THE COMMONS (3610 INNES ROAD) – PHASE 1

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared for:

Glenview Homes (Innes) Ltd.
190 O'Connor Street, 11th Floor
Ottawa, Ontario
K2P 2R3

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

June 30, 2021
Revised: November 26, 2021

Novatech File: 118224
Ref: R-2021-099

NOVATECH
Engineers, Planners & Landscape Architects

November 26, 2021

City of Ottawa
Planning and Growth Management Department
Development Review (Urban Services - East) Branch
Infrastructure Approvals Division
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: **Steve Belan, MCIP, RPP**
Planner II

Sara Mashaie, P.Eng.
Project Manager

Reference: **The Commons (3610 Innes Road) – Phase 1**
Site Servicing and Stormwater Management Report
Novatech File No.: 118224

Enclosed is the Site Servicing and Stormwater Management Report for The Commons (3610 Innes Road) development.

This report addresses the approach to site servicing and stormwater management for Phase 1 of the Subject Site and is submitted in support of the detailed design of the subdivision approval and registration for this phase. This report also provides an update to the conceptual servicing for Phase 2, 3, and 4. The servicing and stormwater management design has been developed based on the requirements of the City of Ottawa and Rideau Valley Conservation Authority.

Should you have any questions, or require additional information, please contact me.

Yours truly,

NOVATECH



Bassam Bahia, M.Eng., P. Eng.
Senior Project Manager | Land Development

cc: Jamie Batchelor, Rideau Valley Conservation Authority
Jillian Normand, Glenview Homes (Innes) Ltd.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 BACKGROUND 1
1.2 DEVELOPMENT INTENT AND PHASING 1
1.3 REPORT OBJECTIVE 2

2.0 REFERENCES AND SUPPORTING DOCUMENTS 3

2.1 GUIDELINES AND SUPPORTING STUDIES 3
2.2 GEOTECHNICAL INVESTIGATION 3

3.0 SERVICING AND GRADING 5

3.1 CONTEMPLATED MSS EUC-PHASE 3 SERVICING CONNECTIONS 5
3.2 GENERAL SERVICING 5
3.3 GENERAL GRADING 5

4.0 STORM SEWER SYSTEM AND STORMWATER MANAGEMENT 6

4.1 STORMWATER MANAGEMENT CRITERIA 6
4.2 PROPOSED STORM DRAINAGE SYSTEM 7
4.2.1 Storm Sewer Design (Minor System) 7
4.2.2 Overland Flow Path (Major System) 8
4.2.3 Best Management Practices and Low Impact Development 8
4.2.1 SWM Facility – EUC Pond 1 8
4.3 HYDROLOGIC & HYDRAULIC MODELING 9
4.4 ADDITIONAL CONSIDERATIONS 9
4.4.1 3636 Innes Road (U-Haul) 9
4.4.2 3604 Innes Road 9
4.4.3 Future Proposed Park (Block 162) 9

5.0 SANITARY SEWER SYSTEM 10

5.1 EXISTING SANITARY INFRASTRUCTURE 10
5.2 PROPOSED SANITARY INFRASTRUCTURE 10
5.3 SANITARY DEMAND AND DESIGN PARAMETERS 10

6.0 WATER SUPPLY SYSTEM 12

6.1 EXISTING WATER INFRASTRUCTURE 12
6.2 PROPOSED WATER INFRASTRUCTURE 12
6.3 WATERMAIN DESIGN PARAMETERS 12
6.4 SYSTEM PRESSURE MODELING AND RESULTS 14

7.0 UTILITIES 15

8.0 EROSION AND SEDIMENT CONTROL AND DEWATERING MEASURES 16

9.0 NEXT STEPS, COORDINATION, AND APPROVALS 17

10.0 SUMMARY AND CONCLUSIONS 18

11.0 CLOSURE 20

LIST OF TABLES

Table 1.1 Land Use, Development Potential, and Yield
Table 2.1 Summary of Geotechnical Servicing and Grading Considerations
Table 4.1 Storm Sewer Design Parameters
Table 5.1 Sanitary Sewer Design Parameters
Table 6.1 Watermain Design Parameters and Criteria
Table 6.2 System Pressure (EPANET)

LIST OF FIGURES

Figure 1.1 Key Plan
Figure 1.2 Existing Conditions
Figure 1.3 Site Plan
Figure 2.1 Geotechnical Investigation – Test Hole Locations (excerpt from Paterson Group)
Figure 3.1 Proposed Servicing Layout Plan
Figure 4.1 EUC Pond 1 – Interim B Conditions
Figure 6.1 Proposed Watermain Sizing, Layout and Junction IDs
Figure 6.2 Ground Elevations (m)
Figure 6.3 Maximum Pressures During BSDY Condition
Figure 6.4 Minimum Pressures During PKHR Condition
Figure 6.5 Available Flow at 20psi During MXDY+FF Condition

LIST OF APPENDICES

Appendix A Correspondence
Appendix B Servicing Report Checklist
Appendix C Storm Sewer Design Sheets and Stormwater Management Report, prepared by J. F. Sabourin and Associates Inc.
Appendix D Sanitary Sewer Design Sheets and Sanitary Calculations
Appendix E Water Demand Calculations and Hydraulic Modeling
Appendix F Geotechnical Investigation (soft copy)
Appendix G Draft Conditions

LIST OF ENCLOSURES

Drawings
CD (report, drawings, and modeling files)

1.0 INTRODUCTION

1.1 Background

This report addresses the approach to site servicing for The Commons development (Subject Site), formerly known as BMR Lands, which is being proposed by Glenview Homes (Innes) Ltd. (Developer).

The Subject Site is located within the north-west quadrant of the East Urban Community (EUC) Phase 3 Area Community Design Plan. More specifically, the site is south of Innes Road, 240m east of its intersection with Lamarche Avenue, as shown on **Figure 1.1** – Key Plan. The site is bound to the south and east by future development lands owned by Richcraft Homes, to the west by the recently constructed residential subdivision known as Orleans Village by Caivan Communities, and to the north by Innes Road, and remnant mixed use parcels.

Historically, the existing land usage was for a commercial plaza that comprised of the BMR sales center/ warehouse and parking lot along Innes Road as shown on **Figure 1.2** – Existing Conditions Plan. Two parts of the existing parcel have since been severed and will be developed under separate planning applications. The existing buildings within the limits of the Subject Site were demolished in 2017. The northern side of the subject side is relatively flat and at grade with Innes Road. The south side is undeveloped and slopes gradually downward to the southern property line.

The existing residential subdivisions to the west, Orleans Village, is currently serviced with public services (i.e. sanitary and storm sewers, and watermain), and drainage is directed towards EUC Pond 1.

1.2 Development Intent and Phasing

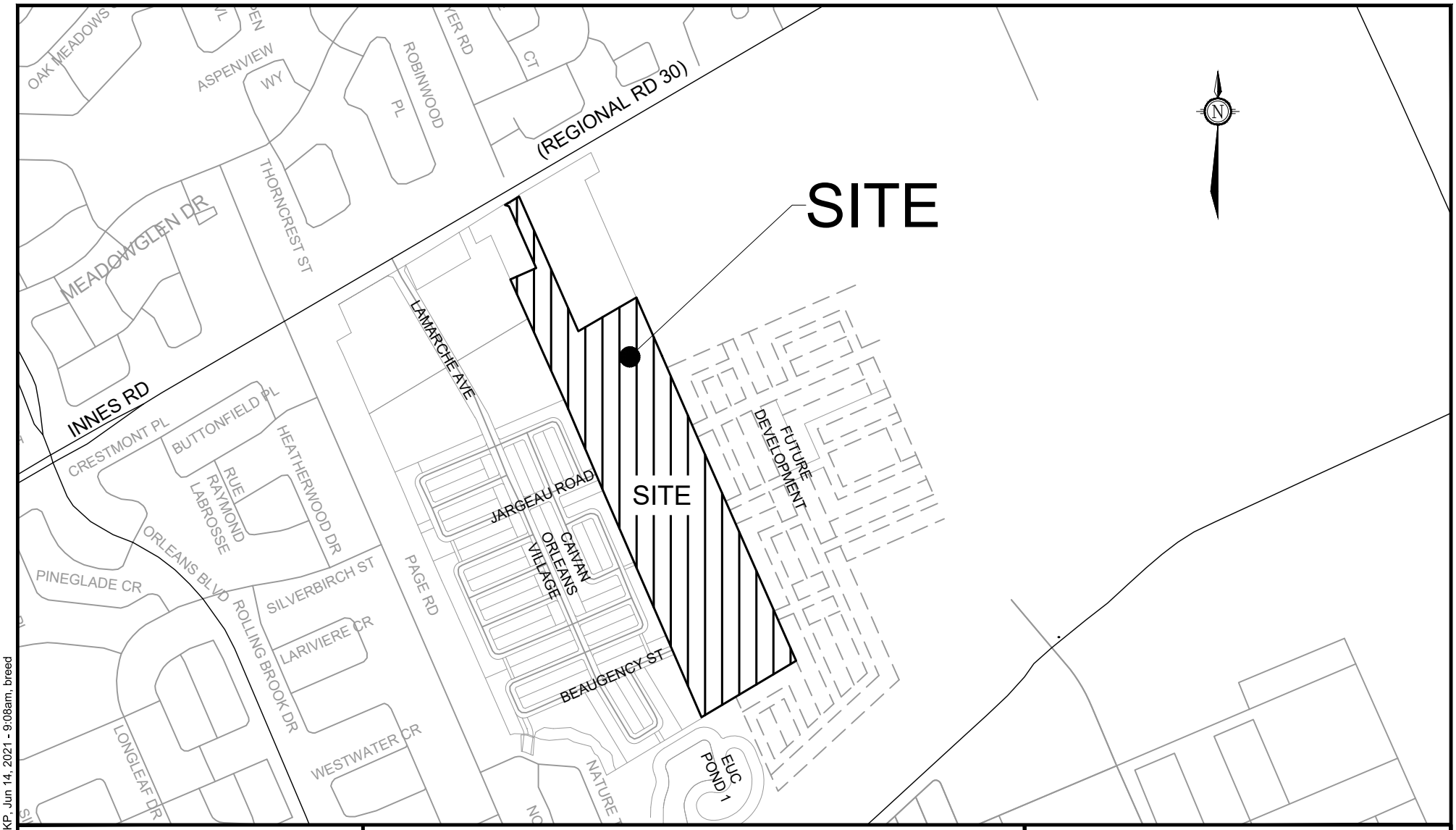
The Subject Site has an area of 15.71 ha, and the proposed subdivision will comprise of residential housing, public right-of-ways/pathways, and parkland, as shown in **Table 1.1**. The development will contain City of Ottawa municipal road allowances of 18.0, 20.0, and 24.0 metres wide. The proposed site development plan is shown on **Figure 1.3** – Site Plan.

Table 1.1: Land Use, Development Potential, and Yield

Unit Type	Number of Units	Area
Singles	151	4.93 ha
Townhouses	151	3.34 ha
Medium Density (2-BR Apartments)	168	2.04 ha
Local Roads / Pathways	-	4.39 ha
Parkland	-	1.01 ha
TOTAL	**470**	**15.71 ha**

In order to facilitate the above, servicing of the Subject Site will be phased. Refer to the Phasing Plan (Drawing 118224-PH) for reference to the limits of the proposed phasing.

As part of Phase 1, the following section describes the rationale and significance of the phase to the overall development:



NOVATECH

Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS (3610 INNES ROAD)

KEY PLAN

SCALE: NOT TO SCALE

DATE: NOV 2021 | JOB: 118224 | FIGURE: 1.1

C:\temp\AcPublish_13004\Fig 1.1- Key Plan.dwg, KP, Jun 14, 2021 - 9:08am, breed

SHT8X11.DWG - 216mmx279mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

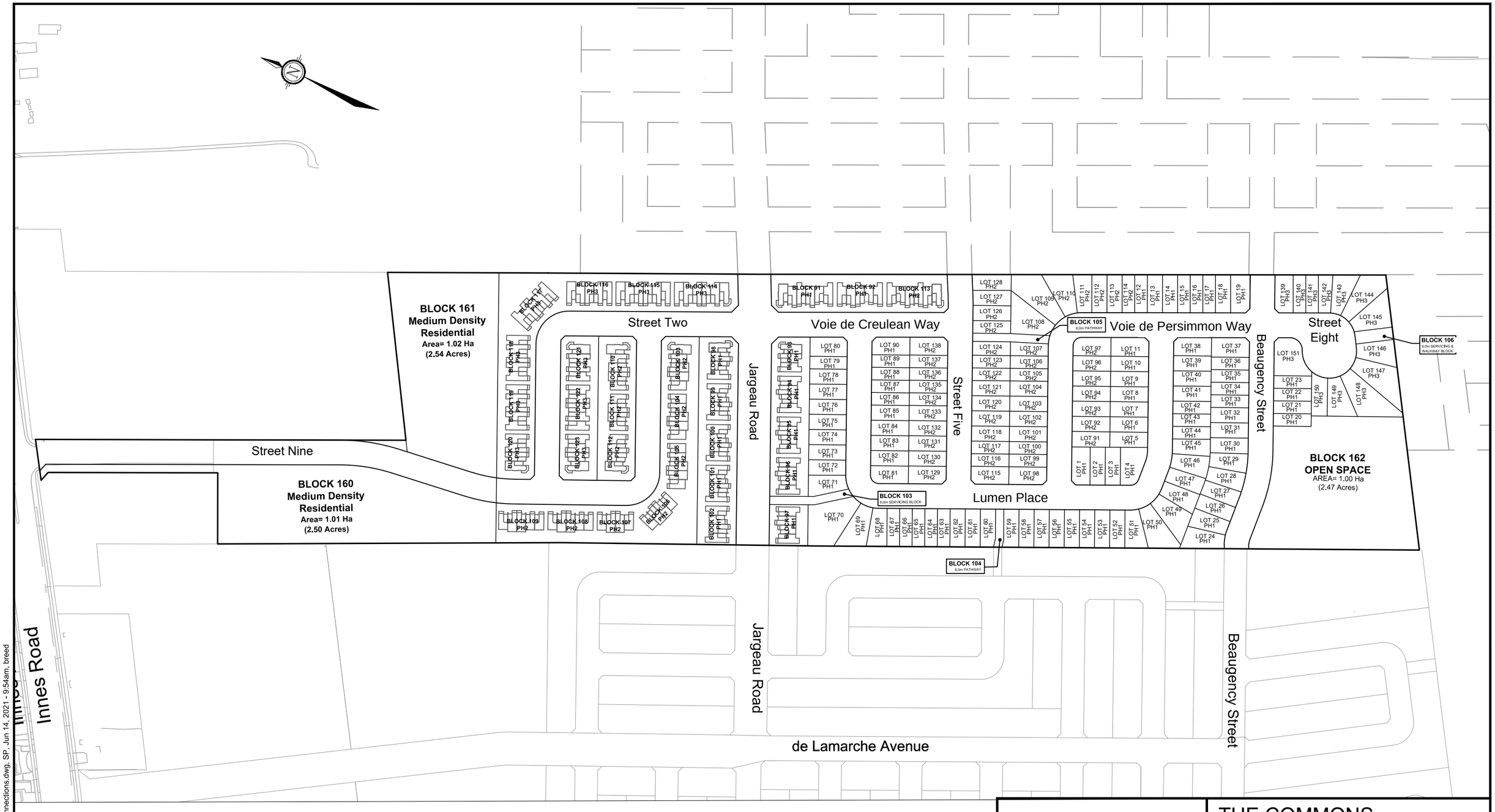
THE COMMONS (3610 INNES ROAD)

EXISTING CONDITIONS

SCALE		
NOT TO SCALE		
DATE: NOV 2021	JOB: 118224	FIGURE: 1.2

SHT8X11.DWG - 216mmx279mm

C:\temp\AcPublish_13004\Fig 1.2- Existing Conditions.dwg, EX, Apr 05, 2020 - 1:25pm, bsweet



C:\temp\AcPublish_13004\Fig 3.1 - Service Connections.dwg, SP, Jun 14, 2021 - 9:54am, breed

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS (3610 INNES ROAD)

SITE PLAN

SCALE		
NOT TO SCALE		
DATE	JOB	FIGURE
NOV 2021	118224	1.3

SHT11X17.DWG - 279mmX432mm

- **Storm Sewers:** The proposed sewers for Phase 1 will be constructed to the existing EUC Pond 1, to serve as the storm outlet for the Subject Site.
- **Stormwater Management**: The existing EUC Pond 1 has sufficient capacity to serve Phase 1 of the Subject Site. No modifications are required as part of Phase 1 construction.
- **Sanitary Sewers**: The proposed sewers for Phase 1 will be constructed, including the extension of the existing trunk sanitary sewer within the Subject Site, to service the future development to the east and serve as the sanitary outlet for the Subject Site.
- **Watermain**: As part of Phase 1, the watermains will be built within Phase 1 and connections will be made to an existing 200 mm watermain within Beaugency Street and to an existing 300mm watermain within Jargeau Road.

As part of Phase 2, the following section describes the rationale and significance of the phase to the overall development:

- **Storm and Sanitary Sewers:** The proposed sewers for Phase 2 will be constructed to extend the systems to the future phases.
- **Stormwater Management**: In Phase 2, the EUC Pond 1 Expansion will need to be implemented.
- **Watermain:** As part of Phase 2, a final watermain connection will be made at the intersection of Street 9 and Innes Road.

In Phase 3, the remainder of the servicing will be implemented as per the ultimate servicing plan.

Phase 4 will allow the development of the high-density blocks when future site plan applications are submitted and approved.

1.3 Report Objective

This report provides detailed servicing and stormwater management details for Phase 1, in support of final approval and registration for this particular phase, in accordance to the Draft Conditions for Draft Approval. The Draft Conditions have been provided in **Appendix G**.

It is important to note that although this report provides an update to the conceptual servicing for Phase 2, 3, and 4, the intention is to demonstrate the functional design of the overall development of the Subject Site. A report addressing the detailed approach to site servicing and stormwater management for Phase 2, 3, and 4 will be provided as part of a separate cover, as the development advances.

Due to the location of the multi-residential blocks, preliminary details for the servicing of the blocks are also provided within this report. The development of these blocks will be subject to a Site Plan Application and detailed site servicing and stormwater management reports will be warranted.

This report will also be provided to various agencies for their approval and in support of obtaining any applicable permits.

The City of Ottawa Applicant Study and Plan Identification List along with proof of a pre-consultation meeting is provided in **Appendix A**. The City of Ottawa Servicing Study Guidelines for Development Applications checklist has been completed and is provided in **Appendix B**.

2.0 REFERENCES AND SUPPORTING DOCUMENTS

2.1 Guidelines and Supporting Studies

The following guidelines and supporting documents were utilized in the preparation of this report:

- **City of Ottawa Official Plan** (OP)
  City of Ottawa, adopted by Council May 2003 (comprehensive review in 2013 and 2016).
- **City of Ottawa Infrastructure Master Plan** (IMP)
  City of Ottawa, November 2013.
- **City of Ottawa Water Distribution Guidelines** (OWDG)
  City of Ottawa, July 2010.
- **Revisions to OWDG** (ISTB-2010-01, ISTB-2014-02, ISTB-2018-02, ISTB-2018-04)
  City of Ottawa, December 2010, May 2014, March 2018, and June 2018.
- **City of Ottawa Sewer Design Guidelines** (OSDG)
  City of Ottawa, October 2012.
- **Revisions to OSDG** (ISTB-2016-01, ISTB-2018-01, ISTB-2018-03)
  City of Ottawa, September 2016 and March 2018.
- **Design Guidelines for Sewage Works and Drinking Water System** (MECP Guidelines)
  Ontario's Ministry of the Environment, 2008.
- **Stormwater Management Planning and Design Manual** (MECP SWM Guidelines)
  Ontario's Ministry of the Environment, 2003.
- **Master Serving Study for East Urban Community Phase 3 Area Community Design Plan** (MSS EUC-Phase 3)
  David Schaeffer Engineering, Dec 2020.
- **Mud Creek Cumulative Impact Study** (Mud Creek CIS)
  Stantec and JTB Environmental Systems, May 2020.

2.2 Geotechnical Investigation

Paterson Group Inc. (Paterson) conducted a geotechnical investigation and subsequent geotechnical review of the lightweight fill requirements in support of the proposed residential development:

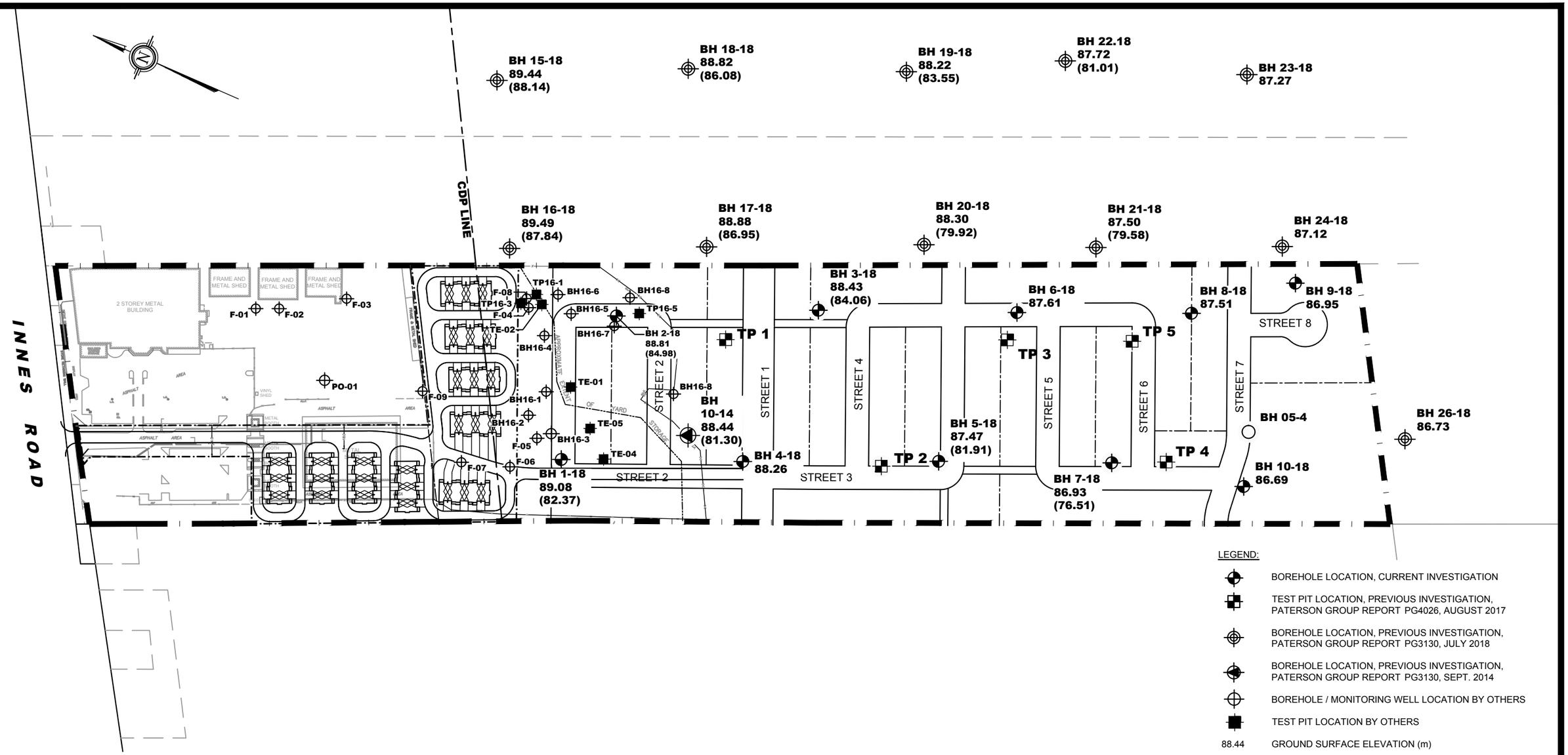
- **Geotechnical Investigation – Proposed Residential Development 3604-3646 Innes Road***, Ottawa, Ontario; Report No. PG4026-2 (revision 2), Paterson Group Inc., April 2, 2020.*
- **Geotechnical Review – Lightweight Fill Requirements, Proposed Residential Development 3604-3646 Innes Road***, Ottawa, Ontario; Report No. PG4026-MEMO.02, Paterson Group Inc., February 18, 2021.*

A digital copy of the foregoing geotechnical information has been provided in **Appendix F.** Based on the geotechnical investigation and subsequent geotechnical review, it is not anticipated that there will be any significant geotechnical concerns with respect to servicing and developing the Subject Site.

The test hole locations have been provided in **Figure 2.1** – Geotechnical Investigation – Test Hole Locations, and a summary of the geotechnical investigation findings has been provided in **Table 2.1** below.

Table 2.1: Summary of Geotechnical Servicing and Grading Considerations

Parameter	Summary
Sub-Soil Conditions	Silty Clay / Glacier Till / Bedrock
Grade Raise Restriction	2.5m to 2.0m
OHSA Soil Type	Type 2 and 3
Groundwater Considerations	Low to Moderate groundwater flow
Pipe Bedding / Backfill	Pipe Bedding 150 mm to 300mm Granular A Pipe Cover 300 mm Granular A Backfill Native Material
Pavement Structure (Driveways)	50mm Wear Course (SuperPave 12.5) 150mm Base (Granular A) 300mm Subbase (Granular B Type II)
Pavement Structure (Local Roadways)	40mm Wear Course (SuperPave 12.5) 50mm Binder Course (SuperPave 19.0) 150mm Base (Granular A) 400mm Subbase (Granular B Type II)
Pavement Structure (Collector Roads)	40mm Wear Course (SuperPave 12.5) 50mm Upper Binder Course (SuperPave 19.0) 50mm Lower Binder Course (SuperPave 19.0) 150mm Base (Granular A) 550mm Subbase (Granular B Type II)
Landscape Consideration	Large Trees (Minimum setback of the full mature height of the tree) Small to Medium tree species (7.5 m set back)



LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION
- TEST PIT LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG4026, AUGUST 2017
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, JULY 2018
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, SEPT. 2014
- BOREHOLE / MONITORING WELL LOCATION BY OTHERS
- TEST PIT LOCATION BY OTHERS
- 88.44 GROUND SURFACE ELEVATION (m)
- (81.30) PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

BASEPLAN PROVIDED BY KORSIAK URBAN PLANNING.

TEST HOLE LOCATIONS AND ELEVATIONS AT TEST HOLES PROVIDED BY J.D. BARNES LIMITED.

SCALE: 1:3000

0 10 20 30 40 50 100 150 200m

FIGURE 2.1- GEOTECHNICAL INVESTIGATION- TEST HOLE LOCATIONS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
3	UPDATED CONCEPTUAL PLAN	09/08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG

GLENVIEW HOMES (INNES) LTD.

SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
3604-3646 INNES ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:3000	Date: 08/2017
Drawn by: RCG	Report No.: PG4026-1
Checked by: NZ	Dwg. No.: PG4026-1
Approved by: DJG	Revision No.: 3

p:\autocad drawings\geotechnical\pg40xx\pg4026\pg4026-1-rev2.dwg

3.0 SERVICING AND GRADING

3.1 Contemplated MSS EUC-Phase 3 Servicing Connections

Storm servicing for the proposed site will outlet into the existing EUC Pond 1. Sanitary servicing for the proposed site will connect to the existing trunk sanitary sewer located within Beaugency Street of the Subject Site. Water service for the proposed site will connect to the existing watermains on Jargeau Road, Beaugency Street and also a connection to the north along Innes Road.

Refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up included in the enclosed drawing set.

3.2 General Servicing

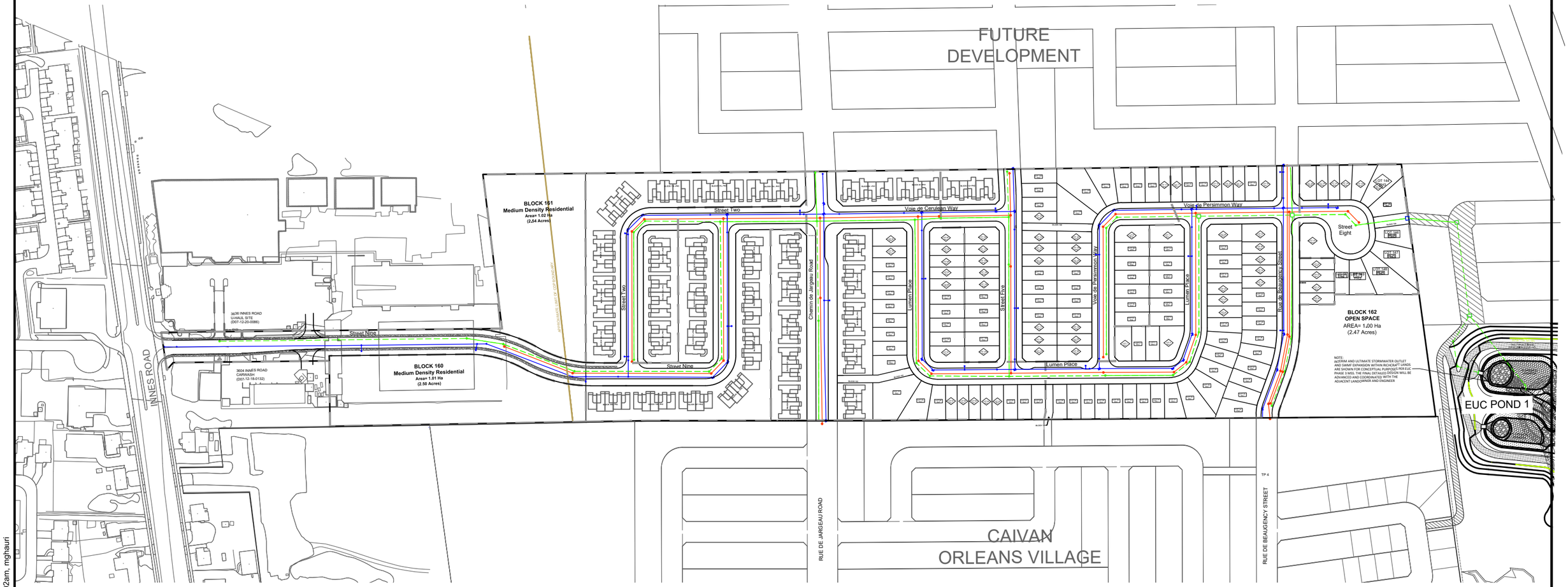
The Subject Site will be serviced using local storm and sanitary sewers, and watermain. The storm / stormwater management, sanitary and water servicing strategy is discussed in further detail in the following sections.

Refer to **Figure 3.1** – Proposed Servicing Layout Plan and the General Plan of Services (Drawings 118224-GP1, 118224-GP2 and 118224-GP3) included in the enclosed drawing set.

3.3 General Grading

The local roadway within the Subject Site will be graded in a saw-toothed pattern to promote surface storage of stormwater. The grading will direct emergency overland flows from the local roads to the existing EUC Pond 1.

Refer to the Grading Plan (Drawings 118224-GR1, 118224-GR2 and 118224-GR3) included in the enclosed drawing set.



LEGEND

- PROPOSED WATERMAIN AND DIAMETER
- MH 101 — PROPOSED SANITARY MH & SEWER
- MH 100 — PROPOSED STORM MH & SEWER
- PROPOSED ROW LIMIT
- PROPERTY BOUNDARY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS (3610 INNES ROAD)

PROPOSED SERVICING LAYOUT PLAN

SCALE		
1:3000		
DATE	JOB	FIGURE
NOV 2021	118224	3.1

C:\temp\AcPublish_22584\118224-PSL.dwg, 11x17 landscape, Nov 30, 2021 - 9:02am, mghauri

4.0 STORM SEWER SYSTEM AND STORMWATER MANAGEMENT

The post-development storm sewer and stormwater management system will adhere to the criteria outlined as a part of the MSS EUC-Phase 3. Storm runoff from the site will outlet to the existing EUC Pond 1 stormwater management facility at the south end of the site.

The following sections outline the preliminary stormwater management design and analysis. J.F. Sabourin and Associates Inc. (JFSA) was retained to prepare a Stormwater Management (SWM) Plan for the Subject Site. The findings and recommendations can be found in the JFSA Report in **Appendix C.** The JFSA Report should be read in conjunction with this report.

4.1 Stormwater Management Criteria

The Subject Site is located within the Ottawa River East Subwatershed, and are tributary to the Ottawa River, which falls under the jurisdiction of the Rideau Valley Conservation Authority (RVCA). The following stormwater management criteria have been developed based on the criteria in the MSS EUC-Phase 3, and requirements of the RVCA and the OSDG.

Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method as follows:
    - 1:2-year return period for local streets;
    - 1:5-year return period for collector roads;
- Ensure that the 100-year hydraulic grade line in the storm sewer is at least 0.3 m below the underside of footing (USF) elevations and ensure that the 100-year + 20% (stress test) hydraulic grade line in the storm sewer is below the USF for the proposed development;
- Inlet control devices (ICDs) are to be installed in road and rearyard catchbasins to control inflows to the storm sewers;

Major System (Overland Flow)

- Overland flows are to be confined within the right-of-ways and/ or defined drainage easements for all storms up to and including the 1:100-year event;
- Storm runoff that exceeds the capacity of the minor system will be stored within road sags;
    - Runoff that exceeds the capacity of the road sags will be conveyed overland along defined major system flow routes towards the proposed major system outlet to the existing EUC Pond 1;
- Major system storage in backyards is not to be included/ accounted for in design computations;
- Maximum depth of flow (static + dynamic) on local and collector streets shall not exceed 0.35 m and shall be confined to the road right-of-way, as well as not touch any part of the building envelope and must remain below the lowest building opening during the stress test event;
- For front yards, there must be 0.15 m of vertical clearance between the spill elevation on the street and the ground elevation at the nearest building envelope that is in the proximity of the flow route or ponding area;
- For rear yards, there must be 0.30 m of vertical clearance between the rear yard spill elevation and the ground elevation at the adjacent building envelope;

- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60.

Water Quality & Quantity Control – Interim as part of Phase 1

- A *Normal* (70% TSS removal) level of quality control will be provided by the existing EUC Pond 1 SWM Facility in the interim, which outlets to Mud Creek, and ultimately outlets to Green's Creek and then the Ottawa River.

Water Quality & Quantity Control – Ultimate as part of Phase 2, 3, and 4

- An *enhanced* (80% TSS removal) level of quality control will be provided by the existing EUC Pond 1 SWM Facility in the ultimate as part of the pond expansion (under separate cover), which outlets to Mud Creek, and ultimately outlets to Green's Creek and then the Ottawa River.

4.2 Proposed Storm Drainage System

Storm servicing for the Subject Site will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while runoff from larger storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). The EUC Pond 1 SWM facility is the outlet for both the major and minor systems.

Excerpts of the storm sewer design sheets from the MSS EUC-Phase 3, demonstrating that the Subject Site was accounted for in the EUC Pond 1 SWM facility revisions/pond expansion, can be found in **Appendix C**. Refer to the MSS EUC-Phase 3 for additional details on the revisions/pond expansion. The East Urban Community Phase 3 Area Community Design Plan – Conceptual Storm Servicing is included in the enclosed drawing set. For reference to the Subject Site's location, refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up.

4.2.1 *Storm Sewer Design (Minor System)*

The minor system has been designed using the Rational Method per the City of Ottawa's Design Guidelines. The storm sewer design sheets are provided in **Appendix C**. Refer to the Storm Drainage Area Plan (Drawing 118224-STM) for details. The criteria used to size the storm sewers are summarized in **Table 4.1** below.

Table 4.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2-year Return Period
Collector Roads	5-year Return Period
Storm Sewer Design	Rational Method/Modeling
IDF Rainfall Data	OSDG
Initial Time of Concentration (T_c)	10 minutes
Minimum Velocity [(1)]	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

[1]A minimum gradient of 0.65% is required for any initial sewer run with less than 10 residential connections.

For both the interim and ultimate conditions, inlet control devices (ICDs) are to be installed in roadway catchbasins and rear yard catchbasin outlets to limit inflows to the minor system during larger storm events.

4.2.2 *Overland Flow Path (Major System)*

The Subject Site has been graded to provide an engineered overland flow route (major system) for large, infrequent storms or in the event that the storm sewer system becomes obstructed. Flows will be directed to EUC Pond 1. The major system is to be designed to conform to the design standards outlined in Section 5.5 of the OSDG.

4.2.3 *Best Management Practices and Low Impact Development*

As outlined within the MSS EUC-Phase 3, the results from site-specific testing found that the vertical movement of water is restricted by the low permeability of the clay soils and the perched water table. As such, implementation of stormwater best management practices (BMPs) and low impact development (LID) techniques to mitigate the reduction in groundwater infiltration / recharge resulting from the proposed development is not being proposed.

4.2.1 *SWM Facility – EUC Pond 1*

Water quantity control and water quality treatment will be provided by an end-of pipe stormwater management pond, 'EUC Pond 1'.

Interim B Conditions

EUC Pond 1 was modified in 2014 to support the development of the Trails Edge subdivision south of the hydro easement, and the extension of Brian Coburn Boulevard. These modifications were detailed as part of the Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge Subdivision (March 2014) and were referred to as the Interim B conditions.

Upon further review in 2018, it was proposed that the interim drainage area could be expanded to allow for development of the Orleans Village Subdivision, which was initially considered as undeveloped area. This was reviewed as part of the Stormwater Management Report for the Orleans Village Subdivision (July 2018).

Building on the model that was reviewed as part of the July 2018 study, it is proposed that the development of Phase 1 of the Subject Site be permitted under Interim B conditions, similar to Orleans Village, in exchange for Orleans Village mixed-use block 148 and future residential block 147 remaining undeveloped until the ultimate conditions expansion of the north main cell and north forebay in EUC Pond 1 is complete. Refer to Section 5 of the JFSA Report provided in **Appendix C** for additional details.

Refer to **Figure 4.1** EUC Pond 1 – Interim B Conditions which demonstrates the limits of the areas tributary to the EUC Pond 1 and the limits of the proposed development under Interim B conditions.

Ultimate Conditions

Development of Phase 2, 3, and 4 of the Subject Site, as well as lands within the EUC, will require the EUC Pond 1 expansion. Detailed design for the expansion is currently being completed by David Schaeffer Engineering (DSEL).

4.3 Hydrologic & Hydraulic Modeling

The OSDG requires hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the Subject Site was evaluated using the PCSWMM hydrologic/hydraulic model. As mentioned above, JFSA was retained to prepare a SWM Plan for the Subject Site. As such, refer to the JFSA Report found in **Appendix C** for the findings and recommendations from the hydrologic and hydraulic modeling.

4.4 Additional Considerations

4.4.1 *3636 Innes Road (U-Haul)*

The U-Haul site (3636 Innes Road) is tributary to EUC Pond 1 and accounted for in the stormwater modelling analysis. The ultimate storm outlet for the U-Haul site will connect to proposed manhole 164 of the Subject Site, ultimately directing flows to EUC Pond 1.

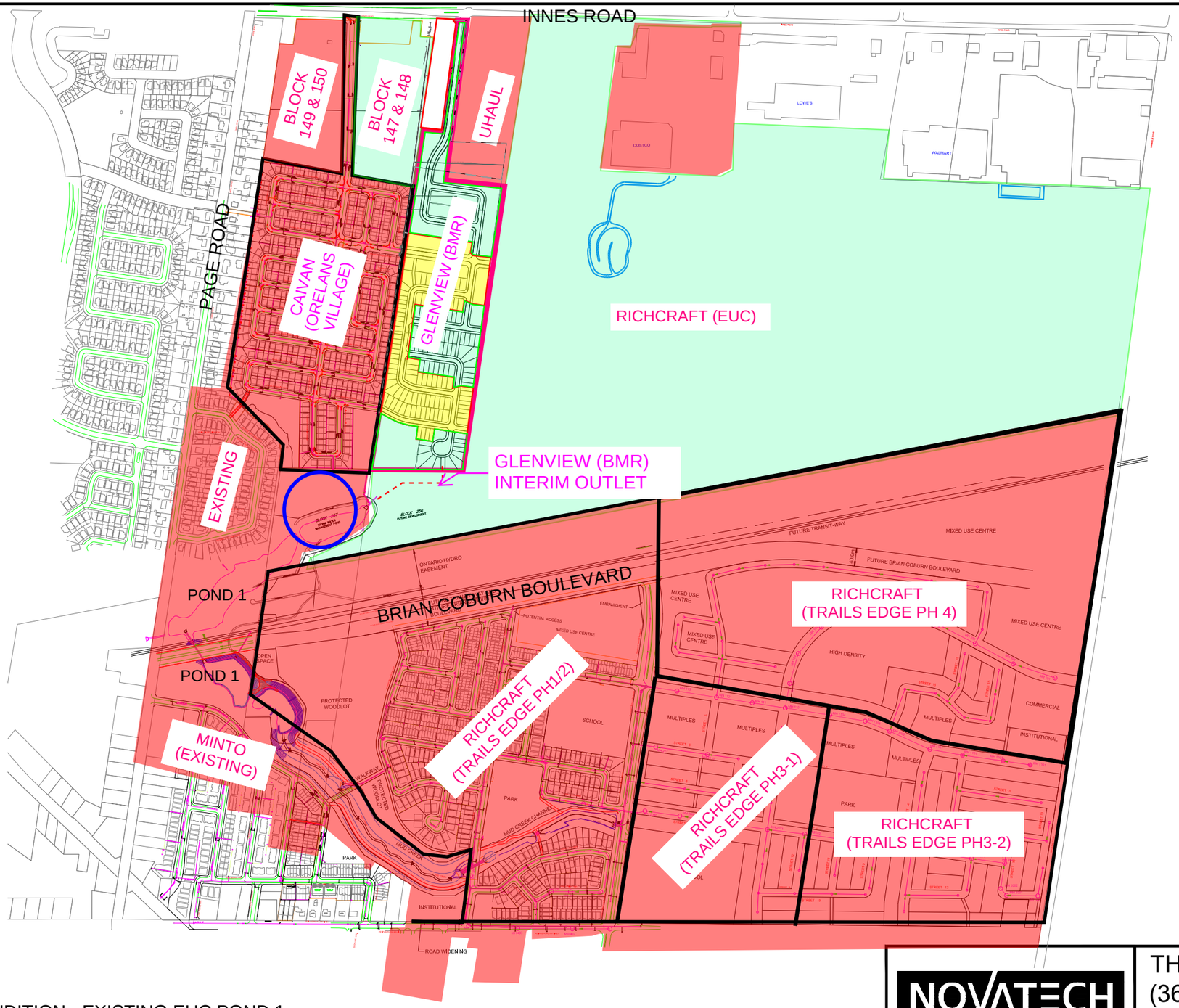
4.4.2 *3604 Innes Road*

3604 Innes Road will consist of a Car Wash which will outlet to an existing storm sewer on Innes road. The site is not tributary to EUC Pond 1. The uncontrolled runoff from the Car Wash entrance has been accounted for in the storm drainage areas for the Subject Site (Drawing 118224-STM1).

Refer to **Figure 4.1** for further details.

4.4.3 *Future Proposed Park (Block 162)*

A swale is being proposed along the southern property line to direct flows to a catchbasin, which will ultimately outlet via a 375mm directly to the 1650mm STM outlet to the pond. Further details can be found in the Grading Plan and General Plan of Services (118224-GR1 and 118224-GP1).



LEGEND

- INTERIM B CONDITION - EXISTING EUC POND 1
- ULTIMATE - FUTURE EUC POND 1 EXPANSION
- GLENVIEW (BMR) PHASE 1

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS (3610 INNES ROAD)

EUC POND 1 - INTERIM B CONDITIONS

SCALE	JOB	FIGURE
NOT TO SCALE		
DATE: NOV 2021	118224	4.1

C:\temp\AcPublish_14868\Fig 1.3 - Site Plan.dwg, SP, Jul 05, 2021 - 10:09am, breed

5.0 SANITARY SEWER SYSTEM

5.1 Existing Sanitary Infrastructure

The sanitary outlet for the site will consist of an existing 525 mm trunk sanitary sewer (gravity) located within Beaugency Street and an existing 200mm sanitary sewer within Jargeau Road. Refer to the General Plan of Services and the Sanitary Drainage Area Plan (Drawings 118224-GP1, 118224-GP2, 118224-GP3 and 118224-SAN) for an illustration of the proposed sanitary connection and layout details.

Excerpts of the sanitary sewer design sheets from the MSS EUC-Phase 3, demonstrating that the Subject Site was accounted for in the downstream sewers, can be found in **Appendix D**. The East Urban Community Phase 3 Area Community Design Plan – Conceptual Sanitary Servicing is included in the enclosed drawing set. For reference to the Subject Site's location, refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up.

5.2 Proposed Sanitary Infrastructure

On-site works

The proposed on-site works will require approximately 1,965 m of on-site sanitary sewer (gravity) to collect wastewater flows and to direct flows to the sanitary outlet. The existing trunk sanitary sewer will be extended within Beaugency Street of the Subject Site to service the future development to the east. The proposed service laterals on Beaugency Street of the Subject Site will connect to a separate collector sanitary sewer running parallel to the trunk sanitary sewer extension and will outlet into the trunk downstream of Beaugency Street.

5.3 Sanitary Demand and Design Parameters

The peak design flow parameters in **Table 5.1** have been used in the sewer capacity analysis. Unit and population densities and all other design parameters are specified in the OSDG.

Table 5.1: Sanitary Sewer Design Parameters

Design Component	Design Parameter
Unit Population: Single Detached Home Semis-Detached /Townhomes 2-BR Apartments	 3.4 people/unit 2.7 people/unit 2.1 people/unit
Residential Flow Rate, Average Daily	280 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0) Harmon Correction Factor = 0.8
Extraneous Flow Rate	0.33 L/s/ha
Minimum Pipe Size	200mm (Res)
Minimum Velocity[1]	0.6 m/s
Maximum Velocity	3.0 m/s
Minimum Pipe Cover	2.5 m (Unless frost protection provided)

[1]A minimum gradient of 0.65% is required for any initial sewer run with less than 10 residential connections.

The sanitary sewer design sheet, located in **Appendix D**, confirms the combined peaked sanitary flows from the Subject Site to the existing 200mm sewer on Jargeau Road and the receiving sanitary trunk on Beaugency Street will be 0.96 L/s and 116.46 L/s, respectively.

Hydraulic Grade Line

In order to comply with the OSDG, the sanitary sewer must have adequate freeboard between the USF elevation and the 100-year HGL, with 1.0m being desirable and 0.3m being the absolute minimum.

Based on review of the Orleans Village Subdivision / Forest Valley Sanitary Trunk Sewer – Hydraulic Gradeline Analysis Test, prepared by JFSA, and included in the MSS EUC-Phase 3, it is anticipated that the HGL within the existing trunk sanitary sewer within Beaugency Street will be greater than 1.0m below the proposed USF elevations within the Subject Site owing to the downstream connection to the existing trunk sanitary sewer at Nature Trail Crescent (ID fv07700) having a ground elevation of 87.80m and an HGL of 83.41m. The existing trunk sanitary sewer connection for the Subject Site has a ground elevation of 87.95m and the lowest proposed USF elevation within the Subject Site is 85.90m. For comparison the lowest proposed USF within the Orleans Village Subdivision, fronting the existing trunk sanitary sewer is 85.58m. Excerpts of the Orleans Village Subdivision / Forest Valley Sanitary Trunk Sewer – Hydraulic Gradeline Analysis Test can be found in **Appendix D**.

6.0 WATER SUPPLY SYSTEM

6.1 Existing Water Infrastructure

The watermain connection points for the proposed site are an existing 300 mm watermain within Jargeau Road (Connection 1); an existing 250 mm watermain within Beaugency Street (Connection 2); and an existing 400 mm watermain located at the Innes Road and Street Nine intersection (Connection 3).

As per the MSS EUC-Phase 3, it is proposed that the 300 mm watermain within Jargeau Road be extended to the future development to the east. Excerpts from the MSS EUC-Phase 3 showing the proposed EUC Phase 3 site layout, connection points, and water supply system is included in **Appendix E**. Refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up, included in the enclosed drawing set, for reference to the Subject Site's location.

6.2 Proposed Water Infrastructure

The Subject Site will be serviced with approximately 2,155 m of on-site watermain 200 mm in diameter, and 200 m of a watermain trunk 300 mm in diameter within Jargeau Road. For fire fighting purposes nineteen onsite hydrants are being proposed. Refer to the General Plan of Services (Drawings 118224-GP1, 118224-GP2 and 118224-GP3) for an illustration of the proposed water supply system.

6.3 Watermain Design Parameters

Boundary conditions were provided by the City of Ottawa, based on the OWDG water demand criteria for the proposed development comprising of approximately 180 single family dwellings, 109 townhouses and 168 medium density units. The boundary conditions are included in **Appendix E**.

The domestic demand design parameters, fire fighting demand design scenarios and system pressure criteria design parameters are outlined in **Table 6.1** below. The system pressure design criteria used to determine the size of the watermains, required within the Subject Site, and are based on a conservative approach that considers three possible scenarios.

Table 6.1: Watermain Design Parameters and Criteria

Domestic Demand Design Parameters	**Design Parameters**
Unit Population: Single Detached Home Semis-Detached /Townhomes 2-BR Apartments	 3.4 people/unit 2.7 people/unit 2.1 people/unit
Basic Day Residential Demand (BSDY)	350 L/c/d
Maximum Day Demand (MXDY)	2.5 x Basic Day
Peak Hour Demand (PKHR)	2.2 x Maximum Day
Fire Demand (FF) Design	**Design Flows**
Conventional single/town units, unless otherwise noted. Medium density residential blocks Hydrant spacing and coding	10,000L/min per FUS / OWDG TB-2014 15,000L/min per FUS 90 to 120m spacing per OWDG
System Pressure Criteria Design Parameters	**Criteria**
Maximum Pressure (BSDY) Condition	< 80 psi occupied areas < 100 psi unoccupied areas
Minimum Pressure (PKHR) Condition	> 40 psi
Minimum Pressure (MXDY+FF) Condition	> 20 psi

The firefighting water demands for the Subject Site have been estimated per OWDG which refers to the Fire Underwriters Survey (CGI, 1999) document, abbreviated as FUS.

In accordance with the FUS and based on the proposed zoning, there is potential for less than 3m of separation between the single family, semi-detached, and row townhome wood-framed buildings, which would require the fire area in the FUS estimate for multiple buildings to be treated as a contiguous block area. This results in a high fire flow demand which is difficult to attain from the existing system; moreover, it would trigger larger diameter watermain size within the Subject Site, creating system vulnerabilities such as water age issues. As per the ISTB-2014-02, fire flows may be capped at 167 L/s (10,000 L/min) for single family, semi-detached, and row townhome, provided certain site criteria are met. The criteria are:

- For singles: a min separation of 10m between the backs of adjacent units.
- Traditional side-by-side semi-detached or row townhomes:
    a. firewalls with a min two-hour rating to separate the block into fire areas of no more than the lesser of 7 dwelling units, or 600 m^2 of building area; and
    b. Min separation of 10 m between the backs of adjacent units.

In general, the proposed layout of the Subject Site in conjunction with the established zoning setbacks ensures that the minimum separation of 10 meters between the backs of adjacent units is achieved and the capped fire flow of 167 L/s can be used for the majority of the residential units being proposed.

Notwithstanding the above, three areas have been identified where a minimum separation of 10 meters between the backs of adjacent units is not achieved. Refer to Figures E-4 and E-5 found in **Appendix E** for the locations of the areas of concern. These areas have been reviewed to

ensure that there is available fire flow in the neighbouring hydrants for fire fighting purposes per the ISTB-2014-02. As such, firewalls with a minimum two-hour rating will not need to be implemented.

Detailed FUS calculations can be found attached in **Appendix E**.

6.4 System Pressure Modeling and Results

System pressures for the Subject Site were estimated using the EPANET engine within PCSWMM.

The PCSWMM model layout is demonstrated in **Figure 6.1** – Proposed Watermain Sizing, Layout and Junction IDs and **Figure 6.2** – Ground Elevations (m).

Domestic Demand

The water demand summary for the complete build out of the Subject Site for the basic daily and peak hour demands has been provided in Error! Reference source not found. **6.2** below. For detailed results refer to the tables provided in **Appendix E.** The detailed results are also demonstrated in **Figure 6.3** – Maximum Pressures During BSDY Condition and **Figure 6.4** – Minimum Pressures During PKHR Condition.

Table 6.2: System Pressure (EPANET)

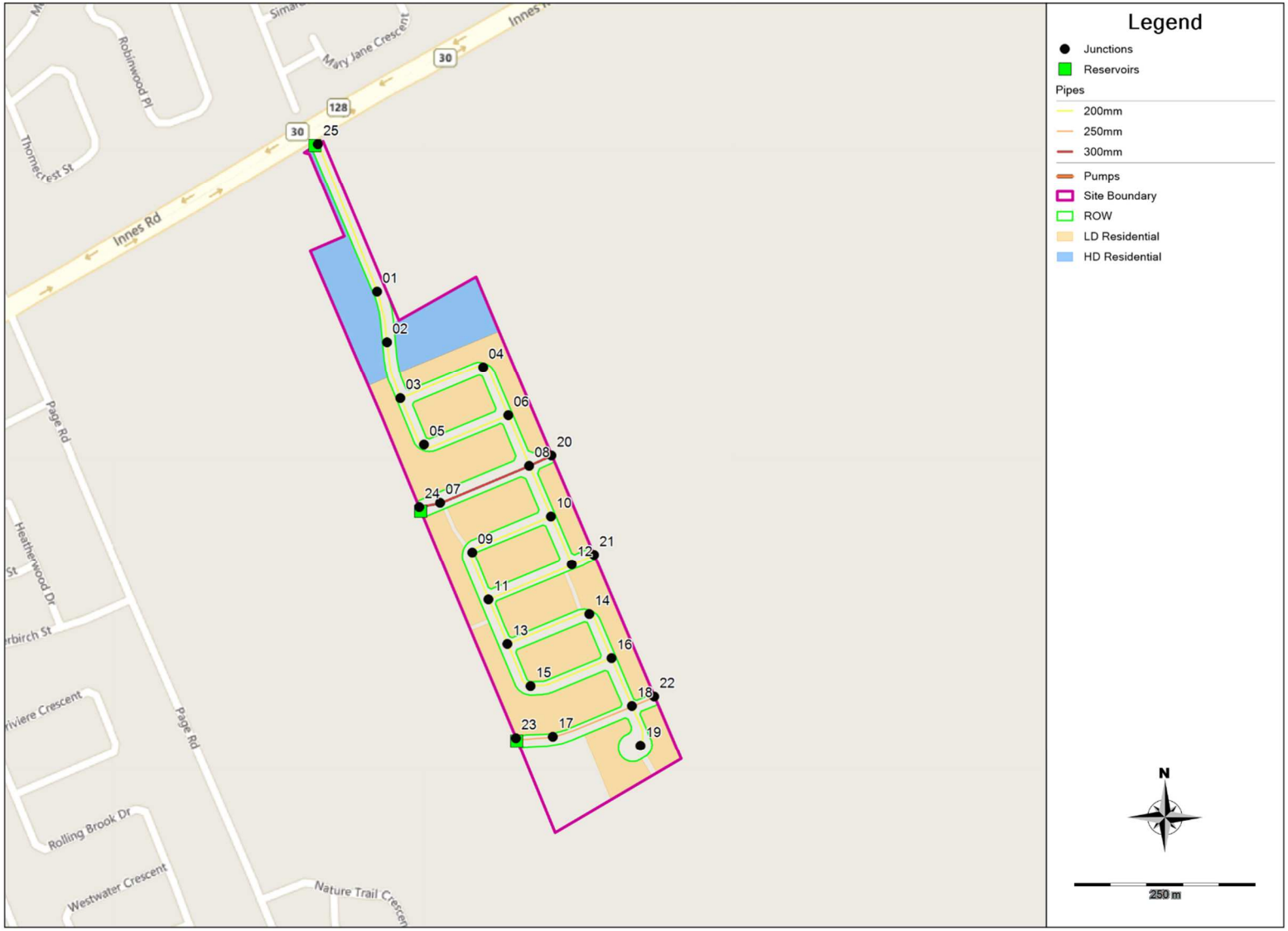
Condition	Demand (L/s)	Allowable Pressure (psi)	Max/Min Pressure (psi)
Basic Daily Demand	5.11	80 (Max)	62
Peak Hour Demand	28.13	40 (Min)	51

Fire Demand

Furthermore, an analysis was carried out to determine the available fire flow under maximum day demand while maintaining a residual pressure of 20psi. This was completed using the EPANET fire flow analysis feature within PCSWMM. For detailed results refer to the tables provided in **Appendix E.** The detailed results are also demonstrated in **Figure 6.5** – Available Flow at 20psi During MXDY+FF Condition.

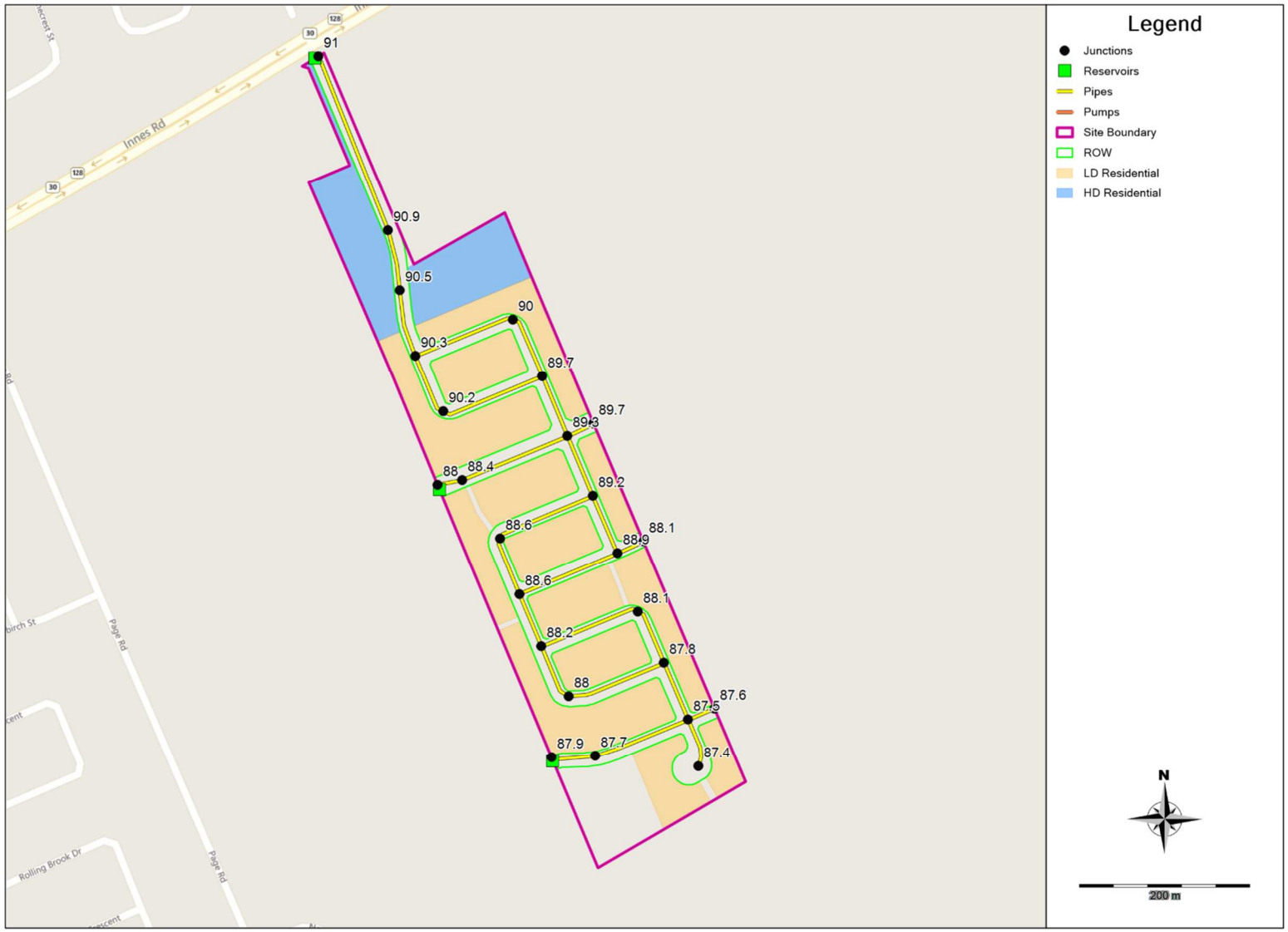
The hydraulic analysis demonstrates that the proposed watermain sizing meets the design criteria.

