.034	5.8	0.000	0
A018a	0.324	10.4	0.171	48.48	LP020SW	0.034	6.8	0.020	1
A018b	0.632	13.3	0.334	95.29	A020W1	0.049	6.6	0.006	0
A018NE	0.024	5.0	0.000	0	A020W2	0.022	4.9	0.000	0
LP018NE	0.034	15.8	0.020	2	A021NE	0.039	6.1	0.000	0
A018NW	0.093	8.4	0.000	0	LP021NE	0.603	24.5	0.036	6
LP018NW	0.098	18.6	0.020	2	A021NW	0.098	8.6	0.000	0
A018R1	0.089	5.2	0.028	0	LP021NW	0.466	20.4	0.069	1
A018R2	0.051	3.6	0.000	0	A021SE	0.596	16.9	0.000	0
A018R3	0.023	1.6	0.000	0	A021SW	0.078	7.9	0.000	0
A018SE	0.011	3.6	0.000	0	A023N1	0.013	3.9	0.000	0
A018SW	0.011	3.7	0.000	0	A023N2	0.042	6.2	0.000	0
A019a	0.448	9.9	0.194	152.23	LP023N2	0.054	14.8	0.028	1
A019E1	0.329	13.5	0.000	0	A023NE	0.042	6.2	0.000	0
LP019E1	0.328	23.5	0.020	2	LP023NE	0.059	14.0	0.028	1
A019E2	0.011	3.7	0.000	0	A023NW	0.017	4.5	0.000	0
A019N1	0.017	4.4	0.000	0	A023R1	0.145	6.0	0.028	0
A019N2	0.045	6.4	0.000	0	A023R2	0.133	5.8	0.000	0
LP019N2	0.061	15.2	0.028	1	A023R3	0.106	5.4	0.000	0
A019N3	0.012	3.9	0.000	0	A023R4	0.071	5.0	0.000	0
A019N4	0.042	6.2	0.000	0	A023S1	0.009	3.3	0.000	0
LP019N4	0.053	13.8	0.028	1	A023S2	0.149	10.0	0.000	0
A019NE	0.493	15.7	0.000	0	LP023S2	0.154	18.2	0.020	1
LP019NE	0.500	25.2	0.020	2	A023SE	0.044	6.3	0.000	0
A019NW	0.039	6.1	0.000	0	LP023SE	0.057	14.0	0.028	1
LP019NW	0.042	15.6	0.020	1	A023SW	0.014	4.0	0.000	0
A019R1	0.068	4.8	0.020	0	A025NE	0.127	9.5	0.000	0
A019R2	0.021	1.5	0.000	0	LP025NE	0.133	17.6	0.020	1
A019S1	0.018	4.5	0.000	0	A025NW	0.285	12.8	0.000	0
A019S2	0.045	6.4	0.000	0	LP025NW	0.288	25.6	0.028	1
LP019S2	0.062	15.2	0.028	1	A025SE	0.016	4.3	0.000	0
A019S3	0.014	4.1	0.000	0	A025SW	0.008	3.3	0.000	0
A019S4	0.041	6.2	0.000	0	A028R1	0.221	6.9	0.000	0
LP019S4	0.054	13.8	0.028	1	A029NE	0.023	4.9	0.000	0
A019SE	0.010	3.6	0.000	0	A029NW	0.007	3.2	0.000	0

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
A029R1	0.077	5.1	0.020	0	A040R3	0.039	2.7	0.000	0
A029R2	0.047	3.3	0.000	0	A040R4	0.023	1.6	0.000	0
A029R3	0.010	0.7	0.000	0	A040R5	0.011	0.8	0.000	0
A029R4	0.033	2.3	0.000	0	A040S1	0.010	3.5	0.000	0
A029R5	0.086	5.2	0.000	0	A040S2	0.017	4.4	0.000	0
A029R6	0.097	5.3	0.028	0	LP040S2	0.026	15.2	0.020	1.56
A029S1	0.030	5.5	0.000	0	A040SE	0.017	4.4	0.000	0
LP029S1	0.040	18.1	0.020	2	LP040SE	0.026	15.2	0.020	1.56
A029S2	0.049	6.6	0.000	0	A040SW	0.010	3.5	0.000	0
LP029S2	0.054	18.8	0.028	2	A041a	1.868	20.5	0.984	312.08
A029SE	0.071	5.9	0.000	0	A041N1	0.092	8.3	0.000	0
LP029SE	0.093	25.4	0.050	14.41	LP041N1	0.107	21.9	0.050	2
A029SW	0.085	6.3	0.000	0	A041N2	0.016	4.3	0.000	0
LP029SW	0.091	21.4	0.050	10	A041NE	0.080	7.9	0.000	0
A031NE	0.040	6.1	0.000	0	LP041NE	0.090	18.3	0.036	2
LP031NE	0.056	15.9	0.028	1	A041NW	0.022	4.9	0.000	0
A031NW	0.017	4.4	0.000	0	A041S1	0.033	5.7	0.000	0
A031SE	0.037	6.0	0.000	0	LP041S1	0.070	17.6	0.020	2
LP031SE	0.046	15.4	0.020	1	A041SE	0.017	4.4	0.000	0
A031SW	0.010	3.5	0.000	0	LP041SE	0.026	17.2	0.020	1.56
A032NE	0.036	5.9	0.000	0	A041SW	0.010	3.5	0.000	0
LP032NE	0.044	16.3	0.020	1	A043R1	0.026	1.8	0.000	0
A032NW	0.008	3.3	0.000	0	A043R2	0.028	1.9	0.020	0
A032R1	0.021	1.5	0.019	0	A043R3	0.024	1.7	0.020	0
A032SE	0.038	6.0	0.000	0	A043R4	0.024	1.7	0.020	0
LP032SE	0.054	16.8	0.028	1	A043SE	0.019	4.6	0.000	0
A032SW	0.017	4.5	0.000	0	LP043SE	0.019	9.6	0.010	1
A034NE	0.012	3.8	0.000	0	A043SW	0.021	4.8	0.000	0
A034NW	0.006	3.1	0.000	0	LP043SW	0.026	10.2	0.010	1
A034SE	0.021	4.8	0.000	0	A044R1	0.035	2.4	0.020	0
LP034SE	0.028	11.3	0.020	1	A045N1	0.024	5.0	0.000	0
A034SW	0.051	6.7	0.000	0	A045N2	0.142	9.8	0.000	0
LP034SW	0.057	13.0	0.028	1	LP045N2	0.156	27.2	0.010	9
A036DV1	0.253	9.4	0.130	0	A045NE	0.128	9.5	0.000	0
A036NE	0.021	4.8	0.000	0	LP045NE	0.148	22.0	0.010	5
A036NW	0.137	9.7	0.000	0	A045NW	0.023	4.9	0.000	0
A036SE	0.026	5.1	0.000	0	A045R1	0.039	2.7	0.020	0
LP036SE	0.087	N/A	0.025	13.27	A045S1	0.023	4.9	0.000	0
A036SW	0.027	5.2	0.000	0	A045S2	0.089	8.2	0.000	0
LP036SW	0.161	N/A	0.025	20	LP045S2	0.110	26.0	0.010	9
A039N1	0.023	3.7	0.000	0	A045SE	0.063	7.3	0.000	0
A039N2	0.037	4.6	0.000	0	LP045SE	0.083	20.0	0.010	5
LP039N2	0.059	15.4	0.036	2	A045SW	0.023	4.9	0.000	0
A039S1	0.010	2.7	0.000	0	A046NE	0.220	11.6	0.000	0
A039S2	0.016	3.3	0.000	0	LP046NE	0.230	21.8	0.010	2
LP039S2	0.026	13.9	0.020	1.38	A046NW	0.022	4.8	0.000	0
A040N1	0.017	4.5	0.000	0	A046R1	0.041	2.8	0.020	0
A040N2	0.044	6.3	0.000	0	A046SE	0.110	9.0	0.000	0
LP040N2	0.060	17.1	0.028	2	LP046SE	0.135	19.7	0.010	2
A040NE	0.051	6.7	0.000	0	A046SW	0.036	5.9	0.000	0
LP040NE	0.065	20.4	0.036	2	A047E1	0.009	3.3	0.000	0
A040NW	0.015	4.2	0.000	0	A047E2	0.019	4.7	0.000	0
A040R1	0.059	4.1	0.020	0	LP047E2	0.027	15.3	0.027	0.5
A040R2	0.050	3.5	0.000	0	A047NE	0.004	2.5	0.000	0

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
A047NW	0.011	3.6	0.000	0	A170S2	0.011	3.7	0.000	0
A047PK1	0.053	3.7	0.025	0	A170SE	0.010	3.6	0.000	0
A047PK2	0.075	5.0	0.000	0	A170SW	0.022	4.9	0.000	0
A047R1	0.040	2.8	0.020	0	A200NE	0.045	6.4	0.000	0
A047R2	0.127	5.7	0.020	0	A200NW	0.016	4.3	0.000	0
A047R3	0.020	1.4	0.000	0	A200R1	0.006	0.5	0.000	0
A047R4	0.030	2.1	0.000	0	A200R2	0.014	1.0	0.000	0
A047R5	0.036	2.5	0.020	0	A200R3	0.024	1.7	0.000	0
A047SE	0.020	4.7	0.000	0	A200R4	0.030	2.1	0.020	0
LP047SE	0.023	15.9	0.010	2	A213a	0.359	10.8	0.187	22.5
A047SW	0.060	7.1	0.000	0	A216a	0.686	13.8	0.369	45.3
LP047SW	0.068	18.5	0.010	2	A216b	1.133	16.7	0.576	216.08
A047W1	0.018	4.5	0.000	0	A250NE	0.112	9.1	0.000	0
A047W2	0.072	7.7	0.000	0	A250NW	0.253	12.3	0.000	0
LP047W2	0.089	18.3	0.027	2	A250SE	0.039	6.1	0.000	0
A049NE	0.023	4.9	0.000	0	LP250SE	0.129	22.2	0.036	3
LP049NE	0.030	20.5	0.027	0.8	A250SW	0.033	5.6	0.000	0
A049NW	0.009	3.3	0.000	0	LP250SW	0.348	19.6	0.020	1
A049SE	0.065	7.4	0.000	0	A306a	0.643	13.4	0.354	44.7
LP049SE	0.076	22.8	0.027	2	A308a	0.353	10.7	0.049	6
A049SW	0.019	4.6	0.000	0	A309a	0.490	12.1	0.146	18.6
A100NE	1.632	19.4	0.416	97	A310a	0.747	14.2	0.151	18.9
A101E1	0.052	6.7	0.000	0	A310b	0.708	13.9	0.390	49.2
A101E2	0.126	9.4	0.000	0	A401a	1.688	19.7	1.668	0
LP101E2	0.170	23.3	0.023	7.79	A401b	3.931	28.0	2.774	0
A101E3	0.049	6.6	0.000	0	A403a	0.096	6.5	0.053	6.6
A101N1	0.069	7.6	0.016	0	A460NE	0.038	6.0	0.000	0
A101N2	0.075	7.8	0.016	0	LP460NE	0.168	23.5	0.010	2
A101NE	0.221	11.7	0.000	0	A460NW	0.137	9.7	0.000	0
A101NW	0.022	4.8	0.000	0	LP460NW	0.240	25.0	0.010	2
A101S1	0.051	6.7	0.000	0	A460SE	0.132	9.6	0.000	0
LP101S1	0.255	32.3	0.013	33.65	A560a	0.283	9.8	0.155	16.8
A101S2	0.055	6.9	0.000	0	A560b	1.898	20.6	0.970	370.63
LP101S2	0.249	32.2	0.013	33.65	AChan1	0.842	12.2	0.842	0
A101SE	0.129	9.5	0.000	0	AChan2	1.582	15.3	1.582	0
LP101SE	0.143	25.9	0.013	33.65	AChan3	1.265	14.5	1.265	0
A101SW	0.035	5.8	0.000	0	AChan4	1.465	15.1	1.465	0
A101W1	0.016	4.4	0.000	0	AForeS	0.489	10.2	0.489	0
A101W2	0.117	9.2	0.000	0	ARes2	0.360	10.8	0.000	0
LP101W2	0.278	28.7	0.023	7.79	AWood1	0.131	5.8	0.061	0
A107NW	0.046	6.4	0.000	0	AWood2	0.403	9.3	0.000	0
LP107NW	1.513	30.1	0.048	58.71	OUT-W	0.374	14.2	0.000	0
A107SW	0.307	13.2	0.000	0	D001N1	0.000	N/A (2)	N/A (2)	N/A (2)
A140R1	0.165	6.2	0.028	0	D001NE	0.000	N/A (2)	N/A (2)	N/A (2)
A140R2	0.153	6.1	0.000	0	D001S1	0.007	N/A (2)	N/A (2)	N/A (2)
A140R3	0.120	5.6	0.000	0	D001SE	0.021	N/A (2)	N/A (2)	N/A (2)
A140R4	0.092	5.3	0.000	0	D004NE	0.028	N/A (2)	N/A (2)	N/A (2)
A140WK1	0.258	7.9	0.000	0	D004NW	0.067	N/A (2)	N/A (2)	N/A (2)
A170NE	0.030	5.5	0.000	0	D005NE	0.011	N/A (2)	N/A (2)	N/A (2)
LP170NE	0.035	15.8	0.020	2	D005SE	0.000	N/A (2)	N/A (2)	N/A (2)
A170NW	0.061	7.2	0.000	0	D005SW	0.000	N/A (2)	N/A (2)	N/A (2)
LP170NW	0.083	18.0	0.036	2	D005W1	0.006	N/A (2)	N/A (2)	N/A (2)
A170S1	0.024	5.0	0.000	0	D006NE	0.030	N/A (2)	N/A (2)	N/A (2)
LP170S1	0.034	15.7	0.020	2	D006SE	0.036	N/A (2)	N/A (2)	N/A (2)

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
D006SW	0.049	N/A (2)	N/A (2)	N/A (2)	D025NE	0.113	N/A (2)	N/A (2)	N/A (2)
D007E1	0.060	N/A (2)	N/A (2)	N/A (2)	D025NW	0.260	N/A (2)	N/A (2)	N/A (2)
D007E2	0.059	N/A (2)	N/A (2)	N/A (2)	D029S1	0.020	N/A (2)	N/A (2)	N/A (2)
D007NE	0.053	N/A (2)	N/A (2)	N/A (2)	D029S2	0.026	N/A (2)	N/A (2)	N/A (2)
D007SE	0.006	N/A (2)	N/A (2)	N/A (2)	D029SE	0.000	N/A (2)	N/A (2)	N/A (2)
D008NE	0.095	N/A (2)	N/A (2)	N/A (2)	D029SW	0.005	N/A (2)	N/A (2)	N/A (2)
D008NW	0.051	N/A (2)	N/A (2)	N/A (2)	D031NE	0.028	N/A (2)	N/A (2)	N/A (2)
D009E1	0.033	N/A (2)	N/A (2)	N/A (2)	D031SE	0.027	N/A (2)	N/A (2)	N/A (2)
D009N1	0.010	N/A (2)	N/A (2)	N/A (2)	D032NE	0.024	N/A (2)	N/A (2)	N/A (2)
D009N3	0.001	N/A (2)	N/A (2)	N/A (2)	D032SE	0.026	N/A (2)	N/A (2)	N/A (2)
D009NE	0.023	N/A (2)	N/A (2)	N/A (2)	D034SE	0.008	N/A (2)	N/A (2)	N/A (2)
D009NW	0.014	N/A (2)	N/A (2)	N/A (2)	D034SW	0.028	N/A (2)	N/A (2)	N/A (2)
D009W1	0.028	N/A (2)	N/A (2)	N/A (2)	D036SE	0.000	N/A (2)	N/A (2)	N/A (2)
D010NE	0.040	N/A (2)	N/A (2)	N/A (2)	D036SW	0.136	N/A (2)	N/A (2)	N/A (2)
D010NW	0.038	N/A (2)	N/A (2)	N/A (2)	D039N2	0.024	N/A (2)	N/A (2)	N/A (2)
D010S1	0.056	N/A (2)	N/A (2)	N/A (2)	D039S2	0.000	N/A (2)	N/A (2)	N/A (2)
D010S2	0.066	N/A (2)	N/A (2)	N/A (2)	D040N2	0.032	N/A (2)	N/A (2)	N/A (2)
D011NW	0.093	N/A (2)	N/A (2)	N/A (2)	D040NE	0.030	N/A (2)	N/A (2)	N/A (2)
D011SW	0.094	N/A (2)	N/A (2)	N/A (2)	D040S2	0.000	N/A (2)	N/A (2)	N/A (2)
D012NE	0.041	N/A (2)	N/A (2)	N/A (2)	D040SE	0.000	N/A (2)	N/A (2)	N/A (2)
D012SE	0.029	N/A (2)	N/A (2)	N/A (2)	D041N1	0.057	N/A (2)	N/A (2)	N/A (2)
D013N1	0.095	N/A (2)	N/A (2)	N/A (2)	D041NE	0.055	N/A (2)	N/A (2)	N/A (2)
D013NE	0.040	N/A (2)	N/A (2)	N/A (2)	D041S1	0.050	N/A (2)	N/A (2)	N/A (2)
D013S1	0.130	N/A (2)	N/A (2)	N/A (2)	D041SE	0.000	N/A (2)	N/A (2)	N/A (2)
D013SE	0.035	N/A (2)	N/A (2)	N/A (2)	D043SE	0.009	N/A (2)	N/A (2)	N/A (2)
D015N1	0.000	N/A (2)	N/A (2)	N/A (2)	D043SW	0.016	N/A (2)	N/A (2)	N/A (2)
D015NE	0.000	N/A (2)	N/A (2)	N/A (2)	D045N2	0.146	N/A (2)	N/A (2)	N/A (2)
D015NW	0.032	N/A (2)	N/A (2)	N/A (2)	D045NE	0.138	N/A (2)	N/A (2)	N/A (2)
D015S1	0.000	N/A (2)	N/A (2)	N/A (2)	D045S2	0.100	N/A (2)	N/A (2)	N/A (2)
D017NE	0.031	N/A (2)	N/A (2)	N/A (2)	D045SE	0.073	N/A (2)	N/A (2)	N/A (2)
D017NW	0.040	N/A (2)	N/A (2)	N/A (2)	D046NE	0.220	N/A (2)	N/A (2)	N/A (2)
D018NE	0.014	N/A (2)	N/A (2)	N/A (2)	D046SE	0.125	N/A (2)	N/A (2)	N/A (2)
D018NW	0.078	N/A (2)	N/A (2)	N/A (2)	D047E2	0.000	N/A (2)	N/A (2)	N/A (2)
D019E1	0.308	N/A (2)	N/A (2)	N/A (2)	D047SE	0.013	N/A (2)	N/A (2)	N/A (2)
D019N2	0.033	N/A (2)	N/A (2)	N/A (2)	D047SW	0.058	N/A (2)	N/A (2)	N/A (2)
D019N4	0.025	N/A (2)	N/A (2)	N/A (2)	D047W2	0.062	N/A (2)	N/A (2)	N/A (2)
D019NE	0.480	N/A (2)	N/A (2)	N/A (2)	D049NE	0.000	N/A (2)	N/A (2)	N/A (2)
D019NW	0.022	N/A (2)	N/A (2)	N/A (2)	D049SE	0.049	N/A (2)	N/A (2)	N/A (2)
D019S2	0.034	N/A (2)	N/A (2)	N/A (2)	D170NE	0.015	N/A (2)	N/A (2)	N/A (2)
D019S4	0.026	N/A (2)	N/A (2)	N/A (2)	D170NW	0.047	N/A (2)	N/A (2)	N/A (2)
D019W1	0.055	N/A (2)	N/A (2)	N/A (2)	D170S1	0.014	N/A (2)	N/A (2)	N/A (2)
D019W2	0.041	N/A (2)	N/A (2)	N/A (2)	D250SE	0.093	N/A (2)	N/A (2)	N/A (2)
D020N1	0.020	N/A (2)	N/A (2)	N/A (2)	D250SW	0.329	N/A (2)	N/A (2)	N/A (2)
D020N2	0.231	N/A (2)	N/A (2)	N/A (2)	D460NE	0.158	N/A (2)	N/A (2)	N/A (2)
D020NE	0.000	N/A (2)	N/A (2)	N/A (2)	D460NW	0.230	N/A (2)	N/A (2)	N/A (2)
D020NW	0.023	N/A (2)	N/A (2)	N/A (2)	A039NE	0.015	4.2	0.000	0
D020SE	0.000	N/A (2)	N/A (2)	N/A (2)	LP039NE	0.056	16.9	0.028	2
D020SW	0.014	N/A (2)	N/A (2)	N/A (2)	A039NW	0.023	4.9	0.000	0
D021NE	0.567	N/A (2)	N/A (2)	N/A (2)	A039SE	0.010	3.6	0.000	0
D021NW	0.397	N/A (2)	N/A (2)	N/A (2)	LP039SE	0.032	15.6	0.020	2
D023N2	0.026	N/A (2)	N/A (2)	N/A (2)	A039SW	0.011	3.7	0.000	0
D023NE	0.030	N/A (2)	N/A (2)	N/A (2)	A051NE	0.035	4.5	0.000	0
D023S2	0.134	N/A (2)	N/A (2)	N/A (2)	LP051NE	0.052	16.7	0.028	2
D023SE	0.029	N/A (2)	N/A (2)	N/A (2)	A051NW	0.036	4.5	0.000	0

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
LP051NW	0.053	16.7	0.028	2	A108a	0.927	15.4	0.547	56.4
A051SE	0.018	3.4	0.000	0	A110a	1.491	18.7	0.201	22.5
A051SW	0.018	3.4	0.000	0	A112a	1.615	19.3	0.198	22.2
A052E1	0.046	4.9	0.000	0	A112b	0.693	13.8	0.367	102.32
LP052E1	0.064	17.3	0.036	3	A112c	0.697	13.8	0.400	48
A052E2	0.019	3.5	0.000	0	A112d	1.213	17.2	0.666	66.6
A052NE	0.041	4.7	0.000	0	A112e	1.364	18.0	0.717	225.56
LP052NE	0.059	17.0	0.028	2	A201a	0.420	11.4	0.236	27
A052NW	0.046	4.9	0.000	0	A202a	2.036	21.3	1.163	138.9
LP052NW	0.063	17.3	0.036	3	A203a	1.348	18.0	0.211	27.6
A052SE	0.019	3.5	0.000	0	A204a	1.194	17.1	0.082	10.2
A052SW	0.019	3.5	0.000	0	A205a	1.516	18.8	0.858	113.4
A052W1	0.045	4.9	0.000	0	A206a	1.769	20.1	0.252	33.3
LP052W1	0.063	17.3	0.036	3	A207a	1.717	19.8	0.237	31.2
A052W2	0.019	3.5	0.000	0	A208a	1.903	20.7	0.167	18.9
A053NE	0.045	4.9	0.000	0	A209a	1.793	20.2	0.127	14.4
LP053NE	0.055	19.6	0.028	1	A1101a	0.444	11.7	0.059	5.4
A053NW	0.045	4.9	0.000	0	A1101b	0.285	9.9	0.151	42.15
LP053NW	0.063	19.9	0.036	6	A1101c	0.412	11.3	0.218	61.59
A053SE	0.011	2.9	0.000	0	A1101d	0.333	10.5	0.169	57.75
A053SW	0.019	3.5	0.000	0	A1101e	0.606	13.1	0.307	110.74
A054E1	0.054	5.2	0.000	0	A1101f	0.888	15.2	0.500	57.3
LP054E1	0.081	N/A	0.036	6	A1102a	2.147	21.7	1.240	156
A054E2	0.028	4.1	0.000	0	A2001a	0.516	12.3	0.226	26.7
A054NE	0.059	5.4	0.000	0	A2070a	1.699	19.7	0.260	34.8
LP054NE	0.083	N/A	0.036	6	A2071a	1.234	17.3	0.651	195.43
A054NW	1.403	18.3	0.000	0	A2071b	0.758	11.7	0.379	102.3
LP054NW	1.389	N/A	0.036	6	A2071c	2.091	21.5	1.199	144.9
A054SE	0.027	4.0	0.000	0	A2090a	1.658	19.5	0.037	4.2
A054SW	0.027	4.0	0.000	0	A2110a	0.492	12.1	0.272	30.3
A054W1	1.046	16.2	0.000	0	A2110b	1.431	18.4	0.743	274.37
LP054W1	1.046	N/A	0.036	6	D039NE	0.036	N/A (2)	N/A (2)	N/A (2)
A054W2	0.028	4.1	0.000	0	D039SE	0.017	N/A (2)	N/A (2)	N/A (2)
A055a	0.922	15.4	0.509	64.2	D051NE	0.024	N/A (2)	N/A (2)	N/A (2)
A055NE	0.052	5.2	0.000	0	D051NW	0.024	N/A (2)	N/A (2)	N/A (2)
LP055NE	0.079	N/A	0.036	1	D052E1	0.028	N/A (2)	N/A (2)	N/A (2)
A055NW	0.852	15.0	0.000	0	D052NE	0.030	N/A (2)	N/A (2)	N/A (2)
LP055NW	0.879	N/A	0.036	1	D052NW	0.028	N/A (2)	N/A (2)	N/A (2)
A055S1	0.059	5.4	0.008	0	D052W1	0.028	N/A (2)	N/A (2)	N/A (2)
A055SE	0.028	4.1	0.000	0	D053NE	0.027	N/A (2)	N/A (2)	N/A (2)
A055SW	0.422	11.4	0.000	0	D053NW	0.004	N/A (2)	N/A (2)	N/A (2)
A056E1	0.082	6.2	0.000	0	D054E1	0.047	N/A (2)	N/A (2)	N/A (2)
LP056E1	0.112	N/A	0.112	0	D054NE	0.051	N/A (2)	N/A (2)	N/A (2)
A056E2	0.034	4.4	0.000	0	D054NW	1.353	N/A (2)	N/A (2)	N/A (2)
A056W1	1.643	19.5	0.000	0	D054W1	1.011	N/A (2)	N/A (2)	N/A (2)
LP056W1	1.624	N/A	1.624	0	D055NE	0.044	N/A (2)	N/A (2)	N/A (2)
A056W2	0.034	4.4	0.000	0	D055NW	0.843	N/A (2)	N/A (2)	N/A (2)
A101a	0.446	11.7	0.265	24.6	AForeN	1.308	14.8	1.300	0
A101b	1.668	19.6	1.163	0	AMainN	1.236	14.4	1.226	0
A101c	1.663	19.6	0.873	280.42	AMainS	0.784	11.8	0.780	0
A101d	4.107	28.6	2.150	681.82	ARes1	0.251	9.4	0.000	0
A103a	0.576	12.9	0.345	31.5	AResN1	1.860	20.5	1.836	0
A103b	1.449	18.5	0.764	233.82	AResN2	0.268	9.6	0.265	0
A103c	1.776	20.1	0.937	284.38	AHE1b	2.905	16.8	0.688	3226.76

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
ATW1b	0.518	10.3	0.000	0	NCOM2	3.680	N/A	0.000	0
ATW2b	1.388	15.1	0.000	0	NNAT1	3.415	N/A	0.000	0
ATW3b	2.554	29.7	0.000	0	NNAT2	0.540	N/A	0.000	0
NorthB	9.389	24.1	9.389	0	NNAT3	1.575	N/A	0.000	0
S-TW1b	3.162	32.5	1.563	1501.81	NNAT4	3.211	N/A	0.000	0
NCOM1	2.627	N/A	0.000	0					

(1) Flow depths on major system catchments were estimated using DDSWMM. Total water depths at low points calculated as flow depth plus static ponding depth (per grading plan); refer to Table D-7 of Appendix D for details.

(2) Dummy segments used in the double routing method for road ponding areas; DDSWMM flow depths do not represent actual conditions, as dummy segments are intended to replicate dynamic attenuation effects only.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

4.3 Minor System and Hydraulic Gradeline Analysis

The minor system analysis was completed using the XPSWMM program based on the peak flows captured during the rainfall events, as calculated with the DDSWMM and SWMHYMO programs. Note that the storm sewer design is as provided by DSEL, and a Manning's roughness coefficient of 0.013 was used for the concrete and PVC storm sewer pipes. Refer to Appendix C for manhole loss coefficients used in the XPSWMM model.

A 675 mm orifice is proposed at the west outlet of MH 39 at an invert of 84.086 m (equal to the pipe invert) to ensure that the flow split at this location does not exceed the capacity of the downstream pipes during the 5-year design storm.

The minor system performance was analyzed based free outfall conditions at the outlet of the facility for all storms. Table 2 presents the peak minor system inflows to Mud Creek obtained with the Rational Method and with the above-mentioned simulations.

Table 2: Comparison of Minor System Flows to Mud Creek

Location	Interim A Flows (m^3/s)			Interim B Flows (m^3/s)		
	5-Year Rational	5-Year DD/XP	100-Year DD/XP	5-Year Rational	5-Year DD/XP	100-Year DD/XP
MH 22 to Channel	4.594	4.830	6.362	3.340	2.738	4.439
MH 27 to Channel	1.257	1.006	1.806	1.188	1.017	1.543
MH 38 to Channel	N/A	2.357	6.030	N/A	2.409	5.765
MH 560 to Channel	N/A	12.641	18.584	N/A	12.622	18.488
Ex. MH 111 to Channel	N/A	0.608	0.655	N/A	0.608	0.657
Total [(1)]	5.851	21.442	33.436	4.528	19.393	30.891

[(1)] Total inflow taken as a direct summation of minor system flows.

Table 2 shows that the 5-year total flow simulated with the DDSWMM/XPSWMM models is much higher than the Rational Method flow. This may be explained by the fact that DSEL's Rational Method design sheet does not include the drainage areas to MH 38, MH 560 or MH 111, which are partly designed by others.

The DDSWMM/XPSWMM simulations have determined that for the selected 5- and 100-year storms, the total maximum minor system peak inflows to the pond would be 21.442 m^3/s and 33.436 m^3/s, respectively. The 100-year flow will surcharge most parts of the minor system; however, a freeboard of 0.3 m between the hydraulic grade line and the underside of footings has been provided throughout the proposed development.

Within the proposed subdivision, the dynamic flow depth on the road will be retained within the right-of-way and will not exceed the maximum allowable value of 30 cm at the gutter during the 100-year Chicago storm (refer to Calculation Sheet 1A of Appendix D, where the calculated maximum was 13.7 cm). Furthermore, it was determined that, for the 100-year storm and for all major system segments, the product of the depth of water (m) at the gutter multiplied by the

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

velocity of flow (m/s) will not exceed the maximum allowable 0.60 m^2/s (refer to Calculation Sheet 1 of Appendix D, where the calculated maximum was 0.148 m^2/s). Refer to Section 4 for an assessment of static ponding depth on the road.

Calculation Sheet 1B of Appendix D presents the climate change stress test results for dynamic flow depth on the road based on a 20% increase in the 100-year storm, as per the October 2012 *City of Ottawa Sewer Design Guidelines*. As shown in Calculation Sheet 1B, the maximum dynamic flow depth under these conditions is calculated as 17.6 cm, and the product of the depth of water at the gutter multiplied by the velocity of flow is 0.222 m^2/s.

Table C-1 of Appendix C summarizes the pipe data and hydraulic simulation results for the 100-year 3-hour Chicago storm, 100-year 24-hour SCS Type II storm and the three historical events. The results presented in Table C-1 of Appendix C are a composite of Interim A and B conditions, where the maximum hydraulic gradeline elevation of the two scenarios is presented at each manhole. Note that a freeboard of 0.3 m between the hydraulic grade line and the underside of footings has been provided throughout the proposed Trails Edge West development for these rainfall events under both Interim A and Interim B conditions. Additionally, note that the flowing full pipe velocities are no less than 0.80 m/s and no greater than 6.0 m/s for all proposed pipes. Table 3 presents the composite hydraulic gradeline results for these events.

Table C-1F of Appendix C presents the climate change stress test results for the hydraulic gradeline analysis based on a 20% increase in the 100-year storm, as per the October 2012 *City of Ottawa Sewer Design Guidelines*. Under these conditions, a freeboard of 0.3 m between the hydraulic grade line and the underside of footings has been provided for all proposed Trails Edge West lots under both Interim A and Interim B conditions.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
1	2	85.077	84.774	B91W	85.99	0.913
2	3	84.774	84.686	N/A	N/A	N/A
3	4	84.650	84.546	B90N	85.76	1.110
4	8	84.546	84.513	N/A	N/A	N/A
5	6	84.960	84.807	B87S	85.67	0.710
6	12	84.807	84.531	B95SS	85.57	0.763
7	8	84.953	84.574	B84W	85.52	0.567
8	14	84.513	84.059	N/A	N/A	N/A
9	10	85.015	84.883	B94NN	85.78	0.765
10	11	84.883	84.678	B96SS	85.56	0.677
11	12	84.678	84.531	B79E	85.53	0.852
11	18	84.678	84.567	B80E	85.38	0.702
12	13	84.531	84.280	B77W	85.51	0.979
13	14	84.264	84.049	B75W	85.37	1.106
14	140	84.049	83.998	N/A	N/A	N/A
15	17	85.137	84.788	B97NN	85.85	0.713
17	170	84.788	84.655	B96NS	85.72	0.932
18	19	84.567	84.477	N/A	N/A	N/A
19	19S	84.477	84.473	N/A	N/A	N/A
19	19W	84.477	84.475	N/A	N/A	N/A
20	20S	84.379	84.374	N/A	N/A	N/A
20	20W	85.979	84.396	N/A	N/A	N/A
21	22	84.248	84.095	68	85.16	0.912
22	Chan2	84.095	84.059	N/A	N/A	N/A
23	230	84.216	83.795	B74W	85.14	0.924
24	25	83.595	83.578	N/A	N/A	N/A
25	250	83.578	83.544	17	85.09	1.512
26	27	83.516	83.470	N/A	N/A	N/A
27	Chan3	83.470	83.441	N/A	N/A	N/A
28	29	84.361	84.361	52	85.18	0.819
29	30	84.361	84.070	53	85.16	0.799
30	31	84.070	83.987	42	85.14	1.070
31	32	83.987	83.920	41	85.08	1.093
32	33	83.920	83.753	39	85.01	1.090
33	34	83.753	83.679	37	85.13	1.377
34	35	83.679	83.538	22	84.97	1.291
35	26	83.538	83.516	20	85.01	1.472
36	37	85.694	84.913	N/A	N/A	N/A
37	38	84.913	84.638	N/A	N/A	N/A
38	Chan2	84.638	84.059	N/A	N/A	N/A
39	54	85.823	85.746	Ground	88.15	2.331
39	39W	85.823	85.030	N/A	N/A	N/A
40	41	84.934	84.879	B133W	85.88	0.946
41	17	84.879	84.788	B132E	85.88	1.001
43	44	83.954	83.505	B4N	85.11	1.156
44	45	83.505	83.390	B6E	84.63	1.125
45	46	83.294	82.735	B6W	84.63	1.336
46	ExPlug1	82.725	82.608	N/A	N/A	N/A
47	460	83.474	83.086	N/A	N/A	N/A
47	47N	83.474	83.815	N/A	N/A	N/A
48	49	83.586	83.575	N/A	N/A	N/A
49	50	83.575	83.241	N/A	N/A	N/A
50	ExPlug2	83.241	83.199	N/A	N/A	N/A

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
51	52	85.983	85.941	Ground	88.44	2.454
52	53	85.941	85.852	Ground	88.29	2.348
53	39	85.852	85.823	Ground	88.17	2.314
54	55	85.746	85.633	Ground	88.11	2.365
55	56	85.633	85.447	Ground	88.00	2.370
56	560	85.447	85.258	Ground	87.41	1.966
56	214	85.447	85.236	Ground	87.41	1.966
560	Chan1	85.258	85.046	N/A	N/A	N/A
101	102	87.254	87.090	Ground	88.87	1.615
102	103	87.090	86.958	Ground	89.63	2.543
103	104	86.958	86.870	Ground	89.50	2.542
104	105	86.870	86.766	Ground	89.37	2.497
105	106	86.766	86.660	Ground	89.22	2.455
106	107	86.660	86.544	Ground	89.10	2.440
107	108	86.544	86.441	Ground	88.97	2.421
108	109	86.441	86.357	Ground	88.85	2.409
109	110	86.357	86.241	Ground	88.75	2.391
110	111	86.241	86.175	Ground	88.65	2.409
111	112	86.175	86.103	Ground	88.56	2.386
112	113	86.103	85.978	Ground	88.44	2.335
113	39	85.978	85.823	Ground	88.30	2.325
170	18	84.655	84.567	B96SS	85.56	0.905
201	2001	86.465	86.426	Ground	88.94	2.474
2002	202	86.413	86.377	Ground	88.81	2.394
202	203	86.377	86.323	Ground	88.72	2.339
203	204	86.323	86.259	Ground	88.61	2.284
204	205	86.259	86.187	Ground	88.51	2.251
205	206	86.187	86.082	Ground	88.41	2.223
206	207	86.082	86.006	Ground	88.29	2.204
207	2070	86.006	85.920	Ground	88.17	2.159
208	209	85.751	85.679	Ground	87.77	2.014
209	2090	85.679	85.619	Ground	87.60	1.922
211	55	85.732	85.633	Ground	87.68	1.948
214	215	85.236	84.930	Ground	87.59	2.353
215	216	84.930	84.690	Ground	87.58	2.648
216	217	84.690	84.626	Ground	87.57	2.880
217	19	84.626	84.477	Ground	87.46	2.832
306	307	85.655	85.459	Ground	87.84	2.183
307	308	85.459	85.432	Ground	87.74	2.278
308	309	85.432	85.253	Ground	87.68	2.243
309	310	85.253	85.164	Ground	87.62	2.364
310	311	85.164	84.991	Ground	87.51	2.349
311	37	84.991	84.913	Ground	87.45	2.456
401	402	86.527	86.161	Ground	86.99	0.466
402	403	86.161	86.036	Ground	86.88	0.723
403	36	86.036	85.694	Ground	86.90	0.864
460	46	83.086	82.761	N/A	N/A	N/A
1101	1102	86.687	86.670	Ground	89.51	2.821
1102	1103	86.670	86.569	Ground	89.42	2.746
1103	1104	86.569	86.483	Ground	89.28	2.709
1104	1105	86.483	86.422	Ground	89.17	2.684
1105	1106	86.422	86.378	Ground	89.02	2.596
1106	1107	86.378	86.318	Ground	88.93	2.551