3610 Innes Road (Former BMR Lands)
Job No. 118224
PCSWMM Model Schematic
Figure 6.1 – Proposed Watermain Sizing, Layout and Junction IDs



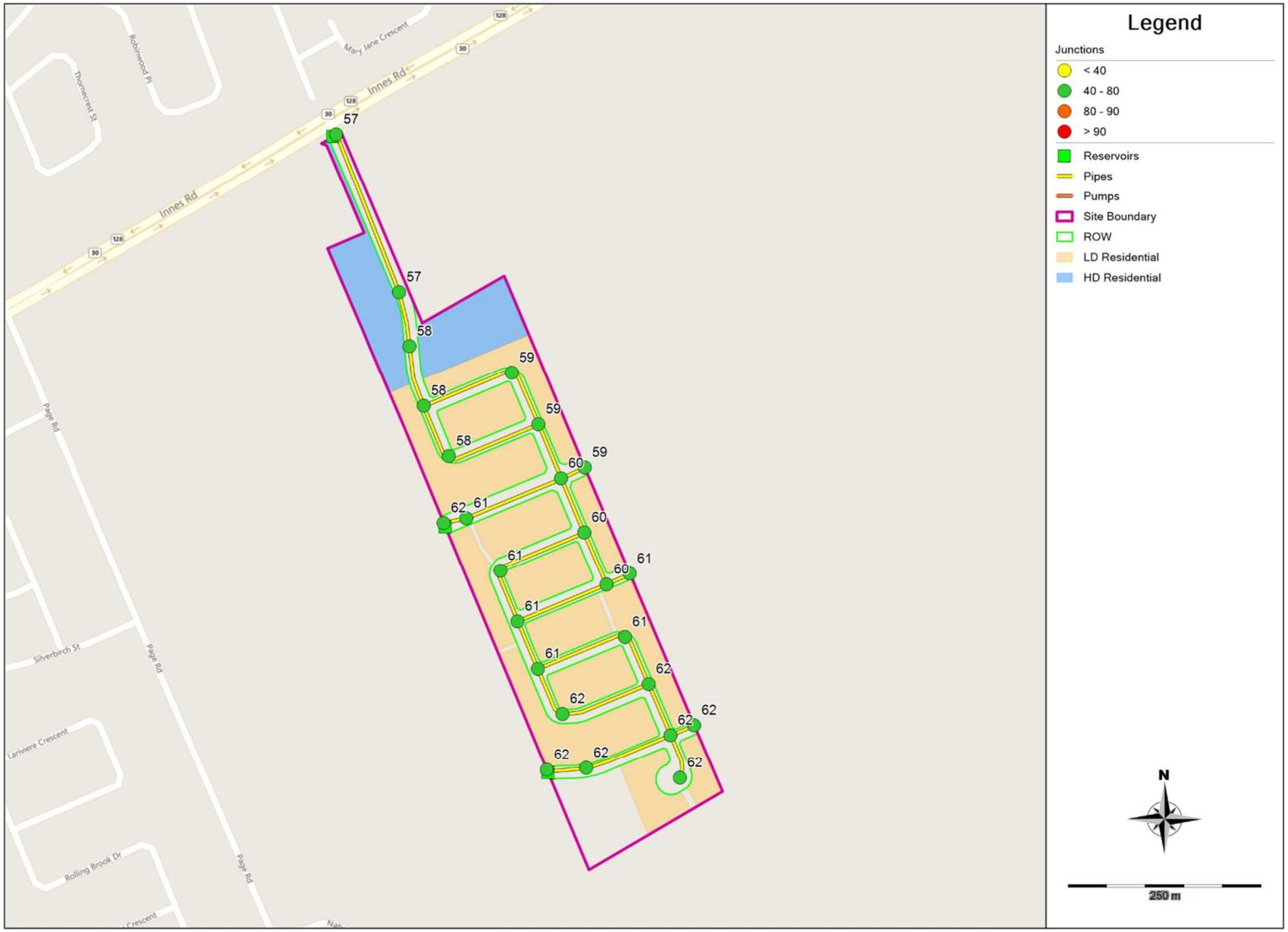
Date: 2020/04/03
M:\2018\118224\DATA\Reports\Design Brief\Conceptual Submission 2\Figures\EPANET Model Schematic.docx

3610 Innes Road (Former BMR Lands)
Job No. 118224
PCSWMM Model Schematic
Figure 6.2 – Ground Elevations (m)



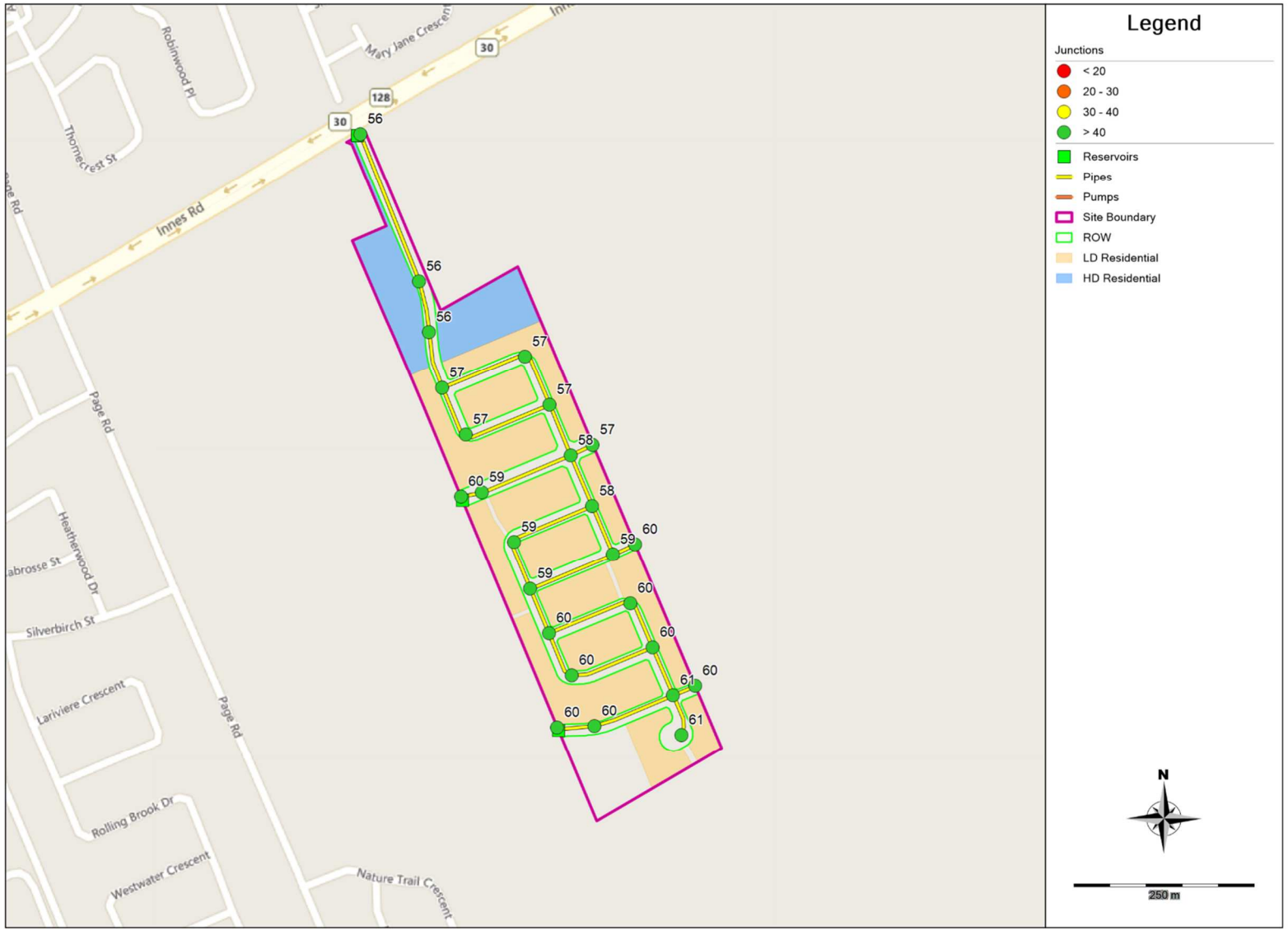
Date: 2020/04/03
M:\2018\118224\DATA\Reports\Design Brief\Conceptual Submission 2\Figures\EPANET Model Schematic.docx

3610 Innes Road (Former BMR Lands)
Job No. 118224
PCSWMM Model Schematic
Figure 6.3 – Maximum Pressures During BSDY Conditions



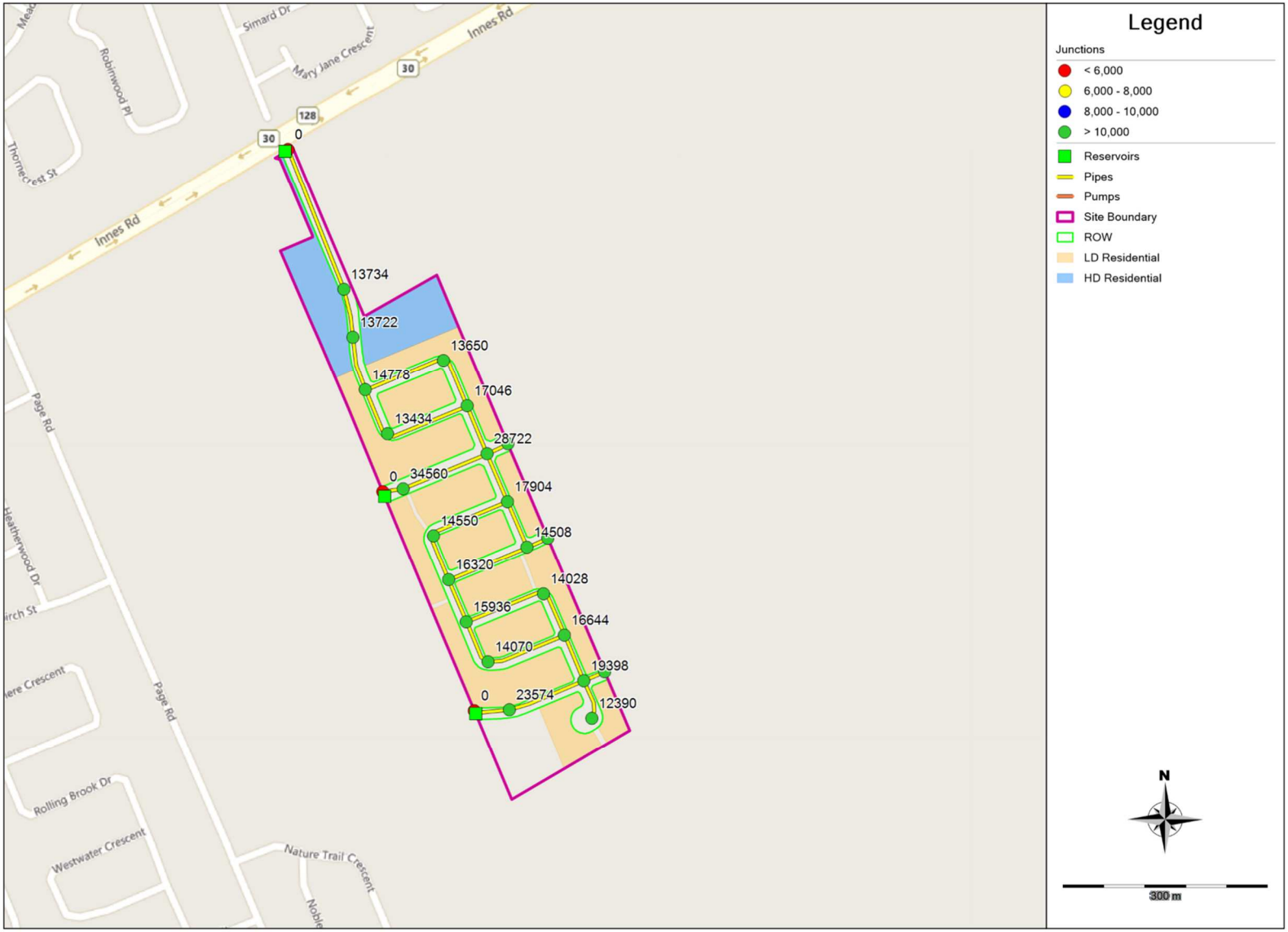
Date: 2020/04/03
M:\2018\118224\DATA\Reports\Design Brief\Conceptual Submission 2\Figures\EPANET Model Schematic.docx

3610 Innes Road (Former BMR Lands)
Job No. 118224
PCSWMM Model Schematic
Figure 6.4 – Minimum Pressures During PKHR Conditions



Date: 2020/04/03
M:\2018\118224\DATA\Reports\Design Brief\Conceptual Submission 2\Figures\EPANET Model Schematic.docx

3610 Innes Road (Former BMR Lands)
Job No. 118224
PCSWMM Model Schematic
Figure 6.5 – Available Flow at 20psi During MXDY+FF Conditions



Date: 2020/04/03
M:\2018\118224\DATA\Reports\Design Brief\Conceptual Submission 2\Figures\EPANET Model Schematic.docx

7.0 UTILITIES

The development will be serviced by Hydro Ottawa, Bell Canada, Rogers Communications, and Enbridge Gas Distribution Inc. Furthermore, streetlighting will be provided within the proposed road allowances, and will be designed in accordance with the City's lighting policy (2016). The utility companies have been contacted and their preliminary designs to service Phase 1 of the development have been received and compiled into the Composite Utility Plan, however, further coordination is still required.

Refer to the preliminary Composite Utility Plan (Drawings 118224-CUP1, 118224-CUP2 and 118224-CUP3) for information.

For the preliminary right-of-way cross sections refer to the Cross Sections Typical ROW (Drawings 118224-XS1 and 118224-XS2), included in the enclosed drawing set.

8.0 EROSION AND SEDIMENT CONTROL AND DEWATERING MEASURES

Temporary erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). Details will be provided on an Erosion and Sediment Control Plan, prepared as part of detailed design. Erosion and sediment control measures may include:

- Placement of filter fabric under all catch basin and maintenance hatches;
- Tree protection fence around the trees to be maintained
- Silt fence around the area under construction placed as per OPSS 577 / OPSD 219.110
- Light duty straw bale check dam per OPSD 219.180

The erosion and sediment control measures will need to be installed to the satisfaction of the engineer, the City, the Ontario Ministry of Environment, Conservation, and Parks (MECP), and the RVCA, prior to construction and will remain in place during construction until vegetation is established. The erosion and sediment control measure will also be subject to regular inspection to ensure that measures are operational.

Refer to the Erosion and Sediment Control Plan (Drawing 118224-ESC) included in the enclosed drawing set.

9.0 NEXT STEPS, COORDINATION, AND APPROVALS

The proposed municipal infrastructure may be subject, but not limited to the following approvals:

- MECP PTTW. Submitted to: MECP. Proponent: Glenview Homes (Innes) Ltd.
- MECP Environmental Certificate of Approval (ECA) for the storm / sanitary sewers through the "Transfer of Review" program. Submitted to: City of Ottawa/ MECP and approved by MECP. Proponent: Glenview Homes (Innes) Ltd.
- MECP Pre-authorized watermain alteration and extension program granted as part of City of Ottawa's Drinking Water Works Permit (F-1 Form). Submitted to: City of Ottawa. Proponent: Glenview Homes (Innes) Ltd.
- Road Cut Permit. Submitted to City of Ottawa. Proponent: Glenview Homes (Innes) Ltd., or its contractor/agent.
- Tree Cutting Permit. Submitted to City of Ottawa. Proponent: Glenview Homes (Innes) Ltd., or its contractor/agent.
- Separate from this report, the Developer may enter into a Cost Sharing Agreement to provide cost sharing principles and recovery mechanisms for development components that benefit external parties.

10.0 SUMMARY AND CONCLUSIONS

This report demonstrates that the proposed development can be adequately serviced with storm and sanitary sewers and watermain. The report is summarized below:

Stormwater Management:

- The Subject Site will be serviced with approximately 2,260 m of on-site storm sewers ranging from 250 mm to 1500 mm in diameter. The on-site storm sewers will outlet to the existing EUC Pond 1 SWM facility to the south of the Subject Site.
- Storm servicing for the Subject Site will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while runoff from larger storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). The EUC Pond 1 SWM facility is the outlet for both the major and minor systems.
- Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system during larger storm events.
- Road Right-of-Ways will be used for surface storage (i.e. road sags – saw-toothed grading).
- It is proposed that the development of Phase 1 of the Subject Site be permitted under Interim B conditions, similar to Orleans Village, in exchange for Orleans Village mixed-use block 148 and future residential block 147 remaining undeveloped until the ultimate conditions expansion of the north main cell and north forebay in EUC Pond 1 are complete.
- Development of Phase 2, 3, and 4 of the Subject Site, as well as lands within the EUC, will require the EUC Pond 1 expansion. Detailed design for the expansion is currently being completed by David Schaeffer Engineering (DSEL).

Sanitary and Wastewater Collection System:

- The Subject Site will be serviced with approximately 1,965 m of on-site sanitary sewers ranging from 200 mm to 250 mm in diameter, which will direct flows to an existing 525 mm trunk sanitary sewer (gravity) located within Beaugency Street of the Subject Site. The existing trunk sanitary sewer will be extended within Beaugency Street of the Subject Site to service the future development to the east. The proposed service laterals on Beaugency Street will connect to a separate collector sanitary sewer running parallel to the trunk sanitary sewer extension and will outlet into the trunk downstream of Beaugency Street.
- The downstream existing sanitary sewer system has been designed for the flows of the Subject Site and have adequate capacity.

Water Supply System

- The Subject Site will be serviced with approximately 2,155 m of on-site watermain 200 mm in diameter, and 200 m of a watermain trunk 300 mm in diameter within Jardeau Road. The watermain connection points for the proposed site are an existing 300 mm watermain within Jargeau Road (Connection 1); an existing 200 mm watermain within Beaugency Street (Connection 2); and the existing 400 mm watermain located at the Innes Road and Street Nine intersection.

- The proposed watermains have adequate capacity to service the domestic and firefighting demand of the Subject Site.
- Firewalls with a minimum two-hour rating will not need be required within the Subject Site.

Erosion and Sediment Control

- Temporary erosion and sediment control measures will be implemented both prior to commencement and during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987).

Next Steps, Coordination, and Approvals

- MECP PTTW.
- MECP Environmental Certificate of Approval (ECA) for the storm / sanitary sewers through the "Transfer of Review" program.
- MECP Pre-authorized watermain alteration and extension program granted as part of City of Ottawa's Drinking Water Works Permit (F-1 Form).
- Road Cut Permit.
- Tree Cutting Permit.
- Separate from this report, the developer may enter into a Cost Sharing Agreement to provide cost sharing principles and recovery mechanisms for development components that provide direct benefits to more than one party.

11.0 CLOSURE

This report is respectfully submitted for review and subsequent approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

Ben Sweet, P.Eng.
Project Coordinator I Land Development

Bradley Reed,
E.I.T. | Land Development

Reviewed by:



Bassam Bahia, M.Eng., P.Eng.
Senior Project Manager | Land Development

Appendix A
Correspondence

MINUTES
Pre-Consultation Meeting

ADDRESS: 3604-3636 Innes Road
DATE: October 5, 2017
TIME: 3:00pm to 4:00pm
LOCATION: 110 Laurier Ave West, Room 4102E
CONTACT: Michael Boughton

City of Ottawa Staff Present:
Michael Boughton (Planner), Nick Stow (Environmental Planner), Diane Emmerson (Parks Planner), Isaac Wong (Engineer), Ellen Potts (Student Planner)

Invitees Present:
Michael Michaud (Glenview Homes)

1.0 Introductions

2.0 Overview of Proposal

- To develop the rear portion of the site for a residential subdivision consisting of single-detached and townhouse dwellings according to the on-going EUC MUC CDP.

3.0 Summary of Preliminary Comments from City Staff Represented Disciplines

- **Michael Boughton and Ellen Potts provided transportation comments (on behalf of Asad Yousfani) and planning comments**
    - A noise study is required and should take into account the area within 100 metres of the right-of-way of arterial and collector roads, both existing and proposed.
    - A transportation study is required.
        - The new TIA guidelines can be accessed at http://documents.ottawa.ca/sites/documents.ottawa.ca/files/tia_guidelines_en.pdf
        - The study will focus on identifying the road modifications required to safely accommodate the site generated traffic.

- **Isaac Wong provided engineering comments**
    - Please see the attached memo.

- **Nick Stow provided environmental comments**
    - No EIS is required, but a tree conservation report is required.

- **Diane Emmerson provided parks comments**
    - Confirmed that the proposed park is a neighbourhood park
    - Explained the new developer-built park process
        - Reviewed the various amenities needed in this park
        - Developer is to provide a Facility-Fit plan prior to Draft Plan approval
    - Main concerns:
        - Park is lacking street frontage; proposed park is only at 25% street frontage (including Caivan's section), but closer to 50% frontage is preferred.

- Michael Michaud pointed out that Caivan has not provided 50% street frontage for their portion of the park and Richcraft is not supplying any.
- Diane Emmerson suggested that Glenview enter into a cost-sharing agreement with Caivan to compensate the lost profit from the removal of housing units for parkland.
    - It is not common practise in cost sharing agreements to compensate a developer for lost revenue from homes that could have been built. Ellen Potts will look into options for compensation.
- Suggested that residential lots bordering the park on Street 7 and Street 8 be eliminated, but of particular concern is the little "divot" on Street 7
- The general location of the park is fine.
- There may be a potential to shift some of the parkland dedication to the north.
- The park budget is $504,865 per hectare.

4.0 Next Steps

- Meet with City staff to have a discussion regarding subdivision layout/design and coordination the CDP.

5.0 List of Required Plans and Studies

Engineering

- Site Servicing Plan (3 copies)
- Site Servicing Study (3 copies)
- Stormwater Management Report (3 copies)
- Geotechnical Study (3 copies)
- Noise Study (3 copies)
- Transportation Impact Study (3 copies)

Planning / Design / Survey

- Draft Plan of Subdivision (15 copies)
- Land-use table (include on Draft Plan of Subdivision)
- Concept Plan showing proposed street configuration, blocks, lots, and dwelling types (colour coordinated, simple) (3 copies)
- Survey Plan (6 copies)
- Planning Rationale (include explanation of how proposal complies with draft EUC MUC CDP) (3 copies)
- Archaeological Resource Assessment (3 copies)

Environmental

- Tree Conservation Report (3 copies)

****Please submit all plans, studies and reports as separate pdf. files on a USB stick or CD (the Draft Plan of Subdivision should also be submitted as a dwg. file)**

ATTACHMENTS

MEMO

Date: October 6, 2017

To / Destinataire	Ellen Potts, Student Planner	
From / Expéditeur	Isaac Wong, Project Manager, Infrastructure Approvals	
Subject / Objet	**Pre-Application Consultation** **3604 Innes Road Ward No. 2** *Develop the rear vacant portion of the site for a residential subdivision consisting of single-detached and townhouse dwellings.*	File No. PC2017-0262

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications

2. The following Engineering plans and reports are requested for submission:

   a. Site Servicing Plan

   b. Site Servicing Study

   c. Geotechnical Study

   d. Stormwater Management Report

3. Servicing and site works shall be in accordance with the following documents:

   ⇨ Ottawa Sewer Design Guidelines (October 2012)

   ⇨ Ottawa Design Guidelines – Water Distribution (2010)

- ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- ⇨ City of Ottawa Park and Pathway Development Manual (2012)
- ⇨ City of Ottawa Accessibility Design Standards (2012)
- ⇨ Ottawa Standard Tender Documents (latest version)
- ⇨ Ontario Provincial Standards for Roads & Public Works (2013)

4. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

5. The Stormwater Management Criteria, for the subject site, is to be based on the following:

   i. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

   ii. For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.

   iii. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).

   iv. A calculated time of concentration (Cannot be less than 10 minutes).

   v. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.

   vi. For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.

   Note: There may be area specific SWM Criteria that may apply. Check for any related SWM &/or Sub-watershed studies that may have been completed.

6. Deep Services (Storm, Sanitary & Water Supply)

   i. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*

   ii. *Connections to trunk sewers and easement sewers are typically not permitted.*

   iii. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*

   iv. *Review provision of a high-level sewer.*

   v. *Provide information on the type of connection permitted*

      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,*

      d. 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.

      e. *No submerged outlet connections.*

7. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

   i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

8. MOECC ECA Requirements – The applicant shall consult with the local office of the MOECC to determine which ECA, if any, are required. **NOTE: Site Plan Approval, or Draft Approval, is required before any Ministry of the Environment and Climate Change application is sent to the MOECC.**

For residential applications: Charlie Primeau

(613) 521-3450, ext. 251

Charlie.Primeau@ontario.ca

For I/C/I applications: Emily Diamond

(613) 521-3450, ext. 238

Emily.Diamond@ontario.ca

9. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x 24169 or by email at Isaac.Wong@ottawa.ca.

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer here:

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	15	1. Site Servicing Plan	2. Site Servicing Study	S	3
S	15	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	S	3
	2	5. Composite Utility Plan	6. Groundwater Impact Study		3
	3	7. Servicing Options Report	8. Wellhead Protection Study		3
S	9	9. Transportation Impact Assessment (TIA)	10.Erosion and Sediment Control Plan / Brief	S	3
S	3	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis		3
	3	13.Hydraulic Water main Analysis	14.Noise / Vibration Study	S	3
	PDF only	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study		3

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
S	15	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		2
	5	19.Draft Plan of Condominium	20.Planning Rationale	S	3
	15	21.Site Plan	22.Minimum Distance Separation (MDS)		3
	15	23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		3
	3	25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		3
	15	27.Landscape Plan	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)	A	3
S	2	29.Survey Plan	30.Shadow Analysis		3
	3	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)		Available online
	3	33.Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S	3	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		3
S	3	36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features		3
S	3	38.Record of Site Condition	39.Mineral Resource Impact Assessment		3
	3	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species	S	3
	3	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
S	1	44. Land use table	45.		

Meeting Date: June 28, 2019 — Application Type: *Plan of Subdivision*

File Lead (Assigned Planner): Steve Belan — Infrastructure Approvals Project Manager: Sara Mashaie

Site Address (Municipal Address):3604 Innes Road — *Preliminary Assessment: 1☐ 2☐ 3☐ 4☒ 5☐

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that 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.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the* Planning, Infrastructure and Economic Development Department *will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.

LISTE DES ÉTUDES ET DES PLANS À FOURNIR PAR LE REQUÉRANT

Légende : **S** indique que l'étude ou le plan doit accompagner la demande.
A indique que l'étude ou le plan peut être requis pour satisfaire une condition d'approbation ou d'approbation provisoire.

Pour obtenir de l'information et des conseils sur la préparation des études et des plans requis, veuillez consulter : http://ottawa.ca/fr/hotel-de-ville/urbanisme-et-amenagement/amenagement-dune-propriete/le-processus-dexamen-dune-dema-72.

S/A	Nombre d'exemplaires	TRAVAUX TECHNIQUES		S/A	Nombre d'exemplaires
☐	15	46. Plan de viabilisation de l'emplacement	47. Évaluation de la capacité des services publics / étude de viabilisation d'emplacement / résumé	☐	3
☐	15	48. Plan de modelé et de drainage	49. Étude géotechnique / étude sur la stabilité des pentes	☐	3
☐	2	50. Plan général des services publics	51. Étude d'impact sur les eaux souterraines	☐	3
☐	3	52. Rapport sur les options de viabilisation	53. Plan de protection des têtes de puits	☐	3
☐	9	54. Étude sur les transports communautaires et / ou étude d'impacts sur les transports / résumé	55. Plan de contrôle de l'érosion et des sédiments / résumé	☐	3
☐	3	56. Rapport sur la gestion des eaux pluviales / résumé	57. Analyse d'hydrogéologie / du terrain	☐	3
☐	3	58. Analyse hydraulique des conduites principales	59. Étude sur le bruit et sur les vibrations	☐	3
☐	PDF	60. Plan de Modifications aux chaussées	61. Étude relative à la proximité d'un aménagement à la Ligne de la Confédération	☐	3

S/A	Nombre d'exemplaires	AMÉNAGEMENT / CONCEPTION / ARPENTAGE		S/A	Nombre d'exemplaires
☐	15	62. Plan de lotissement provisoire	63. Plan illustrant le tracé du garage de stationnement	☐	2
☐	5	64. Plan de copropriété provisoire	65. Justification	☐	3
☐	15	66. Plan d'implantation	67. Distance de séparation minimale (DSM)	☐	3
☐	15	68. Plan conceptuel indiquant les utilisations du sol et l'aménagement paysager proposés	69. Étude d'agrologie et de la capacité agricole des sols	☐	3
☐	3	70. Plan conceptuel indiquant l'utilisation du sol finale	71. Énoncé des impacts sur le patrimoine culturel	☐	3
☐	15	72. Plan d'aménagement paysager	73. Évaluation archéologique conditions: **S** (plans d'implantation) **A** (plans de lotissement, condominium)	☐	3
☐	2	74. Plan d'arpentage	75. Analyse de l'ombre	☐	3
☐	3	76. Dessins architecturaux en élévation d'un immeuble (plan dimensionnel)	77. Conception Bref (comprend la présentation Comité d'examen de design urbain)	☐	Disponible en ligne
☐	3	78. Analyse du vent		☐	

S/A	Nombre d'exemplaires	ENVIRONNEMENT		S/A	Nombre d'exemplaires
☐	3	79. Évaluation environnementale de site, phase I	80. Évaluation des impacts d'une décharge adjacente/ancienne décharge	☐	3
☐	3	81. Évaluation environnementale de site, phase 2 (en fonction des résultats de la phase 1)	82. Évaluation des caractéristiques du relief	☐	3
☐	3	83. Rapport sur l'état du site	84. Évaluation des impacts sur les ressources minérales	☐	3
☐	3	85. Rapport concernant la conservation des arbres	86. Énoncé d'impact environnemental / évaluation de l'impact sur les espèces menacées	☐	3
☐	3	87. Étude des dangers relatifs aux exploitations minières/étude portant sur les mines ou carrières abandonnées			

S/A	Nombre d'exemplaires	EXIGENCES SUPPLÉMENTAIRES		S/A	Nombre d'exemplaires
☐		88.	89.	☐	

Date de réunion : Type de demande :

Urbaniste responsable du dossier : Gestionnaire de projet, Approbation des demandes d'infrastructure :

Adresse du site (adresse municipale) : *Évaluation préliminaire : 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

*Le chiffre un (1) indique que des révisions importantes sont nécessaires avant qu'une demande d'aménagement puisse être présentée, et le chiffre cinq (5) suppose que la demande semble conforme aux politiques et aux directives d'utilisation du sol de la Ville. Cette évaluation est purement consultative. Elle ne tient pas compte des aspects techniques de la demande et ne garantit d'aucune manière l'approbation d'une demande.

Il est important de noter que la nécessité de produire d'autres études ou plans peut survenir au cours de l'examen de la demande. Si, après la présentation de votre demande, il s'avère que des documents ne figurant pas dans cette liste de vérification sont requis pour compléter la demande, conformément aux dispositions de la Loi sur l'aménagement du territoire *et du Plan officiel, le* Direction général de la planification, de l'infrastructure et du développement économique *vous informera des documents manquants au cours de la période légale de 30 jours. La consultation obligatoire préalable à la demande ne réduit pas le délai normal de traitement de la demande par la Ville, ni ne garantit qu'une demande sera approuvée. Elle a pour but d'aider à sensibiliser et à informer le requérant au sujet des exigences relatives aux demandes, des procédés, des politiques et des principaux enjeux municipaux, avant qu'il ne présente sa demande officielle. Cette liste est valide une année après la date de la réunion. Si la demande n'est pas présentée pendant cette période, le requérant devra à nouveau procéder à une consultation préalable auprès du Direction général de la planification, de l'infrastructure et du développement économique.*

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	
Description of Location	
Land Use Classification	
Development Size (units)	
Development Size (m^2)	
Number of Accesses and Locations	
Phase of Development	
Buildout Year	

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		
Is the proposed driveway within auxiliary lanes of an intersection?		
Does the proposed driveway make use of an existing median break that serves an existing site?		
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		
Does the development include a drive-thru facility?		

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?		
Does the development satisfy the Location Trigger?		
Does the development satisfy the Safety Trigger?		

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer here:

S/A	Number of copies	ENGINEERING		S/A	Number of copies
	15	1. Site Servicing Plan	2. Site Servicing Study		3
	15	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study		3
	2	5. Composite Utility Plan	6. Groundwater Impact Study		3
s	3	7. Servicing Options Report	8. Wellhead Protection Study		3
	9	9. Transportation Impact Assessment (TIA)	10.Erosion and Sediment Control Plan / Brief		3
	3	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis		3
	3	13.Hydraulic Water main Analysis	14.Noise / Vibration Study		3
	PDF only	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study		3

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	15	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		2
	5	19.Draft Plan of Condominium	20.Planning Rationale	S	3
	15	21.Site Plan	22.Minimum Distance Separation (MDS)		3
	15	23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		3
	3	25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		3
	15	27.Landscape Plan	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
S	2	29.Survey Plan	30.Shadow Analysis		3
	3	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)		Available online
	3	33.Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
	3	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		3
	3	36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features		3
	3	38.Record of Site Condition	39.Mineral Resource Impact Assessment		3
	3	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species		3
	3	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
S	1	44. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	45.		

Meeting Date: June 28, 2019

Application Type: *Zoning By-Law Amendment*

File Lead (Assigned Planner): Steve Belan

Infrastructure Approvals Project Manager: Sara Mashaie

Site Address (Municipal Address):3604 Innes Road

*Preliminary Assessment: 1☐ 2☐ 3☐ 4☐ 5☒

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that 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.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the* Planning, Infrastructure and Economic Development Department *will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.

LISTE DES ÉTUDES ET DES PLANS À FOURNIR PAR LE REQUÉRANT

Légende : **S** indique que l'étude ou le plan doit accompagner la demande.
A indique que l'étude ou le plan peut être requis pour satisfaire une condition d'approbation ou d'approbation provisoire.

Pour obtenir de l'information et des conseils sur la préparation des études et des plans requis, veuillez consulter : http://ottawa.ca/fr/hotel-de-ville/urbanisme-et-amenagement/amenagement-dune-propriete/le-processus-dexamen-dune-dema-72.

S/A	Nombre d'exemplaires	TRAVAUX TECHNIQUES		S/A	Nombre d'exemplaires
☐	15	46. Plan de viabilisation de l'emplacement	47. Évaluation de la capacité des services publics / étude de viabilisation d'emplacement / résumé	☐	3
☐	15	48. Plan de modelé et de drainage	49. Étude géotechnique / étude sur la stabilité des pentes	☐	3
☐	2	50. Plan général des services publics	51. Étude d'impact sur les eaux souterraines	☐	3
☐	3	52. Rapport sur les options de viabilisation	53. Plan de protection des têtes de puits	☐	3
☐	9	54. Étude sur les transports communautaires et / ou étude d'impacts sur les transports / résumé	55. Plan de contrôle de l'érosion et des sédiments / résumé	☐	3
☐	3	56. Rapport sur la gestion des eaux pluviales / résumé	57. Analyse d'hydrogéologie / du terrain	☐	3
☐	3	58. Analyse hydraulique des conduites principales	59. Étude sur le bruit et sur les vibrations	☐	3
☐	PDF	60. Plan de Modifications aux chaussées	61. Étude relative à la proximité d'un aménagement à la Ligne de la Confédération	☐	3

S/A	Nombre d'exemplaires	AMÉNAGEMENT / CONCEPTION / ARPENTAGE		S/A	Nombre d'exemplaires
☐	15	62. Plan de lotissement provisoire	63. Plan illustrant le tracé du garage de stationnement	☐	2
☐	5	64. Plan de copropriété provisoire	65. Justification	☐	3
☐	15	66. Plan d'implantation	67. Distance de séparation minimale (DSM)	☐	3
☐	15	68. Plan conceptuel indiquant les utilisations du sol et l'aménagement paysager proposés	69. Étude d'agrologie et de la capacité agricole des sols	☐	3
☐	3	70. Plan conceptuel indiquant l'utilisation du sol finale	71. Énoncé des impacts sur le patrimoine culturel	☐	3
☐	15	72. Plan d'aménagement paysager	73. Évaluation archéologique conditions: **S** (plans d'implantation) **A** (plans de lotissement, condominium)	☐	3
☐	2	74. Plan d'arpentage	75. Analyse de l'ombre	☐	3
☐	3	76. Dessins architecturaux en élévation d'un immeuble (plan dimensionnel)	77. Conception Bref (comprend la présentation Comité d'examen de design urbain)	☐	Disponible en ligne
☐	3	78. Analyse du vent		☐	

S/A	Nombre d'exemplaires	ENVIRONNEMENT		S/A	Nombre d'exemplaires
☐	3	79. Évaluation environnementale de site, phase I	80. Évaluation des impacts d'une décharge adjacente/ancienne décharge	☐	3
☐	3	81. Évaluation environnementale de site, phase 2 (en fonction des résultats de la phase 1)	82. Évaluation des caractéristiques du relief	☐	3
☐	3	83. Rapport sur l'état du site	84. Évaluation des impacts sur les ressources minérales	☐	3
☐	3	85. Rapport concernant la conservation des arbres	86. Énoncé d'impact environnemental / évaluation de l'impact sur les espèces menacées	☐	3
☐	3	87. Étude des dangers relatifs aux exploitations minières/étude portant sur les mines ou carrières abandonnées			

S/A	Nombre d'exemplaires	EXIGENCES SUPPLÉMENTAIRES		S/A	Nombre d'exemplaires
☐		88.	89.	☐	

Date de réunion : Type de demande :

Urbaniste responsable du dossier : Gestionnaire de projet, Approbation des demandes d'infrastructure :

Adresse du site (adresse municipale) : *Évaluation préliminaire : 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

*Le chiffre un (1) indique que des révisions importantes sont nécessaires avant qu'une demande d'aménagement puisse être présentée, et le chiffre cinq (5) suppose que la demande semble conforme aux politiques et aux directives d'utilisation du sol de la Ville. Cette évaluation est purement consultative. Elle ne tient pas compte des aspects techniques de la demande et ne garantit d'aucune manière l'approbation d'une demande.

Il est important de noter que la nécessité de produire d'autres études ou plans peut survenir au cours de l'examen de la demande. Si, après la présentation de votre demande, il s'avère que des documents ne figurant pas dans cette liste de vérification sont requis pour compléter la demande, conformément aux dispositions de la Loi sur l'aménagement du territoire *et du Plan officiel, le* Direction général de la planification, de l'infrastructure et du développement économique *vous informera des documents manquants au cours de la période légale de 30 jours. La consultation obligatoire préalable à la demande ne réduit pas le délai normal de traitement de la demande par la Ville, ni ne garantit qu'une demande sera approuvée. Elle a pour but d'aider à sensibiliser et à informer le requérant au sujet des exigences relatives aux demandes, des procédés, des politiques et des principaux enjeux municipaux, avant qu'il ne présente sa demande officielle. Cette liste est valide une année après la date de la réunion. Si la demande n'est pas présentée pendant cette période, le requérant devra à nouveau procéder à une consultation préalable auprès du Direction général de la planification, de l'infrastructure et du développement économique.*

Ben Sweet

Subject: RE: IPU Review Comments - Oct 2018 EUCMUC MSS

On Jun 20, 2019, at 12:48 PM, Michael Michaud <MMichaud@glenview.ca> wrote:

Hi Sam. Please see attached from Laura. Maybe the anticipated meeting is not required?

Mike

From: Laura Maxwell <LMaxwell@dsel.ca>
Sent: June 20, 2019 12:40 PM
To: van de Lande, Robin <Robin.vandeLande@ottawa.ca>; Ted.Cooper@ottawa.ca; Baird, Natasha <Natasha.Baird@ottawa.ca>
Cc: 'Fairouz Wahab - Richcraft (FWahab@richcraft.com)' <FWahab@richcraft.com>; Steve Pichette <SPichette@dsel.ca>; Matt Wingate <MWingate@dsel.ca>; Michael Michaud <MMichaud@glenview.ca>
Subject: RE: IPU Review Comments - Oct 2018 EUCMUC MSS

Hi Robin, Ted, Natasha,

Please find attached draft updated storm servicing & pond concepts for the northwest quadrant, for review and discussion.

I've provided preliminary notes below [in red], based on a phone conversation with Ted last month about the City comments we received April 29, 2019 [in black].

Attachments are available for download at this link:

* https://spaces.hightail.com/receive/e0VcWngSbx
* Expires Friday June 28th

Can we please meet to discuss and set out next steps for the MSS?

We would like to suggest Monday, June 24th starting anytime between 11:00am and 12:30pm – are you available?

Thanks,

Laura Maxwell, B.Sc.(Civil Eng), M.Pl.
Client Project Manager

DSEL
david schaeffer engineering ltd.

phone: (613) 836-0856 ext. 527
cell: (613) 293-8750
email: lmaxwell@DSEL.ca<mailto:lmaxwell@DSEL.ca>

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the

sender by reply email and destroy all copies of the original.

Following are IPU's comments following our review of the subject MSS:

General

The MSS has been prepared with the intention of fulfilling documentation requirements of the MEA Class EA process. It is normal practice for the City to require documentation and evaluation of alternatives in the MSS prior to recommending the approval by Council of the preferred water, wastewater and stormwater servicing plans (I have attached excerpts from the Area 10 MSS that provides an example of the typical type of servicing alternatives considered / evaluated in an MSS).

[Noted.]

[The public consultation report (that will be published as a MCEA document alongside the existing conditions report, the MSS, the MTS, and the CDP) will describe the evaluation of alternative development scenarios and associated servicing options. I've re-attached a summary of the evaluation that was presented at TAC #4 (Attachment A) and the associated responses to City comments (Attachment B), for reference.]

[The MSS will be updated to further document the consideration of alternative designs.]

It is acknowledged that previous servicing plans have been approved in recent years in the Southeast and Southwest quadrants that need not be re-opened (unless affected by changes in development / servicing elsewhere in the EUCMUC). However, the Northwest quadrant is largely a greenfield area where servicing alternatives are not constrained. (For the Northeast quadrant, given the passage of time and change in environmental setting, should this area remain part of the EUCMUC study area, existing preferred servicing approaches would need to be re-confirmed or revised as appropriate).

[Noted. While servicing alternatives may not be considered constrained within the quadrants, the MSS builds on the existing trunk infrastructure surrounding each quadrant that has been built with allowances for development of the subject lands.]

We are not requesting an exhaustive development and evaluation of alternatives. We explain what would be helpful in our comments on water, wastewater and stormwater below.

[Noted.]

The SWM approach and hydraulic modelling documentation included in the MSS was reviewed and found to be consistent with the City's master servicing and design guideline requirements.

[Noted.]

Water

As per the Area 10 examples, it would be helpful to present alternative watermain networks and a discussion, for example, of how the various alternatives improve looping, simplify phasing/implementation, etc.

[Consideration of alternative designs will be further described in the MSS. See snapshot below for alternative trunk watermain locations that were considered, based on available connection points to the City's existing watermain

network. The network identified in the MSS represents the minimum amount of trunk infrastructure required to meet service pressures and to provide a redundant network. The watermain network in the northeast quadrant will be defined as the internal road network is finalized for each development parcel.]

[cid:image001.jpg@01D52766.41F65DB0]

Wastewater

Again, as per the Area 10 examples, alternative routing of trunk sewers should be presented. As noted in the EUCMUC MSS Alternatives attachment, there appears to be an opportunity to locate the deeper trunk sanitary sewer (Trunk 1) to the hydro corridor alignment (Trunk 2), which would avoid the need to construct the deeper trunk sewer on a local street within a narrow ROW.

[Consideration of the alternative designs will be further described in the MSS. Given the grade raise restrictions for the soils, the overall grading strategy is to keep the road grades as low as possible in the northwest quadrant. The sanitary sewer elevation drives the grading plan for the northwest quadrant. To keep sanitary sewers as flat as possible, the overall concept is to collect as much flow as possible into a main trunk sewer and have the alignment be as direct as possible to the existing outlet within the Orleans Village development. The sanitary sewer is expected to have a max cover of about 3.75m at the downstream end of the system.]

Stormwater (Sewers)

The EUC MUC MSS Alternatives attachment presents a storm sewer alternative similar to the alternative wastewater solution referred to above, whereby the deeper trunk storm sewer (Trunk 1) is relocated to the hydro corridor (Trunk 2), which would avoid the need to construct a deep trunk storm sewer on a local street within a narrow ROW. The terminus of the Snow Storage Facility FM could be relocated to outlet to this storm trunk.

[Consideration of the alternative designs will be further described in the MSS.The attached updated servicing design relocates the trunk storm sewer towards the Hydro One corridor as suggested, to minimize the extent of large storm sewers within local roads, which will contribute to ease of maintenance. The updated servicing design restricts capture and requires storage up to the 100-year design event on development blocks other than low density residential areas. Note that there is a proposed 2.7m dia. storm trunk sewer within the local ROWs surrounding the pond. The attached memo from Paterson (Attachment C) confirms that the construction of a storm sewer up to 3m dia. is acceptable in this area, including where the storm trunk sewer runs parallel to the sanitary trunk sewer. Per the City's direction at TAC #5, the snow disposal facility is assumed to remain in place (e.g. no future development) with its forcemain directly connected to EUC Pond 1, like in existing conditions.]

SWM Pond Expansion

The MSS identified the need to expand the existing EUC Pond 1. The MSS did not present / evaluate alternatives that were considered as to how / where the SWMP was to be expanded. The only approach presented included expansion of the SWMP into the woodlot surrounding the existing pond, part of which is subject to the City's Significant Woodland Guidelines. Application of the Significant Woodland Guidelines must follow the mitigation hierarchy outlined below, which lends itself well to the normal evaluation process requirements of MSSs / Class EAs previously approved by Council. As is outlined in the Guidelines, environmental reports must explicitly address how the mitigation hierarchy has been applied in the proposed development or site alteration.

The mitigation hierarchy is a widely accepted approach in conservation and land use planning for guiding decisions on protection of the natural environment. It categorizes and prioritizes protective measures according to their general type and effectiveness:
Priority 1 - Avoidance: redirection of the proposed action away from the natural feature.
Priority 2 - Minimization: reduction of the magnitude of the proposed action, either in space, time, or both.

Priority 3 - Mitigation: protection of the feature from the proposed action, through measures such as changes in design, physical barriers, and modified operating procedures.
Priority 4 - Compensation: off-setting of the impacts through replacement of the feature and its ecological functions elsewhere, typically at a ratio greater than 1:1 to reflect the greater risks.

The current draft of the MSS has focused entirely on Priority 4 – proposing compensation of only 0.5 ha of tree planting for every 1 ha of loss of woodland around EUC Pond 1. There will be a need to demonstrate why Priorities 1-3 cannot apply if there is a need to expand the SWM Pond into the Significant Woodlands at the perimeter of EUC Pond 1.

[Noted. The attached memo from Kilgour (Attachment D) clarifies the extent of the significant woodland. Based on the new woodland definition and the updated predicted storm inflows (including exclusion of future development of the snow dump), a revised draft pond footprint is proposed for City comment. Please note that overall this pond does not meet the RVCA's request for 80% TSS removal (which is beyond the 70% TSS removal approved for the existing EUC Pond 1), but is expected to achieve around 78% TSS removal for the lands draining to the proposed expanded north forebays.]

Four alternative SWM pond expansion concepts have been presented in the EUCMUC MSS Alternatives attachment. The alternatives present incremental pond expansion approaches:

1) Construct new sediment forebay at east end of existing SWMP, and modify existing outlet structure to more closely discharge pre-development flows so as to minimize peak quantity control storage requirements;

[Per discussions with City staff regarding the Mud Creek CIS study, the project team has previously been directed to keep the existing EUC Pond 1 outflows that were approved under the existing ECA for EUC Pond 1.]

2) If additional quantity control is required beyond Alternative 1, expand existing SWMP into hydro corridor to the south;

[Per the approved EUC Pond 1 design drawings, the Hydro One corridor is the location of the sediment management area for EUC Pond 1.]

3) If additional quantity control is required beyond Alternative 2, expand SWMP to the east of the existing SWMP;

[Noted.]

4) If additional quantity control is required beyond Alternative 3, expand existing SWMP into area south of existing SWMP.

[Noted.]

If there is no means to satisfy quantity and quality control requirements with Alternative 4, then the SWMP could be expanded to the north into the Significant Woodland providing acceptable compensation is agreed to.

[Noted.]

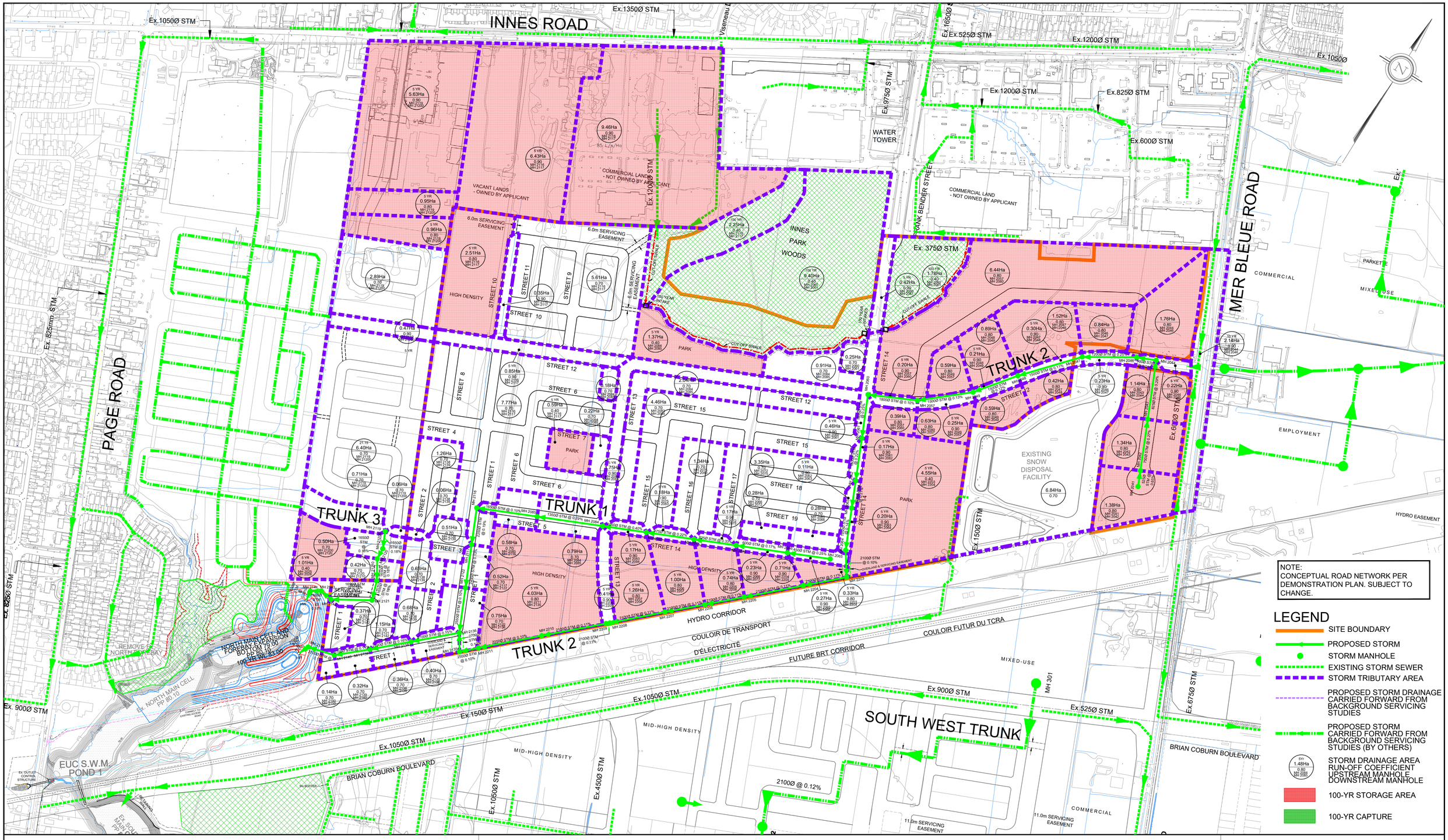
[I've attached an updated slope stability report for the area surrounding the pond (Attachment E), prepared in response

to the geotechnical peer review comments dated April 5, 2019 (Attachment F) and RVCA comments dated February 11, 2019 and March 7, 2019 (Attachment G). The slope stability report shows that the pond slopes could be constructed close to the existing headwater features provided the limit of hazard line is respected, although additional clearance is proposed under the latest pond concept.]
'

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.
'

<image001.jpg>
<04D_733_STM_June2019_DRAFT.pdf>
<03AF_733_ExistSWMPondSections_June1919_DRAFT.pdf>
<03D_733_ServicingPlan_June2019_DRAFT.pdf>
<03F_733_ExistSWMPond_June2019_DRAFT.pdf>



DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

TRAILSEDGE NORTH
CONCEPTUAL STORM SERVICING

PROJECT No. :	20-1195
SCALE	1:3000
DATE:	SEPTEMBER 2020
DRAWING No.	2

Ben Sweet

Subject: RE: Pre-con Follow-up - 3604 Innes Rd, BMR lands

From: Belan, Steve <Steve.Belan@ottawa.ca>
Sent: Tuesday, July 16, 2019 3:34 PM
To: Michael Michaud <MMichaud@glenview.ca>
Subject: Pre-con Follow-up - 3604 Innes Rd, BMR lands

In attendance: Mike Giampa, Robin van de Lande, Sara Mashaie, Mike Thivierge, Sami Rehman, Steve Belan, Michael Michaud, Jake Shabinsky, Jenifer Wong, James Ireland

Hello,

Please refer to the below regarding the Pre-Application Consultation (pre-con) Meeting held on June 28 for the property at 3604 Innes Road for a rezoning and plan of subdivision application in order to allow the development of a plan of subdivision by Glenview Homes. I have also attached the required Plans & Study List for application submission.

As Heard

- Pre-Application Consultation held in 2017, Plan of Subdivision delayed to delays of the CDP
- Brownfield Clean-up in southern portion of site to be completed, 90% complete, RSC awaiting completion
- Early servicing to begin in 2020, home building 2021
- Park concern addressed with Ingrid (see park comments)
- McEwen and U-Haul have purchased lands up on Innes Road, remainder of the lands outside of the CDP to be incorporated into this subdivision
- The City has asked U-Haul and Gib Patterson for an access (private or public) road (or a protected ROW), running parallel to Innes to allow connectivity between lots/developments
- The lands on the edge of the CDP are medium density (62 unit/ha) and will continue that density over the abutting lands to the north
- Adjacent to Significant woodlands, EIS requirements? (see Sami's comments)
- Engineering, MMS is still underway along with the CDP. LIDs in the MSS: the MSS will not have 10mm accommodation cushion. Glenview will be required to implement the use of LIDs either as soft or other, this is all related to Mud Creek flows.

Below are staff's preliminary comments based on the information available since of pre-con meeting:

Planning

- Draft CDP to be posted
- Road pattern looks acceptable
- Planning wants a ROW (public or private running parallel with Innes Road. To be roughly along the rear of the U-haul property. In a pre-consultation, U-haul was considering providing 40 feet at the rear of their property.
- Maybe both Glenview and U-haul could contribute some land for this ROW and provide landscaping to buffer residential uses from the warehouse space
- We have no issue with including lands outside of the CDP to this application
- A Zoning amendment application will need to be submitted to address the permitted uses and accommodate any provision requests.

Urban Design

- This application will not subject to the Urban Design Review Panel
- Mid to higher density development should be orientated (door should face) to the street.
- There should be accommodations made to provide street trees in front of every house and each corner side yards.

Engineering

- Please consult the Pre-con servicing memo Dated October 6, 2017 From Isaac Wong
- Servicing will be in conformity with the MSS
- Storm water quantity and quality will be controlled
- LIDs either as soft or other need to be implemented and the MSS will not have a 10mm accommodation cushion.

Feel free to contact Infrastructure Project Manager, Sara Mashaie, at sara.mashaie@ottawa.ca or 613.580.2424 ext./poste 27885, for follow-up questions

Transportation

- TIA submission / Road modification agreement requirements

Feel free to contact Transportation Project Manager, Mike Giampa, at mike.giampa@ottawa.ca or 613.580.2424 ext./poste 23657, for follow-up questions

Environmental

- The scoped EIS was reviewed and it was found that it does not sufficiently cover the requirements for an EIS in support of the subdivision. The EIS is required since the site is adjacent to a significant woodlot and Species at Risk have been identified in the vicinity by the CDP study, The EIS should cover potential impacts on these two items and demonstrate how the proposed development will have no negative impacts. Further details of EIS requirements can be found in the OP section 4.7.8 and the EIS guidelines:
  https://documents.ottawa.ca/sites/default/files/documents/eis_guidelines2015_en.pdf
- A RSC will be required for sensitive land uses where Brownfields development occurs.

Feel free to contact Sami Rehman, Environmental Planner, at Sami.Rehman@ottawa.ca or 613.580.2424 ext./poste 13364, for follow-up questions.

Parkland

- The park size proposed is 0.96ha. The CDP and Area Parks Plan requires a 1.82ha park block shown as Park 1 in the APP. Caivan has provided 0.654ha of the required 1.82ha. The remaining parkland is to be conveyed by Glenview. Please have Glenview revise Block 186 to reflect the required 1.166ha park block.
- Once a formal application is submitted, Parks and Facility Planning will review and provide draft conditions as required.

Feel free to contact Mary Ellen Wood, Parks Planner, at MaryEllen.Wood@ottawa.ca or 613.580.2424 ext./poste 16482, for follow-up questions.

Conservation Authority

- Comments related to the Conservation Authority
  - Stormwater runoff quality criteria
  - Area specific stormwater runoff criteria
-

Other

- You are encouraged to contact the Ward Councillor, Councillor Laura Dudas, at Laura.Dudas@ottawa.ca about the proposal.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

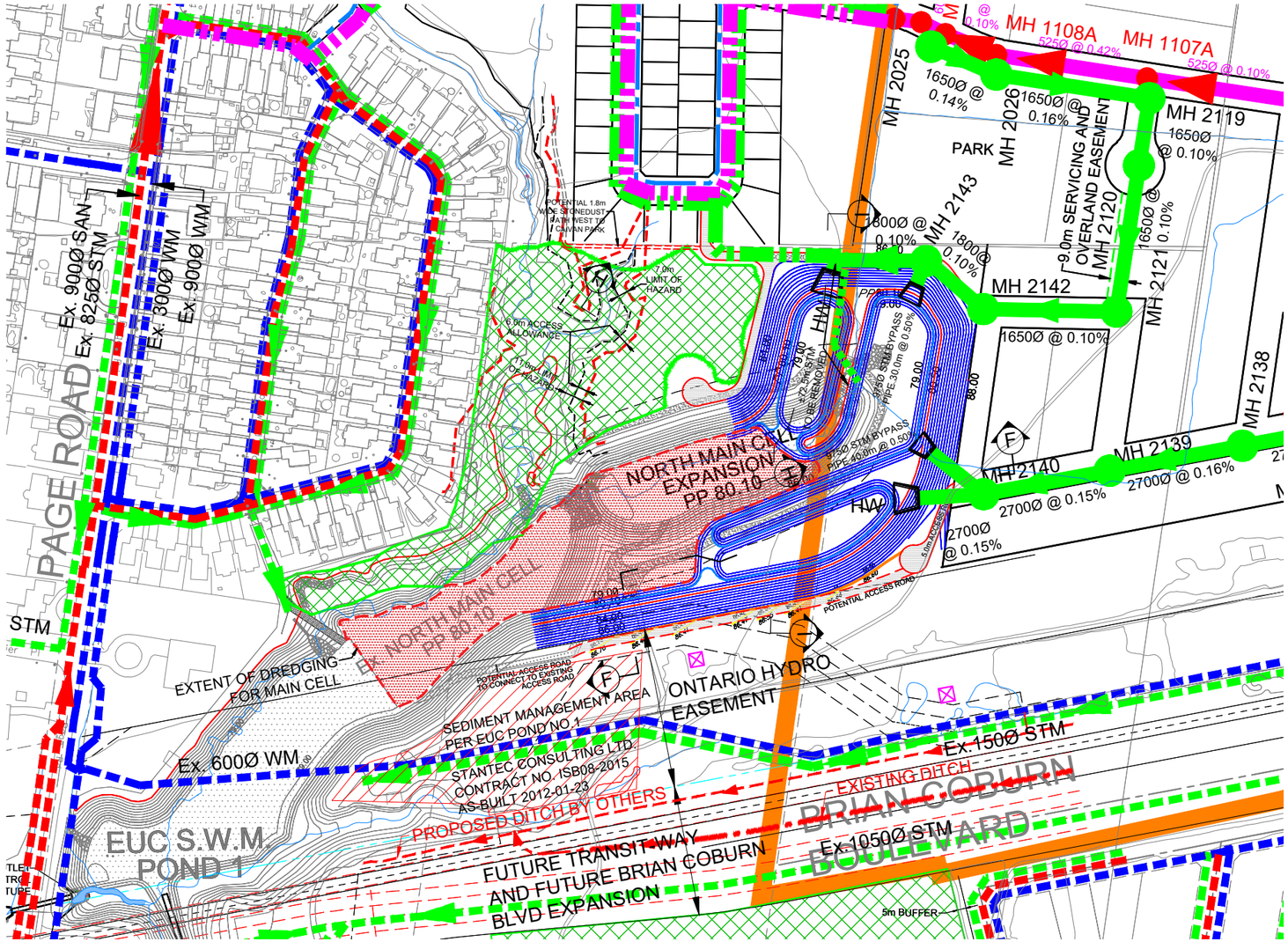
Please do not hesitate to contact me if you have any questions.

Regards,

Steve Belan, MCIP, RPP

Planner Planning Services, Development Review Services
Planning, Infrastructure and Economic Development
City of Ottawa / Ville d'Ottawa
110 Laurier Avenue West, 4th Floor / 110, avenue Laurier Ouest, 4e étage
Ottawa, ON K1P 1J1
Telephone / tél.: 613-580-2424 ext./poste 27591
E-mail / courriel: Steve.Belan@ottawa.ca

EUC POND No. 1 PAGE ROAD SWM FACILITY
REFER TO
STANTEC CONSULTING LTD.
CONTRACT No. ISB08-2015
AS-BUILT 2012-01-23



LEGEND

- EXISTING STORM SEWER
- PROPOSED STORM TRUNK
- PROPOSED STORM SEWER
- STORM SEWER BY OTHERS
- EXISTING SANITARY SEWER
- PROPOSED SAN SEWER
- SAN SEWER BY OTHERS
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- WATERMAIN BY OTHERS
- EXISTING HYDRO TOWER
- SEDIMENT MANAGEMENT AREA

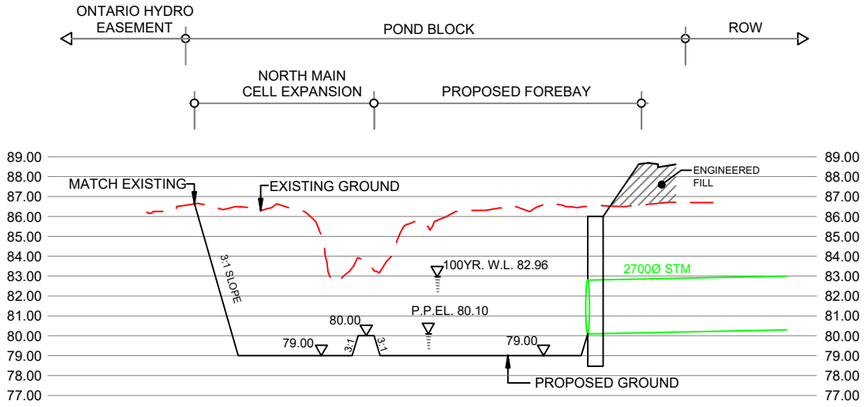
NOTE:
FOR CROSS-SECTIONS F,H, AND I,
REFER TO FIGURE 3A

david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

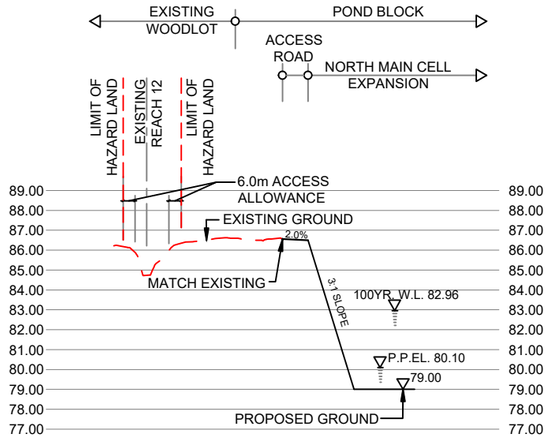
EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN

PROPOSED SWM POND EXPANSION
CITY OF OTTAWA

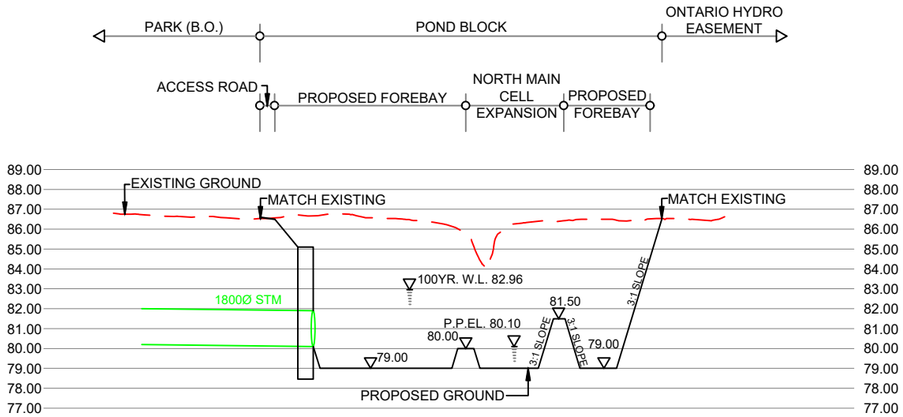
DATE:	JUNE 2019
SCALE:	1:3000
PROJECT No.:	14-733
FIGURE	3



SECTION F-F
SCALE HOR. 1:3000
VER. 1:300



SECTION H-H
SCALE HOR. 1:3000
VER. 1:300



SECTION I-I
SCALE HOR. 1:3000
VER. 1:300

david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN

PROPOSED SWM POND EXPANSION
CITY OF OTTAWA

DATE:	OCTOBER 2019
SCALE:	NOT APPLICABLE
PROJECT No.:	14-733
FIGURE	3A

November 26, 2021

City of Ottawa
Planning, Infrastructure and Economic Development
110 Laurier Avenue West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: **Steve Belan, Planner II**

Sara Mashaie, P.Eng
Project Manager

Reference: **The Commons Phase 1 – 3610 Innes Road**
Response to 1st Review Comments (Engineering)
City File: D07-16-19-0027
Our File: 118224

This letter provides Novatech's response to the engineering review comments received on August 27, 2021 for the above noted development application. Novatech's responses are provided below each of the comments in **bold text** and J.F. Sabourin and Associates' responses are provided in red text.

City of Ottawa (Sara Mashaie) comments, dated August 27, 2021:

A. General:

1. Place application (file) number D07-16-19-0027 and drawing number 18535 on the bottom right-hand side of all drawings.

Drawings have been revised.

2. Note that comments from one drawing can be relevant to other drawings. Also, review the drawings in conjunction with the Geotechnical Investigation and the Site Servicing and Stormwater Management Report. Revise accordingly.

Noted.

3. Provide the Landscape Plan, as available.

Noted.

4. Provide the Topographical Plan of Survey.

Topography of existing grade has been added to the Grading Plan.

5. Provide the street names.

Included with second submission for Phase 1.

6. Why is Dwg. 118224-D1-7 not included?

Details have been included in the second submission.

7. Please note that the Composite Utility Plan (CUP) will be reviewed at a later time, and a CUP Commence Work will then be issued following review.

Noted.

B. List of Drawing(s):

Cover Page, prepared by Novatech Engineering Consultants Ltd.

1. Since this is not a City Capital Project, please remove the text 'Road, Sewers and Watermains', provide the site address at the top, and place the North arrow in the key plan.

The title has been revised.

Notes and Details, Dwg. 118224-ND, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 1.

2. Correct Note 7. Under 'Grading' to S29, and not D29.

Drawing has been revised.

3. Correct Note 6, 8, and 12 to reflect the applicable standard numbers. Ensure that other notes missing the standard numbers is updated accordingly.

Drawing has been revised.

4. Note 6: remove the suggested on-site measures listed. Ensure that this is revised elsewhere, as applicable

Drawing has been revised.

Erosion and Sediment Control Plan, Dwg. 118224-ESC, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 1.

1. Please provide detail for OPSD 219.110 on this drawing.

Drawing has been revised.