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
1107	110	86.318	86.241	Ground	88.81	2.490
2001	2002	86.426	86.413	Ground	88.84	2.411
2070	2071	85.920	85.815	Ground	88.05	2.126
2071	208	85.815	85.751	Ground	87.92	2.105
2090	56	85.619	85.447	Ground	87.48	1.856
2110	211	85.821	85.732	Ground	87.80	1.979
19S	20	84.473	84.379	N/A	N/A	N/A
19W	23	84.475	84.216	B71W	85.25	0.775
20S	21	84.374	84.248	64	85.23	0.856
20W	30	84.396	84.149	56	85.28	0.884
47N	48	83.815	83.586	N/A	N/A	N/A
Chan1	Chan1a	85.046	84.794	N/A	N/A	N/A
Chan1a	Chan1b	84.794	84.681	N/A	N/A	N/A
Chan1b	Chan1c	84.681	84.615	N/A	N/A	N/A
Chan1c	Chan1d	84.615	84.271	N/A	N/A	N/A
Chan1d	Chan1e	84.271	84.209	N/A	N/A	N/A
Chan2	Chan3	84.059	83.441	N/A	N/A	N/A
Chan3	Chan4	83.441	83.121	N/A	N/A	N/A
Chan4	ForeS	83.121	83.121	N/A	N/A	N/A
DICB	15	85.431	85.159	N/A	N/A	N/A
Ex100	Ex111	83.122	83.121	IBI (3)	83.47	0.348
Ex107	Ex100	83.184	83.122	IBI (3)	83.58	0.396
Ex111	Chan4	83.121	83.121	IBI (3)	83.45	0.329
ExPlug1	Ex102	82.608	82.590	IBI (3)	83.66	1.052
ExPlug2	Ex107	83.199	83.184	N/A	N/A	N/A
ForeN	MainN	83.119	83.118	N/A	N/A	N/A
ForeS	MainS	83.121	83.120	N/A	N/A	N/A
MainN	Out	83.119	80.100	N/A	N/A	N/A
MainS	MainN	83.121	83.119	N/A	N/A	N/A
140	141	83.998	83.657	N/A	N/A	N/A
141	24	83.657	83.595	N/A	N/A	N/A
230	24	83.795	83.650	N/A	N/A	N/A
250	26	83.544	83.516	N/A	N/A	N/A
39W	40	85.030	84.934	B134W	86.14	1.110
280	28	84.381	84.361	47	85.21	0.829
200	41	84.881	84.879	N/A	N/A	N/A
Chan1e	Chan2	84.209	84.059	N/A	N/A	N/A

Note: [1] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

david schaeffer engineering ltd
SMART SUBDIVISIONS™

JFSA Water Resources and Environmental Consultants

DESIGN BRIEF

FOR

THE RECONSTRUCTION OF

THE EAST URBAN COMMUNITY

STORMWATER MANAGEMENT POND 1

FOR THE

TRAILS EDGE SUBDIVISION

CITY OF OTTAWA

PROJECT NO. 12-613

DECEMBER 2012
REVISED MARCH 2014
© DSEL

DESIGN BRIEF
FOR
THE RECONSTRUCTION OF THE EAST URBAN COMMUNITY
STORMWATER MANAGEMENT POND 1
FOR THE
TRAILS EDGE SUBDIVISION

CITY OF OTTAWA

DECEMBER 2012
REVISED MARCH 2014
OUR FILE: 12-613

TABLE OF CONTENTS

Background: Rationale for Report Update iii

1.0 INTRODUCTION 1

2.0 PREVIOUS STUDIES AND REPORTS 2

2.1 General 2
2.2 Findings of the East Urban Community Pond No. 1 Design Brief 3

3.0 DRAINAGE ANALYSIS 3

4.0 SUBDIVISION DRAINAGE 4

4.1 Conveyance of Minor System 4
4.2 Assumptions and Sources of Data Used 6
4.3 Conveyance of Major System 7

5.0 POND OPERATING CHARACTERISTICS 8

6.0 POND COMPONENTS 9

6.1 Sediment Forebay 9
6.2 Permanent Pool 10
6.3 Quality Control 10
6.4 Extended Detention 11
6.5 Quantity Control 11
6.6 Main Cell Culvert 12
6.7 Access Road 12
6.8 South Mud Creek Channel 12

7.0 SITE RESTORATION AND POND PLANTINGS 12

8.0 GEOTECHNICAL CONSIDERATIONS 13

8.1 Geotechnical Considerations for South Mud Creek Channel 13

© DSEL

8.2 Geotechnical Considerations for Proposed SWM Facility 13

9.0 POND MAINTENANCE AND OPERATIONS 13

9.1 Inspections 13
9.2 Regular Operation and Maintenance Activities 14

10.0 EROSION AND SEDIMENT CONTROL 15

Appendices

Appendix A — Hydrologic and Hydraulic Modelling
Appendix B — Pond Controls - Quality, Extended Detention and Quantity; Sediment Forebay Calculations
Appendix C — Drainage Areas and Target Release Rates
Appendix D — Ministry of Transporation Nomograph for Main Cell Culvert
Appendix E — Geotechnical Review of Proposed SWM Facility Design (paterson group, June 2012)
Geotechnical Response to City Comments (paterson group, December 2013)

Figures

Figure 1 — General Location of Subject Site
Figure 2A — Detailed Drainage Area to SWM Facility
Figure 2B — Total Drainage Area to SWM Facility Under Interim Conditions

Tables

Table 1 — SWM Pond Design Characteristics
Table 2 — SWM Pond Inflow, Outflow and Storage Summary
Table 3 — Summary of Pond Operating Characteristics

Drawings

Drawing 4 — Stormwater Management Pond 1
Drawing 5 — Stormwater Management Pond 1
Drawing 6 — Stormwater Management Pond 1
Drawing 7 — Stormwater Management Pond 1
Drawing 8 — Stormwater Management Pond Cross Sections
Drawing 8A — Stormwater Management Pond Cross Sections
Drawing 9 — Stormwater Management Pond Details
Drawing CH-2 — Mud Creek
Drawing CH-3 — Mud Creek
Drawing CH-4 — Mud Creek
Drawing CH-5 — Mud Creek Cross Sections

Also refer to: ***EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings C05 to C12*** (Stantec, January 2012).

© DSEL

Background: Rationale for Report Update

This report is an update of the December 2012 "Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge Subdivision". The previous version of this report has been updated to reflect changes to the m-plan of the proposed drainage area to Pond 1, including drainage area, land use, overland flow patterns and storm sewer pipe data.

Note that changes have also been made to the proposed stage-storage relationship of Pond 1 and the design of the proposed channel of Mud Creek between Street A and the south forebay, which is considered part of the stormwater management (SWM) facility. The existing Mud Creek channel between Belcourt Extension and Street A is also to be modified under proposed conditions, but is considered separate from the SWM facility.

© DSEL

DESIGN BRIEF
FOR
THE RECONSTRUCTION OF THE EAST URBAN COMMUNITY
STORMWATER MANAGEMENT POND 1
FOR THE
TRAILS EDGE SUBDIVISION

CITY OF OTTAWA
DECEMBER 2012
REVISED MARCH 2014

1.0 INTRODUCTION

The existing East Urban Community Stormwater Management (SWM) Pond 1 was constructed in 2008 and is located within the City of Ottawa in the Trails Edge subdivision. The proposed layout of the drainage area to SWM Pond 1 is shown in ***Figure 1***. As shown by ***Figure 1***, the proposed development is located east of Page Road, north of Renaud Road, west of Mer Bleue Road and south of Innes Road.

The initial design of SWM Facility 1 was completed by Stantec in the April 2008 ***East Urban Community Pond No. 1 Design Brief*** for a 326 ha drainage area at 57% imperviousness. The area and percent imperviousness of the proposed development to be serviced by SWM Facility 1 has since increased, necessitating a review of the storage required to meet quality and quantity control targets. Furthermore, the ***Trails Edge Development - Stormwater Management Facility 1 Reconstruction*** memo (June 2012, JFSA) details several other factors that also result in an increase in required storage for the SWM facility, including:

(i) Revised modelling of the pond storage-discharge relationship;
(ii) Revised drainage area and percent imperviousness;
(iii) Minor system capture of the 5-year flow plus 12%;
(iv) Use of current City of Ottawa IDF Curves;
(v) Use of more critical 24-hour SCS Type II design storm (not the April 2008 Chicago storms);
(vi) A five minute time step;
(vii) Modelling parameters selected according to current City of Ottawa standards; and
(viii) Use of Horton's equation in modelling infiltration.

Pond 1 will be modified to meet the increased required storage volumes in two stages, under interim and ultimate conditions. Under interim conditions, existing Pond 1 will be modified to support the development of the Trails Edge subdivision south of the hydro easement, and the extension of Brian Coburn Boulevard. The south channel of Mud Creek between Street A and the south forebay is to be constructed as part of the SWM facility, and the south forebay and south main cell of the existing pond are to be reconstructed. A small portion of the north main cell will be filled by the future Brian Coburn Boulevard extension, and a 3000 mm diameter circular concrete culvert will be installed under future Brian Coburn Boulevard to connect the north and south main cells, which are currently connected by an open channel. The existing north forebay will remain as-built. The existing controls currently installed for the pond as per the ***EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings*** (Stantec, January 2012) will be retained under interim conditions.

© DSEL

The future business park north of the hydro easement, and the future Transitway corridor, will remain undeveloped under interim conditions. These areas will be developed under ultimate conditions, and design alternatives to meet municipal standards and stormwater management requirements under ultimate conditions are to be evaluated as part of a future study by the proponent for those lands.

Under interim conditions, SWM Facility 1 has a drainage area of approximately 370.36 ha, including 16.09 ha of Trails Edge Phase 2, 26.15 ha of existing residential development, 5.31 ha of channel blocks, a 12.29 ha pond block, a 0.30 ha buffer block, the 18.30 ha hydro easement, the 7.79 ha Brian Colburn Boulevard extension, 9.20 ha of the future transitway corridor (undeveloped), a 6.55 ha existing woodlot, 36.07 ha of future development west of the Belcourt Extension, 80.69 ha of future development east of the Belcourt extension, 14.83 ha of existing commercial development north of the hydro easement, and 152.88 ha of the future business park north of the hydro easement (undeveloped).

As set out in the ***East Urban Community Pond No. 1 Design Brief*** (April 2008, Stantec), a multi-function pond is required within the subject lands. The pond is intended to satisfy various stormwater management requirements, including water quality, erosion and quantity control. The pond will release treated flows to Mud Creek on the west side of Page Road. Note that quality control for Brian Colburn Boulevard and the hydro corridor (and the future Transitway corridor under ultimate conditions) will be provided by an oil-and-grit separator or separators.

The following design brief is intended to provide technical support for the reconstruction of the pond under interim conditions, as well as to demonstrate conformance with the overall servicing requirements of the ***East Urban Community Pond No. 1 Design Brief***, current City of Ottawa standards and generally accepted stormwater management practice.

2.0 PREVIOUS STUDIES AND REPORTS

2.1 General

The following material has been reviewed in order to identify the constraints that govern development within this area:

- **Stormwater Management Planning and Design Manual**
  Ministry of the Environment, March 2003. **(*SWMP Design Manual*)**

- **Gloucester East Urban Community Infrastructure Servicing Study Update**
  Stantec Consulting Ltd., March 2005.

- **East Urban Community Pond No. 1 Design Brief**
  Stantec Consulting Ltd., April 2008.

- **Trails Edge Phase 1 Stormwater Management Report**
  IBI Group, June 2010.

- **EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings**
  Stantec Consulting Ltd., January 2012.

© DSEL

- **Trails Edge Development - Stormwater Management Facility 1 Reconstruction**
  J.F. Sabourin and Associates Inc., June 2012.
- **City of Ottawa Sewer Design Guidelines**
  City of Ottawa, October 2012.

- **Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan**
  J.F. Sabourin and Associates Inc., January 2014.

- **Servicing Report for Trails Edge and Orleans Business Park**
  David Schaeffer Engineering Ltd., March 2014.

The above documents form the basis of this report.

2.2 Findings of the East Urban Community Pond No. 1 Design Brief

The April 2008 ***East Urban Community Pond No. 1 Design Brief*** prepared by Stantec established the stormwater control criteria, pond location and general stormwater management scheme for SWM Facility 1. The subsequent ***Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan*** memo (November 2012, JFSA) established the final SWM facility requirements.

The reconstructed stormwater management facility is to be designed with the following characteristics:

- **Water Quality Control:** The permanent pool should be sized for a normal level of protection (70% long-term S.S. removal). The active volume portion for water quality control is contained within the erosion control volume.

- **Erosion Control:** Erosion control will be provided by extended detention of the 25 mm storm for the maximum detention time between 24 to 48 hours, and by overcontrol of the 2- and 5-year storms

- **Water Quantity Control:** Provision of sufficient pond storage to meet the 2- to 100-year target release rates based on pre-development flows.

- A sediment forebay shall be provided.

A summary of the required SWM pond characteristics is provided in Table 1.

3.0 DRAINAGE ANALYSIS

The pond design characteristics and requirements, based on a 370.362 ha drainage area to the pond (as shown in ***Figures 2A and 2B)***, are summarized in ***Table 1*** as follows:

© DSEL

Table 1
SWM Pond Design Characteristics

Item	Target	Comments
Drainage Area	370.362 ha	26.15 ha existing residential, 5.31 ha channel, 12.29 ha pond, 0.30 ha buffer, 18.30 ha hydro easement, 7.79 ha Brian Colburn extension, 9.20 ha future transitway corridor (undeveloped), 6.55 ha existing woodlot, 36.07 ha future development west of Belcourt Extension, 80.69 ha future development east of Belcourt extension, 14.83 ha existing commercial north of the hydro easement, 152.88 ha future business park north of the hydro easement (undeveloped).
Required Permanent Pool Volume	19,259 m^3	Based on 52.00 m^3/ha (1)
Required Quality Control Volume	14,814 m^3	40 m^3 /ha
Required Extended Detention Volume	27,645 m^3	Total extended detention volume is based on 25 mm storm (2)
Allowable Release Rate	2-Year : 1000 L/s 5-Year : 2300 L/s 10-Year : 3800 L/s 25-Year : 5600 L/s 50-Year : 6700 L/s 100-Year : 8000 L/s	As per ***East Urban Community Pond No. 1 Design Brief*** (April 2008, Stantec) (3)

(1) Note: Interpolated for 37% imperviousness, normal protection level for wet pond, as per Table 3.2 of the SWM Planning and Design Manual. Refer to Tables B-1 and B-2 of Appendix B.
(2) Refer to Tables B-3 and B-4 of Appendix B. 25 mm storm runoff to be detained for the maximum detention time between 24 and 48 hours.
(3) Refer to Appendix C.

Furthermore, the reconstruction design of the facility has been completed in general conformance with the ***SWMP Design Manual.***

4.0 SUBDIVISION DRAINAGE

4.1 Conveyance of Minor System

The 370.362 ha area draining to the pond, as shown in ***Figures 2A and 2B***, will be serviced by a conventional storm sewer system designed in accordance with City of Ottawa standards, using a 5-year return frequency and City of Ottawa IDF curves. All flows will be directed to the stormwater management facility, where the runoff will be treated for water quality, erosion, and quantity control.

© DSEL

The minor system has been modeled using XPSWMM based on the peak inflows calculated with the DDSWMM and SWMHYMO programs. For further details, refer to the January 2014 ***Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan*** by JFSA.

Note that as the DDSWMM program is most appropriate for use in modelling urban drainage, the large undeveloped drainage areas north of the hydro easement were instead modelled using SWMHYMO, and the generated hydrographs then input to DDSWMM. These natural drainage areas were modelled with an SCS Curve Number of 78 (CN* = 70) based on hydrologic soil group D and a combination of woods, meadow and brush in fair condition. Time to peak values for the undeveloped areas were calculated using existing contour data and the Bransby Williams equation. Under ultimate conditions, the future transitway corridor design will address flows from existing areas to the north. For the purposes of this analysis, we have assumed that a diversion ditch will be constructed with the extension of Brian Coburn under interim conditions to direct existing flows from the north to the north main cell of the pond.

In accordance with City of Ottawa standards, the minor system has been designed to accommodate the 5-year post-development flows from within the site. Within the development areas with detailed design information available, standard inlet control devices types A, B, C, D and E and grate and lead pipe capacities were used to limit minor system capture to the 5-year flow.

Minor system capture on park blocks 110, 150 and 152, on institutional block 151, and on 0.85 ha of the existing woodlot are to be limited to the 5-year Rational Method flows at storm control manholes. Additionally, catchbasin capture rates on those areas draining to Trails Edge Phase 1 are to be limited to the total flows specified in the Trails Edge Phase 1 Stormwater Management Report dated June 2010 by IBI Group (approximately 85 L/s/ha). A weir is to be installed in proposed MH 47 in order to maintain the flow split specified in the June 2010 report between the minor systems for SWM Facilities 1 and 3. Catchbasin capture rates within existing Trails Edge Phase 1 are limited by the inlet control devices specified in the June 2010 ***Trails Edge Phase 1 Stormwater Management Report*** by IBI Group.