2. Please correct the light-duty straw bale barrier OPSD 219.180 (listed in the legend) to: OPSD 219.100.

Drawing has been revised.

3. Note 2: Siltsacks may not be compatible across certain frames and covers. Suggest removing 'siltsacks' and replacing with 'inlet protection measures'. Ensure that this is revised elsewhere, as applicable.

Drawing has been revised.

4. Note 6: remove the suggested on-site measures listed. Ensure that this is revised elsewhere, as applicable.

Drawings has been revised.

Phasing Plan, **Dwg. 118224-PH**, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 1.

1. Please clarify the rationale behind the phasing plan. Assuming that early servicing is currently being sought for Phase 1, which is Phase 1A and 1B (due to current pond capacity)? Please confirm. What is the intent/timeline for the balance of the phases? Although an overall review has been carried out for the most part, the concentration of this review has been placed on Phase 1.

The current phasing is being proposed to allow for watermain connections at Jargeau Road and Beaugency Street, while remaining within the capacity constraints of EUC Pond 1.

General Plan of Services, Dwg. 118224-GP1 to 118224-GP3/118224-GPND, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 5 / # 1.

1. A cross-section (see sample below) is to be provided for the servicing Block 106 (at the appropriate time). What about bollards for preventing vehicular access (other than for operations, as required)? Typically, these blocks are 3.0m wide asphalt. Please address.

Block 106 is a 1.8m asphalt pathway intended for pedestrian connectivity per the EUC CPD, not an emergency pathway. The applicable detail (SC19) is provided in the standard detail drawings which shows a 1.8m asphalt path.

2. Where there is a connection of the sanitary sewer to an existing manhole (see Jargeau and Beaugency), provide a note regarding benching and provide the standard detail on the applicable drawing (assuming 118224-D1-7?)

Detail has been provided in the standard detail drawings.

3. There are catchbasins proposed at the edge driveways (see CB5 for Phase 1, among others). It is highly recommended to relocate these outside of the path of vehicular movement.

Catchbasins were moved where applicable.

4. Please provide the townhouse and single-family home servicing details. Note that on an exception basis (if applicable), will connections under garages be permitted, and the services shall be sleeved.

Servicing details provided on the Notes and Details drawing (118224-ND).

5. Block 103: it is highly recommended to not divert the rear yard drainage through a lead running along a pathway. Also, where is the CB lead connecting to? Same with the pathway abutting Lot 60 (not labelled).

Through previous coordination, a figure was provided demonstrating the proposed intent of the CB leads within the pathway Blocks. A non-perforated HDPE pipe will carry flows from the rear yards to a 600x600 CB or a CBMH within the pathway block. A CB lead will direct flows to the STM trunk within the ROW.

6. Provide a rear yard catchbasin detail.

Provided in the standard detail drawings.

7. Rear of Lots 37 and 38: revise perforated pipe to reflect CB lead for last reach connecting to the ROW CB.

Drawing has been revised.

8. It is unclear what is proposed for the sanitary and storm at the end of Jargeau and Street Two (at the edge of the Phase 1B limit). How is the sanitary sewer not capped? Why is the flow area directed from storm MH144 to CB31? Please clarify.

The drawing has been revised to show a cap for future infrastructure. The flow is being directed from CB31 to MH144, the slope error was shown in the wrong direction and has since been revised.

9. Block 94: the proposed catchbasin is very close to the location of the lateral service connections. Please revise at this location, and wherever else this applies.

Catchbasin locations were revised where applicable.

10. There should be a note speaking the continuous subdrain installed along the roads, per City detail R1. Either place this note on the said drawings, or provide a note on the details sheet.

We are confirming with Geotech weather continuous or 3m stubs will be required. It will be added to the next final submission.

11. As a note, upstream start of run CBMHs should have the S25 and S28.1 frame and cover, unless the CBMH is proposed in a ponding area. Revise accordingly.

Noted.

12. If possible, please provide a Release Rate column on the CB tables.

Noted.

13. Dwg 118224-GP-ND: update the tables in this drawing to reflect ICD sizes for the rear year CBs. Note: ensure that ICDs are installed at the outletting connection of the structure.

Noted.

Cross Sections - ROW, Dwg. 118224-XS1, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 5.

1. Please revise June 18/20 in the title block to June 18/21.

Drawing has been revised.

2. To note: various City staff have reviewed the cross-sections to ensure that separation distances are respected for proposed infrastructure, trees, etc. at the draft plan stage. Please note that a sidewalk is not proposed for Streets 2-6 and 8, yet Dwg. 118224-GR2 shows a sidewalk from Street 9 to Street 2. Please address and correct the station for Street 9 (and any others, as applicable), accordingly. In addition, should anything have changed with other discipline reviews, please provide revised cross-sections, accordingly.

Drawing has been revised. A sidewalk has been added to station 2+200 to 2+263 of Street 2 provided on 118224-XS2.

3. Note that mountable curbs are permitted for townhouse developments (only), and barrier curbs for the single-family homes. You may choose to provide a note on the said drawings, accordingly, and reference can be made to the Grading Plans for transition locations. Or, you may prefer to label this on the Grading Plans instead.

Noted. Curb labels and transitions (TR*) are included in the Grading Plans.

Cross Sections - ROW, Dwg. 118224-XS2, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 2.

1. Please revise June 18/20 in the title block to June 18/21.

Drawing has been revised.

Plan and Profile PR, Dwg. 118224-PR1 to PR14, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 2.

1. <u>General Comments:</u>
   a. Per review timing, please provide Dwg. 118224-PR9 (Street 9, STA. 9+275 to 9+450), as it is missing from the suite.

Drawing has been provided in the latest drawing set.

b. Please note that the PCSWMM (stormwater management) modelling is currently being reviewed by City staff for the hydrologic and hydraulic components. Comments will follow and revisions shall be made to the applicable documents, accordingly.

Noted.

c. Ensure that safety platforms are shown, accordingly.

Noted.

d. Ensure that clay seals are shown, accordingly.

Noted.

e. Ensure that pipe drops are shown, accordingly.

Noted.

f. Ensure that HGL is shown on all drawings (see PR-10).

Noted.

g. Ensure that the cover to the watermain (2.4m) is shown.

Noted.

h. Dwg: 118224-PR12: please note the easement for the servicing block. Further detail to be provided in the cross-section for the services running along the block. To be labelled accordingly.

An easement is shown on related plans in favour of the storm outlet through Richcraft lands.

Sanitary Drainage Plan, Dwg. 118224-SAN, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 4.

1. No comments at this time.

Noted.

Storm Drainage Plan, Dwg. 118224-STM1, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 4.

1. Please provide a sample calculation for the runoff coefficients obtained.

Figures have been produced and included in Appendix C of the SWM Report in support of the runoff coefficients provided.

2. Dwg. 118224-STM1 is labelled on both storm drainage plans. Please adjust for -STM2 accordingly, per the Cover Page.

Drawing has been revised.

Grading Plan, Dwg. 118224-GR1 to 118224-GR3, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 5.

1. Note that the Grading Plans are typically reviewed separately from Early Servicing documents, and a Grading Plan Review Letter will be issued at a later time accordingly. Overall comments, however:
   a. There are insufficient grades shown for the existing. Please address.

Drawings have been revised to show more existing grades.

   b. As stated in the Geotechnical Report comments below, please ensure that a sign-off letter from the Geotechnical Engineer is obtained further to the review of the latest Grading Plans.

A sign-off letter from the Geotechnical consultant will be obtained prior to the Grading Commence Work Notification.

   c. Ensure that the geotechnical recommendations for grade raises are shown accordingly.

Noted.

   d. Drainage shall spill to the ROW, but not through pathways. Tying into this, please revise Block 103 as this is not an ideal location for ponding. Similarly, at the block abutting Lot 60, there is ponding at the depressed curb, where there is a pedestrian route. Please revise.

Noted. Block 103 has been revised to eliminate ponding within the pathway. There is no ponding within Block 104 (block abutting Lot 60).

   e. Proposed pathway: Please include details SC20 and SC21 on the applicable drawing, provide a custom cross-section, similar to that below, as well as a pathway detail. Provide more grades, and ensure conformance with the accessibility design standards, as required.

Details SC20 and SC21 have been added to the standard detail drawings.

   f. There should be more grades provided for the MUP while ensuring that accessibility standards are met.

Further details including grades have been provided on the Pavement and Elevation Drawings.

   g. Please address the drainage for the proposed park (Block 162).

Flows are generally directed to the SE corner of the park. We are proposing a swale running along the PL to a CB, which will outlet via a 375mm directly to the 1650mm STM outlet to the pond. Further details can be found in the Grading Plan and Servicing Plan (118224-GR1 and 118224-GP1).

h. Please provide a detail for the rear yard drainage around the noise barriers.

Drainage details will be added to the final submission.

i. Specify the length of the noise barriers on the said drawings. Ensure conformity with the latest noise study.

Details added to the Grading Plan.

Pavement Elevations Plan, Dwgs. 118224-PEL1 to 118224-PEL5, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 1.

1. Please link these drawings with the Grading Plans, if possible. Have the Grading Plans clearly show the locations and width of sidewalks, curb types, and other relevant information from the said drawings. Please note that for example, Dwg 118224-PEL5 shows a 1.8m concrete sidewalk on Street 4, where the cross-section for Streets 2-6, and 8 does not call for a sidewalk.

Noted. Drawings have been revised to show consistency.

Ponding and ICD Plan, Dwgs. 118224-P-ICD1 to 118224-P-ICD3, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 18, 2021, Revision # 1.

1. Note that the maximum depth of flow in rear yard systems is 300mm prior to spilling to the ROW. Please ensure that this is respected throughout, by providing a table showing the depths. Note that this is not accounted for in the SWM model.

Noted.

2. Has the 20% stress test been accounted for? There is no indication on the drawings.

Stress test was accounted for in the USF comparison.

List of Report(s):
Site Servicing and Stormwater Management Report, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 30, 2021, Revision # -.

1. Revise the report and plans further to the comments provided in this memo, accordingly.

Noted.

2. Has the Conservation Authority provided any water quality comments further to their review?

The second detailed submission will be circulated to the RVCA.

3. Provide discussion on the park block capacity allocation.

Discussion has been provided in the report.

Geotechnical Investigation, Proposed Residential Development – 3604-3646 Innes Rd., Ottawa, Ontario, prepared by Paterson Group Inc., Report # PG4026-2, dated April 2, 2020, Revision # 2.

1. Please ensure that the latest Landscape Plan is reviewed in conjunction with tree planting restrictions and recommendations.

Noted.

2. Please ensure that the latest Grading Plans are reviewed and a sign-off letter is ultimately provided

A sign-off letter from the Geotechnical consultant will be obtained prior to the Commence Work Notification.

City of Ottawa (Charles Warnock) comments, dated September 3, 2021:

List of Report(s):
Site Servicing and Stormwater Management Report, prepared by Novatech Engineering Consultants Ltd., Project # 118224-00, dated June 30, 2021, Revision # -.

1. Page 2, the statement that the SWM pond has capacity for phase 1 is misleading. It has capacity if another area is with held from development. This statement and the one further down the page referring to phase 2 must be changed.

Glenview Homes (Innes) Ltd. (Developer) is dealing with the City and other landowners for this item under separate cover.

2. Page 2, with respect to the multi unit blocks. You may wish to model a portion of these blocks with a perimeter of uncontrolled flows. Currently the drainage boundary is along the property line. Experience has shown that quite often there is a portion of uncontrolled flows out to the ROW. This has required the designer to go back after the fact and remodel the entire subdivision for a site plan development.

A 6m strip has been provided in favour of the future high density blocks.

3. Page 5, front to back drainage is not what is designed for in the City of Ottawa and is unacceptable. Furthermore it does not meet the guidelines for grading. Grading should be split lot drainage. Even if we did allow front to rear lot grading the drainage boundary shown on the

plans are incorrect. Water from the front half of the homes roof will flow out to the streets and not around to the back of the house. Please note that we do not make assumptions on roof gutters for residential homes. Most new homes are constructed with out roof gutters and it is up to the homeowner to have them installed. Grading plans, storm drainage plans, modeling etc. all need to be revised to reflect proper grading.

Drainage areas have been revised to show split lot grading.

4. Page 6, this statement "Storm runoff that exceeds the capacity of the minor system will be stored within road sags" assumes that the ICD's will control the flows to the minor system and therefore there will be no surcharging of the minor system. Is this the case? JFSA report states on page 4 that they will be used if required. There appears to be a number of rear yard areas that do not include ICD's.

Figure 2 has been updated with all ICD controls in place with the exception of rear yards in subcatchments A53 and A54 as the RY drain directly into the storm pipe.

5. Page 7, quality control, there is no capacity in the interim for phase 1 in the SWM pond. Please revise.

Glenview Homes (Innes) Ltd. (Developer) is dealing with the City and other landowners under separate cover.

6. Page 7, "The minor system has been conceptually designed using the Rational Method." The system is not conceptually designed with the rational method. It is designed with the Rational method as per City's design guidelines. Furthermore the rational method sheets form part of the documents required for the MECP ECA. Please revise.

The report has been revised. Conceptual wording has been removed.

7. Page 8, states "For both the interim and ultimate conditions, inlet control devices (ICDs) are to be installed in all catch basins to limit inflows to the minor system during larger storm events. ICDs will be sized during the detailed design stage." Is this not the detailed design stage? Limit the flows to what level? Is it to the design flow as a stated earlier? Do all cb's including rear yards connected to the system have ICD's?

Report has been revised for clarity.

8. Page 8, the rational C value (imperviousness values as well) need to be based on zoning setbacks and maximum driveway widths as per City guidelines. Please provide sample calculations for all zoning types. SWM modeling must also use the same values.

Figures have been produced and included in Appendix C of the SWM Report in support of the runoff coefficients provided.

9. Page 9 states "Building on the model that was reviewed as part of the July 2018 study, it is proposed that the development of Phase 1 of the Subject Site be permitted under Interim B conditions, similar to Orleans Village, in exchange for Orleans Village mixed-use block 148 and future residential block 147 remaining undeveloped until the ultimate conditions expansion of the north main cell and north forebay in EUC Pond 1 is complete." The subdivision condition 89 states "The Owner acknowledges and agrees that an interim storm water management facility may be temporarily required prior to the expansion of Pond 1 unless it can be demonstrated that the existing Pond 1 has sufficient capacity to proceed with servicing Phase 1 without interim measures or expansion." Stating that not developing Blocks 147 and 148 is not demonstrating that Pond 1 has capacity for this phase 1 development. Phase 1 will require an interim SWM pond or wait until the expansion of pond 1 is completed.

Glenview Homes (Innes) Ltd. (Developer) is dealing with the City and other landowners under separate cover.

10. The main report (not only in JFSA report) should clearly state how or if the lands at 3636 Innes (U-Haul) and 3604 Innes (Car wash) are accounted for in the site development. 3636 Innes is shown on the storm drainage area plan but not 3604. However the drawing "EUC interim conditions B" shows 3604 as part of the existing conditions to Pond 1. How will runoff from this area make it to pond 1? The release rates from the external areas and future site plan Blocks should be tabulated in the report and release rates shown on the storm drainage area drawing.

A section has been added to the SWM Report discussing 3636 Innes and 3604 Innes.

11. Appendix C. Why are the rational sheet identified as preliminary? C value are to low and as discussed earlier need to be based on the zoning. Park C value should be 0.4.

C values have been revised based on zoning and the Park Block has been assigned a C value of 0.4.

12. There are pipes that are flowing at a small fraction of the capacity of the pipe. Please verify that for pipes with d/D less than 0.4 the velocity are acceptable.

Noted.

<u>Stormwater Management Report BMR The Commons (J.F. Sabourin and Associates, Inc., dated June 2021):</u>

13. Spot checks noted small discrepancies between model/drawings and design sheet (e.g., MH.106 to MH.104 length)

Lengths in the model have been updated based on geometric distances between MH.

14. In Figure 1 – Collector Road should be noted as 5-year capture.

Figure 1 and associated text has been updated accordingly, to show the collector roads as 5 year capture.

15. Page 7, we suggest that multi-unit site plan blocks assume a perimeter that drains uncontrolled to the ROW. See comment 2 above.

Subcatchment drainage areas for the multi-unit site plan blocks have been updated accordingly.

16. Page 8, provide the zoning setbacks and maximum driveway widths used to determine the imperviousness. Provide example calculations for all zoning types. Park should be based on a C value of 0.4. The discreet values stated in the report should compare closely with the example calculations.

Figures have been produced and included in Appendix C of the SWM Report in support of the runoff coefficients provided. The Park Block has been assigned a C value of 0.4.

17. Section 3 says that PVC pipe is assigned n=0.024 while section 4.2 says n=0.013 for PVC?

Manning's number of 0.013 was used for all pipes in the model. Report text has been updated accordingly.

18. Section 4.2, please include a table in the report that shows the complete time series for the dynamic water levels at STM-2121 for the different design storms used.

Outflow hydrographs at this location for the various design storms have been provided in the Appendix of the updated SWM report.

19. Page 11 table 2, why is there such a large difference between the 2 year and the 100 year (93%) and 5/100 (39%) while the difference between the ICDS 0 m to 0.35 m is 10 to 13%?

The PCSWMM model, peak flows, and ICD's have all been updated as per the requested comments. The updated Chicago storm peak flows are 1.857 m3/s (2-yr), 2.602 m3/s (5-yr), and 3.614m3/s (100-yr). The 2-yr and 5-yr flows fall in between the rational method calculated flow as per standard checks.

The ICD's have been represented at the invert of the manhole which therefore allows the head to fully develop at the ICD's which may result in higher flows but is more accurate to constructed conditions. Also, please note there is only 81 L/s of major system flow leaving the site which means all water on site must be captured within the stormwater system. Due to this, further head is developed at the ICD's which also allows for higher flows and ICD requirements.

20. Page 11 table 2, the 100 year minor flow is listed as 3,340 L/s, the rational sheet shows the capacity of the pipe between MH 102 and 100 as 3006 L/s while the plan and profiles show the HGL at MH 102 at 89.92 m which is well below the obvert of the pipe. Please explain how a pipe flowing above capacity can have an HGL below the obvert? Please verify all HGL's in the report tables and on the drawings.

The pipes at this location are now updated and all HGL's in the report tables and on the drawings have been updated accordingly. The PCSWMM model is using full hydraulic properties analyzed the flow at this pipe with a slightly higher peak flow than the rational method calculation. However, this discrepancy is within

10-15% peak flow difference between excel calculation and PCSWMM calculation which is reasonable for the difference in platforms.

21. Page 11 states that the majority of the surcharging will be in the rear yard swales. Please provide more description and details on this.

Further text will be added to the SWM Report discussing the water levels in the rear yards for the 100-year storm. Additional table outlining the rear yard ponding depths has also been provided to the Appendix of the report.

22. Section 5 proposes to exchange Blocks 147 and 148 of Caivan development for development of phase 1. As noted earlier this is not an acceptable solution.

Glenview Homes (Innes) Ltd. (Developer) is dealing with the City and other landowners under separate cover.

23. Page 14, the proposed interim condition phase 1 is not acceptable. If you choose to design an interim SWM pond please provide the hydrographs for the phase 1 development and the undeveloped drainage areas that flow through it.

Glenview Homes (Innes) Ltd. (Developer) is dealing with the City and other landowners under separate cover. We are of the opinion that this item is not applicable at this time.

24. Figure 2 shows numerous rear yards that do not have ICD controls. Please comment on this.

Figure 2 has been updated with all ICD controls in place with the exception of rear yards in subcatchments A53 and A54 as the RY drain directly into the storm pipe.

25. The park flows are indicated to be controlled to 129 L/s in the 100-year model (equivalent to 5-year design storm event based on the Rational Method). However, in the 5-year model, the flows leaving the park block are only 7 L/s. Please review and advise.

Park subcatchment parameters have been revised in the latest model.

26. The park flows are shown to be directed to MH.106 in the model and directed to the stormwater management pond in the Storm Area Drainage Plan. Please review and advise.

Park subcatchment parameters have been revised in the latest model with an updated design storm event (5-year design storm) and outfall location has been updated to the SWM pond.

27. Some pipes appear to be larger than needed to convey the Rational Method (e.g., 130 to 132). Please review and advise.

Storm sewer pipe sizes have been reviewed and the appropriate modifications have been made.

28. Please provide a table that demonstrates approach flow versus capture flow rate for all inlet control devices during the 2-year design storm event. Please include a Table that shows the 2 year (or 5 year) rational flow, area, and C value for each drainage area compared with the ICD' restrictions for the same area. The ICD's must be sized to be at a minimum the rational design flows.

Additional table has been provided in the updated SWM Report.

29. Please comment on HGLs under Interim Conditions and how these will compare to the HGL's in the Ultimate Condition.

HGL's under the Interim Condition has been commented on and the tables provided in the updated report.

30. Spot checks showed some discrepancies between inlet control inverts in models versus drawings in the Stormwater Management Report (e.g. CB31a, 87.65 in drawing versus 88.54 in model).

The ICD control parameters have been reviewed and updated accordingly.

31. Spot checks showed some discrepancies between HGL levels in PCSWMM model and reported values in Table 3 (e.g., 104 to 102 HGL, USF for 146 to 144).

HGL results have been reviewed and updated accordingly.

32. Spot checks showed some discrepancies between HGL levels in XPSWMM model and reported values in Table 4 (e.g. 10yrSCS results)

HGL results have been reviewed and updated accordingly.

33. Spot checks showed some discrepancies between values reported in Table C1-A, C1-B, C1-C and those in the models (e.g. MH102 Cover 67.4 in table versus 87.54 in the model, HGLs for 104 to 102 in Table C1-B, Pipe Length from 138 to 136, Invert for MH144).

Results have been reviewed and updated accordingly.

34. Table D-3a, widths and slopes appear to be inconsistent to typical values used by modelers reviewed by the City. Some of the slopes are significantly underestimated. The modeler has not taken into account that sags in the center of catchments will double the flow width and halve the length. The values should be based on City guidelines. Widths and slopes have changed from the modeling approved for draft approval. Most areas have changed but if you compare areas that have not changed such as the 1 ha park you will see changes. Draft approval example, park area B04, A=1ha, W=225 m, S=0.2%, Imp=7%. Detail design B4 W=67 m, A=1.002 ha, S=0.5%, Imp%=7%.

Subcatchment slopes have been updated based on the proposed development grading plan. With regards to the application of the width parameter please refer to JFSA's November 4, 2021 memo titled "HMB Detailed Design - PCSWMM Width Parameter", which shows that the approach adopted in this study matches more closely to values derived via the rational method than those proposed per the city of Ottawa Guidelines. Also note that from this study it was found that for small subcatchments

35. As noted in earlier please provide sample calculations showing the imperviousness are based on the zoning setbacks and maximum driveway widths.

See earlier response.

36. Spot checks showed a discrepancy between values reported in Table D-7 and those in the model (e.g. CB12 100yr+20% 87.78 in Table D-7 versus 87.73 in model)

Results have been reviewed and updated accordingly.

37. Table D-8, Table D-9 - Depths reported in PCSWMM are a fraction of the depth of the channel inputted - therefore C1 has a maximum flow depth of 0.16 x 0.6m = 0.10m

Noted, result tables have been reviewed and updated accordingly.

38. Please explain the purpose of dual catch basins when some of them are restricted to diameters as low as 83 mm?

Catch basins were reviewed and adjusted accordingly.

Drawings:

39. Structures should be labelled in plan view of PR1 - Plan and Profile Rue De Beaugency Street (Station 7+000 to 7+205).

Drawing has been revised.

40. The Drainage Area Plan uses street numbers 7 and 1 and the Plan and Profile Plans uses Rue de Beaugency and Rue de Jargeau. Please review and revise as needed.

Drawing has been revised.

41. There are a number of duplicate PDFs with two dates on them which causes some confusion in the review (e.g., two Storm Drainage Area Plan-1 PDFs).

Drawings have been revised and reviewed to display correct titles.

42. Labels are missing for pipes on the Storm Drainage Area Plans (e.g., 142 to 140, 134 to 132)

Drawing has been revised to show pipe labels.

43. Please provide further detail on how the interim storm sewers will connect into the existing stormwater inlet.

Refer to PR13 on interim connection to the existing EUC Pond 1.

44. The Phasing Plan shows that the stormwater outlet is part of a future phase which cannot be the case. All drawings should clearly indicate what underground infrastructure is being built as part of the Phase 1 construction of the subdivision. All other pipes should be labelled as "Future".

Phasing plan has been revised to demonstrate interim outlet to EUC Pond 1.

45. Drawing numbers for Plan and Profiles has duplicates and PDF titles do not match the drawing numbers.

Drawings have been revised and reviewed to display correct titles.

46. Drawings should not show any changes made to the pond as those are not part of the proposed works for Phase 1 development. Curb inlets are not acceptable for connecting to rear yard cb . Please refer to City standard and revise.

Future Pond upgrades are shown in 118224-PR14 and 118224-PR15 to demonstrate ultimate connection to the Pond. Curb inlets acting as rear yard outlets have been eliminated.

47. Grading does not all have the 0.3 m clearance in the rear yard. Example high points upstream of lot 40 and 43, lot 19, lots 20-23, lot 3, rycb 12,

Grading has been revised to provide 0.3m of clearance in the rear yards.

48. Where is the overland flow route from the rear of lots 60-70? Should not be between 2 homes. Further more not clear what the maximum elevation at cb 18 and 19 (HP 88.49m versus overflow 88.44m). Please review and revise so there are no overland flow routes between homes.

The emergency spillover is located at the rear property line of lots 64/63.

49. Contour elevation should be shown on the ponding areas and include ponding in the rear yards. Some contours don't seem correct, example, cb 38/39, elevation is 90.09m and there is a corner lot at 90.00 m but the contour does not cross it. There are other areas were this is the case. Please verify all contours. There are also areas were the contour line goes straight across the road even though there is a cross slope on the road? Example cb's 29/30.

Ponding contours have been corrected and contour elevations have been provided on the Ponding Drawings.

50. Review the grading on Pathway Block 103. Ponding level is 88.80 which is the same contour that will spill over into the rear of Block 97/Lot 71. There should be a minimum 15 cm between the overflow into the rear yard and the downstream elevation on the pathway. Similar comment applies to other Block pathways such as Block 105.

Grading has been revised to provide a continuous slope along Block 103. No ponding will occur. Block 105 has been provided with freeboard between spillover elevations.

51. There are areas were the ponding will spill over from the ROW up into the rear yards. Example rear of Blocks 110 and 121, Blocks 103 and 98, etc. Please check all and revise as necessary.

The grading has been revised to provide freeboard from the spill elevations on the street to the spill elevations in the rear yards.

52. There appears to be no overland outlet from the rear of Block 106. Overland flow outlet should not be between two houses. There is no overland flow outlet from the rear of lots 64/63. Overland flow from rycb 9 should not be between two homes. Please revise.

The grading has been revised to direct overland flow through Block 106. The emergency spillover is located at the rear property line of lots 64/63.

53. There are numerous places where the spill elevation on the street is the same as the spill elevation into the rear yards. Example cb 18. As note earlier there should be a minimum difference of 0.15 m between the spill elevation on the street compared to that of of the rear yard.

The grading has been revised to provide freeboard from the spill elevations on the street to the spill elevations in the rear yards.

54. Overflow from cb's 32/33 do not seem to be accurately portrayed on the ponding drawing. Furthermore it appears water will flow into the rear yards before it flows down the street. Water will flow from the street to the rear yard at cb9 and not enough clearance at cb11. Please revise.

The grading has been revised to properly convey overland flows through the servicing block.

55. Spot checks on Ponding plan shows cb 34 in place of cb 31a, RYCB 26 versus 6, etc. shown on other plans and schematic. Please verify that all drawings and schematics are consistent.

Noted.

56. Ponding plans don't seem to include rear yard cb's in the tables. Please add.

Ponding in the rear yard cbs has been added to the ponding plans for Phase 1.

57. It appears that lots 20-23 and 18-150 will overflow into the park. Please revise.

Grading has been revised to provide an alternative spillover location.

58. The usf is supposed to be compared with the HGL or obvert of storm pipe which ever is greater. Plan and profiles show HGL lower than obvert in some places. Please review and revise were necessary.

The HGL is shown on all plan and profiles. USFs are compared with the greater of the two.

Modelling:

59. To assess interim conditions, the user inflow in XPSWMM at the North Forebay was compared to the outfall time series from PCSWMM and these values did not match. Please review and advise.

The user inflow in the XPSWMM model included both the contributions from the BMR Interim Conditions Phase 1 PCSWMM model as well as other areas to the tributary to the North Forebay. As expected the input to the XPSWMM model shouldn't exactly match the PCSWMM input.

60. DDSWMM files were not included with digital submission.

The DDSWMM files have been included in the next digital submission.

61. The interim model shows that all 100-year flows are conveyed via the pipe system to the pond with no overland flow, however the grading plan makes it appear that the major overland route will have some runoff from catchment S7. Please confirm if an overland channel as shown in the model (Conduit C2) is being proposed from Phase 1 to the pond.

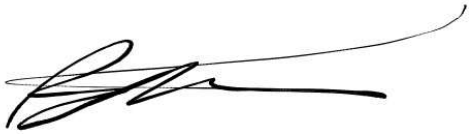
It has been confirmed that all 100-year flows are conveyed via the pond system to the pond with no overland flow.

We trust this re-submission adequately responds to your comments. If you have any questions, please contact me.

Yours truly,

NOVATECH





Bassam Bahia, M.Eng., P. Eng.
Project Manager | Land Development

Bradley Reed, E.I.T. I Land Development

cc: Jillian Normand, Glenview Homes

Appendix B
Servicing Report Checklist

NOVATECH
Engineers, Planners & Landscape Architects

Development Servicing Study Checklist

Project Name: The Commons (3610 Innes Road)
Project Number:118224
Date: November 26, 2021

4.1 General Content	**Addressed (Y/N/NA)**	**Section**	**Comments**
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Fig 1.1, 1.2, 1.3	
Plan showing the site and location of all existing services.	Y	GP	
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	NA	1	
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	1	
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	2.1	
Statement of objectives and servicing criteria.	Y	1	
Identification of existing and proposed infrastructure available in the immediate area.	Y	4,5,6	
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	NA		
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	GR	

4.1 General Content	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	NA		
Reference to geotechnical studies and recommendations concerning servicing.	Y	2.2	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	NA		
North arrow (including construction North)	NA		
Key plan	NA		
Name and contact information of applicant and property owner	NA		
Property limits including bearings and dimensions	NA		
Existing and proposed structures and parking areas	NA		
Easements, road widening and rights-of-way	NA		
Adjacent street names	NA		

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	6	
Availability of public infrastructure to service proposed development.	Y	6	
Identification of system constraints.	Y	6	
Identify boundary conditions.	Y	6	
Confirmation of adequate domestic supply and pressure.	Y	6	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	6	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	6	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N	1, 6, GP	
Address reliability requirements such as appropriate location of shut-off valves.	N	GP	
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	6	
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	6, GP	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	6	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y	App E	

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	5	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	5	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	5	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	5	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	NA		
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	5	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	4	
Analysis of the available capacity in existing public infrastructure.	NA		
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	AppC, STM	
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	4	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	4	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	4	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	NA		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	NA		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	4	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	4	
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	4	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	4	
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	4	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	NA		

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	NA		
Description of how the conveyance and storage capacity will be achieved for the development.	Y	4	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	4	
Inclusion of hydraulic analysis including HGL elevations.	Y	4	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	8	
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	Y	4	
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	9	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	Y	9	
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Y	9	

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	10	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	11	

Appendix C
Storm Sewer Design Sheets and
Stormwater Management Report, prepared by J. F. Sabourin and Associates Inc.

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons - 3610 Innes Road
Date Prepared: 10/4/2019
Date Revised: 11/26/2021
Input By: Bradley Reed
Reviewed By: Sam Bahia/ Ben Sweet
Drawing Reference: 118224-STM1, 118224-STM2 and 118224-GP

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION			DEMAND																	CAPACITY						
			AREA									FLOW								PROPOSED SEWER PIPE SIZING / DESIGN						
															RAIN INTENSITY (mm/hr)					PIPE PROPERTIES								
STREET	FROM MH	TO MH	AREA ID	COMMERCIAL	HIGH DENSITY	ROAD 1	REAR YARD 1	REAR YARD 2	PARK	TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	2yr	5yr	100yr	PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (QDesign)	TOTAL RESTRICTED PEAK FLOW (Q)	LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
				0.90	0.80	0.70	0.55	0.50	0.40	(ha)				(min.)				(L/s)	(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
	170	168	A1			0.36				0.36	0.70	0.70	0.70	10.00	76.81			53.81			93.9	375 PVC	0.381	0.013	0.35	108.2	0.95	1.65	49.7%
										0.00		0.00	0.00	10.00				0.00	**53.8**									
										0.00		0.00	0.00	10.00				0.00										
	168	166	B1		1.01					0.00		0.00	0.70	11.65	71.01			49.74			93.9	600 CONC	0.6096	0.013	0.35	379.0	1.30	1.21	70.2%
										1.01	0.80	2.25	2.25	11.65		96.22		216.14	**265.9**									
										0.00		0.00	0.00	11.65				0.00										
	166	164								0.00		0.00	0.70	12.85	67.34			47.18			32.0	600 CONC	0.6096	0.013	0.35	379.0	1.30	0.41	66.5%
										0.00	0.90	0.00	2.25	12.85		91.20		204.85	**252.0**									
										0.00		0.00	0.00	12.85				0.00										
Street 9	164	162	A2, B2, B3	3.43	1.02	0.24				0.24	0.70	0.47	1.17	13.26	66.19			77.28			70.0	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.62	74.2%
										4.45	0.88	10.85	13.10	13.26		89.62		1173.67	**1251.0**									
										0.00		0.00	0.00	13.26				0.00										
	162	160	A3, A4, A5, A6			0.45		0.29		0.74	0.62	1.28	2.45	13.88	64.53			157.88			99.8	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.88	77.2%
										0.00		0.00	13.10	13.88		87.35		1143.94	**1301.8**									
										0.00		0.00	0.00	13.88				0.00										
	160	158	-							0.00		0.00	2.45	14.77	62.33			152.47			14.3	1050 CONC	1.0668	0.013	0.50	2014.4	2.25	0.11	62.4%
										0.00		0.00	13.10	14.77		84.32		1104.32	**1256.8**									
										0.00		0.00	0.00	14.77				0.00										
	158	150	A7			0.51				0.51	0.70	0.99	3.44	14.87	62.07			213.46			108.0	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.95	77.9%
										0.00		0.00	13.10	14.87		83.97		1099.78	**1313.2**									
										0.00		0.00	0.00	14.87				0.00										
	156	154	A8			0.42				0.42	0.70	0.82	0.82	10.00	76.81			62.77			100.7	375 PVC	0.381	0.013	0.35	108.2	0.95	1.77	58.0%
										0.00		0.00	0.00	10.00				0.00	**62.8**									
										0.00		0.00	0.00	10.00				0.00										
Street 2	154	152	-							0.00		0.00	0.82	11.77	70.62			57.72			12.6	375 PVC	0.381	0.013	0.50	129.3	1.13	0.19	44.6%
										0.00		0.00	0.00	11.77				0.00	**57.7**									
										0.00		0.00	0.00	11.77				0.00										
	152	150	A9, A10, A11			0.25		0.49		0.74	0.57	1.17	1.98	11.95	70.04			139.02			59.4	525 CONC	0.5334	0.013	0.35	265.4	1.19	0.83	52.4%
										0.00		0.00	0.00	11.95				0.00	**139.0**									
										0.00		0.00	0.00	11.95				0.00										
	150	144	A12, A13			0.29		0.23		0.52	0.61	0.88	6.31	15.83	59.88			377.74			76.3	1200 CONC	1.2192	0.013	0.25	2033.7	1.74	0.73	70.7%
										0.00		0.00	13.10	15.83		80.98		1060.56	**1438.3**									
										0.00		0.00	0.00	15.83				0.00										
	148	146	A14, A15			0.53		0.32		0.00		0.00	0.00	10.00				0.00			78.5	525 CONC	0.5334	0.013	0.35	265.4	1.19	1.10	57.9%
Chemin de Jargeau Road										0.85	0.62	1.48	1.48	10.00		104.19		153.81	**153.8**									
										0.00		0.00	0.00	10.00				0.00										
	146	144	A16			0.12				0.00		0.00	0.00	11.10				0.00			78.7	600 CONC	0.6096	0.013	0.35	379.0	1.30	1.01	44.5%
										0.12	0.70	0.23	1.71	11.10		98.71		168.77	**168.8**									
										0.00		0.00	0.00	11.10				0.00										
Voie de Cerulean Way	144	140	A17, A18			0.28		0.09		0.37	0.65	0.67	6.98	10.00	76.81			535.93			77.3	1200 CONC	1.2192	0.013	0.35	2406.2	2.06	0.63	86.4%
										0.00		0.00	14.81	10.00		104.19		1542.71	**2078.6**									
										0.00		0.00	0.00	10.00				0.00										
Voie De Cerulean Way	142	140	A19					0.19		0.19	0.50	0.26	0.26	10.00	76.81			20.28			20.7	250 PVC	0.254	0.013	0.65	50.0	0.99	0.35	40.6%
										0.00		0.00	0.00	10.00				0.00	**20.3**									
										0.00		0.00	0.00	10.00				0.00										
	140	138	A20			0.40				0.40	0.70	0.78	8.02	10.63	74.49			597.39			113.1	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	1.00	75.2%
										0.00		0.00	14.81	10.63		101.00		1495.48	**2092.9**									
										0.00		0.00	0.00	10.63				0.00										
Lumen Place	138	136	A21, A22, A23				0.49	0.03		0.52	0.55	0.79	8.81	11.63	71.08			626.31			14.8	1350 CONC	1.3716	0.013	0.50	3937.3	2.66	0.09	52.1%
										0.00		0.00	14.81	11.63		96.33		1426.22	**2052.5**									
										0.00		0.00	0.00	11.63				0.00										
	136	128	A24, A25			0.35	0.29			0.64	0.63	1.12	9.94	11.72	70.78			703.28			62.5	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.55	76.3%
										0.00		0.00	14.81	11.72		95.92		1420.17	**2123.5**									
										0.00		0.00	0.00	11.72				0.00										
Voie de Cerulean Way	142	132	A26			0.23				0.23	0.70	0.45	0.45	10.00	76.81			34.38			53.4	250 PVC	0.254	0.013	0.65	50.0	0.99	0.90	68.7%
										0.00		0.00	0.00	10.00				0.00	**34.4**									
										0.00		0.00	0.00	10.00				0.00										
	134	132	-							0.00		0.00	0.00	10.00				0.00			36.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.61	0.0%
										0.00		0.00	0.00	10.00				0.00	**0.0**									
										0.00		0.00	0.00	10.00				0.00										
Street 5	132	130	A27			0.27				0.27	0.70	0.53	0.97	10.61	74.55			72.53			37.4	375 PVC	0.381	0.013	0.35	108.2	0.95	0.66	67.0%
										0.00		0.00	0.00	10.61				0.00	**72.5**									
										0.00		0.00	0.00	10.61				0.00										
	130	128	A28			0.28				0.28	0.70	0.54	1.52	11.26	72.27			109.69			88.3	450 PVC	0.4572	0.013	0.35	176.0	1.07	1.37	62.3%
										0.00		0.00	0.00	11.26				0.00	**109.7**									
										0.00		0.00	0.00	11.26				0.00										

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND																	CAPACITY								
			AREA									FLOW									PROPOSED SEWER PIPE SIZING / DESIGN								
STREET	FROM MH	TO MH	AREA ID	COMMERCIAL	HIGH DENSITY	ROAD 1	REAR YARD 1	REAR YARD 2	PARK	TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	RAIN INTENSITY (mm/hr) 2yr	5yr	100yr	PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (QDesign)	TOTAL RESTRICTED PEAK FLOW (Q)	PIPE PROPERTIES LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
				0.90	0.80	0.70	0.55	0.50	0.40	(ha)				(min.)				(L/s)	(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
Lumen Place	128	126	A29, A30, A31, A32			0.24	0.31	0.01		0.56	0.61	0.95	12.41	12.64	67.97			843.42											
										0.00		0.00	14.81	12.64		92.06		1363.03	2206.4		76.0	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.67	79.3%
										0.00		0.00	0.00	12.64				0.00											
	126	124	A33			0.27				0.27	0.70	0.53	12.93	13.31	66.07			854.51											
										0.00		0.00	14.81	13.31		89.45		1324.38	2178.9		53.4	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.47	78.3%
										0.00		0.00	0.00	13.31				0.00											
	124	122	-							0.00		0.00	12.93	13.78	64.80			838.11											
										0.00		0.00	14.81	13.78		87.71		1298.66	2136.8		16.9	1350 CONC	1.3716	0.013	0.50	3937.3	2.66	0.11	54.3%
										0.00		0.00	0.00	13.78				0.00											
	122	120	-							0.00		0.00	12.93	13.89	64.52			834.54											
										0.00		0.00	14.81	13.89		87.33		1293.05	2127.6		24.6	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.22	76.4%
										0.00		0.00	0.00	13.89				0.00											
	120	112	A34			0.49				0.49	0.70	0.95	13.89	14.11	63.96			888.28											
										0.00		0.00	14.81	14.11		86.56		1281.68	2170.0		91.6	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.81	77.9%
										0.00		0.00	0.00	14.11				0.00											
Voie de Persimmon Way	118	116	A35			0.43				0.43	0.70	0.84	0.84	10.00	76.81			64.27											
										0.00		0.00	0.00	10.00				0.00	64.3		99.6	375 PVC	0.381	0.013	0.35	108.2	0.95	1.75	59.4%
										0.00		0.00	0.00	10.00				0.00											
	116	114	A36, A37, A38				0.53	0.03		0.56	0.55	0.85	1.69	11.75	70.68			119.38											
										0.00		0.00	0.00	11.75				0.00	119.4		11.9	450 PVC	0.4572	0.013	0.50	210.3	1.28	0.15	56.8%
										0.00		0.00	0.00	11.75				0.00											
	114	112	A39, A40, A41			0.29	0.30			0.59	0.62	1.02	2.71	11.90	70.19			190.36											
										0.00		0.00	0.00	11.90				0.00	190.4		64.6	525 CONC	0.5334	0.013	0.35	265.4	1.19	0.91	71.7%
										0.00		0.00	0.00	11.90				0.00											
Voie de Persimmon Way	112	104	A42, A43			0.25	0.24			0.49	0.63	0.85	17.45	14.92	61.97			1081.50											
										0.00		0.00	14.81	14.92		83.83		1241.22	2322.7		73.8	1350 CONC	1.3716	0.013	0.30	3049.8	2.06	0.60	76.2%
										0.00		0.00	0.00	14.92				0.00											
Rue de Beaugency Street	110	108	A44, B4ii				0.20			0.20	0.55	0.31	0.31	10.00	76.81			23.49											
										0.00		0.00	0.00	10.00				0.00	23.5		27.7	250 PVC	0.254	0.013	0.65	50.0	0.99	0.47	47.0%
										0.00		0.00	0.00	10.00				0.00											
	108	106	A45, B4ii			0.23				0.23	0.70	0.45	0.75	10.47	75.05			56.54											
									0.04	0.04	0.40	0.04	0.04	10.47		101.79		4.53	61.1		27.7	450 PVC	0.4572	0.013	0.25	148.7	0.91	0.51	41.1%
										0.00		0.00	0.00	10.47				0.00											
	106	104	A46, B4iii			0.29				0.29	0.70	0.56	1.32	10.98	73.25			96.52											
									0.01	0.01	0.40	0.01	0.06	10.98		99.30		5.52	102.0		97.6	450 PVC	0.4572	0.013	0.20	133.0	0.81	2.01	76.7%
										0.00		0.00	0.00	10.98				0.00											
Street 8	104	102	A47, A48, A49, A50			0.28	0.21			0.49	0.64	0.87	19.64	15.51	60.59			1189.69											
										0.00		0.00	14.86	15.51		81.94		1217.78	2407.5		41.9	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.51	80.1%
										0.00		0.00	0.00	15.51				0.00											
	102	100	-							0.00		0.00	19.64	16.02	59.45			1167.42											
										0.00		0.00	14.86	16.02		80.39		1194.71	2362.1		13.3	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.16	78.6%
										0.00		0.00	0.00	16.02				0.00											
	100	98	A51, A52, A53, A54			0.10	0.34	0.02		0.46	0.58	0.74	20.38	16.19	59.10			1204.41											
										0.00		0.00	14.86	16.19		79.91		1187.59	2392.0		74.8	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.92	79.6%
										0.00		0.00	0.00	16.19				0.00											
	98	2121								0.00		0.00	20.38	17.10	57.21			1165.95											
										0.00		0.00	14.86	17.10		77.33		1149.25	2315.2		74.8	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.92	77.0%
										0.00		0.00	0.00	17.10				0.00											
Park	CB 57	STM Outlet	B4i						0.95	0.95	0.40	1.06	1.06	10.00		104.19		110.07	110.1		33.0	375 PVC	0.381	0.013	0.50	129.3	1.13	0.48	85.1%
										0.00		0.00	0.00	10.00				0.00											
STM Easement (Richcraft Lands)	2121	2142	-							0.00		0.00	20.38	18.02	55.46			1130.13											
										0.00		0.00	19.64	18.02		74.93		1471.30	2601.4		74.3	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.91	86.5%
										0.00		0.00	0.00	18.02				0.00											
	2142	2143	-							0.00		0.00	20.38	18.93	53.83			1096.89											
										0.00		0.00	20.69	18.93		72.70		1504.37	2601.3		24.0	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.29	86.5%
										0.00		0.00	0.00	18.93				0.00											
	2143	2144	-							0.00		0.00	20.38	19.22	53.32			1086.62											
										0.00		0.00	20.69	19.22		72.01		1490.13	2576.7		20.1	1800 CONC	1.8288	0.013	0.10	3792.1	1.44	0.23	67.9%
										0.00		0.00	0.00	19.22				0.00											
	2144	HW	-							0.00		0.00	20.38	19.45	52.93			1078.65											
										0.00		0.00	20.69	19.45		71.48		1479.08	2557.7		17.2	1800 CONC	1.8288	0.013	0.10	3792.1	1.44	0.20	67.4%
										0.00		0.00	0.00	19.45				0.00											
TO TRUNK STORM SEWER																												

DEMAND EQUATION

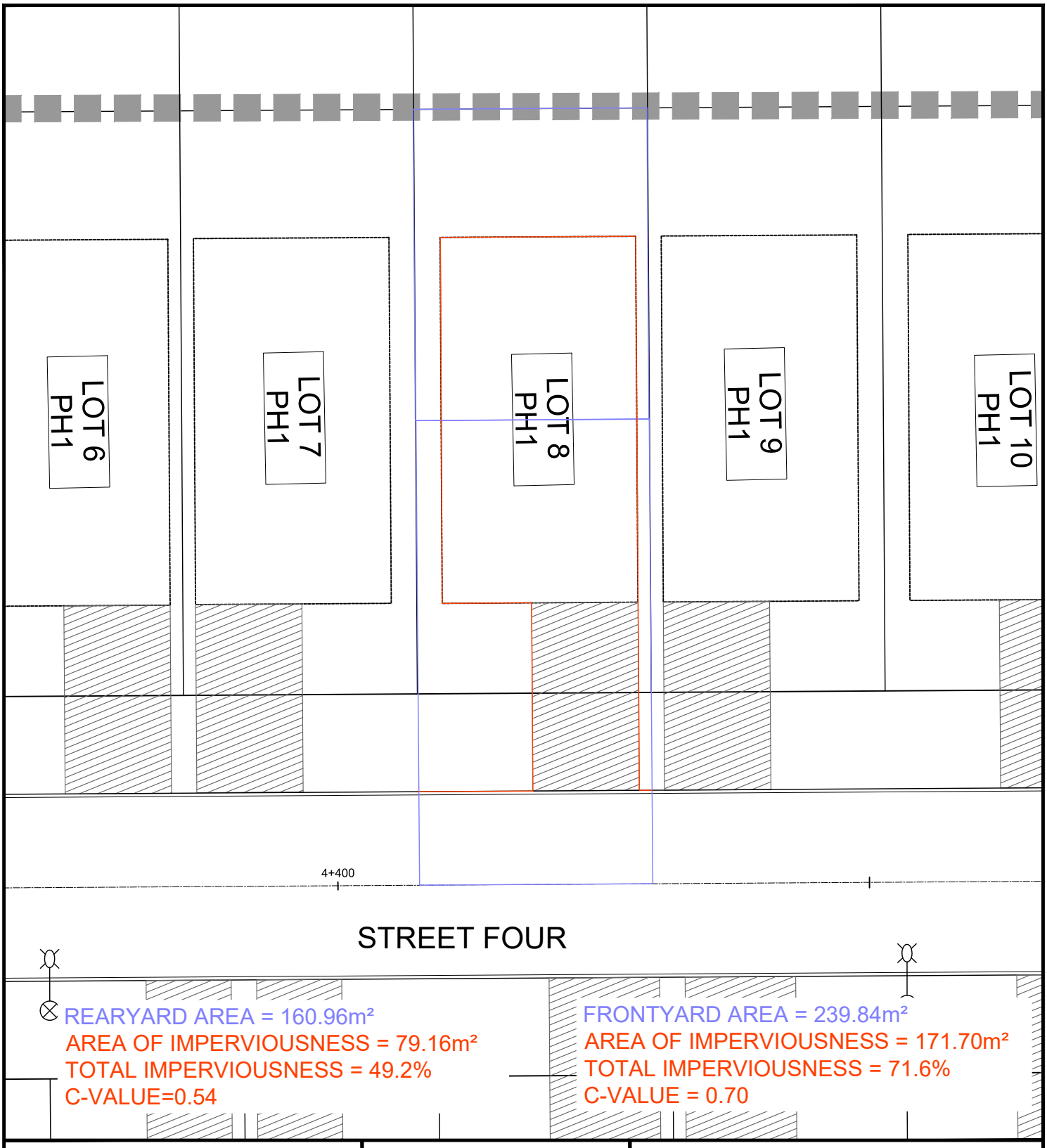
Q = 2.78 AIR

Where : Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
R = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)
Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)

Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m²)
R = Wetter perimenter (m)
So = Pipe Slope/gradient



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

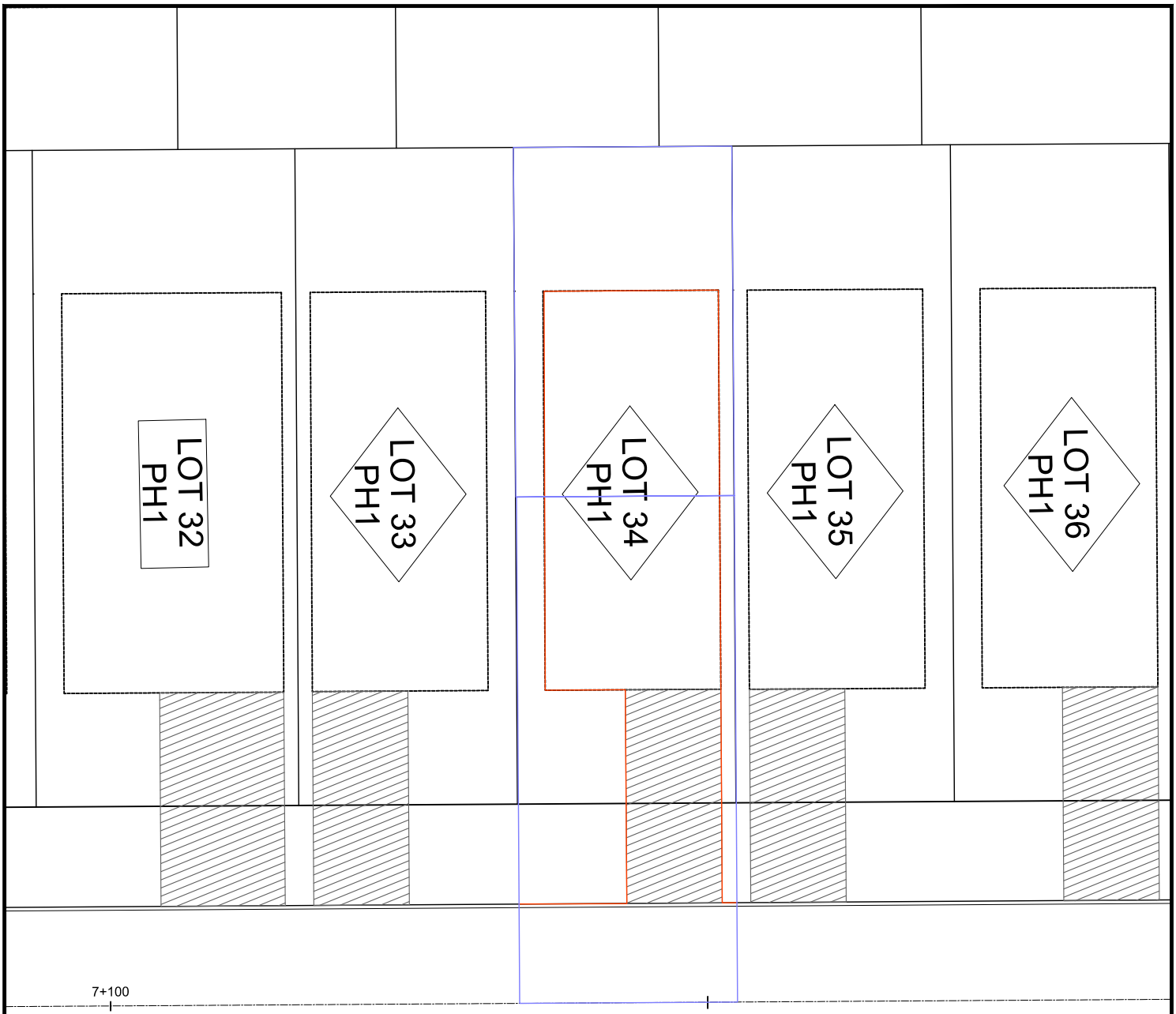
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS

EXAMPLE LOT 5
36' SINGLE

DATE	JOB	FIGURE
SEP 2021	118224	SINGLE1

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, SINGLE1, Sep 28, 2021 - 10:27am, breed



RUE DE BEAUGENCY STREET

REARYARD AREA = 133.94m²
AREA OF IMPERVIOUSNESS = 62.90m²
TOTAL IMPERVIOUSNESS = 46.96%
C-VALUE = 0.53

FRONTYARD AREA = 193.44m²
AREA OF IMPERVIOUSNESS = 133.29m²
TOTAL IMPERVIOUSNESS = 68.91%
C-VALUE = 0.68

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

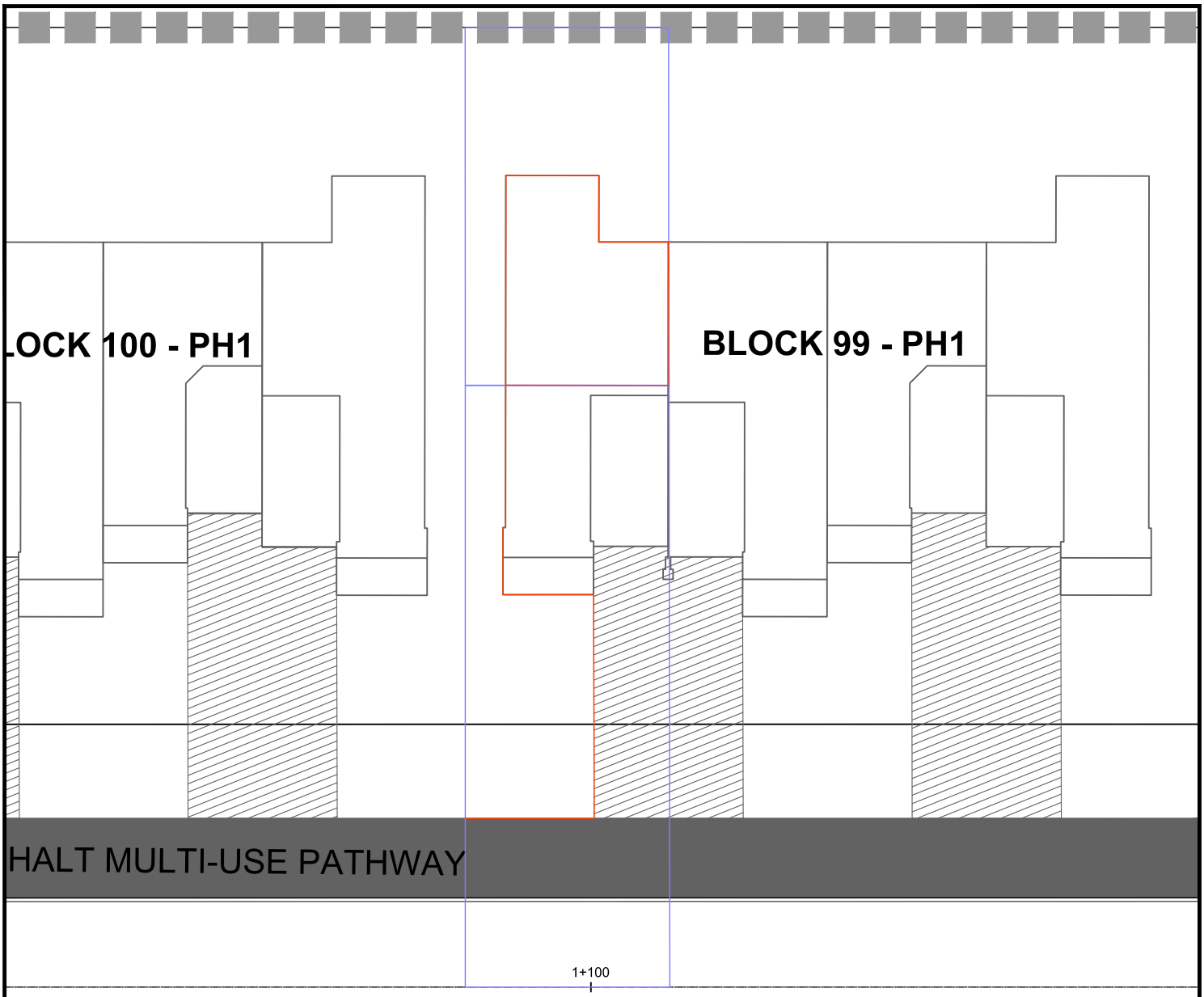
THE COMMONS

EXAMPLE LOT 6
30' SINGLE

DATE	JOB	FIGURE
SEP 2021	118224	SINGLE2

SHT8X11.DWG - 216mmx279mm

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, SINGLE2, Sep 28, 2021 - 10:27am, breed



REARYARD AREA = 121.79m²
AREA OF IMPERVIOUSNESS = 49.43m²
TOTAL IMPERVIOUSNESS = 40.59%
C-VALUE = 0.48

FRONTYARD AREA = 205.49m²
AREA OF IMPERVIOUSNESS = 142.32m²
TOTAL IMPERVIOUSNESS = 69.3%
C-VALUE = 0.68

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

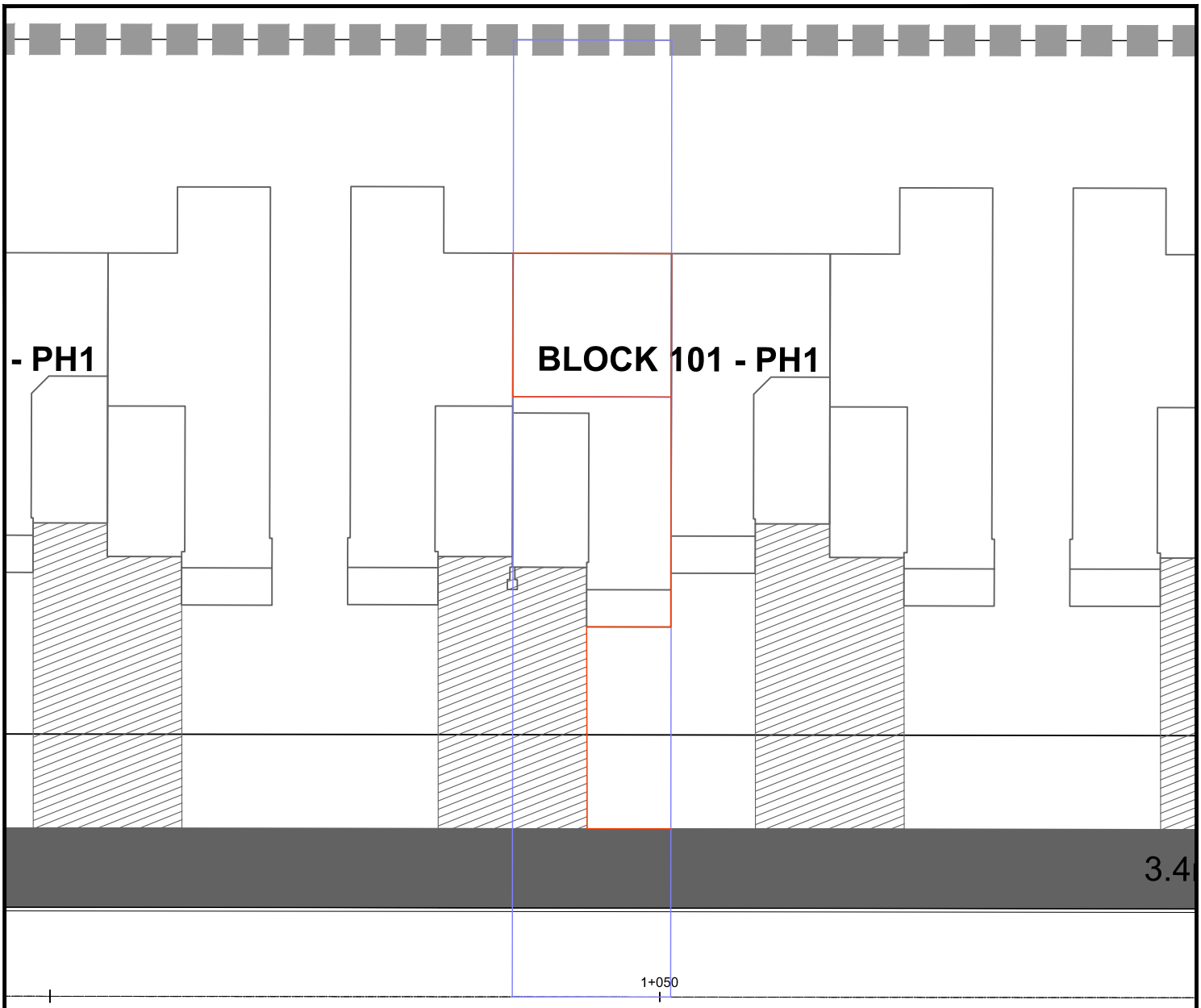
THE COMMONS

EXAMPLE LOT 1
EXTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN1

SHT8X11.DWG - 216mmx279mm

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN1, Sep 17, 2021 - 3:54pm, breed