Minor system capture rates in future (undetailed) school, high density, mixed use, multiples, institutional and commercial blocks south of the transitway corridor / hydro easement are to be limited to the 5-year flow with sufficient on-site storage to retain excess flows up to the 100-year return period.

In accordance with conceptual design information provided by the City of Ottawa, minor system capture on the future transitway corridor and Brian Coburn Boulevard extension under ultimate conditions will be restricted to the 10-year flows, and minor system capture on the hydro easement will be restricted to the 5-year flows. We understand that sufficient on-site storage will be provided to retain excess flows up to the 100-year return period on these areas under both interim and ultimate conditions. The captured flows from these areas will be conveyed to the south main cell of the SWM facility by a future storm sewer. Note that quality control for Brian Colburn Boulevard and the hydro corridor (and the future Transitway corridor under ultimate conditions) will be provided by an oil-and-grit separator or separators.

For modelling purposes, minor system captures rates in the remaining future (undetailed) development areas were limited to 112% of the 5-year flows simulated in DDSWMM, in order to account for additional flows captured by standard inlet control devices and catchbasins during the

© DSEL

100-year storm. It was assumed that approximately 30 m^3/ha of surface storage will be provided in these future development areas.

On-site storage was modelled using a storage-discharge relationship with three points: the first with 0 L/s capture and 0 cu.m. storage; the second with maximum capture and negligible storage; and the third with maximum capture and maximum available storage. Note that where high surface storage on large undetailed areas produced instability in the DDSWMM-generated minor system capture hydrographs, the hydrograph flows were averaged over ten minute intervals to produce a smooth curve. The peaks of the hydrographs are unaffected by this instability, which only occurs after the time to peak has passed.

The street segments within the proposed development are to be designed using a 'saw tooth' or 'sagged' road profile. The runoff from within front yard / non-residential areas will be conveyed to catchbasins located at low points on the street. Flows in excess of the minor system capture rate are temporarily stored within the 'sagged' street segments and released slowly to the storm sewers and then, when that storage is surpassed, conveyed overland to the next downstream catchment.

A storm sewer outfall on Belcourt Extension will discharge flows from east of Belcourt Extension directly to the Mud Creek channel between Belcourt Extension and Street A. All other storm sewer outfalls from the Trails Edge subdivision will discharge to the south channel of Mud Creek between Street A and the south forebay.

4.2 Assumptions and Sources of Data Used

The following parameters and assumptions used in the analysis are based on City of Ottawa standards and generally accepted stormwater management design guidelines.

- SWM Model: *DDSWMM (release 2.1), SWMHYMO (v. 5.02) and XPSWMM (v.10)*
- Minor System Design: *1:5 year*
- Major System Design: *1:100 year*
- Max. Allowable Flow Depth: *30 cm above gutter*
- Extent of Major System: *Must be contained within the municipal right-of-way*.
- Model Parameters: *Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm (as per 2012 City of Ottawa Guidelines)*.
- Imperviousness: *Detailed Areas: based on development layout and taken as fully effective in the front lot portion and half effective in the rear lot portion of each house.*
  Undetailed Areas: based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
- Design Storms: *Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes. Based on 2012 City of Ottawa Sewer Design Guidelines.*
- Historical Events: *July 1st, 1979, August 4th, 1988 and August 8th, 1996 events per 2012 City of Ottawa Sewer Design Guidelines.*
- Catchbasin Covers: *City Standard Type S22 (side inlet), City Standard Type S19 (fish), and City Standard Type S30 and S31 (rearyard). Type S19 approach-flow capture curves as per MTO design charts*

© DSEL

	(equivalent to OPSD 400.010). Type S22 approach-flow capture curves as per 2012 City of Ottawa Guidelines.
- Curb and Gutter:	*City Standard SC1.3 (mountable) and City Standard SC1.1 (barrier). In the absence of flow capture curves for these curb and gutters, OPSD 600.010 curb and gutters are assumed.*
- Manning's Roughness:	*0.013 for concrete pipes (free flow)*.
- Minor System Losses:	*Refer to Attachment E for manhole loss coefficients.*
- Freeboard in HGL analysis:	*0.3 m between underside of footing elevation and 100-year hydraulic gradeline.*
- Inlet Control Devices:	*As required (refer to Attachment E).*
- Downstream HGL:	*Free outfall conditions assumed at SWM Facility 1 outlet.*

4.3 Conveyance of Major System

A continuous overland flow route has been provided within the proposed development in order to safely convey major system flows in excess of the minor system and up to the 100-year storm. For further details, refer to the January 2014 ***Trails Edge Subdivision Stormwater Management Facility 1 Reconstruction and Preliminary Stormwater Management Plan*** by JFSA.

Note that the 100-year major system flows on Belcourt Extension south of the transitway corridor / hydro easement are to be captured to a culvert underneath the road (separate from the storm sewer system) and discharge to the Mud Creek channel between Belcourt Extension and Street A for conveyance to the SWM facility. The purpose of these 100-year intakes is to prevent flows from crossing the road or exceeding 30 cm in total water depth at the gutter.

Major and minor system flows within the development and from external areas were simulated using the DDSWMM, SWMHYMO and XPSWMM programs. DDSWMM and SWMHYMO input and output files and an XPSWMM model schematic are presented in Appendix A.

The minor system was analyzed based on free outfall conditions at the outlet of the facility for all storms. The 25 mm 3-hour Chicago storm, 2- to 100-year 24-hour SCS storms and the 1979, 1988 and 1996 historical events have been used with the DDSWMM/SWMHYMO/XPSWMM models to verify that the target release rates for all return periods are achieved, and that the storage volumes are adequate, based on the reconstructed interim pond design for SWM Facility 1. Simulated peak inflows, release rates, pond levels and storage volumes for the 2- to 100-year storms and historical events are presented in Table 2 for free outfall conditions.

© DSEL

Table 2
SWM Pond Inflow, Outflow and Storage Summary

Event	Total Inflow [1] (m^3/s)	Outflow (m^3/s)	Water Level (m)				Volume Used [2] (m^3)
			North Forebay	North Main Cell	South Forebay	South Main Cell	
2yr/24hr SCS	15.215	0.513	81.806	81.806	81.971	81.806	52249
5yr/24hr SCS	24.453	1.136	82.216	82.216	82.216	82.216	69874
10yr/24hr SCS	30.275	1.772	82.458	82.458	82.460	82.460	81520
25yr/24hr SCS	37.063	3.350	82.675	82.675	82.675	82.675	92317
50yr/24hr SCS	42.225	4.882	82.833	82.833	82.836	82.836	100479
100yr/24hr SCS	46.983	6.684	82.996	82.995	83.001	83.001	109010
July 1979 Event	47.934	8.015	83.106	83.105	83.108	83.108	114766
Aug 1988 Event	44.961	5.733	82.913	82.912	82.918	82.918	104687
Aug 1996 Event	31.889	4.929	82.838	82.837	82.840	82.840	100706

[1] Taken as a direct summation of major and minor flows to the SWM Facility.
[2] Active storage volume only.

Based on the DDSWMM/XPSWMM models, the peak 5-year and 100-year inflows to the SWM Pond are approximately 24.453 m^3/s and 46.983 m^3/s, respectively.

5.0 POND OPERATING CHARACTERISTICS

Pond 1 has been designed in accordance with the requirements of the ***East Urban Community Pond No. 1 Design Brief***, ***City of Ottawa Sewer Design Guidelines*** and the ***SWMP Design Manual***, and includes the following features (refer to ***Table 1***):

Sediment Forebay	➢ to improve sediment removal prior to entering the pond
Permanent Pool	➢ to buffer storm flows and trap pollutants
Extended Detention Storage	➢ to provide water quality and erosion control
Quantity Control Storage	➢ to attenuate post-development flows to the allowable release rates

The re-grading of the pond and the details are illustrated on ***Drawings 4 through 9***. Details of the sizing and verification of the various pond components will follow in **Section 6.0**. Note that the existing controls currently installed for the pond as per the ***EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings*** (Stantec, January 2012) will be retained under interim conditions. As previously noted, the south channel of Mud Creek between Street A and the south forebay is to be constructed as part of the SWM facility, and the south forebay and south main cell of the existing pond are to be reconstructed under interim conditions. A small portion of the north main cell will be filled by the future Brian Coburn Boulevard extension, and a 3000 mm diameter circular concrete culvert will be installed under future Brian Coburn Boulevard to connect the north and south main cells, which are currently connected by an open channel. The existing north forebay will remain as-built.

The operating characteristics of the pond are defined in the following section, and are summarized below in ***Table 3*** for free outfall conditions.

© DSEL

Table 3
Summary of Pond Operating Characteristics

Pond Component	Pond Inflow [1] (m^3/s)	Water Level (m)				Volume Used [2] (m^3/s)	Allowable Outflow [3] (m^3/s)	Provided Outflow (m^3)
		North Forebay	North Main Cell	South Forebay	South Main Cell			
Permanent Pool [4]	N/A	81.500	80.100	81.500	80.100	36400	N/A	N/A
Quality Control	N/A	N/A	80.681	N/A	80.681	14814	N/A	0.204
Extended Detention	N/A	81.650	81.650	81.650	81.650	43988	N/A	0.383
2yr/24hr SCS	15.215	81.806	81.806	81.971	81.806	52249	1.000	0.513
5yr/24hr SCS	24.453	82.216	82.216	82.216	82.216	69874	2.300	1.136
10yr/24hr SCS	30.275	82.458	82.458	82.460	82.460	81520	3.800	1.772
25yr/24hr SCS	37.063	82.675	82.675	82.675	82.675	92317	5.600	3.350
50yr/24hr SCS	42.225	82.833	82.833	82.836	82.836	100479	6.700	4.882
100yr/24hr SCS [5]	46.983	82.996	82.995	83.001	83.001	109010	8.000	6.684
July 1979 Event	47.934	83.106	83.105	83.108	83.108	114766	N/A	8.015
Aug 1988 Event	44.961	82.913	82.912	82.918	82.918	104687	N/A	5.733
Aug 1996 Event	31.889	82.838	82.837	82.840	82.840	100706	N/A	4.929

[1] Total inflow taken as a direct summation of major and minor flows to the SWM facility.
[2] Volumes are active storage only for all SWM facility components except the permanent pool.
[3] Refer to Tables C-1 and C-2 of Appendix C and the April 2008 ***East Urban Community Pond No. 1 Design Brief*** by Stantec for target release rates and volumes.
[4] Bottom elevations are 79.00 m in the north main cell, 79.10 m in the south main cell, 79.50 m in the north forebay and 80.00 m in the south forebay.
[5] Maximum allowable 100-year pond level = 83.0 m in the main cell (per the April 2008 ***East Urban Community Pond No. 1 Design Brief*** by Stantec).

With the controls described in **Section 6.0**, the above results show that the actual provided release rates do not exceed the allowable release rates. Note that the maximum 100-year pond level is 83.001 m, which is equal to the maximum allowable 100-year water level in the facility of 83.0 m as per the ***East Urban Community Pond No. 1 Design Brief***. The maximum pond level is 83.108 m during the July 1st, 1979 event, and a 0.3 m freeboard above this pond level is provided to the top of berm around the pond and to all adjacent lots.

6.0 POND COMPONENTS

6.1 Sediment Forebay

The existing facility has been equipped with two sediment forebays in order to improve the pollutant removal by allowing the larger particles to settle out prior to entering the main cell of the pond. The forebays have been designed with minimum length to width ratios of approximately 3:1. Note that they do not exceed one third of the permanent pool area, as per the requirements of the ***SWMP Design Manual*** (Refer to Table B-2 of ***Appendix B***).

The forebays should be sized to meet the greater of the settling and dispersion criteria, as stated in the ***SWMP Design Manual***. Calculations and verification for the minimum dispersion length, settling length and the average velocity have been included in Calculation Sheets B-2 and B-3 of ***Appendix B***. Note that the south forebay does not quite meet the average velocity

© DSEL

requirement of 0.15 m/s during the 10-year design storm under interim conditions. However, this target is most appropriate for a particle size of approximately 0.45 mm. Conversely, the bottoms of the proposed forebays are hard, and the sediment deposits will correspond roughly to a particle size of 0.01 mm based on the clay/silt soils. For a 0.01 mm particle size, a 0.45 m/s average velocity is a more appropriate limit based on the erosion velocity graph referenced by the ***SWMP Design Manual*** (Hjülstrom, 1939). The average velocity in the forebays does not exceed the revised target of 0.45 m/s during the 10-year design storm. Note that this same approach is used in an example of Page H-9 of the ***SWMP Design Manual***.

The forebays have been provided with permanent pools of 1.5 m minimum depth to minimize the potential for re-suspension. The forebays have been graded with side slopes of 3:1; similarly, the south forebay will be re-graded with side slopes of 3:1. The north forebay berm is set at 81.60 m, above the main cell permanent pool elevation of 80.10 m. The reconstructed south forebay berm will be set at an elevation of 81.50 m.

6.2 Permanent Pool

The pond should have a permanent pool depth between 1.0 and 2.0 m, as stipulated in the ***SWMP Design Manual***. Therefore, the existing facility has been designed with a permanent pool depth of 1.0 m in the south main cell and 1.1 m in the north main cell, at a permanent pool elevation of 80.10 m.

The permanent pool has been sized and verified based on normal protection (70% long-term S.S. removal) in accordance with Table 3.2 in the ***SWMP Design Manual***.

Based on a 370.362 ha drainage area with an average imperviousness of 37% (refer to Tables C-1 and C-2 of ***Appendix C***), a minimum of 52.00 m^3/ha must be provided. The required permanent pool storage volume is calculated as follows:

$$(92.00 - 40)\ m^3/ha \times 370.362\ ha = 19{,}259\ m^3$$

The interim facility will be provided with a permanent pool volume of 36,400 m^3, which is more than the minimum permanent pool volume the ***SWMP Design Manual*** requires.

The slopes in the south main cell permanent pool will be re-graded with side slopes of 3:1, with minor localized variations. The slopes in the north main cell permanent pool will remain at 3:1. The proposed pond re-grading is shown on ***Drawings 4 through 9***.

6.3 Quality Control

The quality control volume is based on a volume of 40 m^3/ha. The required quality control volume for the 370.362 ha drainage area is calculated as follows:

$$40\ m^3/ha \times 370.362\ ha = 14{,}814\ m^3$$

The quality control volume is contained within the extended detention volume at an elevation of 80.681 m.

© DSEL

6.4 Extended Detention

The SWM Pond 1 extended detention storage has been sized and verified based on the detention of the 25 mm storm runoff for the maximum detention time between 24 and 48 hours, as per the ***East Urban Community Pond No. 1 Design Brief***. The required erosion control volume for the 370.362 ha drainage area is approximately 27,645 m^3 based on the XPSWMM model for the 25 mm storm.

The reconstructed facility provides 43,988 m^3 of extended detention, which exceeds the required volume. Refer to Table B-2 of ***Appendix B***. The pond will operate with a maximum extended detention storage depth of 1.55 m at an elevation of 81.65 m, as per the existing SWM facility outlet controls. Note that although this extended detention depth exceeds the 1.5 m depth allowed by the ***SWMP Design Manual***, it is consistent with the existing design of the facility.

The extended detention volume within the pond will outlet through an existing 600 mm reverse grade intake pipe, located at the west end of the pond near Page Road. The existing extended detention outlet is illustrated on the ***EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings*** (Stantec, January 2012).

In accordance with the ***East Urban Community Pond No. 1 Design Brief*** (Stantec, April 2008), an existing sluice gate with an area equivalent to a 400 mm diameter orifice has been installed at the end of the 600 mm existing intake pipe to the existing outlet control structure. The existing sluice gate at an invert of 80.10 m has been provided to discharge the extended detention volume at a peak release rate of 383 L/s.

The calculation of extended detention drawdown time is provided in Tables B-3 and B-4 of ***Appendix B***. Note that the 43,988 m^3 provided extended volume has a drawdown time of approximately 61 hours due to the limitations of maintaining the existing outlet controls, and does not meet the required maximum detention time between 24 and 48 hours. However, the 27,645 m^3 required volume has a satisfactory detention time of approximately 42 hours.

6.5 Quantity Control

Quantity control will be provided by multiple weirs located in the existing 3.50 m x 4.50 m box rectangular outlet control structure located in the north main cell. As previously noted, the existing controls currently installed in the rectangular outlet control structure will be retained under interim conditions. One 1.0 m long weir has been installed in the rectangular outlet control structure at an invert of 81.65 m to provide quantity control up to the 10-year storm. Two 1.5 m long weirs and one 3.0 m long weir at an invert of 82.35 m will provide additional quantity control for the 25- to 100-year storms. The remaining portion of the box structure has been set above the 100-year pond level at an elevation of 84.00 m. The details of the rectangular outlet control structure are provided in the ***EUC Pond No. 1 Page Road Stormwater Management Facility As-Built Drawings*** (Stantec, January 2012).

The controlled flows from the rectangular outlet control structure will be conveyed by an existing 2400 mm by 1500 mm box culvert with a 0.54% average slope and a capacity of 12.20 m^3/s. This capacity is greater than the maximum outflow to the pipe of 8.015 m^3/s during the July 1st, 1979 event. The SWM facility outlet pipe discharges to Mud Creek on the west side of Page Road.

© DSEL

Calculations in support of the existing quantity control orifices and weirs are provided in Table B-5 and Calculation Sheet B-1 of ***Appendix B***.

6.6 Main Cell Culvert

As previously noted, a 3000 mm diameter circular concrete culvert will be installed under future Brian Coburn Boulevard to connect the north and south main cells, which are currently connected by an open channel. XPSWMM modelling has demonstrated that the culvert is sufficiently sized to convey flows freely between the main cells, as the peak water levels in the north and south main cells are effectively equal for the 2- to 100-year 24-hour SCS design storms and all historical events considered.

Sediment accumulation is not a significant concern for the proposed 3000 mm culvert, as most sediment will be contained within the forebays. However, assuming a worst-case scenario wherein the water level in the north cell is at its maximum allowable elevation of 83.0 m and the water level in the south cell is at the top of bank of 84.5 m, even with 40% blockage the culvert would still have the capacity to convey the 100-year 24-hour SCS design storm flow of 17.08 m^3/s from the south main cell to the north main cell, based on the Ministry of Transportation design chart for a concrete circular culvert operating under outlet control (refer to ***Appendix D***). Note that ice clogging is not a concern, as the City maintenance department has confirmed that pond levels will be lowered in the winter.

6.7 Access Road

3.0 m to 5.0 m wide access roads have been provided for the pond in order to facilitate routine inspection and maintenance activities.