RUE DE JARGEAU ROAD

REARYARD AREA = 95.00m²
AREA OF IMPERVIOUSNESS = 38.21m²
TOTAL IMPERVIOUSNESS = 40.22%
C-VALUE = 0.48

FRONTYARD AREA = 159.66m²
AREA OF IMPERVIOUSNESS = 131.25m²
TOTAL IMPERVIOUSNESS = 82.21%
C-VALUE = 0.77

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

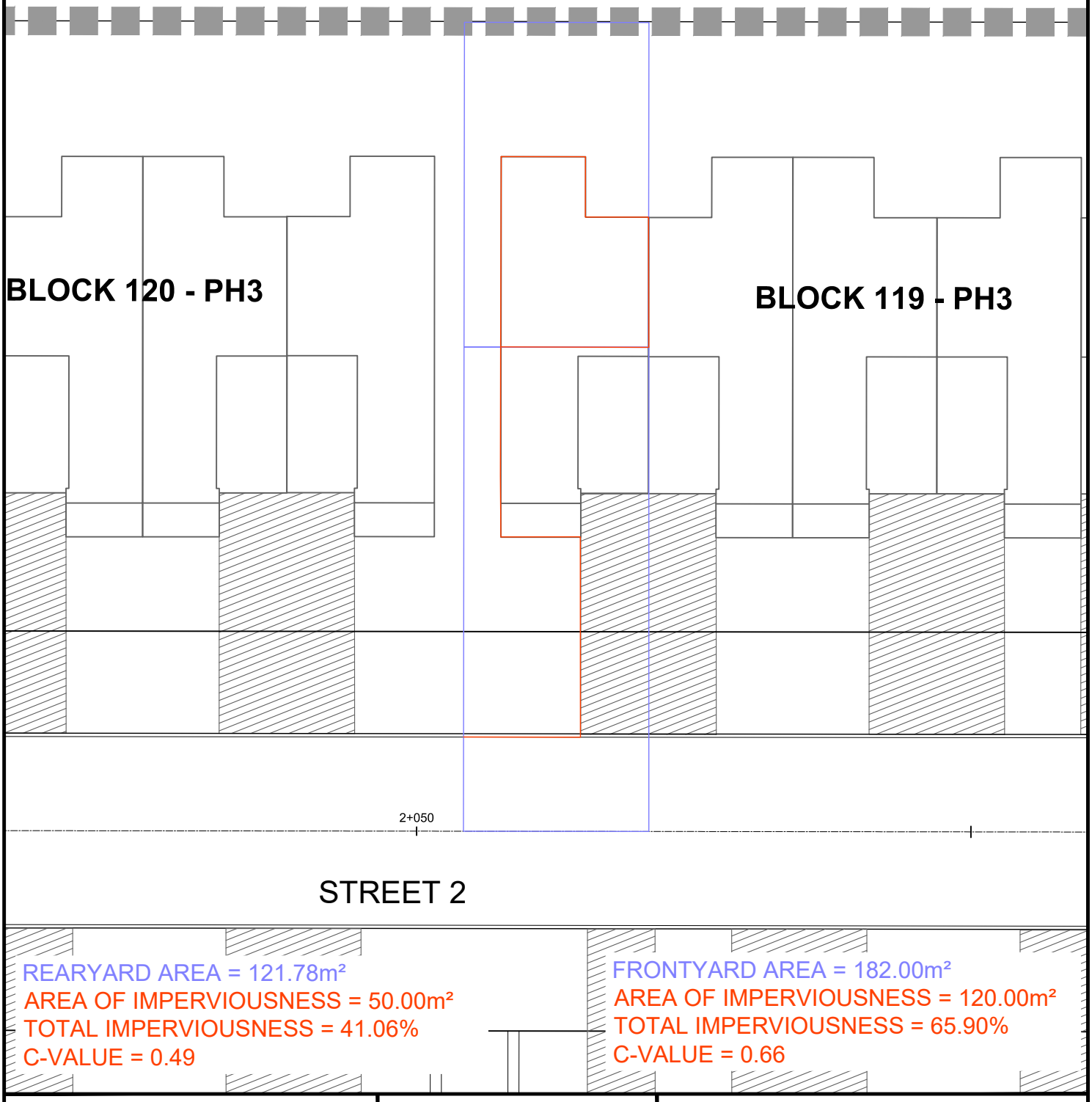
THE COMMONS

EXAMPLE LOT 2
INTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN2

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN2, Sep 17, 2021 - 3:54pm, breed

SHT8X11.DWG - 216mmx279mm



REARYARD AREA = 121.78m²
AREA OF IMPERVIOUSNESS = 50.00m²
TOTAL IMPERVIOUSNESS = 41.06%
C-VALUE = 0.49

FRONTYARD AREA = 182.00m²
AREA OF IMPERVIOUSNESS = 120.00m²
TOTAL IMPERVIOUSNESS = 65.90%
C-VALUE = 0.66

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

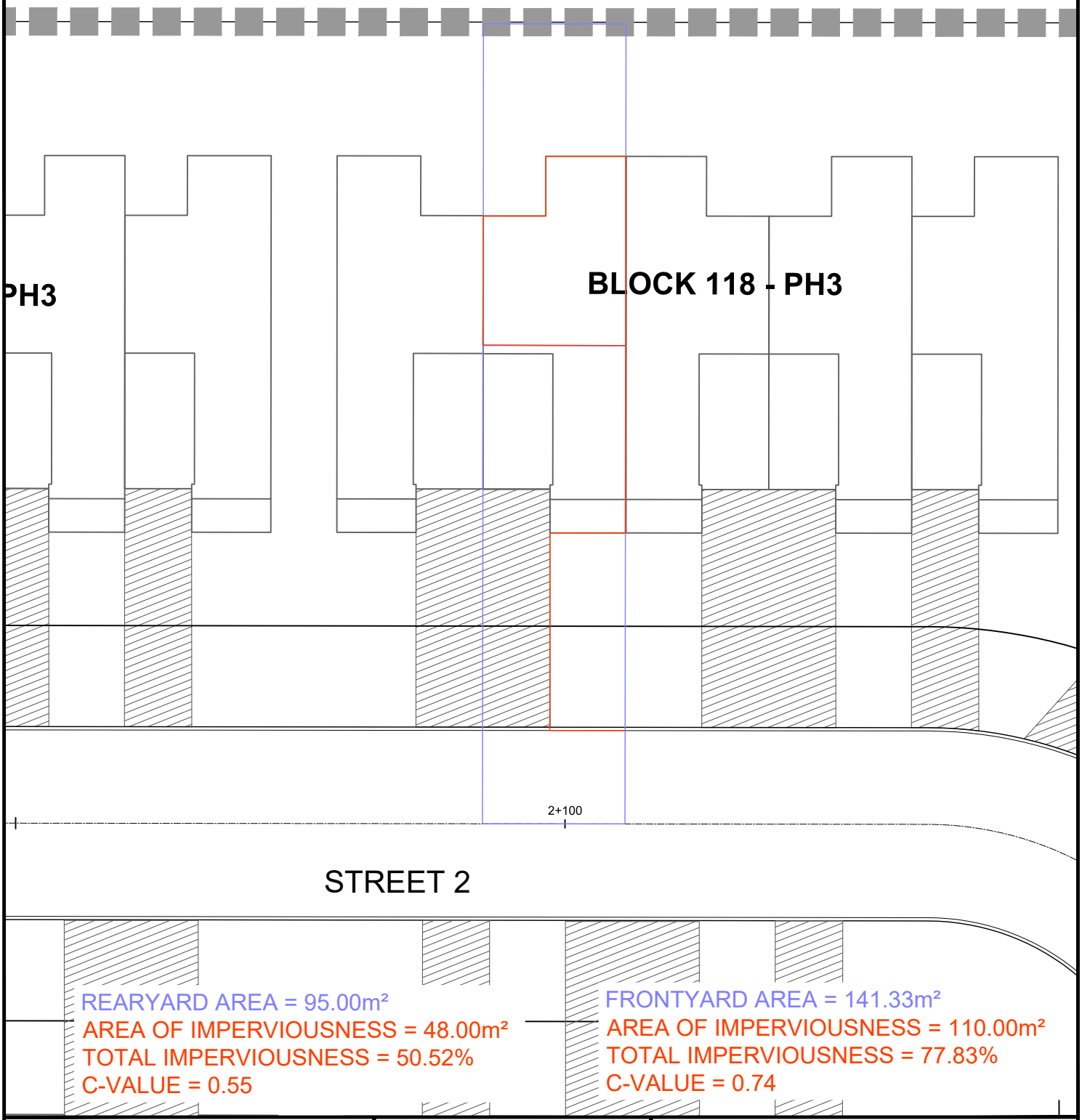
THE COMMONS

EXAMPLE LOT 3
EXTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN3

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN3, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

THE COMMONS

EXAMPLE LOT 4
INTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN4

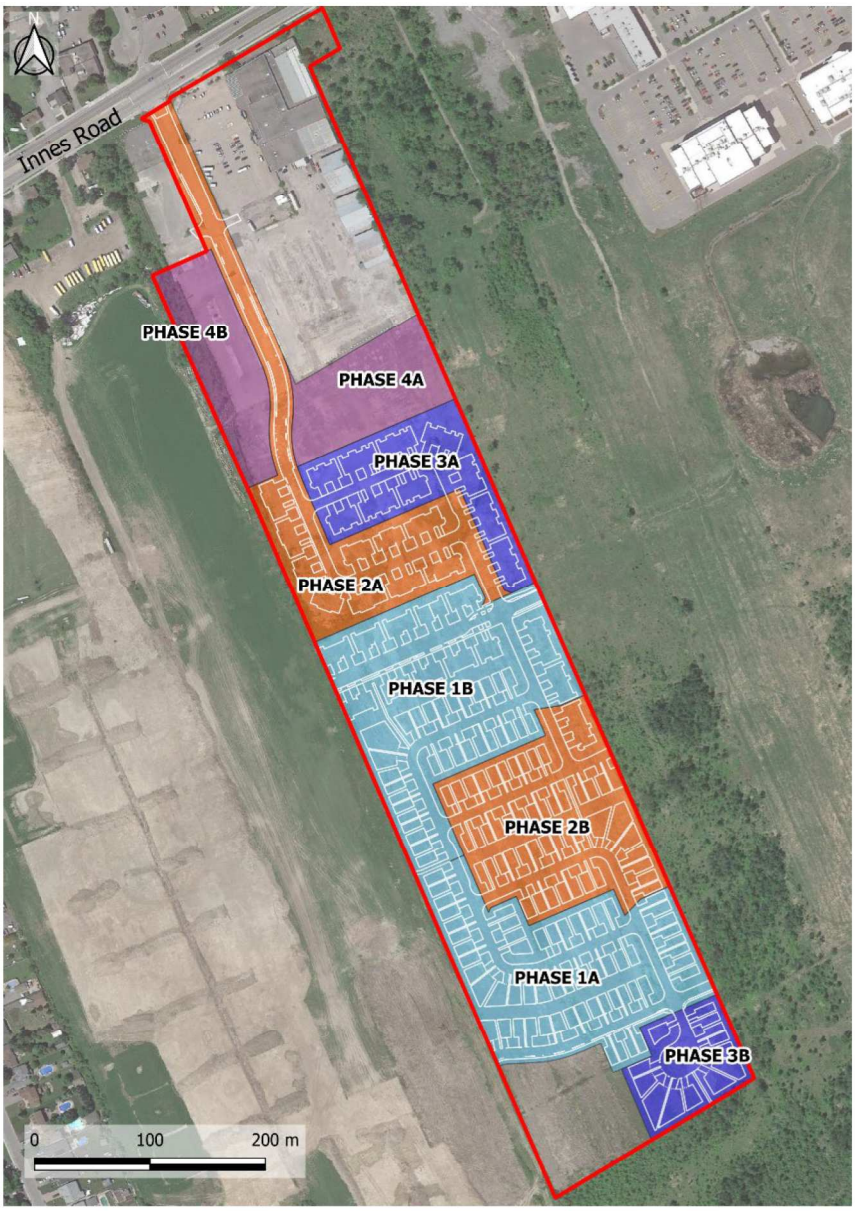
C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN4, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm

Stormwater Management Report
BMR The Commons

Novatech Engineering Consultants

December 2021



Prepared for: Novatech Engineering Consultants

Prepared by:

JFSA Water Resources and Environmental Consultants

JFSA Ref. No.: 2102-21

J.F. Sabourin and Associates Inc.
www.jfsa.com

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive, Ottawa, ON K2S 1B9
tel.: 613.836.3884, fax: 613.836.0332, www.jfsa.com

Stormwater Management Report
BMR – The Commons Subdivision

in the City of Ottawa

December 2021

Prepared for :

Novatech Engineering Consultants

Prepared by :

Tamarra Lewis, B.Eng., EIT.



Reviewed by :

JFSA Ref. No.: 2102-21

Stormwater Management Report
BMR The Commons
in the City of Ottawa

TABLE OF CONTENTS

1 INTRODUCTION AND OBJECTIVES 1

2 DESIGN CRITERIA AND GUIDELINES 4

2.1 Minor System 4
2.2 Major System 5

3 ASSUMPTIONS AND SOURCE OF DATA USED IN THIS STUDY 6

4 ULTIMATE CONDITIONS PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE 7

4.1 Ultimate Conditions Major System and SWM Analysis 8
4.2 Ultimate Conditions Minor System and Hydraulic Gradeline Analysis 11

5 PERFORMANCE OF INTERIM B EUC POND 1 14

EROSION AND SEDIMENT CONTROL DURING AND AFTER CONSTRUCTION 17

6 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS 18

APPENDICES

Appendix A: Rational Method Design Sheets (as per Novatech)
Appendix B: Inlet Control Devices, PCSWMM Input Files
Appendix C: Manhole Loss Coefficient Nomograph and Table; Pipe Data and Hydraulic Simulation Results
Appendix D: Tables and Calculation Sheets
Appendix E: Interim Condition and EUC Pond 1 Analysis

LIST OF TABLES

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm ..... Page 11
Table 2: Comparison of Minor System Flows to the Pond ..... Page 12
Table 3: Composite Hydraulic Grade Line Results for 100-Year Design Storms ..... Page 14
Table 4: Summary of SWM Pond 1 Operating Characteristics Under Interim B ..... Page 15

LIST OF FIGURES

Figure 1: General Site Location ..... Page 3
Figure 2: Minor System Overview ..... (End of Report)
Figure 3: Subcatchment Overview ..... (End of Report)
Figure 4: Proposed Major System ..... (End of Report)
Figure 5: Interim Condition ..... (End of Report)
Figure 6a-6c: Major System Ponding Areas ..... (End of Report)
Figure 7: Silt Control Measures during Construction (Silt fences) ..... Page 23

Stormwater Management Report
BMR The Commons
in the City of Ottawa
December 2021

1 INTRODUCTION AND OBJECTIVES

J.F. Sabourin and Associates Inc. (JFSA) were retained by Novatech Engineering Consultants (Novatech) to prepare a Stormwater Management (SWM) Plan for the BMR – The Commons Subdivision, located in Orleans, within the City of Ottawa. As shown by the image provided on the cover page, the future development is located at 3610 Innes Road and is split into four phases. The Interim SWM scenario includes the development of Phase 1A and 1B only, and the Ultimate SWM scenario includes Phases 1 – 4. The proposed development will be serviced by the existing East Urban Community Stormwater Pond #1 (EUC SWM Pond 1) that is located southwest of the site. EUC SWM Pond 1 will discharge under Page Road and into Mud Creek.

The BMR – The Commons development has a total drainage area of 19.84 ha, including a 0.95 ha of park block, 13.61 ha of residential development, 1.85 ha of medium density development and a 3.43 ha existing U-Haul site. The proposed development will be treated by a wet pond, the EUC Pond 1. Figure 1 provides an overview of the location of these respective blocks within the subdivision.

The purpose of this report is to evaluate the major and minor system flows of the proposed BMR – The Commons residential development with respect to the City's stormwater management guidelines and to check the adequacy of the proposed pipe sizes to convey the 2-year (5-year on collector) 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.
- *Erosion and Sediment Control Guidelines for Urban Construction,* Conservation Halton et al., December 2006.
- *City of Ottawa Sewer Design Guidelines,* City of Ottawa, October 2012.
- *Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines – Sewer,* City of Ottawa, February 2014.
- *City of Ottawa Technical Bulletin PIEDTB-2016-01*, City of Ottawa, September 2016.
- *City of Ottawa Technical Bulletin ISTB-2018-04*, City of Ottawa, June 2018.
- *EUC SWM Pond 1 – Original ECA and Amended ECA,* David Schaeffer Engineering Limited, April 2018
- *East Urban Community / Preliminary Hydraulic Gradeline Analysis and Pond Design Addendum,* J.F. Sabourin & Associates, August 2020

- *Design Brief 3636 Innes Road C/O Amerco Real Estate Company City of Ottawa.* IBI Group, February 2020
- *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan Richcraft Homes,* David Schaeffer Engineering Limited, June 2020
- *Novatech Conceptual Site Servicing and Stormwater Management Report for 3610 Innes Road (Former BMR Lands),* Novatech Engineering Consultants, November 2020

As per the approach formalized in the September 2016 *City of Ottawa Technical Bulletin PIEDTB-2016-01*, the proposed subdivision has been designed with a 2-year minor system level of service on local roads and a 5-year level of service on collector roads (Rue De Jargeau Road). Where possible with grading and minor system capture limitations, road ponding areas up to 35 cm deep were used to contain the 100-year major system flows.

The PCSWMM computer program was used to model the major and minor systems, to ensure that all stormwater management requirements are satisfied. The general SWM design criteria and guidelines that are to be met are described in Section 2.

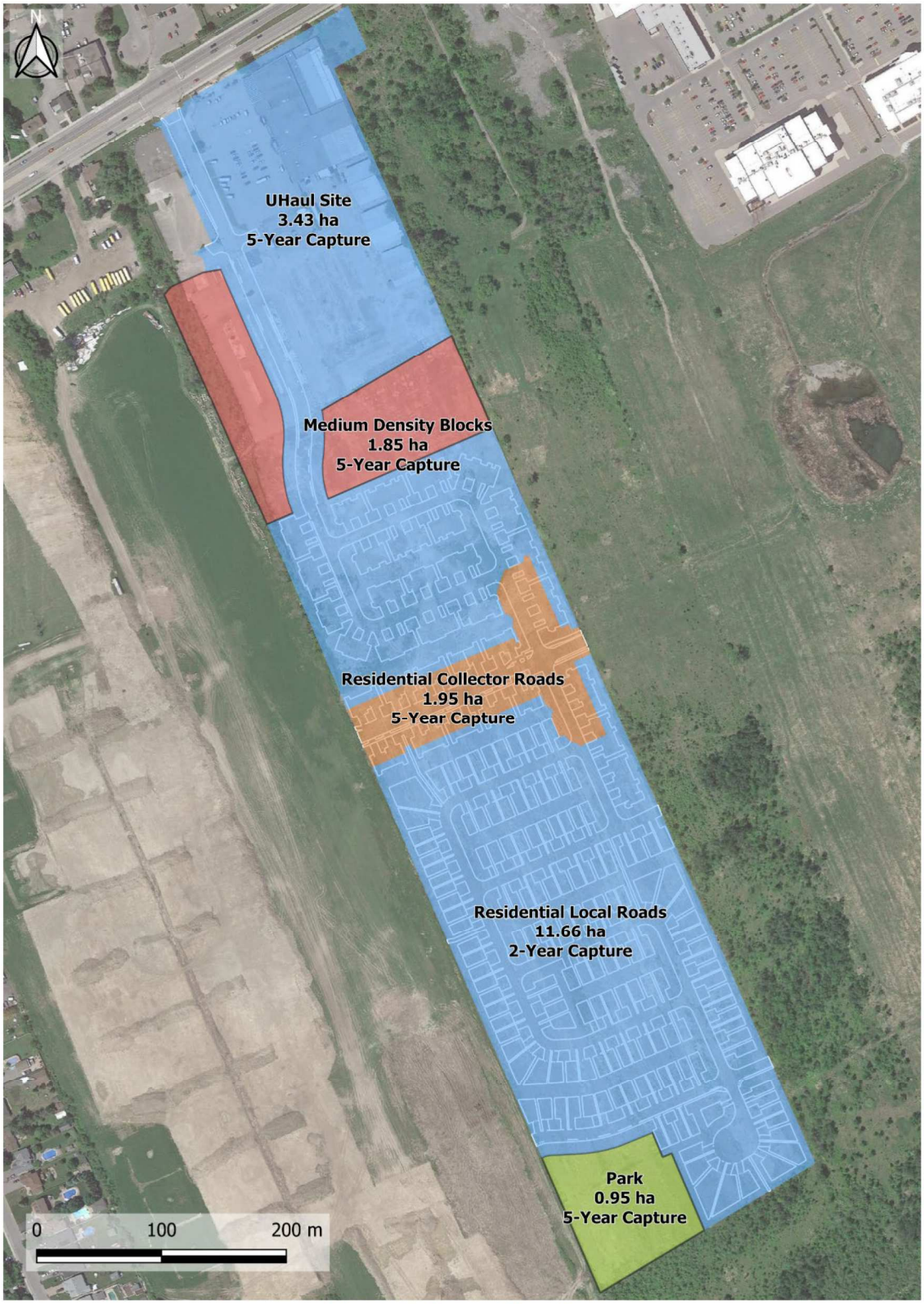


Figure 1: General Site Plan

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 subsequent technical memorandums, and generally accepted stormwater management design guidelines.

The detailed design of the proposed BMR – The Commons development has a total drainage area of 19.84 ha with an average imperviousness of 70%. 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 are to be designed to provide a minimum 2-year level of service, plus 5-year inflows on collector roads (Rue De Jargeau Road), as seen in Figure 1 above.

b) The 100-year hydraulic grade line (HGL) within the development minor systems 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 1:2 year or 1:5 year on collector), the minor system shall, if required, be limited with the use of inlet control devices to prevent excessive hydraulic surcharges and to maximize the use of surface storage on the road where desired.

d) Catchbasins on the road are to be equipped with City standard type S19 (fish) grates or City standard type S22 side inlets, 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) Rearyard catchbasins are to be equipped with 250 mm minimum lead pipes. Catchbasins installed on the street, where rearyard catchbasins connect to the main storm sewer through the catchbasin, are to be equipped with 250 mm minimum lead pipes for both single and double catchbasins.

g) Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80m/s and no greater than 3.0m/s. Where velocities over 3.0 m/s are proposed, provisions shall be made to protect against displacement of sewers by sudden jarring or movement. Velocities greater than 6.0 m/s are not permitted.

2.2 Major System

a) The major system shall be designed with enough road surface storage to allow the excess runoff of a 100-year storm to be retained within road ponding areas where desired.

b) Inlet control devices should be sized such that they do not create surface ponding on the road during the 2-year design storm on local roads (5-year design storm on collector and 10-year design storm on arterial roads); it should be noted that surface ponding over grates is present during rainfall under any design, as an appropriate depth of water is required for runoff to enter the grate (refer to Tables D-6 of Appendix D).

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

d) For the 100-year storm, the maximum total depth of water (static + dynamic) on all roads shall not exceed 35 cm at the gutter.

e) During the 100-year + 20% stress test, the maximum extent of surface water on streets, rearyards, public space and parking areas shall not touch the building envelope.

f) 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.

g) 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.

h) For the majority of the developments, the excess major system flows up to the 100-year return period are to be retained on-site in development blocks such as parks, schools, commercial, unless specified otherwise.

i) There must be at least 15 cm of vertical clearance between the spill elevation on the street and the ground elevation at the nearest building envelope that is in the proximity of the flow route or ponding area.

j) There must be at least 30 cm of vertical clearance between the rearyard spill elevation and the ground elevation at the adjacent building envelope.

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: *PCSWMM (version 7.4)*
- Minor system design: *1:2 year, plus 1:5-year inflows on collector roads. See the Rational Method Calculations in Appendix A.*
- Major system design: *1:100 year*
- Max. 100-yr water depth on roads: *35cm above the gutter*
- Extent of the major system: *Shall not touch the building envelope during the 100-year + 20% stress test*
- PCSWMM 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.
- Design storms: *25mm 4-hour Chicago, 2-, 5-, and 100-year 3-hour Chicago and the 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.*
- Stress Test: *20% increase in the 100-year 3-hour Chicago storm.*
- Street catchbasin covers: *City Standard Type S19 (fish) or City Standard Type S22 (side inlet). Type S19 approach flow-capture curves as per MTO design charts (equivalent to OPSD 400.010). Type S22 approach flow-capture curves as per the 2004 City of Ottawa Guidelines.*
- Rearyard catchbasin covers: *City Standard Type S19, S30 and S31*
- Curb and gutter: *City Standard SC1.3 (mountable) and SC1.1 (barrier). In the absence of flow capture curves for these curbs and gutters, OPSD 600.010 curb and gutters are assumed.*
- Manning's' roughness coeff.: *0.013 for concrete and 0.013 for PVC pipes (free flow).*
- Minor system losses: *Refer to Appendix C for maintenance hole loss coefficients.*
- Underside of footing elevations: *As provided by Novatech.*
- Freeboard in HGL analysis: *0.3 m between the underside of footing elevation and 100-year hydraulic gradeline.*
- Inlet Control Devices: *Refer to Appendix B for Plas-Tech ICD details.*
- Depth of backyard swales: *As per Novatech's Grading Plan*
- Street and pipe dimensions: *As per Novatech's Plan and Profiles*
- Right-of-way characteristics: *As per Novatech's Details of Roads*
- Downstream HGL: *Boundary condition set at STM-111 as per JFSA East Urban Community/Preliminary HGL analysis and Pond Design Addendum, August 2020 (See Table D-12).*

4 ULTIMATE CONDITIONS PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

The proposed minor and major system drainage routes are shown in plan view in Figures 2 and 3. The residential areas where enough detail was available were modelled in PCSWMM.

As per City standards, the minor system has been designed to accommodate a minimum of the 2-year post-development flows from within the site and local roads, plus 5-year inflows on collector roads, the medium density areas and the U-Haul area. A Rational Method design was conducted by Novatech (refer to Appendix A) to estimate minor system flows based on the City of Ottawa IDF relationship and selected runoff coefficients. The rational method 5-year inflows were used to determine the release rates for the medium density and U-Haul lands. An additional rational method table can be seen in Appendix D, Table D-11, which compares rational method design flow to the respective CBs against that simulated in the PCSWMM model.

The minor system release rates from the 1.0 ha parklands area were assumed to be 5-year capture to the minor system with on-site storage up to the 100-year event with any excess flows to Rue De Beaugency street to the North of the park. The U-Haul land on the Northeast corner of the site was limited to the 5-year capture and 100-year storage on-site. The on-site storage volumes were determined by the IBI Group in the Pond Design Brief (Feb, 2020) and were then used in JFSA's PCSWMM model. The medium density blocks were limited to the 5-year capture, with onsite storage provided up to the 100-year event as determined in the MSS (June, 2020) and Novatech Conceptual Design (Nov, 2020). The collector road (Rue De Jargeau Road) was limited to the 5-year rational method as per the MSS (June, 2020) and Novatech Conceptual Design (Nov, 2020).

As noted earlier in this report, where possible with grading limitations, road ponding areas up to 35 cm deep were used to contain the 100-year major system flows in the development. Note that rearyard catchbasins were connected to catchbasins on the road where possible, to allow rearyard runoff access to the storage in road ponding areas at regular intervals. In a design of this type where lots are serviced by gravity house connections, inlet control devices (ICDs) can be used to limit minor system capture at each catchbasin to the appropriate level of service.

Within the development, circular orifice plate type Inlet Control Devices (ICDs) of City standard diameters 83 mm, 94 mm, 102 mm, 108 mm, 127 mm, 152 mm and 178 mm will be used to limit minor system capture to a minimum of the 2-year flow (refer to Appendix B for Plas-Tech ICD details), allowing for sub-surface storage of 0.5 m^3 in single catchbasins, 1.0 m^3 in double catch basins, and 1.9 m^3 in catchbasin manholes. Note that this subsurface catchbasin storage has not been included in the modelling to be conservative.

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 more than the catchbasin capture rate will be temporarily stored within the 'sagged' street segments and released slowly to the storm sewers, up to the 100-year design storm. When the storage on a specific street segment is surpassed due to blockage or an event greater than the 100-year storm, the excess water will flow

towards the next downstream street sag, and eventually to the pond. It should be noted that the major system would outlet during the 100-year + 20% stress test without flooding any of the properties within the subdivision.

If the drainage system's capacity to capture surface flows is exceeded, Figures 5A-5C via Novatech present the maximum extent of static surface ponding and volume on the streets based on grading. Additionally, surface storage volumes that may exist in the rear yards have not been considered in this model, and the runoff from these areas have been directed straight to the catchbasins that the rear yard swales will discharge to. This has been completed to ensure that the peak flows and ponding volumes calculated in the model are conservative. The rear yard ponding depths for the 100-year Chicago Storm can be seen in Appendix D, Table D-10.

The PCSWMM analyses, discussed in Sections 4.1 and 4.2, 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 2-year (plus 5-year on collector roads) flow to the pond.

4.1 Ultimate Conditions Major System and SWM Analysis

The PCSWMM computer program was used to model the major and minor system flows within the proposed development.

The PCSWMM model was developed based on the information provided in Figures 2, 3, and 4. Eight (8) simulations were conducted, one for each of the following rainfall events:

i) the 2-year, 3-hour Chicago storm;
ii) the 5-year, 3-hour Chicago storm;
iii) the 100-year, 3-hour Chicago storm;
iv) the 100-year, 24-hour SCS Type II storm
v) the July 1st, 1979 historical event;
vi) the August 4th, 1988 historical event;
vii) the August 8th, 1996 historical event; and
viii) 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, as per the October 2012 City of Ottawa Sewer Design Guidelines. The depression storage and infiltration parameters in the PCSWMM model are as per the October 2012 City of Ottawa Sewer Design Guidelines. The percent imperviousness of the detailed drainage areas was measured based on the proposed development layout. The proposed development layouts have been established based on zoning requirements and represent the largest allowable footprint on each lot. The percent imperviousness of undetailed (lumped/external) drainage areas were calculated based on the runoff coefficient (C), where C = 0.7 x imperviousness ratio + 0.2. Figure 2 provides an overview of the subcatchments, and Table D-3 provides a full summary of all

subcatchment parameters modelled in PCSWMM, respectively. Figures representing the details of the C Value calculations provided by Novatech can be found in Appendix A.

Within the model, all CB grates have been explicitly represented using orifice connections, with the opening dimensions and configuration (side/bottom inlet) reflective of each specific grate. The grate allows flows into the CB based on the individual hydraulic properties of each specific grate configuration.Where required, inflows are limited by circular orifice plate type Inlet Control Devices (ICDs) of City standard diameters 83 mm, 94 mm, 102 mm, 108 mm, 127 mm, 152 mm and 178 mm. Each of these ICDs has been explicitly represented in the model through the use of circular orifices reflective of the standard ICD dimensions. 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 rearyard catchbasins or single catchbasin maintenance holes and the storm sewers. No temporary CBs are required within the development, note that the proposed ICDs are the controlling feature into the minor system, not the lead pipe, as such only the ICD has been represented in the model. Refer to Table B-1 for ICD's control rates, D-4A & D-4B for grate capacity, and D-5C to lead pipe flows.

Within the proposed subdivision, the dynamic flow depth on the road (at the gutter) will be minimal during the 100-year storms, as the 100-year flows are mostly retained within the road ponding areas and do not accumulate as in a typical subdivision design. Furthermore, it was determined that for the 100-year storm at all major system segments, the product of the depth of water (m) at the gutter multiplied by the velocity of flow (m/s) will not exceed the maximum allowable 0.6 m^2/s (refer to Table D-8 of Appendix D, where the calculated maximum was determined to be0.056 m^2/s). Table D-9 of Appendix D presents the 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 Table D-9, the maximum dynamic flow depth under these conditions is calculated as 0.28 cm, and the product of the depth of water at the gutter multiplied by the velocity of flow is 0.07 m^2/s. Table 1 below presents a summary of the major system results within the development simulated in PCSWMM during the 100-year Chicago storm.

Details of the 100-year street maximum water depth and water surface elevations are provided in Table D-7 of Appendix D. Based on Novatech's grading the major system has approximately 920 m^3 of storage at these localized low points throughout the development (see Figures 6A-6C). Depths calculated by the PCSWMM model demonstrate that the total 100-year depth of water (static and dynamic) on the street at these ponding areas will not exceed the maximum depth of 35 cm.

Table D-7 of Appendix D also presents the street storage 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 (static + dynamic overflow) at any ponding area under these conditions is calculated as 30 cm. The maximum extent of surface water during the 100-year + 20% stress test will not touch the building envelopes, refer to Novatech drawings for the flood extent of these ponding depths provided in Figures 6A-6C.

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

Catch Basin ID	Flow Depth (m)	Approach Flow (m^3/s)	Captured Flow (m^3/s)
02_(CB)	0.12	0.038	0.021
03_(CB)	0.12	0.066	0.031
04_(CB)	0.12	0.055	0.027
05_(CB)	0.12	0.062	0.032
06_(CB)	0.00	0.037	0.037
08_(CB)	0.14	0.068	0.033
09_(CB)	0.14	0.033	0.022
10_(CB)	0.24	0.084	0.043
11_(CB)	0.24	0.070	0.018
12_(CB)	0.18	0.101	0.051
13_(CB)	0.18	0.078	0.036
14_(CB)	0.16	0.041	0.022
15_(CB)	0.16	0.064	0.033
16_(CB)	0.13	0.034	0.021
17_(CB)	0.13	0.064	0.033
18_(CB)	0.27	0.077	0.022
19_(CB)	0.27	0.091	0.051
20_(CB)	0.15	0.081	0.051
21_(CB)	0.15	0.077	0.035
23_(CB)	0.11	0.074	0.050
24_(CB)	0.11	0.037	0.027
25_(CB)	0.04	0.055	0.041
26_(CB)	0.04	0.056	0.041
27_(CB)	0.22	0.198	0.096
28_(CB)	0.22	0.198	0.096
30_(CB)	0.12	0.076	0.052
31_(CB)	0.12	0.059	0.028
32_(CB)	0.20	0.074	0.029
33_(CB)	0.20	0.056	0.018
34_(CB)	0.14	0.106	0.050
35_(CB)	0.14	0.087	0.050
36_(CB)	0.13	0.041	0.022
37_(CB)	0.13	0.097	0.051
40_(CB)	0.18	0.066	0.032
41_(CB)	0.18	0.092	0.051
42_(CB)	0.15	0.057	0.028
43_(CB)	0.15	0.073	0.033
44_(CB)	0.12	0.068	0.033
45_(CB)	0.12	0.024	0.021
46_(CB)	0.17	0.070	0.033
47_(CB)	0.17	0.036	0.021
48_(CB)	0.16	0.059	0.033
49_(CB)	0.16	0.060	0.027
50_(CB)	0.14	0.076	0.036
51_(CB)	0.14	0.085	0.049
52_(CB)	0.05	0.037	0.027
53_(CB)	0.16	0.083	0.051
54_(CB)	0.16	0.074	0.036
55_(CB)	0.12	0.083	0.050
57_(CB)	0.16	0.074	0.036

4.2 Ultimate Conditions Minor System and Hydraulic Gradeline Analysis

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

The minor system performance was analyzed using a dynamic water surface elevation time-series at STM-111 unique for each design storm based on the HGL determined in JFSA's *"East Urban Community/Preliminary HGL analysis and Pond Design Addendum, August 2020"*. Table 2 presents the peak minor system outflows obtained with the above-mentioned simulations.