6.8 South Mud Creek Channel

As previously noted, the south channel of Mud Creek between Street A and the south forebay is to be constructed as part of the SWM facility. The channel block is approximately 68.9 m wide, and includes buffers on both sides of the channel, adjacent to proposed development and the existing woodlot. Erosion protection will be provided at all storm sewer outfalls to the channel.

The peak 100-year 24-hour SCS Type II design storm flow simulated in the channel is approximately 26.67 m^3/s, which is significantly less than the channel capacity of approximately 48.07 m^3/s up to the proposed 6 m wide pathway platform, as calculated based on Manning's equation.

7.0 SITE RESTORATION AND POND PLANTINGS

Any plantings for the existing stormwater management pond affected by the reconstruction will be restored in accordance with the landscape drawings and the ***SWMP Design Manual***. Refer to the landscape drawings for details of the plantings for the pond and storm outfall.

© DSEL

8.0 GEOTECHNICAL CONSIDERATIONS

Detailed soil investigations and slope stability analyses were conducted by Paterson Group to provide geotechnical guidelines for reconstruction of EUC Pond 1 and Mud Creek channel and to establish the limits of development adjacent to the SWM facility. The geotechnical review for the Reconstruction of EUC Pond 1 is described in the following sections.

8.1 Geotechnical Considerations for South Mud Creek Channel

Paterson Group conducted a review of existing conditions to determine the limit of the unstable slope areas classified as the Hazard Lands, including a slope stability analysis of the existing slope along the existing Mud Creek watercourse within Trails Edge Development.

The existing Mud Creek channel is being modified to become a stormwater conveyance channel downstream of Street A. As part of this design, it is understood that the side slopes will be reshaped to a maximum 3H:1V slope. From a geotechnical perspective, sidewalls shaped to a 3H:1V slope are considered to be stable in the long term. From a slope stability perspective, the limits of hazard lands can be taken as the top of the proposed re-graded slope. The updated Slope Stability Analysis and Limit of Hazard Lands are included in PG0861-MEMO.13, dated December 13, 2013, and enclosed in ***Appendix E***. Note that the proposed 6 m pathway platform is beyond the 100-year flood level in the channel and beyond the top of the proposed re-graded 3:1 slope.

8.2 Geotechnical Considerations for Proposed SWM Facility

Paterson Group also provide comments on SWM Facility requirements from a geotechnical perspective, noting that excavation slopes of 3H:1V within the SWM bays and forebays are considered to be stable in the long term and adequate for SWM Facility construction at the subject site. The Paterson Memo PG0861-MEMO.10 completed on June 5, 2012 is enclosed in ***Appendix E*** for reference.

The 3H:1V side slopes would be stable under both short term conditions and under rapid drawdown conditions. This point of clarification is discussed in PG0861-MEMO.13, dated December 13, 2013, and enclosed in ***Appendix E***.

9.0 POND MAINTENANCE AND OPERATIONS

The pond should be maintained in accordance with the current City of Ottawa guidelines for pond maintenance.

9.1 Inspections

As recommended in the ***SWMP Design Manual***, inspections should be made after every significant storm (> 10 mm) during the first two years of operation to ensure that the facility is functioning properly. It is anticipated that four inspections will be required per year. After the initial period, and after proper operation has been confirmed, an inspection schedule can be established based on the observed operation of the pond. As a minimum requirement, the pond should be inspected annually, although four inspections per year are recommended.

© DSEL

The inspections must be conducted by experienced personnel, trained in all elements associated with the routine operation and maintenance of a stormwater management facility. The inspection team should be knowledgeable in the following areas:

- Routine operation and maintenance activities (all pond elements)
- Stormwater management (pond operating levels)
- Hydraulics (inlet, outlet, spillway, etc.)
- Soil Mechanics (erosion, embankment characteristics, groundwater seepage, etc.)

All monitoring will be prepared in accordance with the City of Ottawa standards.

9.2 Regular Operation and Maintenance Activities

The existing operations, maintenance and monitoring manual will be updated to include the design of the revised facility, including updated as-built drawings for the interim facility.

Grass Cutting

Grass cutting is not recommended for the pond. Allowing grass to grow enhances the water quality and provides other benefits. However, it is understood that grass cutting enhances the aesthetics of the facility for nearby residents. Therefore, grass cutting should be done as infrequently as possible.

Grass should not be cut to the edge of the permanent pool and should be done parallel to the shoreline. Grass clippings should be ejected away from the pond.

Weed Control

As with grass cutting, weed control is not recommended for the pond. If weed control is required in order to remove a specific species, the weeds should be removed by hand.

Plantings

A vegetative community is required in three different locations – upland / flood, shoreline and aquatic fringes. Planting methods and any replanting should be carried out in accordance with the approved landscape design and the recommendations of the ***SWMP Design Manual***, or as modified by the operating authority.

Sediment Removal

In accordance with the ***SWMP Design Manual***, it is recommended that the frequency of sediment removal be determined based on a 5% reduction in the total suspended solids (TSS) removal efficiency. Based on Figure 6.2, Figure 6.3 and Table 3.2 of the ***SWMP Design Manual***, we have estimated the overall pond maintenance frequency to be approximately every 33 years (92.00 m^3/ha, 37% imperviousness). Note that the pond maintenance frequency should be revisited in a future study to evaluate stormwater management requirements for the future Transitway corridor and future business park areas under ultimate conditions. It should also be noted that the pre-treatment of storm water in the forebay should allow for less frequent cleaning than indicated in the ***SWMP Design Manual***; however, the extension of service life prior to

© DSEL

cleaning cannot be quantified. Sediment accumulation in the pond should be checked every 5-10 years or as deemed necessary by the City of Ottawa to identify appropriate clean-out intervals.

Trash and Debris Removal

Accumulated trash and debris within the facility should be removed by hand, performed as required based on inspections.

Seasonal Operation

As per the City of Ottawa maintenance department, valve adjustments for lowering of the pond water level will be performed for the winter months, with reclosing of the valves in spring.

Safety

The SWM facility should be provided with appropriate signage that warns the public of the presence of deep water and steep slopes.

Landscape drawings will be prepared with strategic plantings around the perimeter of the pond in order to discourage direct access to the facility.

All inlets, outlets, structures, and headwalls will be provided with the appropriate grates, covers and safety features in order to prevent public entry or tampering.

10.0 EROSION AND SEDIMENT CONTROL

An erosion and sediment control strategy will be implemented during the construction of services in accordance with City of Ottawa standards. The erosion and sediment control strategy will include the following:

- methods for constructing SWM and environmental features
- methods to stabilize disturbed areas to minimize transfer of sediment
- special measures for works in or adjacent to stream corridors, such as culvert crossings, wetland construction, etc.
- environment fencing
- stone mud mat at all construction entrances
- use of the permanent ponds as a temporary silt basins during site construction activities
- regular inspection of the erosion and sediment control devices
- removal and disposal of the erosion and sediment control devices after the site has been stabilized

© DSEL

Prepared by,
J.F. Sabourin and Associates Inc.



Per: Laura Pipkins, P. Eng.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Jennifer Ailey, P.Eng.

© DSEL
Pond Design Brief 20140331 - Main Text.doc

C.4 Manufacturer Specifications

Volume III: TEMPEST INLET CONTROL DEVICES



Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

IPEX
by aliaxis

IPEX Tempest™ Inlet Control Devices

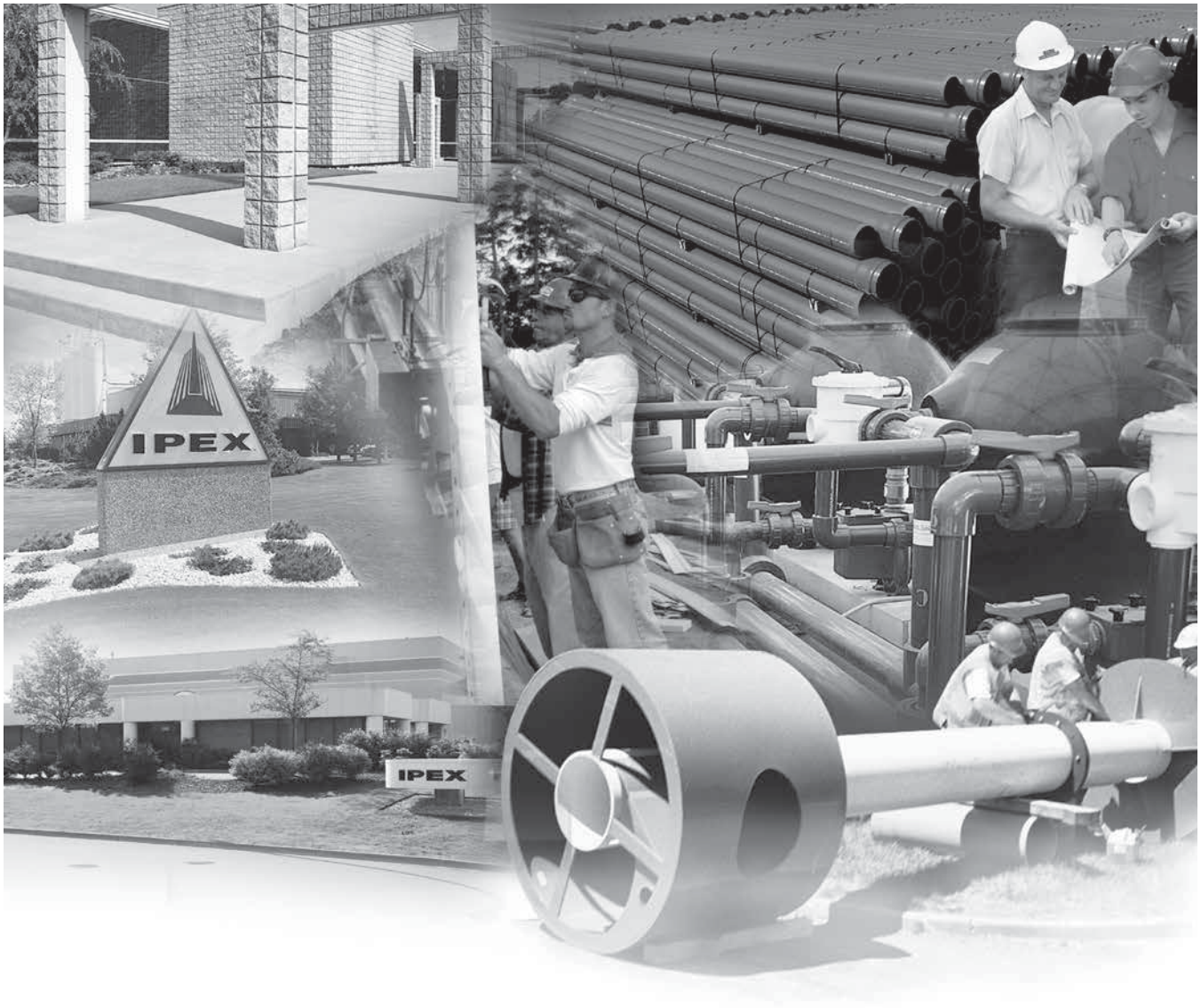
Municipal Technical Manual Series

Vol. I, 2nd Edition

© 2022 by IPEX. All rights reserved. No part of this book may be used or reproduced in any manner whatsoever without prior written permission.

For information contact: IPEX, Marketing,
1425 North Service Road East, Oakville, Ontario, Canada, L6H 1A7

The information contained here within is based on current information and product design at the time of publication and is subject to change without notification. IPEX does not guarantee or warranty the accuracy, suitability for particular applications, or results to be obtained therefrom.



ABOUT IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

CONTENTS

TEMPEST INLET CONTROL DEVICES Technical Manual

About IPEX

Section One: Product Information: TEMPEST Low, Medium Flow (LMF) ICD

Purpose 4
Product Description. . . . 4
Product Function 4
Product Construction 4
Product Applications. . . . 4
Chart 1: LMF 14 Preset Flow Curves 5
Chart 2: LMF Flow Vs. ICD Alternatives 5

Product Installation

Instructions to assemble a TEMPEST LMF ICD into a square catch basin: 6
Instructions to assemble a TEMPEST LMF ICD into a round catch basin: 6

Product Technical Specification

General 7
Materials 7
Dimensioning 7
Installation 7

Section Two: Product Information: TEMPEST High Flow (HF) & Medium, High Flow (MHF) ICD

Product Description. . . . 8
Product Function 8
Product Construction 8
Product Applications. . . . 8
Chart 3: HF & MHF Preset Flow Curves. . . . 9

Product Installation

Instructions to assemble a TEMPEST HF or MHF ICD into a square catch basin: 10
Instructions to assemble a TEMPEST HF or MHF ICD into a round catch basin: 10
Instructions to assemble a TEMPEST HF Sump into a square or round catch basin: . . . 11

Product Technical Specification

General 11
Materials 11
Dimensioning 11
Installation 11

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

Our LMF ICD is designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter and larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

Will accommodate both square and round applications:

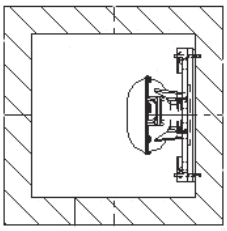


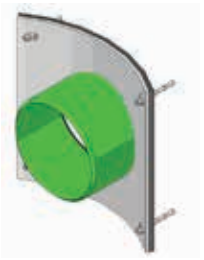
Square Application

Round Application



Universal Mounting Plate





+

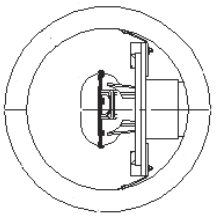


Spigot CB Wall Plate

=



Universal Mounting Plate Hub Adapter



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 1: LMF 14 Preset Flow Curves

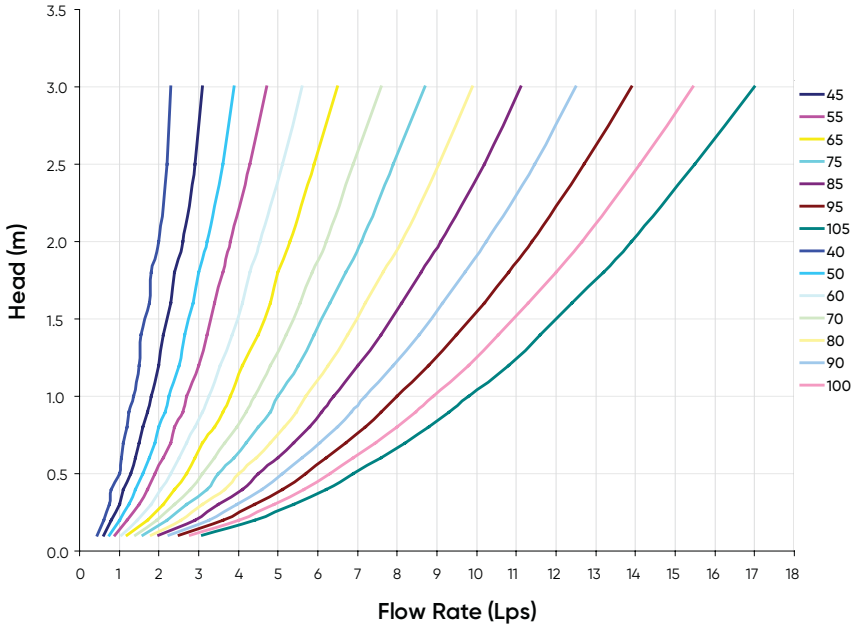
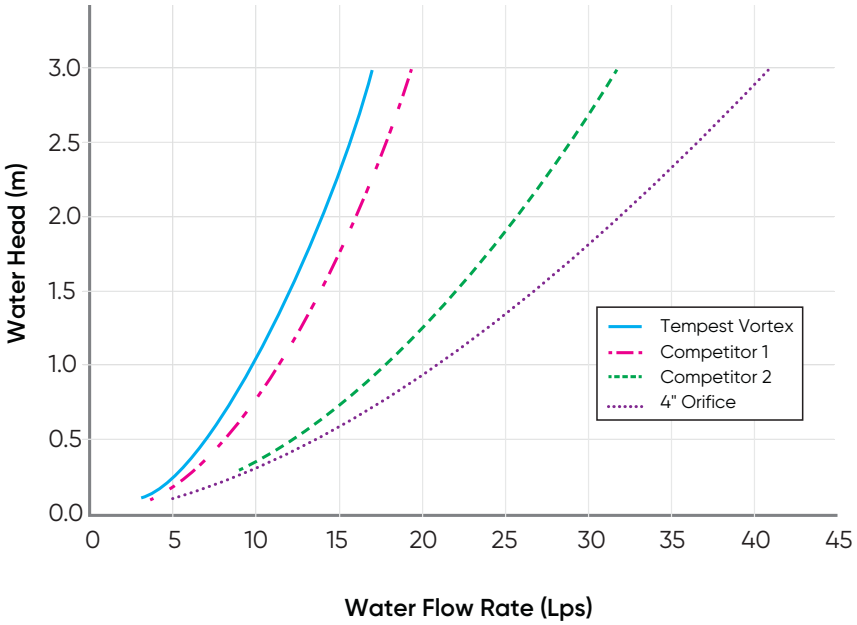


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at ipexna.com.
- Call your IPEX representative for more information or if you have any questions about our products.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function



TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.



TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.



TEMPEST MHF (Medium to High Flow): The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

Product Construction

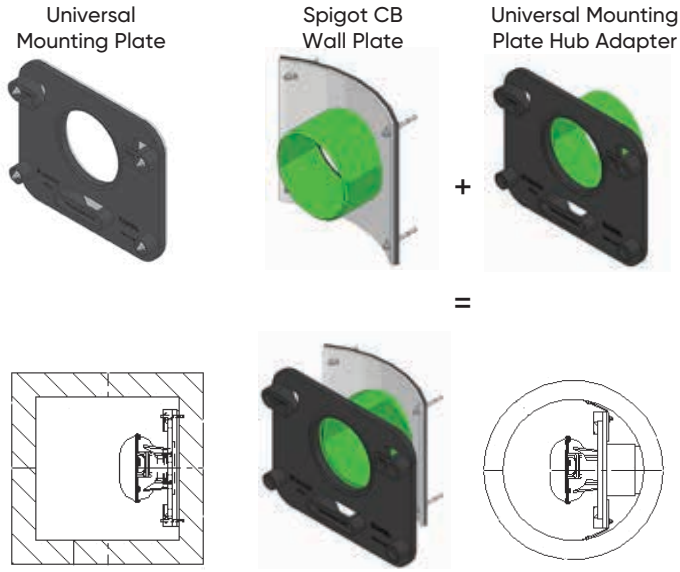
The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

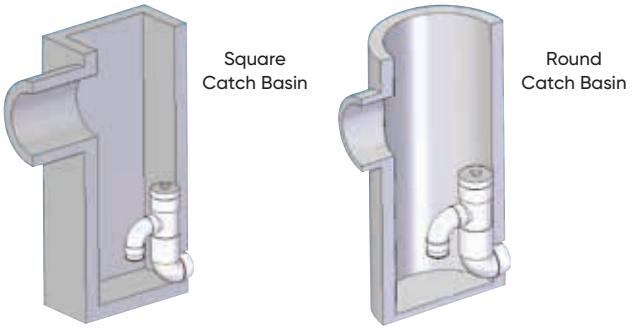
The HF and MHF ICD's are available to accommodate both square and round applications:



Square Application **Round Application**

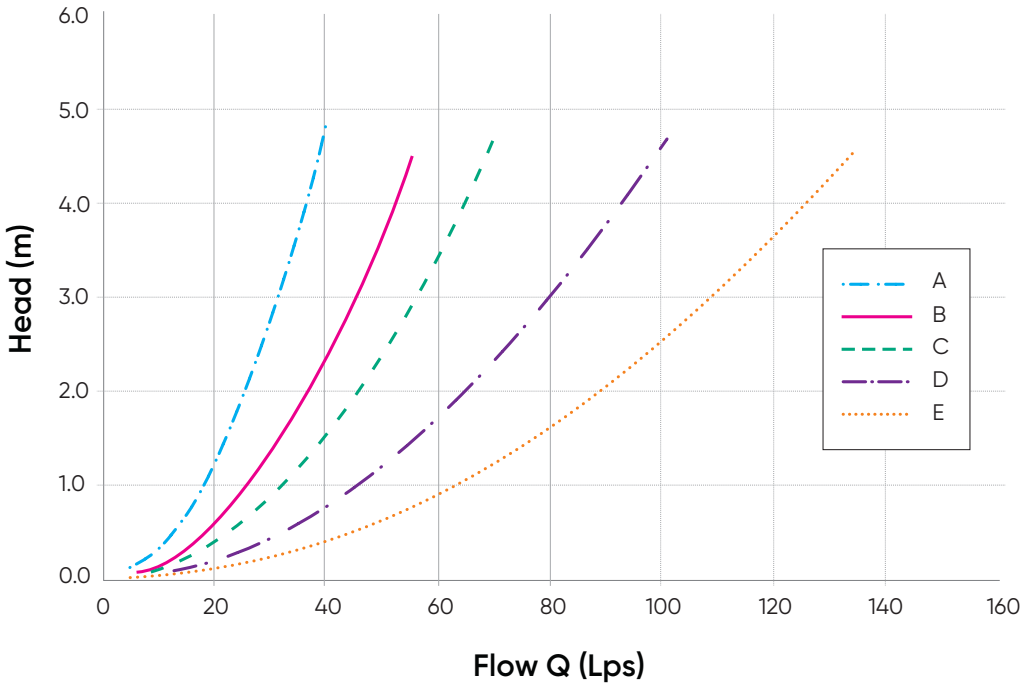


The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 3: HF & MHF Preset Flow Curves



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

⚠ WARNING

- **Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.**
- **The solvent cement which is used in this installation is to be approved for PVC.**
- **The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.**
- **Call your IPEX representative for more information or if you have any questions about our products.**

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

NOTES

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

SALES AND CUSTOMER SERVICE

IPEX Inc.
Toll Free: (866) 473-9462
ipexna.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

Products manufactured by IPEX Inc.
Tempest™ is a trademark of IPEX Branding Inc.

This literature is published in good faith and is believed to be reliable. However it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

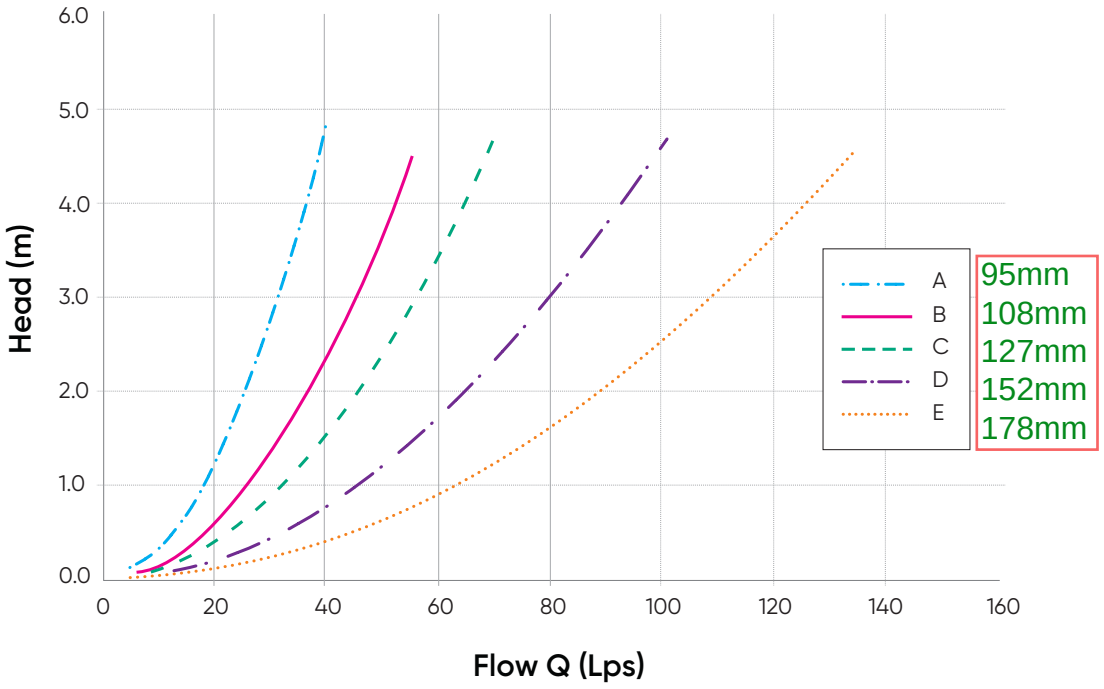
A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.

IPEX by aliaxis

MNMNTPIP110817RC
© 2022 IPEX MN0038C

C.5 Typical ICD Discharge Curve Calculations

Chart 3: HF & MHF Preset Flow Curves



Orifice Equation:
Q = Cd A (g H)^0.5

Using Cd = 0.572,
for 95mm orifice @ 1.2m head, Q = 19.8L/s
for 152mm orifice @ 3.0m head, Q = 80.1L/s
for 178mm orifice @ 2.5m head, Q = 99.5L/s
Roughly corresponding to manufacture discharge curves above.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

C.6 Modified Rational Method Calculations for Existing ICD Upsizing

Stormwater Management Calculations

File No: **160401760**
Project: **Trailsedge West Block 121**
Date: **29-Oct-26**

SWM Approach:
5-year minor system capture

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Controlled - Tributary	410C, 410C-1	Hard	0.081		0.9	0.073		
		Soft	0.029		0.2	0.006		
	Subtotal			0.11			0.0784	0.71
Controlled - Tributary	410A, 410A-1	Hard	0.146		0.9	0.132		
		Soft	0.044		0.2	0.009		
	Subtotal			0.19			0.1403	0.74
Controlled - Tributary	S404, S404-1	Hard	0.120		0.9	0.108		
		Soft	0.060		0.2	0.012		
	Subtotal			0.18			0.1202	0.67
Total				**0.480**			**0.339**	
Overall Runoff Coefficient= C:								**0.71**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.480 ha**
Total Tributary Area to Outlet	**0.480 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.000 ha**
Total Site	**0.480 ha**

Stormwater Management Calculations

Project #160401760, Trailsedge West Block 121
Modified Rational Method Calculations for ICD Sizing

5 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	998.071
b =	6.053
c =	0.814

t (min)	I (mm/hr)
10	104.19
20	70.25
30	53.93
40	44.18
50	37.65
60	32.94
70	29.37
80	26.56
90	24.29
100	22.41
110	20.82
120	19.47

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: 410C, 410C-1 — Controlled - Tributary
Area (ha): 0.11
C: 0.71

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	22.71	22.71	0.00	**0.00**
20	70.25	15.31	15.31	0.00	**0.00**
30	53.93	11.75	11.75	0.00	**0.00**
40	44.18	9.63	9.63	0.00	**0.00**
50	37.65	8.21	8.21	0.00	**0.00**
60	32.94	7.18	7.18	0.00	**0.00**
70	29.37	6.40	6.40	0.00	**0.00**
80	26.56	5.79	5.79	0.00	**0.00**
90	24.29	5.29	5.29	0.00	**0.00**
100	22.41	4.88	4.88	0.00	**0.00**
110	20.82	4.54	4.54	0.00	**0.00**
120	19.47	4.24	4.24	0.00	**0.00**

Storage: Full capture of 5-year event

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 94.00 mm
Approx. Invert Depth 1.70 m
T/G Elevation 86.58 m

	Head (m)	Max. Discharge (L/s)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)
5-year Water Level	1.70	22.93	22.71	0.00	0.00

Subdrainage Area: 410A, 410A-1 — Controlled - Tributary
Area (ha): 0.19
C: 0.74

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	40.64	40.64	0.00	0.00
20	70.25	27.40	27.40	0.00	0.00
30	53.93	21.03	21.03	0.00	0.00
40	44.18	17.23	17.23	0.00	0.00
50	37.65	14.69	14.69	0.00	0.00
60	32.94	12.85	12.85	0.00	0.00
70	29.37	11.46	11.46	0.00	0.00
80	26.56	10.36	10.36	0.00	0.00
90	24.29	9.47	9.47	0.00	0.00
100	22.41	8.74	8.74	0.00	0.00
110	20.82	8.12	8.12	0.00	0.00
120	19.47	7.59	7.59	0.00	0.00

Storage: Full capture of 5-year event

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 127.00 mm
Approx. Invert Depth 1.70 m
T/G Elevation 86.58 m

	Head (m)	Max. Discharge (L/s)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)
5-year Water Level	1.70	41.85	40.64	0.00	0.00

Subdrainage Area: S404, S404-1 — Controlled - Tributary
Area (ha): 0.18
C: 0.67

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	34.82	34.82	0.00	**0.00**
20	70.25	23.47	23.47	0.00	**0.00**
30	53.93	18.02	18.02	0.00	**0.00**
40	44.18	14.76	14.76	0.00	**0.00**
50	37.65	12.58	12.58	0.00	**0.00**
60	32.94	11.01	11.01	0.00	**0.00**
70	29.37	9.81	9.81	0.00	**0.00**
80	26.56	8.88	8.88	0.00	**0.00**
90	24.29	8.12	8.12	0.00	**0.00**
100	22.41	7.49	7.49	0.00	**0.00**
110	20.82	6.96	6.96	0.00	**0.00**
120	19.47	6.51	6.51	0.00	**0.00**

Storage: Full capture of 5-year event

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 127.00 mm
Approx. Invert Depth 1.70 m
T/G Elevation 86.58 m

	Head (m)	Max. Discharge (L/s)	5-yr Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)
5-year Water Level	1.70	41.85	34.82	0.00	0.00

Flow Discharge Summary

Total Max. Allowable Controlled 5yr Flow to Sewer	107	L/s
Total Rational Method Runoff 5yr Flow	98	L/s
Differnce	-8	L/s

Appendix D External Report Excerpts

PATERSON GROUP

Geotechnical Investigation

Proposed Residential Development

Trailsedge West – Block 121
6259, 6267, 6271 & 6273 Renaud Road
Ottawa, Ontario

Prepared for Richcraft

Report PG6405-1 Revision 3 dated June 24, 2025

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current supplemental geotechnical investigation was carried out on July 12, 2024, and consisted of advancing a total of 3 boreholes to a maximum depth of 10.4 m below existing ground surface. A previous geotechnical investigation was completed on October 3, 2022, consisting of 4 boreholes advanced to a maximum depth of 8.1 m below the existing ground surface.

Furthermore, an initial geotechnical investigation was completed by Paterson in August 2006 which included 1 borehole and 1 test pit at the subject site, which were advanced to depths of 9.6 m and 3.8 m below ground surface, respectively.

The test hole locations were distributed in a manner to provide general coverage of the subject site, taking into consideration underground utilities and site features. The approximate borehole locations are shown on Drawing PG6405-1 – Test Hole Location Plan included in Appendix 2.

The boreholes were completed using a low clearance auger drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The testing procedure consisted of augering to the required depths at the selected locations, and sampling the overburden.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split spoon (SS) sampler. All samples were visually inspected and initially classified on-site. The auger and split-spoon samples were placed in sealed plastic bags.

All samples were transported to our laboratory for further examination and classification. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU, and SS, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

4.0 Observations

4.1 Surface Conditions

The subject site consists of 4 contiguous properties: 6259, 6267, 6271 & 6273 Renaud Road. The western portion of the site is currently occupied by 3 residential properties, while the eastern portion is used as a construction staging area, with an office trailer and several storage containers.

The site is bordered by Renaud Road to the south, Compass Street to the east, Melodie Street to the west, and a pedestrian pathway followed by Mud Creek to the north. The ground surface across the subject site is relatively level at approximate geodetic elevation 87 m, however, beyond the site boundary to the north, the existing grades slope downward moderately toward Mud Creek, which is at approximate 82 m.

4.2 Subsurface Profile

Generally, the subsurface profile at the test hole locations consists of topsoil and/ or fill underlain by silty sand and a deep silty clay deposit. Fill was observed to generally consist of loose to compact silty sand with gravel and crushed stone. The fill was observed to extend to depths ranging between about 0.3 to 1.8 m below the existing ground surface.

Underlying the fill, the silty sand layer generally consists of a loose to dense, brown silty sand, and extends to depths ranging from about 0.9 and 1.8 m below the existing ground surface.

The deep silty clay deposit, encountered underlying silty sand layer, was observed to consist of a very stiff to stiff, brown silty clay, extending to depths ranging between 2.1 and 2.4 m, and becoming a firm to soft, grey silty clay below these depths. However, in borehole BH 3-24, a thin interbedded layer of silty sand to sandy silt deposit was encountered at depth of 2.2 m.

No practical refusal to the DCPT was encountered at boreholes BH 1-24 and BH 4 -22 to approximate depths of 30 m.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profile encountered at each test hole location.

Bedrock

Based on available geological mapping, bedrock in the area of the subject site consists of interbedded limestone and shale of the Lindsay Formation with an overburden drift thickness of about 25 to 50 m in depth.

Grain Size Distribution and Hydrometer Testing

Grain size distribution (sieve and hydrometer analysis) was completed on 2 selected soil samples. The results of the grain size analysis are summarized in Table 1 and presented on the Grain-Size Distribution and Hydrometer Testing Results sheets in Appendix 1.

Table 1 – Summary of Grain Size Distribution Analysis – Current Investigation

Borehole	Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 4-22	SS4	2.3-2.9	0.0	5.4	36.6	58.0
BH 3-24	SS5	3.1-3.7	0.0	0.9	24.6	74.5

Note: The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum.

Atterberg Limits Testing

Atterberg limits testing was completed on the recovered silty clay samples at selected locations throughout the subject site during the current and previous investigations. The results of the Atterberg limits are presented in Table 2 and on the Atterberg Limits Results sheet in Appendix 1.

Table 2 – Atterberg Limits Results – Current Investigation

Borehole	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 1-22	SS4	2.3-2.9	78	38	40	MH
BH 2-22	SS4	2.3-2.9	49	25	24	CH
BH 3-22	SS4	2.3-2.9	74	36	38	MH
BH 2-24	SS5	3.1-3.7	66	27	39	CH

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plastic Index; CH: Inorganic Clay of High Plasticity.
MH: Inorganic Silt of High Plasticity

Shrinkage Testing

Linear shrinkage testing was completed on 1 selected sample. The results are summarized in Table 3 on the next page, and on the Shrinkage Testing Results sheet in Appendix 1.

Table 3 – Linear Shrinkage Results				
Borehole	**Sample**	**Depth (m)**	**Shrinkage Limit**	**Shrinkage Ratio**
BH 4-22	SS4	2.3-2.9	23.55	1.726

Consolidation Testing

Generally, the potential long-term settlement of the silty clay deposit is evaluated based on its compressibility characteristics. A method to evaluate these characteristics is by completing unidimensional consolidation tests on undisturbed soil samples collected using Shelby tubes. A total of 1 consolidation test was completed from the Shelby tubes collected during the previous investigation. The results of the consolidation testing are presented on the Consolidation Test sheet in Appendix 1.

4.3 Groundwater

Groundwater levels were measured within the installed piezometers at the time of the investigation. The measured groundwater levels noted at that time are presented in Table 1 on below.

Table 4 – Summary of Groundwater Levels				
Borehole Number	**Ground Surface Elevation (m)**	**Measured Groundwater Level**		**Dated Recorded**
		Depth (m)	**Elevation (m)**	
BH 1-24	87.56	7.29	80.27	July 19, 2024
BH 2-24	87.28	2.18	85.1	July 19, 2024
BH 3-24	87.29	9.06	78.23	July 19, 2024
BH 1-22*	86.87	2.98	83.89	October 13, 2022
BH 2-22*	86.86	1.82	85.04	October 13, 2022
BH 3-22*	86.79	1.84	84.95	October 13, 2022
BH 4-22*	86.84	5.72	81.12	October 13, 2022
BH 1-08*	86.83	1.74	85.09	August 28, 2008
TP 1-08 *	86.83	2.00	84.83	August 28, 2008

Note: Ground surface elevations at borehole location are referenced to a geodetic datum.

* - Denotes ground water levels from previous investigation

Long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, the long-term groundwater table can be expected at approximately 2 to 3 m below ground surface.

However, it should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered suitable for the proposed development. It is recommended that the proposed structures be founded on conventional spread footings placed on the undisturbed, firm to stiff silty clay bearing surface.

Due to the presence of a silty clay deposit at the site, the proposed development will be subjected to grade raise restrictions. Our permissible grade raise recommendations are discussed in Section 5.3.

Further, as the existing ground surface slopes downward to Mud Creek, beyond the northern boundary of the site, a slope stability assessment has been completed, which is provided in Section 6.9.

The above and other considerations are discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, containing significant amounts of organic materials, should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures. Care should be taken not to disturb adequate bearing soils below the founding level during site preparation activities. Disturbance of the subgrade may result in sub-excavating the disturbed material and the placement of additional suitable fill material.

Fill Placement

Fill used for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness.

Fill placed beneath the proposed building areas should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Permissible Grade Raise Recommendations

Consideration must also be given to potential settlements which could occur due to the presence of the silty clay deposit and the combined loads from the proposed footings, any groundwater lowering effects, and grade raise fill. The foundation loads to be considered for the settlement case are the continuously applied loads which consist of the unfactored dead loads and the portion of the unfactored live load that is considered to be continuously applied. For buildings, a minimum value of 50% of the live load is often recommended by Paterson. A post-development groundwater lowering of 0.5 m was assumed.

Due to the presence of the silty clay deposit, a permissible grade raise restriction of **1.0 m** is recommended for grading at the subject site.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class X_E** in accordance with the Ontario Building Code (OBC) 2024 for foundations considered at this site. The soils underlying the site are not susceptible to liquefaction. Reference should be made to the latest revision of the OBC 2024 for a full discussion of the earthquake design requirements.

5.5 Basement Floor Slab

With the removal of all topsoil and deleterious fill from within the footprint of the proposed buildings, the undisturbed, compact silty sand or undisturbed, stiff silty clay will be considered an acceptable subgrade on which to commence backfilling for floor slab construction.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Types I or II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slabs.

It is recommended that the upper 200 mm of subfloor fill underlying the basement slabs consist of 19 mm clear crushed stone.

The earth force component (P_o) under seismic conditions can be calculated using $Po = 0.5\ K_o \cdot \gamma \cdot H^2$, where K = 0.5 for the soil conditions noted above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2024.

5.7 Pavement Design

For design purposes, the pavement structures presented in Table 5 and 6 below are recommended for the design of driveways, car only parking areas, access lanes, and local roadways.

Table 5 - Recommended Pavement Structure – Driveways and Car Only parking Areas

Thickness (mm)	Material Description
50	**Wear Course** – HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.	

Table 6 - Recommended Pavement Structure – Access Lanes and Local Roadways

Thickness (mm)	Material Description
40	**Wear Course** – Superpave 12.5 Asphaltic Concrete
50	**Binder Course** – Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Review of the Grading Plan, from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

All excess soil must be handled as per ***Ontario Regulation 406/19: On-Site and Excess Soil Management*.**

8.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Richcraft, or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.



Puneet Bandi, M.Eng.





Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ Richcraft (Email Copy)
- ❑ Paterson Group (1 Copy)

Appendix E City of Ottawa Correspondence

E.1 Phase 1 Pre-consultation Feedback Form

File No.: PC2025-0018

February 28, 2025

Jaafar Oleiche
Richcraft Homes Ltd.
Via email: joleiche@richcraft.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed ZBL and SPC Applications – 6259, 6267, 6271, 6273 Renaud Road

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on February 20, 2025.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☒	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Should you choose, proceed to complete a Phase 2 Pre-consultation Application Form. Please submit this information together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed is requested with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density it is recommended that a subsequent pre-consultation application be submitted.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1) Site is designated as Neighbourhood within the Suburban (East) Transect

2) Site is split-zoned DR and I1A. Proposal is rezone to R3Z[XXXX] to permit townhouses (Back to back towns).

3) Western-most residential block was confirmed to be included in the ZBLA/SPC applications and a revised concept plan was provided.

4) Staff generally have no concerns with the proposed introduction of townhouse uses to the site; the Official Plan and Community Design Plan contemplate residential uses on the subject lands, particularly lot consolidation and development for larger residential uses.

5) Applicant noted that there was no current intent to provide a public access easement through the N/S open space corridor leading to the northern public trail.

a) Please consider providing a public access easement through this amenity space as it aligns with the crosswalk on Renaud Road and ends at the trail access at the north of the site. This is compounded by the City's request for CILP rather than land dedication. For further discussion regarding the areas to contain the easements and applicable CILP amounts, please contact Craig.hamilton@ottawa.ca and Jessica.button@ottawa.ca.

6) Applicant noted a relief requirement for the distance between front walls of dwellings and the sidewalk: waiving of the minimum visitor parking space requirement is based on the ability to accommodate a legal parking space in the driveway of the dwelling. Please ensure this is accommodated (and dimensioned), at minimum. The City has an interest in ensuring appropriate soft landscaping area and tree planting in front yards- Ensure that adequate space for both is provided when designing the reduced front yards and provide a rationale as to the need for the relief.

a) Please note that the site is currently I1A and open space and planting aligning with that typically provided on an Institutional site is strongly preferred.

7) Street trees and tree planting along the private way (where feasible) are requested and will be reviewed by the City

8) Staff note that while multiple private approaches are not preferred on the ROW, this design is consistent with the existing neighbourhoods in the area, and the alternative of removing private accesses and accommodating the parking in a surface lot interior to the site severely impacts the amount of soft landscaping and amenity area.

9) For Reference: Area 4 of the Community Design Plan (CDP) expects 25 units/net ha can be supported due to the proximity of significant natural features and environmental conditions. Other areas of the CDP are anticipated to develop with 29 units/net ha and 35 units/net ha. Current proposed density is 57 du/net ha (entire site).

a) The applicant noted that proposed densities are 31 du/net ha within Area 4 and 43du/net ha outside of Area 4.

10) Section 37 requirements and/or Community Benefits Charge

a) The former Section 37 regime has been replaced with a “Community Benefits Charge”, By-law No. 2022-307, of 4% of the land value. This charge will be required for ALL buildings that are 5 or more storeys and 10 or more units and will be required at the time of building permit unless the development is subject to an existing registered Section 37 agreement. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.

Urban Design

Submission Requirements:

- Urban Design Brief – can be a part of planning rationale at rezoning
- Site Plan
- Landscape Plan (conceptual for rezoning)
- Elevations (for site plan)

Preliminary Design Comments:

11) An Urban Design Brief will be required as part of a complete application. Please see the

12) attached Terms of Reference for requirementsThe ample open space and amenity is appreciated.

13) Ensure that tree plantings can be provided on public roadways and along private roadways internal to the site. Sensitive Marine clays may require an increased setback to accommodate trees.

14) The connectivity to the MUP is appreciated. A public access easement is recommended to provide connection from the PXO/School to the larger open space area.

15) Drive aisles should be screened with landscaping from the properties to the west and from the open space to the rear.

16) Look for opportunities to maintain existing trees at the rear of the site and on Renaud Road.

17) Elevations should address public roadways.

Please feel free to contact Lisa Stern, Urban Designer, for any additional questions.

Engineering

Comments:

Water

18) Watermain looping is recommended for 50 or more dwellings to avoid creating a vulnerable service area. District Metering Area (DMA) Chamber(s) are required for private developments serviced by a connection 150 mm or larger or when there are two or more private connections to the public watermain. Refer to the City of Ottawa Water Distribution Guidelines.

19) Please be advised that capacity of the existing system will be determined after Water Boundary conditions are requested. Water Boundary condition requests must be submitted to the City Project Manager, Development Review by the civil design engineer or consultant prior to submission and include the following information:

20) The location of the service and the expected water demand of the proposed development shown on a plan, figure, or map;

a) Type of development;

b) Average daily demand: ___ l/s;

c) Maximum daily demand: ___l/s;

d) Maximum hourly daily demand: ___ l/s;

21) Required fire flow and completed FUS Design Declaration if applicable;

22) Supporting Calculations for all demands listed above and required fire flow as per Ontario Building Code or Fire Underwriter Surveys (See technical Bulletin ISTB-2021-03;

23) Watermain system analysis demonstrating adequate pressure as per section 4.2.2 of the Water Distribution Guidelines;

24) Demonstrate adequate hydrant coverage for fire protection. Please review Technical Bulletin ISTB-2018-02, Appendix I Table 1 – maximum flow to be considered from a given hydrant;

25) Show proposed emergency route (to be satisfactory to Fire Services).

26) Water metering requirements need to be confirmed through circulation of the water metering group at the City.

Sanitary Sewers

27) Confirm available capacity to receive additional flows in the receiving sewers.

28) A monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use by-law for details.

29) Provide pre and post CCTV of the sanitary trunk sewer as per City Standard CCTV spec S.P. F-4090.

30) Provide an analysis to demonstrate that there is adequate residual capacity in the receiving and downstream wastewater system to accommodate the proposed development.

31) Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

32) A maintenance hole is required to be installed over the public sewer where private sewer connection to the public sewer exceeds 50% of the public sewer diameter. If a maintenance hole is proposed to be installed over existing City infrastructure, clearly indicate on the design drawings the applicable Standard City Drawing. For example, S12.1 or doghouse structure / S12.2, etc.

Stormwater Management

33) A monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use by-law for details.

34) A maintenance hole is required to be installed over the public sewer where private sewer connection to the public sewer exceeds 50% of the public sewer diameter.

35) If a maintenance hole is proposed to be installed over existing City infrastructure, clearly indicate on the design drawings the applicable Standard City Drawing. For example, S12.1 or doghouse structure / S12.2, etc.

Stormwater Quality

36) Characterize the water quality to be protected and Stormwater Contaminants (e.g., suspended solids, nutrients, bacteria, water temperature) for potential impact on the Natural Environment, and control as necessary; OR As per the MSS, watershed/subwatershed plan, similar area-wide Stormwater study, or Stormwater management plan to minimize, or where possible, prevent increases in Contaminant loads and impacts to receiving waters.

37) Provide Enhanced level of protection (80%) for suspended solids removal.

38) OGS unit shall be ISO 14034 Environmental Technology Verification (ETV) certified.

Stormwater Quantity

39) Servicing and Stormwater Management as per East Urban Community CDP and Gloucester EUC Infrastructure Servicing Study (release rate to 85 l/s/ha)

40) Time of concentration (Tc) to be calculated, min Tc = 10mins

41) The allowable release rate is to be computed using the lesser of C=0.5 or existing.

Grading and Drainage

42) Active coordination and grading transition encouraged with the adjacent properties to reduce reliance on retaining walls

43) No retaining walls especially within or along public ROW - ensure grading design accounts for the transition rather than retaining walls.

44) Permissible ponding of 350mm for 100-year. No spilling to adjacent sites. At 100-year ponding elevation, you must spill to the ROW. 100-year Spill elevation must be 300mm lower than any building opening or ramp.

45) Consider Pedestrian Accessibilities at max 5%.

Geotechnical and Slope Stability

46) Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane shear test. Refer to City of Ottawa Geotechnical and Slope Stability Guidelines.

47) Due to the close proximity of the site to the **Mud Creek** watercourse, refer to existing floodplain studies to confirm **development setbacks**.

Additional Engineering Notes

48) Sanitary, storm and water servicing stubs are available along Compass Street, so I suggest servicing the property from Compass Street.



49) The following studies are attached for your reference:

a) Mud Creek Cumulative Impact Study prepared by Stantec Consulting Ltd. and JTB Environmental Systems dated May 5, 2020

b) The Design Brief for the Trails Edge West Richcraft Group of Companies prepared by DSEL dated January 26, 2015, Revision 3

50) No road moratorium that would impact the application has been identified.

51) Any future road widening setbacks, existing easements or proposed easements should be shown on all plans. Proposed infrastructure shall not be located within setbacks.

52) For any proposed exterior light fixtures, please provide certification from a licensed professional engineer confirming lighting has been designed only using fixtures that meet the criteria for full cut-off classification as recognized by the

Illuminating Engineering Society of North America and result in minimal light spillage onto adjacent properties (maximum allowable spillage is 0.5 fc). Additionally, include in the submission the location of the fixtures, fixture type (make, model, part number and mounting height.

53) Sewer connections to be made above the springline of the sewermain as per:

a) Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

b) Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,

c) Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,

54) Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

55) No submerged outlet connections.

Minimum Drawing and File Requirements

56) Plans are to be submitted on standard A1 size (594mm x 841mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400, or 1:500).

57) With all submitted hard copies provide individual PDF of the DWGs and for reports please provide one PDF file of the reports. All PDF documents are to be unlocked and flattened.

Drawings, Plans and geoOttawa

58) Record drawings, utility plans and/or LIDAR information are also available for purchase from the City (Contact the City's Information Centre by email at geoinformation@ottawa.ca or by phone at (613) 580-2424 x.44455.

59) Please refer to GeoOttawa with the Water and Wastewater Infrastructure layer turned on to determine what servicing is available for this site: https://maps.ottawa.ca/geoottawa/.

For information on preparing required studies and plans refer to:

a) Planning application submission information and materials | City of Ottawa;

b) Ottawa Sewer Design Guidelines (October 2012);

c) Ottawa Design Guidelines – Water Distribution (2010);

d) Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007);

e) City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012);

f) City of Ottawa Environmental Noise Control Guidelines (January, 2016);

g) City of Ottawa Park and Pathway Development Manual (2012);

h) City of Ottawa Accessibility Design Standards (2012);

i) Ottawa Standard Tender Documents (latest version);

j) Please refer to other applicable Guidelines (provincial and federal);

k) Site Alteration (By-law No. 2018-164) | City of Ottawa;

l) Sewer Connection (By-law No. 2003-513) | City of Ottawa;

m) Sewer Use (By-law No. 2003-514) | City of Ottawa;

n) Building (By-law No. 2014-220) | City of Ottaw;

o) Community Benefits Charge By-law (By-law No. 2022-307) | City of Ottawa;

p) Delegation of Authority (By-law No. 2023-67) | City of Ottawa;

q) Encroachments on City Highways (By-law No. 2003-446) | City of Ottawa;

r) Fence (By-law No. 2003-462) | City of Ottawa;

s) Fire Routes (By-law No. 2003-499) | City of Ottawa;

t) Integrated Orléans Community Improvement Plan (By-law No. 2021-284) | City of Ottawa;

u) Integrated Orléans Community Improvement Plan (By-law No. 2021-285) | City of Ottawa;

v) Montreal Road Community Improvement Plan (By-law No. 2019-224) | City of Ottaw;

w) Montreal Road Community Improvement Plan Area (By-law No. 2019-213) | City of Ottawa;

x) Noise (By-law No. 2017-255) | City of Ottaw;

y) Private Approach (By-law No. 2003-447) | City of Ottawa;

z) Road Activity (By-law No. 2003-445) | City of Ottawa;

aa) Site Plan Control (By-law No. 2014 - 256) | City of Ottawa;

bb) Tree Protection (By-law No. 2020-340) | City of Ottawa;

cc) Water (By-law No. 2019-74) | City of Ottawa;

dd) Zoning (By-law No. 2008-250) | City of Ottawa;

60) Please contact Alex Polyak, Infrastructure Project Manager, for questions regarding engineering.

61) Please consider these comments in combination with comments you receive from other technical groups, agencies and the public. Contact me if it is necessary to resolve any conflicting comments.

62) “Please provide a resubmission which addresses each of the comments or issues listed above. **A cover letter must also be included that states how each provided comment was addressed in the resubmission. Please co-ordinate the numbering of each resubmission comment, or issue, with the above noted comment number.**

63) All addenda or revisions to any studies, or plans, must be accompanied by a *.pdf copy (either by CD or e-mail).”

Feel free to contact Alex Polyak, Project ManagerSelect Position, for follow-up questions.

Noise

Comments:

64) A road noise study is required.

Feel free to contact Mike Giampa, TPM, for follow-up questions.

Transportation

Comments:

65) Right-of-way protection (Renaud Road).

a) See Schedule C16 of the Official Plan.

b) Any requests for exceptions to ROW protection or corner triangle requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

66) Corner sight triangle for two Renaud Road intersections: 3m x 9m with the longer dimension along the collector road.

67) A complete TIA is not warranted but a transportation memo is recommended. The memo should highlight key aspects of the site including vehicle trip generation, proposed mode shares, turning movements and left-turn warrants for the two private approaches.

Feel free to contact Mike Giampa, Transportation Project Manager, for follow-up questions.

Environment

Comments:

68) Due to the existing zoning at the rear of the subject lands, no Environmental Impact Statement/Study (EIS) shall be required. The rear of 6267 Renaud is zoned Parks and Open Space (OR1), and the rear of 6271 Renaud is zoned OR1 and Environmental Protection (EP). The existing zoning lists permitted uses as environmental preserve and education area, as well as forestry operations on OR1 and EP.

With the above said, most of the OR1 and EP appear to be in public ownership, whereas the rear portions of 6267 Renaud and 6271 Renaud appear to be in private ownership. It would be nice to have the OR1 and EP portions of those lands dedicated to the city for protection and continuity.

69) According to the MNRF Natural Heritage Information Centre (NHIC), endangered Butternut trees may be present in this general area. A landscape plan must be submitted and ensure the existing tree species and the proposed tree species are identified. Any new plantings (including plant species) should be local species, and any identified SAR may require further evaluation as per the Endangered Species Act and in coordination with MOECP.

70) The city strives for an urban forest canopy cover of 40% while also using native tree plantings to help achieve that long-term goal. The target aims to improve health and wellbeing, climate resiliency, etc. More trees and Low Impact Development (LID) strategies are welcome, where feasible on the site.

71) Please refer to the city's Bird Safe-Design Guidelines early in the development stage to ensure safe design and landscaping elements can be incorporated with those risks and avoidance measures in mind.

Feel free to contact Kimberley MacDonald, Environmental Planner, for follow-up questions.

Forestry

Comments:

72) A Tree Conservation Report and Landscape Plan are submission requirements.

73) The conceptual site plan does a good job of providing greenspace that overlaps with areas of tree retention potential.

a) Tree retention over removal and replacement is a priority under the Official Plan (Section 4.8.2, policy 3,d).

b) Ensure the distance between these greenspace areas and the proposed buildings align with the Geotechnical Investigation.

c) Prioritize the placement of large canopy tree species throughout the site and especially in the greenspaces adjacent the northern property line

74) Provide street tree planting on public and private roads. Refer to Section 4.1.3 of the Official Plan, 6.1.1 of the CDP, and 4.3 policy 18 (i) of the East Urban Community Secondary Plan.

i) There are no overhead wires observed so large canopy trees should be planted along the public streets if sensitive soil implications don't apply.

75) Removal and replacement of the hackberry trees in the Right of Way along Compass is anticipated.

76) **Tree Conservation Report requirements. The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact hayley.murray@ottawa.ca**

- A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
- Any tree 10 cm in diameter or greater and City-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

- The TCR must contain 2 separate plans/maps:
- Plan/Map 1 - show existing conditions with tree cover information.
- Plan/Map 2 - show proposed development with tree cover information.
- The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter, and health condition. Please note that averages can be used if there are forested areas.
- Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
- The removal of trees on a property line will require the permission of both property owners.
- All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
- The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

77) Landscape Plan (LP) requirements.

78) Landscape Plan Terms of Reference must be adhered to for all tree planting: Click Here. For more information on these requirements please contact hayley.murray@ottawa.ca

79) Additional Elements for Tree Planting in the Right of Way:

- Please ensure any retained trees are shown on the LP
- Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.
- Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the minimum soil volumes requested.
- The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.
- Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- Maintain 2.5m from curb

- Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.
- Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Parkland

Comments:

80) Cash-in-lieu of parkland / parkland dedication

a. Parkland Dedication By-law No. 2022-280

81) Provide a breakdown of past parkland dedication as it relates to the site and draft parkland dedication calculation for cash in lieu of parkland dedication.

82) Given the site's proximity to parkland, proposed connectivity to the pathway system, and amenity space on site, PFP is willing to consider cash in lieu of parkland dedication. Note that if the proposed density or layout changes, this comment may change.

83) The pathway extending to the north, and connection to the Mud Creek Trail is a desirable location for a public access easement.

Feel free to contact Jessica Button, Parks Planner, for follow-up questions.

Conservation Authority

Comments:

84) To be provided under separate cover.

Feel free to contact Insert Name, Rideau Valley Conservation Authority, for follow-up questions.

Other

85) Under the Affordable Housing Community Improvement Plan, a Tax Increment Equivalent Grant (TIEG) program was created to incentivize the development of affordable rental units. It provides a yearly fixed grant for 20 years. The grant helps offset the revenue loss housing providers experience when incorporating affordable units in their developments.

a) To be eligible for the TIEG program you must meet the following criteria:

i) the greater of five units OR 15 per cent of the total number of units within the development must be made affordable

ii) provide a minimum of 15 per cent of each unit type in the development as affordable

iii) enter into an agreement with the city to ensure the units maintain affordable for a minimum period of 20 years at or below the city-wide average market rent for the entire housing stock based on building form and unit type, as defined by the Canada Mortgage and Housing Corporation

iv) must apply after a formal Site Plan Control submission, or Building Permit submission for projects not requiring Site Plan Control, and prior to Occupancy Permit issuance

b) Please refer to the TIEG information *at Affordable housing community improvement plan / Plan d'améliorations communautaires pour le logement abordable for more details or contact the TIEG coordinator via email at affordablehousingcip@ottawa.ca.*

86) Other concerns or comments

Submission Requirements and Fees

1. Major Zoning By-law Amendment and Site Plan Control applications
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and

Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Colleen Ivits

Encl. Study and Plan Identification List

Technical Agencies

Urban Design Brief

c.c. Kim Macdonald
Lisa Stern
Mike Giampa
Alex Polyak
Craig Hamilton
Kelly Livingstone
Jessica Button
Hayley Murray
Amy MacPherson

E.2 Permitted ROW Service Connections

From: Jaafar Oleiche
To: Gillis, Sheridan
Subject: FW: 6259 Renaud Road - Pre-application Consultation (PC2025-0018)
Date: Wednesday, January 14, 2026 2:54:54 PM
Attachments: image001.jpg
image002.png
image003.jpg
image004.jpg
image005.jpg
image006.png
image007.png
image008.png

FYI this is a previous correspondence with the city allowing for the connection of water services to Renaud Rd.

Jaafar Oleiche
Project Manager - Land Development

2280 St. Laurent Blvd. Suite 201
Ottawa, ON, K1G 4K1
P 613.739.7111 **x** 169 | **C** 905.966.7697
joleiche@richcraft.com | richcraft.com |

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Thursday, March 13, 2025 3:59 PM
To: Virginia Johnson <vjohnson@lrl.ca>
Cc: Hamilton, Craig <craig.hamilton@ottawa.ca>; Livingstone, Kelly <kelly.livingstone@ottawa.ca>; Stephane Godin <SGodin@lrl.ca>; Haynes, Kris <Kris.Haynes@ottawa.ca>; Maxime Longtin <mlongtin@lrl.ca>; Miguel Tremblay <tremblay@fotenn.com>; Jaafar Oleiche <joleiche@richcraft.com>; Nico Church <church@fotenn.com>
Subject: RE: 6259 Renaud Road - Pre-application Consultation (PC2025-0018)

> You don't often get email from alex.polyak@ottawa.ca. Learn why this is important

Good afternoon Virginia,

We reviewed your proposal in detail and should highlight a few things:

- The example you shared from Riverside South should not be taken out of context as the decisions that were made on that development are not a precedent to the decisions being made on this proposed development.
- We have discussed internally about the 19mm water service connections to the units fronting the ROW, and engineering will be supportive of these connections so long as there will be room for landscaping and trees and the impact to Traffic during construction is reduced. Note that trenchless installation may be required to reduce the impact to the community during construction.

- Regarding the units facing Melodie Street, only the units facing Melodie Street would be permitted connection to the ROW. Note that the full length from road-cut to road-cut would need to be resurfaced.

Happy to discuss with you further if you have follow-up questions or comments.

Regards,

Oleksandr (Alex) Polyak, B.Eng., C.E.T., P.Eng.
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca





Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Virginia Johnson <vjohnson@lrl.ca>
Sent: March 12, 2025 4:49 PM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Hamilton, Craig <craig.hamilton@ottawa.ca>; Livingstone, Kelly <kelly.livingstone@ottawa.ca>; Stephane Godin <SGodin@lrl.ca>; Haynes, Kris <Kris.Haynes@ottawa.ca>; Maxime Longtin <mlongtin@lrl.ca>; Miguel Tremblay <tremblay@fotenn.com>; Jaafar Oleiche <joleiche@richcraft.com>; Nico Church <church@fotenn.com>
Subject: RE: 6259 Renaud Road - Pre-application Consultation (PC2025-0018)

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hello Alex,
Thanks for meeting with us yesterday and the summary you provided below.

The intention of the meeting was to discuss the challenges we for see with the servicing if this was to

be reviewed as a traditional a planned unit development.

We have reviewed the historic design and construction of Hennessy Court in Riverside South (attached) as it is a similar product and has some similar characteristics. For this development, the 19mm water connection for each of the units facing the municipal ROW was tied directly into the watermain in the street. Due to separation requirements and layout constraints, we would be looking to have a very similar design concept on the Renaud Road Project to the previously approved Hennesy Court.

I understand this is not typical for a PUD, and would be looking for a deviation acceptance for stand alone water connections for units fronting Renaud. We would be able to service the sanitary and storm internally utilizing the existing stub's to the property for the majority of the units, with the Exception of the unit's Facing Melodie street. Attached to this e-mail is conceptual layout of what this would look like.

To support this product with active frontage on Renaud, and accommodate the future road widening, we would like to better understand the opportunities for acceptance of the individual water service connections.

Happy to meet to discuss further, and understand if there were any specific challenges that City's team had with the Hennesy Court project.

Thank you,
Virginia Johnson, P.Eng
Civil Engineering Manager/Associate

Please Note: I'll be out of the office on Friday, March 14th.

Head Office – 5430 Canotek Rd., Ottawa, ON
C +1 613-915-9503 **E** vjohnson@lrl.ca
Ottawa | *Pembroke* | *Moncton*
www.lrl.ca

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

E.3 Stormwater Criteria Confirmation

From:	Giovannitti, Terenzo
To:	Gillis, Sheridan
Cc:	Polyak, Alex; Livingstone, Kelly; Jaafar Oleiche; Thiffault, Dustin; Haynes, Kris
Subject:	RE: Trailsedge West – Block 121: Transfer of File and Request for Criteria Confirmation
Date:	Monday, February 2, 2026 10:59:01 AM
Attachments:	image001.png

Hi Sheridan,

This is to confirm you can revise the stormwater quantity control criteria to the originally modelled release rates in the phase 2 report. Please provide excerpts from the report to support the design. You may proceed with the parameters you've identified in your item 2 below.

As for your item 3, the EUC pond 1 provides quality treatment. Therefore, any flows generated on-site travelling to this pond are covered and do not need on-site quality control measures. Please provide excerpts from high level reports to support this design.

Regards,
Terenzo Giovannitti, *P.Eng*
Project Manager
Development Review
Planning, Development and Building Services Department
City of Ottawa
110 Laurier Ave W. Ottawa, ON
613-580-2424 (ext. 23436)
terenzo.giovannitti@ottawa.ca

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Gillis, Sheridan <Sheridan.Gillis@stantec.com>
Sent: January 29, 2026 2:19 PM
To: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Cc: Polyak, Alex <alex.polyak@ottawa.ca>; Livingstone, Kelly <kelly.livingstone@ottawa.ca>; Jaafar Oleiche <joleiche@richcraft.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: Trailsedge West – Block 121: Transfer of File and Request for Criteria Confirmation

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Terenzo,
No problem, the IBI report is attached. See page 88 for minor system flow restrictions as modeled. Storm Drainage Plans and Design Sheet are also included on pages 82-84.

If there's anything else you need, just let us know.
Cheers,

Sheridan Gillis
Project Manager, Community Development
Stantec
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4

Phone: (613) 799-1363
sheridan.gillis@stantec.com

Design with community in mind

From: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Sent: Thursday, January 29, 2026 10:20 AM
To: Gillis, Sheridan <Sheridan.Gillis@stantec.com>
Cc: Polyak, Alex <alex.polyak@ottawa.ca>; Livingstone, Kelly <kelly.livingstone@ottawa.ca>; Jaafar Oleiche <joleiche@richcraft.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: Trailsedge West – Block 121: Transfer of File and Request for Criteria Confirmation

You don't often get email from terenzo.giovannitti@ottawa.ca. Learn why this is important

Hi Sheridan,

Please provide me with a copy of the reports you referenced so that I can verify your request to alter the SWM controls.

Thanks,
Terenzo Giovannitti, *P.Eng*
Project Manager
Development Review
Planning, Development and Building Services Department
City of Ottawa
110 Laurier Ave W. Ottawa, ON
613-580-2424 (ext. 23436)
terenzo.giovannitti@ottawa.ca

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

---

From: Gillis, Sheridan <Sheridan.Gillis@stantec.com>
Sent: January 27, 2026 4:17 PM
To: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Cc: Polyak, Alex <alex.polyak@ottawa.ca>; Livingstone, Kelly <kelly.livingstone@ottawa.ca>; Jaafar Oleiche <joleiche@richcraft.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: Trailsedge West – Block 121: Transfer of File and Request for Criteria Confirmation

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Terenzo,
I'm writing to let you know that Stantec will be taking over the civil engineering and stormwater management design for the Trailsedge West Block 121 development on behalf of Richcraft, replacing LRL Associates as the engineer of record. We've begun our review of the previous submissions and supporting background material, and as we move forward, there are a few items we'd like to confirm with the City to ensure we are applying the correct design criteria.

1. We have updated the fire flow requirements for the site based on revised FUS calculations. This results in the need for new hydraulic boundary conditions. Ziyi Wang from our office will follow up shortly with the formal request and supporting information for those updated fire flow demands

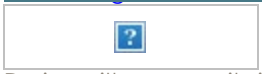
2. We would appreciate confirmation of the appropriate stormwater quantity control criteria for the block. The prior submissions applied an 85 L/s/ha release rate, but our review indicates that this value may not reflect the servicing assumptions originally established for Trailsedge West Phase 1. Although an 85L/s/ha discharge rate is noted on later design reports for Phases 2 and lands east of Compass Street, this rate relates to contemplated residential areas within Phase 1. The development site was previously intended for use as an institutional block, and maintained a different level of stormwater controls per the Phase 1 report. Background modeling as prepared by IBI group for the site referenced as Area 21 and 410F to MH409/Renaud Road MH410C identifies a peak allowable discharge rate of 175L/s + 110L/s with major system flows directed uncontrolled to Mud Creek. Additionally this area did not include the entirely of the Block 121 development as there is additional area added to the block adjacent to Melodie street which was provided with an 85 l/s/ha residential rate in the Phase 1 report. We would like to request revised stormwater criteria given the information in the Phase 1 report and think that the release rate would be a combination of those identified for Areas 21 and 410F and the 85 l/sec/ha for additional block lands.

3. We would also like to confirm the requirements for stormwater quality control. Based on the subdivision-level stormwater strategy, Block 121 drains to EUC Pond 1, which provides the quality treatment for this area. Our understanding is that on-site quality measures (such as an OGS unit) should not be required, consistent with surrounding developments. Please let us know if the City still considers Pond 1 to be providing the required treatment for this block.

If you prefer to discuss any of this in a brief call, we are happy to do so. Otherwise, any clarification you can provide on the quantity and quality control targets would be much appreciated. Ziyi will follow shortly with the hydraulic boundary condition request.

Thanks,

Sheridan Gillis
Project Manager, Community Development
Stantec
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4
Phone: (613) 799-1363
sheridan.gillis@stantec.com



Design with community in mind

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

E.4 Sanitary Capacity Confirmation

From:	Bougadis, John
To:	Gillis, Sheridan
Cc:	Johnson, Warren; Thiffault, Dustin
Subject:	Re: Trailsedge West Block 121
Date:	Tuesday, August 11, 2026 10:35:31 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png

---

Hi Sheridan,

There are no capacity concerns at the Forest Valley PS or the downstream trunk sanitary system related to the anticipated 1.4 L/s increase from Block 121. My greater concern is the cumulative impact of similar requests across the Trail's Edge West developments on the local sanitary system, assuming this development discharges to a local sewer. I recommend checking with the DRS PM for this file to confirm they have the most up-to-date sanitary spreadsheet for the area.

Thanks,

John
Program Manager, Trunk System Planning

From: Gillis, Sheridan <Sheridan.Gillis@stantec.com>
Sent: Tuesday, July 28, 2026 1:15 PM
To: Bougadis, John <John.Bougadis@ottawa.ca>
Cc: Johnson, Warren <warren.johnson@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: FW: Trailsedge West Block 121

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.
ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi John,
We received the following comment on a site plan application in Trailsedge regarding a 1.4 l/sec increase in flows vs the Subdivision Servicing Report:

"Provide discussion in the report about the increase in sanitary flows from the previously planned flows and it's downstream impact on the sewers and Forest Valley Pump Station. Discuss if the pump station is anticipagted to have capacity to support this increase"

Warren has reached out to the info centre in the email below, but I'm wondering if there's someone we could reach out to directly regarding the FVPS and its ability to handle our proposed flow increase.

Thanks, hope things are well.

Sheridan Gillis
Project Manager, Community Development
Stantec

400 - 1331 Clyde Avenue Ottawa ON K2C 3G4
Phone: (613) 799-1363
sheridan.gillis@stantec.com
Stantec
Design with community in mind

From: Johnson, Warren <Warren.Johnson@stantec.com>
Sent: Tuesday, July 28, 2026 10:06 AM
To: Geoinformation Centre / Centre Information <geoinformation@ottawa.ca>
Cc: Gillis, Sheridan <Sheridan.Gillis@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: Trailsedge West Block 121

Hello,

I'm reaching out as directed by the City reviewer to inquire if you have any information to assist in confirming the available capacity of the sanitary infrastructure downstream of the Trailedge West Block 121 development (6259, 6267, 6271, & 6273 Renaud Road), including the Forest Valley Pump Station. Servicing and/or pump station design reports, drainage area plans, and design sheets would be especially applicable.

See attached servicing and sanitary drainage plans outlining the design of the proposed development which is intended to have two connections (to the existing sanitary sewers within Compass Street and Renaud Road) which will both ultimately discharge to the Forest Valley Pump Station. The previous subdivision design brief had assumed a total contribution of 1.2 L/s from the site, however, the peak flows from the proposed development are anticipated to be 2.6 L/s so we need to confirm that the 1.4 L/s increase will not negatively impact the downstream system.

If you require any additional information let me know.

Thanks,

Warren Johnson, L.E.T., C.E.T.
Licensed Engineering Technologist

Direct: (613) 784-2272
warren.johnson@stantec.com

Stantec

With every community, we redefine what's possible.

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. For a list of Stantec's operating entities with associated license and registration information, please visit stantec.com.

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this

e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.
Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.
'

Caution: This email originated from outside of Stantec. Please take extra precaution.
Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.
Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

From:	Giovannitti, Terenzo
To:	Wu, Michael
Cc:	Gillis, Sheridan; Johnson, Warren
Subject:	RE: D07-12-25-0092 - 6259-6273 Renaud Road Updated Boundary Conditions Request
Date:	Tuesday, October 6, 2026 2:24:19 PM
Attachments:	image001.png image002.png image003.png image004.png

Hi Micheal,

No concerns with the 0.1L/s increase.

Terenzo

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: October 06, 2026 12:20 PM
To: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Cc: Gillis, Sheridan <Sheridan.Gillis@stantec.com>; Johnson, Warren <warren.johnson@stantec.com>
Subject: RE: D07-12-25-0092 - 6259-6273 Renaud Road Updated Boundary Conditions Request

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Terenzo, any concerns about the projected 0.1 L/s increase in sanitary peak flow from the site?

Thanks,

Michael Wu, P.Eng.
Project Engineer
He, him

Direct: (613) 738 6033
michael.wu@stantec.com

Stantec

From: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Sent: October 1, 2026 15:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Gillis, Sheridan <Sheridan.Gillis@stantec.com>; Johnson, Warren <Warren.Johnson@stantec.com>
Subject: RE: D07-12-25-0092 - 6259-6273 Renaud Road Updated Boundary Conditions Request

Hi Michael,

See attached updated BC results based on the revised demands.
Let me know if you have any questions.

Thanks,
Terenzo Giovannitti, *P.Eng*
Project Manager
Development Review
Planning, Development and Building Services Department
City of Ottawa
110 Laurier Ave W. Ottawa, ON
613-580-2424 (ext. 23436)
terenzo.giovannitti@ottawa.ca

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: September 25, 2026 1:12 PM
To: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>
Cc: Gillis, Sheridan <Sheridan.Gillis@stantec.com>; Johnson, Warren <warren.johnson@stantec.com>
Subject: D07-12-25-0092 - 6259-6273 Renaud Road Updated Boundary Conditions Request

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Good afternoon, Terenzo:

We are requesting updated boundary conditions for the proposed residential development at 6259-6273 Renaud Road based on the updated site plan and is projected to service a total population of 216 persons.

The updated water and fire flow demands for the development are as follows:

- Average Day Demands (AVDY): 0.7 L/s
- Maximum Day Demands (MXDY): 3.0 L/s
- Peak Hour Demands (PKHR): 4.6 L/s
- Fire Flow Demands (2020 FUS): 233 L/s (14,000 L/min)

The locations for which we are requesting the boundary conditions are the same as in the previous request, per the attached Word file.

In addition, the projected sanitary peak flow for the development has increased slightly to 2.7 L/s (up from 2.6 L/s in the previous submission), which is negligible from a sanitary flow development.

Please advise if the City has any capacity concerns regarding the sanitary peak flow, or if you require additional information to facilitate the updated boundary conditions request.

Thanks,

Michael Wu, P.Eng.
Project Engineer
He, him

Direct: (613) 738 6033

michael.wu@stantec.com

Stantec

With every community, we redefine what's possible.

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. For a list of Stantec's operating entities with associated license and registration information, please visit stantec.com.

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones

adicionales.

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec Consulting Ltd.
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4
stantec.com