Table 2: Comparison of Ultimate Minor System Flows (3-Hour Chicago Storm) to the Pond from The Commons Development

Location	Novatech Rational Method Flow (m^3/s)	2-Year PCSWMM Flow (m^3/s)	5-Year PCSWMM Flow (m^3/s)	100-Year PCSWMM Flow (m^3/s)
STM-111 to Pond	2.32	1.85	2.60	3.62

(1)The total flow is calculated as per PCSWMM model peak inflows.

Table 2 shows that the total 2-year flows simulated by the PCSWMM models are between the 2-year and 5-year PCSWMM flows. This is to be expected as the majority of the site is serviced by the 2-year storms with some locations within the development serviced by the 5-year storm.

The PCSWMM simulations have determined that for the selected 2-, 5- and 100-year 3-Hour Chicago storms, the total minor system flows from the BMR – The Commons development would be 1.85 m^3/s, 2.60 m^3/s and 3.62 m^3/s, respectively. Although the 100-year flow will surcharge some of the minor system, with the majority being in the rear yard swales, a freeboard of 0.3 m between the 100-year hydraulic grade line and the underside of footings has been provided throughout the proposed development.

Tables C-1A and C-1E 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. Note that a minimum freeboard of 0.3 m between the hydraulic grade line and the underside of footings has been provided throughout the proposed developments for the 100-year storms, and a minimum freeboard of 0 m has been provided throughout the proposed development for the historical events. Additionally, note that the majority of the flowing full pipe velocities are no less than 0.80m/s and no greater than 3.0m/s. If velocities are over 3.0m/s, provisions shall be made to protect against displacement of sewers by sudden jarring or movement. Velocities greater than 6.0 m/s are not permitted.

Table C-1F of Appendix C presents the climate change stress test results for the hydraulic grade line 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, no locations within the proposed developments have a USF freeboard less than 0 m.

Table 3 presents the Ultimate composite hydraulic grade line results for the 100-year 3-hour Chicago and 100-year 24-hour SCS Type II design storms. Note to simplify this analysis, the highest HGL and the lowest USF on a single pipe length are compared, if it is found that the freeboard between these two locations is either less than 0.3m or less than 0.0m this location is flagged yellow or red, respectively. This flag then initiates a detailed analysis for this segment, where the HGL is interpolated along the full length of the pipe and then compared with the individual USF along with the distance, to confirm whether there is an HGL issue along that segment.

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

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL Length HGL (m)	Interpolated HGL Dist. From D/S MH (m)	Interpolated HGL HGL (m)
102_(STM)	100_(STM)	83.161	83.070	145	85.65	2.489			
104_(STM)	102_(STM)	83.273	83.161	139	85.7	2.427			
106_(STM)	104_(STM)	84.129	83.273	23	85.85	1.721			
108_(STM)	106_(STM)	84.136	84.129	28	86.1	1.964			
110_(STM)	108_(STM)	84.426	84.136	26	86.1	1.674			
112_(STM)	104_(STM)	83.484	83.273	18	85.95	2.466			
114_(STM)	112_(STM)	84.026	83.484	113	86.05	2.024			
116_(STM)	114_(STM)	84.121	84.026	108	86.5	2.379			
118_(STM)	116_(STM)	84.470	84.121	104	86.35	1.880			
120_(STM)	112_(STM)	84.464	83.484	9	86.1	1.636			
122_(STM)	120_(STM)	84.556	84.464	47	86.25	1.694			
124_(STM)	122_(STM)	84.664	84.556	49	86.5	1.836			
126_(STM)	124_(STM)	84.874	84.664	3	86.5	1.626			
128_(STM)	126_(STM)	85.090	84.874	56	86.7	1.610			
130_(STM)	128_(STM)	85.398	85.090	115	86.85	1.452			
132_(STM)	130_(STM)	85.494	85.398	122	87.3	1.806			
134_(STM)	132_(STM)	85.494	85.494	125	87.4	1.906			
136_(STM)	128_(STM)	85.246	85.090	65	86.7	1.454			
138_(STM)	136_(STM)	85.334	85.246	70	87.05	1.716			
140_(STM)	138_(STM)	85.633	85.334	76	87.05	1.417			
142_(STM)	132_(STM)	85.737	85.494	113	87.35	1.613			
142_(STM)	140_(STM)	85.737	85.633	92	87.45	1.713			
144_(STM)	140_(STM)	86.211	85.633	91	87.45	1.239			
146_(STM)	144_(STM)	86.445	86.211	94	87.7	1.255			
148_(STM)	146_(STM)	86.705	86.445	97	87	0.295			
				97	87	0.509	78.5	13.783	86.491
				102	87	0.509	78.5	13.783	86.491
				96	87.2	0.709	78.5	13.783	86.491
				101	87.2	0.709	78.5	13.783	86.491
				95	87.4	0.909	78.5	13.783	86.491
				100	87.45	0.959	78.5	13.783	86.491
150_(STM)	144_(STM)	86.429	86.211	114	87.7	1.271			
152_(STM)	150_(STM)	86.492	86.429	115	87.9	1.408			
154_(STM)	152_(STM)	86.543	86.492	117	88.3	1.757			
156_(STM)	154_(STM)	86.808	86.543	118	88.2	1.392			
158_(STM)	150_(STM)	87.157	86.429	103	88	0.843			
160_(STM)	158_(STM)	87.269	87.157	106	88.4	1.131			
162_(STM)	160_(STM)	87.758	87.269	107	88.4	0.642			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

5 PERFORMANCE OF INTERIM B EUC POND 1

As detailed in the March 2014 *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge Subdivision*, East Urban Community (EUC) Pond 1 has been modified for Interim B conditions to support the development of the Trails Edge subdivision south of the hydro easement, and the extension of Brian Coburn Boulevard. Undeveloped area and existing commercial areas north of the hydro easement also drain to Pond 1 under Interim B conditions.

The Orleans Village and BMR - The Commons sites north of the hydro corridor were treated as undeveloped under Interim B conditions in the March 2014 *Design Brief* and lumped in with the development of the East Urban Community lands to the north of the hydro corridor, which will trigger an "Ultimate Conditions" expansion of the north main cell and north forebay in EUC Pond 1. However, it was proposed in the July 2018 *Stormwater Management Report for the Orleans Village Subdivision* that the development of Orleans Village be allowed under Interim B conditions, with the understanding that the 100-year water level in EUC Pond 1 would increase temporarily under these conditions. A maximum 100-year pond level of 83.05 m was reported for these conditions in the July 2018 *Stormwater Management Report for the Orleans Village Subdivision*; 5 cm above the target 100-year pond level of 83.00 m. All other quality, erosion and quantity control requirements identified in the March 2014 *Design Brief* are satisfied under these conditions. The Interim B drainage area to EUC Pond 1 as proposed in the July 2018 *Stormwater Management Report for the Orleans Village Subdivision* is presented in Figure E-1 of Appendix E of the current report. Refer to the July 2018 *Stormwater Management Report for the Orleans Village Subdivision* for further details.

It is proposed as part of the current study that the development of Phase 1 of BMR - The Commons be permitted under Interim B conditions, similar to Orleans Village, in exchange for Orleans Village mixed-use block 148 and future residential block 147 remaining undeveloped until the ultimate conditions expansion of the north main cell and north forebay in EUC Pond 1. Orleans Village mixed-use block 148 is identified as area B013DV2 in Figure E-1 of Appendix E (2.535 ha at 93% imperviousness), and Orleans Village future residential block 147 is identified as area B015RE2 in Figure E-1 of Appendix E (2.165 ha at 79% imperviousness). For comparison, Phase 1 of BMR - The Commons is 5.817 ha at 59% imperviousness.

To evaluate the performance of EUC Pond 1 under these proposed conditions, the PCSWMM model of BMR - The Commons was modified to represent interim conditions wherein only Phase 1 is developed, with 100-year capture to the minor system of undeveloped future phases and the existing commercial area to the north (refer to Figure 5). Similarly, the DDSWMM / SWMHYMO / XPSWMM model of drainage to EUC Pond 1 under Interim B conditions from the July 2018 *Stormwater Management Report for the Orleans Village Subdivision* was modified to remove the area occupied by the BMR - The Commons development (to avoid double-counting this area), and to represent Orleans Village areas B013DV2 and B015RE2 as undeveloped. The simulated outflow from the interim conditions model of BMR - The Commons Phase 1 was then input to the modified XPSWMM model of the EUC Pond 1 system under Interim B conditions.

The operation of Interim B EUC Pond 1 under these proposed conditions – Interim B + Orleans Village development (areas B013DV2 and B015RE2 undeveloped) + BMR – The Commons Phase 1 development – are summarized in Table 4 below.

Table 4: Summary of SWM Pond 1 Operating Characteristics
Under Interim B Conditions (+ BMR - The Commons Phase 1)

Pond Component	Total Inflow (m^3/s)	Water Level (m)				Volume Used [2] (m^3)	Allowable Outflow [3] (m^3/s)	Provided Outflow (m^3/s)
		North Forebay	North Main Cell	South Forebay	South Main Cell			
Permanent Pool [4]	N/A	81.600	80.100	81.500	80.100	36400	N/A	N/A
Quality Control	N/A	N/A	80.684	N/A	80.684	14892	N/A	0.204
Extended Detention	N/A	81.650	81.650	81.650	81.650	43988	N/A	0.383
100-Year, 24-Hour SCS [5][6]	0.000	83.016	83.015	83.021	83.021	110086	8.000	6.914

[2] Volumes are active storage only for all SWM facility components except the permanent pool.
[3] Refer to the March 2014 Design Brief 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).
[6] 100-Year 14-Hour SCS was used for Submission 2 as the critical storm to check against the allowable outflow

The above results show that the actual provided release rate for the critical 100-year storm does not exceed the allowable release rates for SWM Pond 1. Note that the maximum 100-year pond level is 83.02 m; 2 cm above the target 100-year water level of 83.0 m.

Interim B EUC Pond 1 has been equipped with two sediment forebays. Calculations for the minimum dispersion length, settling length and the average velocity in the north and south forebays under these Interim B conditions are presented in Calculation Sheets E-2 and E-3 of Attachment E. Note that the south forebay is not negatively affected by the Orleans Village and BMR - The Commons Phase 1 developments, as the proposed developments discharge to the north main cell and forebay of EUC Pond 1. Dispersion, setting and average velocity criteria are satisfied by the existing north forebay under these proposed conditions.

EUC SWM Pond 1 has a permanent pool volume of 36,400 m^3, which is more than the minimum permanent pool volume the SWMP Design Manual requires for normal protection for a wet pond for the 372.298 ha drainage area at 42% imperviousness, as calculated below.

$$(97.00 - 40)\ m^3/ha \times 372.298\ ha = 21{,}221\ m^3$$

The required quality control volume of 14,892 m^3 (40 m^3/ha) for the 372.298 ha drainage area is contained within the extended detention volume at an elevation of 80.684 m. The provided extended detention volume of 43,988 m^3 exceeds the required volume of 33,922 m^3 calculated based on detention of the 25 mm storm runoff.

It may therefore be concluded that the operation of EUC SWM Pond 1 under Interim B conditions, with the Orleans Village (with areas B013DV2 and B015RE2 undeveloped) and BMR The Commons Phase 1 developments in place, is in conformance with the requirements presented in the March 2014 *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge West Subdivision*, except for the 100-year pond level, which exceeds the maximum allowable elevation by 2 cm. It is also noted the 100-year outflow of 6.914 m^3/s does not exceed the maximum allowable outflow of 8.0 m^3/s.

EROSION AND SEDIMENT CONTROL DURING AND AFTER CONSTRUCTION

Silt and erosion control strategies shall be implemented during construction activities to minimize the transfer of silt off-site. The following measures should be implemented:

i) Silt control fences shall be installed as required to prevent the movement of silt off-site during rainfall events.

ii) Construction of a mud mat shall be installed at the site entrance to promote self-cleaning of truck tires when leaving the site.

iii) All catch basins shall be equipped with a crushed stone filter to prevent the capture of silt in the storm sewer system.

iv) Regular cleaning of the adjacent roads shall be undertaken during the construction activities.

v) Regular inspection and maintenance of the silt control measures shall be undertaken until the site has been stabilized.

vi) The erosion and sediment control devices shall be removed after the site has been stabilized.

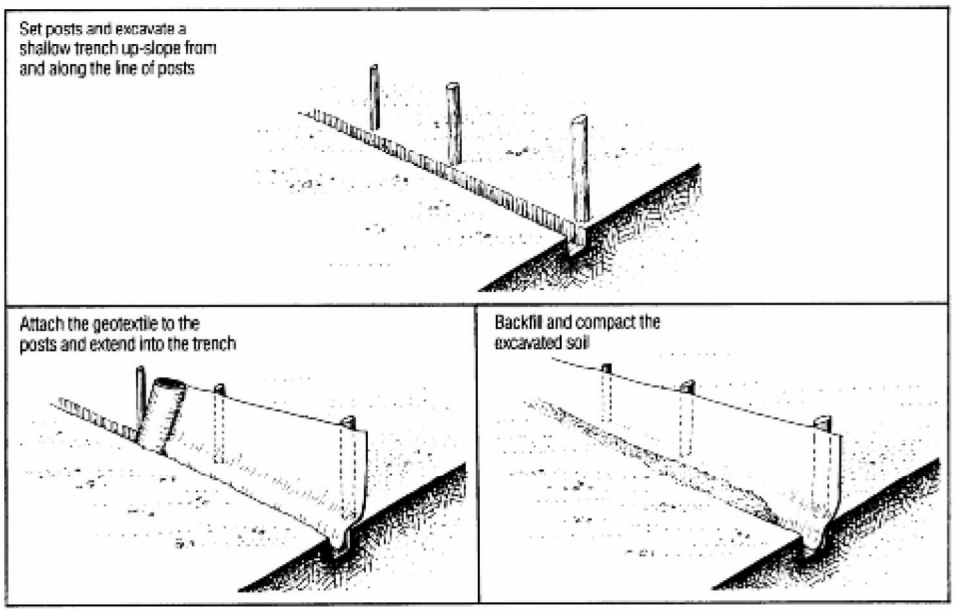


Figure 7: Typical installation of silt fences

6 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The BMR – The Commons development is in the City of Ottawa, on Innes Road and east of Page Road. The development has a drainage area of 19.84 ha, which will be treated by a wet SWM pond for quantity and quality control, which services a total drainage area of 372.298 ha.

Per the City of Ottawa design guidelines, the minor system has been designed to accommodate a minimum of the 2-year post-development flows from within the site and from external areas (plus 5-year flows on collector). The PCSWMM model analyses have determined that the minor system will surcharge in some parts of the system. However, with the use of Inlet Control Devices, a minimum freeboard of 0.3 m is provided between the 100-year hydraulic grade line and the underside of footings throughout the subdivision.

The PCSWMM simulations have determined that for the selected 2-, 5- and 100-year 3-Hour Chicago storms, the total minor system flows from the BMR development and associated external areas would be 1.85 m^3/s, 2.60 m^3/s and 3.62m^3/s, respectively.

Within the subdivision, the peak water depths do not exceed the maximum allowable 35 cm depth at the gutter for the simulated 100-year storm (Table D-7 of Appendix D). Furthermore, it was determined that for the 100-year event, the product of the velocity and depth of flow does not exceed the maximum allowable 0.60 m^2/s. Also as required, the maximum extent of surface water during the 100-year + 20% stress test will not touch the building envelopes.

Table C-1A- C1F of Appendix C summarizes the hydraulic grade line analysis for the various storm. Note that the full pipe velocities are generally no less than 0.80 m/s and no greater than 3.0 m/s for the proposed pipes. Where velocities over 3.0 m/s are proposed, provisions shall be made to protect against displacement of sewers by sudden jarring or movement.

Stress test results for the major and minor drainage systems based on a 20% increase in the 100-year storm, as per the October 2012 *City of Ottawa Sewer Design Guidelines*, are summarized in Section 4.

The operation of EUC SWM Pond 1 under Interim B conditions, with the Orleans Village (with areas B013DV2 and B015RE2 undeveloped) and BMR The Commons Phase 1 developments in place, is in conformance with the requirements presented in the March 2014 *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge West Subdivision*, except for the 100-year pond level, which exceeds the maximum allowable elevation by 2 cm. It is also noted the 100-year outflow of 6.914 m^3/s does not exceed the maximum allowable outflow of 8.0 m^3/s.

Recommendations for silt and erosion control strategies to be implemented during construction are presented in Section 6.

In conclusion, the proposed design satisfies all selected design guidelines and requirements.



Legend

- Site Plan
- Manhole
- Catch Basins
- Rear Yard Catch Basin
- Minor System
- Rear Yard

ICD Sizing

- 0.083
- 0.094
- 0.102
- 0.108
- 0.127
- 0.152
- 0.178

N

SCALE: 1:3700

0 100 200 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

NOVATECH ENGINEERING CONSULTANTS LTD.

Stormwater Management Report for BMR - The Commons

Figure 2: Minor System Overview

PROJECT	2102-21
DRAWN	MP/TL
DATE	11-24-2021

C:\Users\TLewis\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2102-21\202110 Subm2\Design\GIS\20211123-Report Figures



N

Legend

Site Plan

Subcatchments

SCALE: 1:4000

0 100 200 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

NOVATECH ENGINEERING CONSULTANTS LTD.

Stormwater Management Report for BMR - The Commons

Figure 3: Subcatchment Overview

PROJECT	2102-21
DRAWN	MP/TL
DATE	11-29-2021

C:\Users\TLewis\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2102-21\202110 Subm2\Design\GIS\20211123-Report Figures



N

Legend

- Site Plan
- High Point
- Low Point
- Major System
- Rear Yard
- Major System Spill Points

SCALE: 1:3500

0 100 200 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

NOVATECH

Stormwater Management Report for
BMR - The Commons

Figure 4: Proposed Major System

PROJECT	2102-21
DRAWN	MP
DATE	06-23-2021

C:\Users\JFSAPC1\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2102-21\202105 Subm1\Design\GIS\20210518 - Report Figures



N

Legend

- Site Plan
- Site Area
- Developed Areas
- Undeveloped Areas

SCALE: 1:4100

0 100 200 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

NOVATECH

Stormwater Management Report for
BMR - The Commons

Figure 5: Interim Condition

PROJECT	2102-21
DRAWN	MP
DATE	06-24-2021

C:\Users\JFSAPC1\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2102-21\202105 Subm1\Design\GIS\20210518 - Report Figures

LEGEND

- 120.46 — PROPOSED ELEVATION
- 120.46 — EXISTING ELEVATION
- 120.46(S) — PROPOSED SWALE ELEVATION
- 120.46(TG) — PROPOSED TOP OF GRATE ELEVATION
- 120.46(VPI) — PROPOSED VERTICAL POINT OF INTERSECTION ELEVATION
- 83.78TW 83.38BW — PROPOSED TOP OF NOISE WALL ELEVATION / PROPOSED BOTTOM OF NOISEWALL ELEVATION
- (120.46) — PROPOSED ELEVATION BY OTHERS (CAIVAN ORLEANS VILLAGE)
- 3.2% — GRADE AND DIRECTION
- 127.55 — PROPOSED TERRACE ELEVATION
- 120.46* — SPILL ELEVATION
- FF= — FINISHED FLOOR ELEVATION
- TF= — TOP OF FOUNDATION ELEVATION
- USF= — UNDERSIDE OF FOOTING ELEVATION
- CL/OW/O — UNIT BASEMENT STYLE (CONVENTIONAL / LOOKOUT / WALKOUT)
- PRV — PRESSURE REDUCING VALVE
- EMERGENCY OVERLAND FLOW
- PROPOSED TERRACING
- PROPOSED SWALE
- MH 100 — PROPOSED STORM MH
- PROPOSED LANDSCAPE TEE CATCH BASIN
- PROPOSED LANDSCAPE ELBOW CATCH BASIN
- PROPOSED REAR YARD CATCH BASIN MANHOLE
- PROPOSED REAR YARD CATCH BASIN
- PROPOSED ROAD CATCHBASIN
- EXISTING TREE TO REMAIN IF POSSIBLE
- 97.84 — STATIC PONDING LIMITS

ROADWAY CATCHBASIN TABLE (PHASE 2A)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
30	2+235,53	89,07	87,57	127mm	600 x 600 CB
31**	2+235,52	89,07	87,65	102mm	600 x 600 CB
32	2+172,35	89,47	87,97	108mm	600 x 600 CB
33	2+172,35	89,47	87,97	83mm	600 x 600 CB
34	9+535,97	89,51	88,01	127mm	600 x 600 CB
35	9+535,97	89,51	88,01	127mm	600 x 600 CB
36	9+396,24	89,79	88,29	83mm	600 x 600 CB
37	9+395,97	89,79	88,29	127mm	600 x 600 CB
38*	9+387,20	89,86	88,36	83mm	600 x 600 CB
39*	9+351,61	90,13	88,77	83mm	600 x 600 CB
40	9+294,96	90,23	88,73	102mm	600 x 600 CB
41	9+294,96	90,13	88,63	127mm	600 x 600 CB
42	9+139,87	90,30	88,80	94mm	600 x 600 CB
43	9+140	90,29	88,79	102mm	600 x 600 CB
52	9+382,52	89,81	88,31	83mm	600 x 600 CB

* SOLID COVER
** CURB INLET

ROADWAY CATCHBASIN TABLE (PHASE 3A)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
53	2+079,97	89,66	88,16	127mm	600 x 600 CB
54	2+079,97	89,71	88,21	108mm	600 x 600 CB

NORTH

KEY PLAN N.T.S.

SITE

SITE BENCHMARK REFERENCED TO LOCAL GEODETIC DATUM

BLOCK 161
Medium Density Residential
Area= 1.02 Ha
(2.54 Acres)

BLOCK 160
Medium Density Residential
Area= 1.01 Ha
(2.50 Acres)

APPROXIMATE LIMIT OF CDP BOUNDARY

Street Two

Street Nine

1.8m CONCRETE SIDEWALK

3604 INNES ROAD
CARWASH
(D07-12-18-0132)

3636 INNES ROAD
HAUL SITE
(D07-12-20-0086)

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PRELIMINARY

No.	REVISION	DATE	BY
2.	REVISED AND REISSUED FOR REVIEW	NOV 26/21	BHB
1.	ISSUED FOR REVIEW	JUNE 18/21	BHB

SCALE 1:500

1:500 0 5 10 15 20

DESIGN DJC
CHECKED BCS
DRAWN MFD
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

PROFESSIONAL ENGINEER PROVINCE OF ONTARIO — B. H. BAHIA 100184647 — Nov 26, 2021

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
THE COMMONS

DRAWING NAME
PONDING AND ICD PLAN

PROJECT No. 118224-00
REV REV # 2
DRAWING No. 118224-P-ICD1

#18535
D07-16-19-0027

C:\Users\AdrianaB\Desktop\...\118224-P-ICD1.dwg, 11/26/2021 3:47:29 PM, bwood

LEGEND

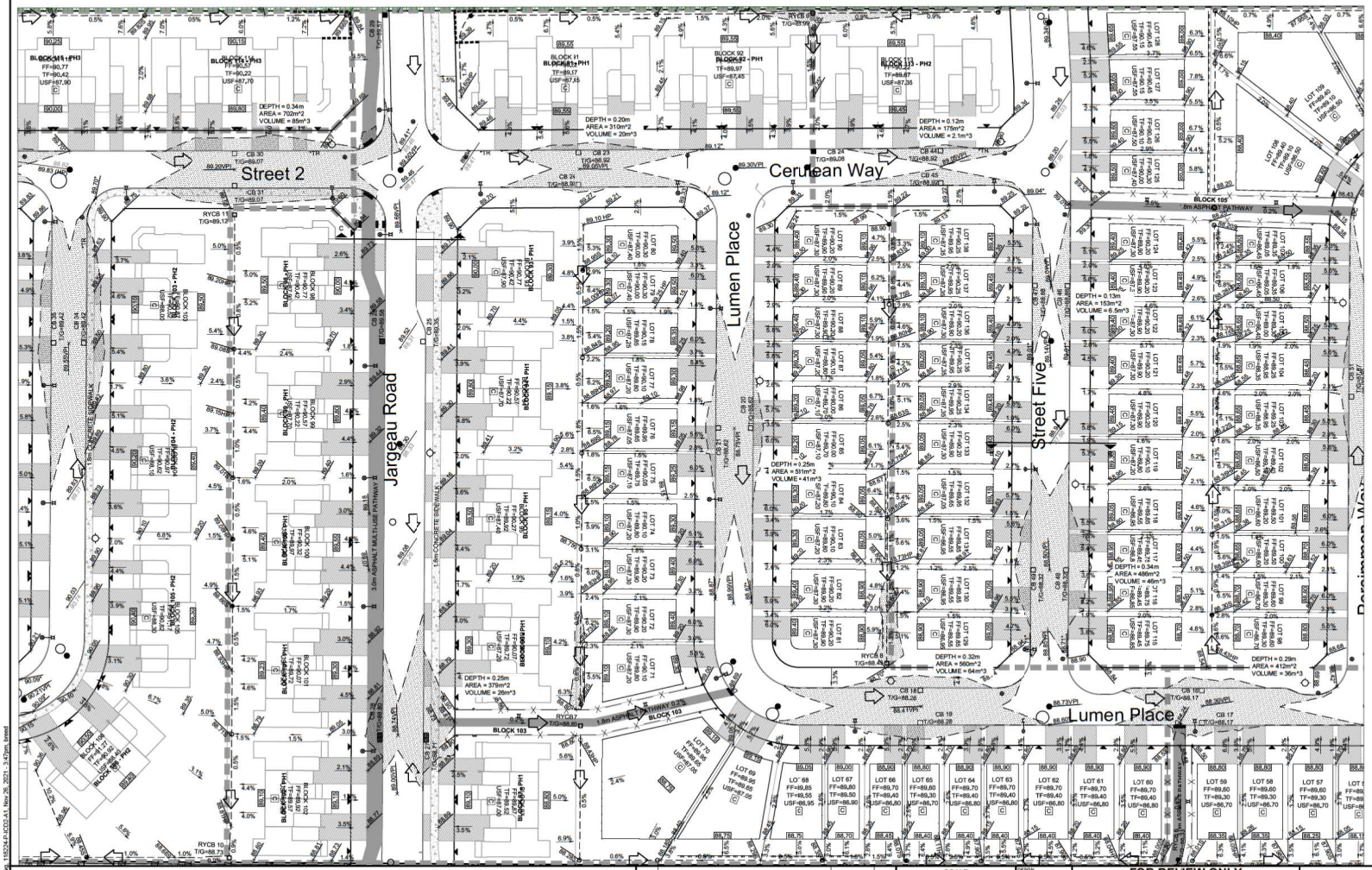
120.46 / 119.96	PROPOSED ELEVATION / EXISTING ELEVATION	3.2%	GRADE AND DIRECTION		EMERGENCY OVERLAND FLOW
120.46(S)	PROPOSED SWALE ELEVATION	127.55 / 120.46	PROPOSED TERRACE ELEVATION / SPILL ELEVATION		PROPOSED TERRACING
120.46TOG	PROPOSED TOP OF GRATE ELEVATION	FF=	FINISHED FLOOR ELEVATION		PROPOSED SWALE
120.46(VPI)	PROPOSED VERTICAL POINT OF INTERSECTION ELEVATION	TF=	TOP OF FOUNDATION ELEVATION	MH 100	PROPOSED STORM MH
87.78(TB) / 85.98(BF)	PROPOSED TOP OF NOISE WALL ELEVATION / PROPOSED BOTTOM OF NOISE WALL ELEVATION	USF=	UNDERSIDE OF FOOTING ELEVATION		PROPOSED LANDSCAPE TEE CATCH BASIN
120.46	PROPOSED ELEVATION BY OTHERS (CAIVAN ORLEANS VILLAGE)	CL/LO/WO	UNIT BASEMENT STYLE (CONVENTIONAL / LOCKOUT / WALKOUT)		PROPOSED LANDSCAPE ELBOW CATCH BASIN
		PRV	PRESSURE REDUCING VALVE		PROPOSED REAR YARD CATCH BASIN MANHOLE
					PROPOSED REAR YARD CATCH BASIN
					PROPOSED ROAD CATCHBASIN
					EXISTING TREE TO REMAIN IF POSSIBLE
				97.84	STATIC PONDING LIMITS

NORTH

KEY PLAN
N.T.S.

SITE

SITE BENCHMARK
REFERENCED TO LOCAL GEODETIC DATUM



ROADWAY CATCHBASIN TABLE (PHASE 1B)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
18	4+170	88,28	86,78	94mm	600 x 600 C3
19	4+170	88,28	86,78	127mm	600 x 600 C3
20	4+069	88,62	87,12	127mm	600 x 600 C3
21	4+069	88,77	87,27	108mm	600 x 600 C3
23	3+052	88,92	87,42	127mm	600 x 600 C3
24	3+052	88,92	87,42	94mm	600 x 600 C3
25	1+126,45	89,38	87,88	108mm	600 x 600 C3
26**	1+126,45	89,50	88,00	108mm	600 x 600 C3
27***	1+035,61	88,64	87,14	178mm	600 x 600 C3
28***	1+035,62	88,72	87,22	178mm	600 x 600 C3
29*	1+201,84	89,56	88,14	127mm	1,200 mm dia CBMH

* SOLID COVER
** CURB INLET
*** CURB INLET DUAL CATCHBASIN

ROADWAY CATCHBASIN TABLE (PHASE 2B)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
10	6+165,12	87,57	86,07	127mm	600 x 600 CB
11	6+165,12	87,56	86,06	83mm	600 x 600 CB
22*	3+106,23	89,08	87,58	127mm	600 x 600 CB
44	3+135,44	88,92	87,42	102mm	600 x 600 CB
45	3+135,44	88,92	87,42	83mm	600 x 600 CB
46	5+063,76	88,88	87,38	102mm	600 x 600 CB
47	5+063,76	89,03	87,53	83mm	600 x 600 CB
48	5+129,30	88,37	86,87	102mm	600 x 600 CB
49	5+129,30	88,52	87,02	94mm	600 x 600 CB
50	6+080,50	87,87	86,37	108mm	600 x 600 CB
51	6+080,50	88,02	86,52	127mm	600 x 600 CB

* SOLID COVER

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PRELIMINARY

No.	REVISION	DATE	BY
2.	REVISED AND REISSUED FOR RVIEW	NOV 26/21	BHB
1.	ISSUED FOR REVIEW	JUNE 18/21	BHB

SCALE 1:500

1:500
0 5 10 15 20

DESIGN BR
CHECKED BCS
DRAWN BR
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
B. H. BAHIA
100164647
Nov 26, 2021
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
THE COMMONS

DRAWING NAME
PONDING AND ICD PLAN

PROJECT No. 118224-00
REV REV # 2
DRAWING No. 118224-P-ICD2

D07-16-19-0027 #18535

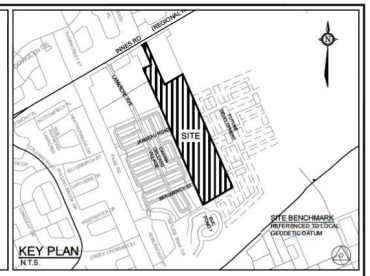
C:\Users\AdPublish_10348\118224-P-ICD2.dwg, 118224-P-ICD2-A1, Nov 26, 2021 - 3:47pm, bmed

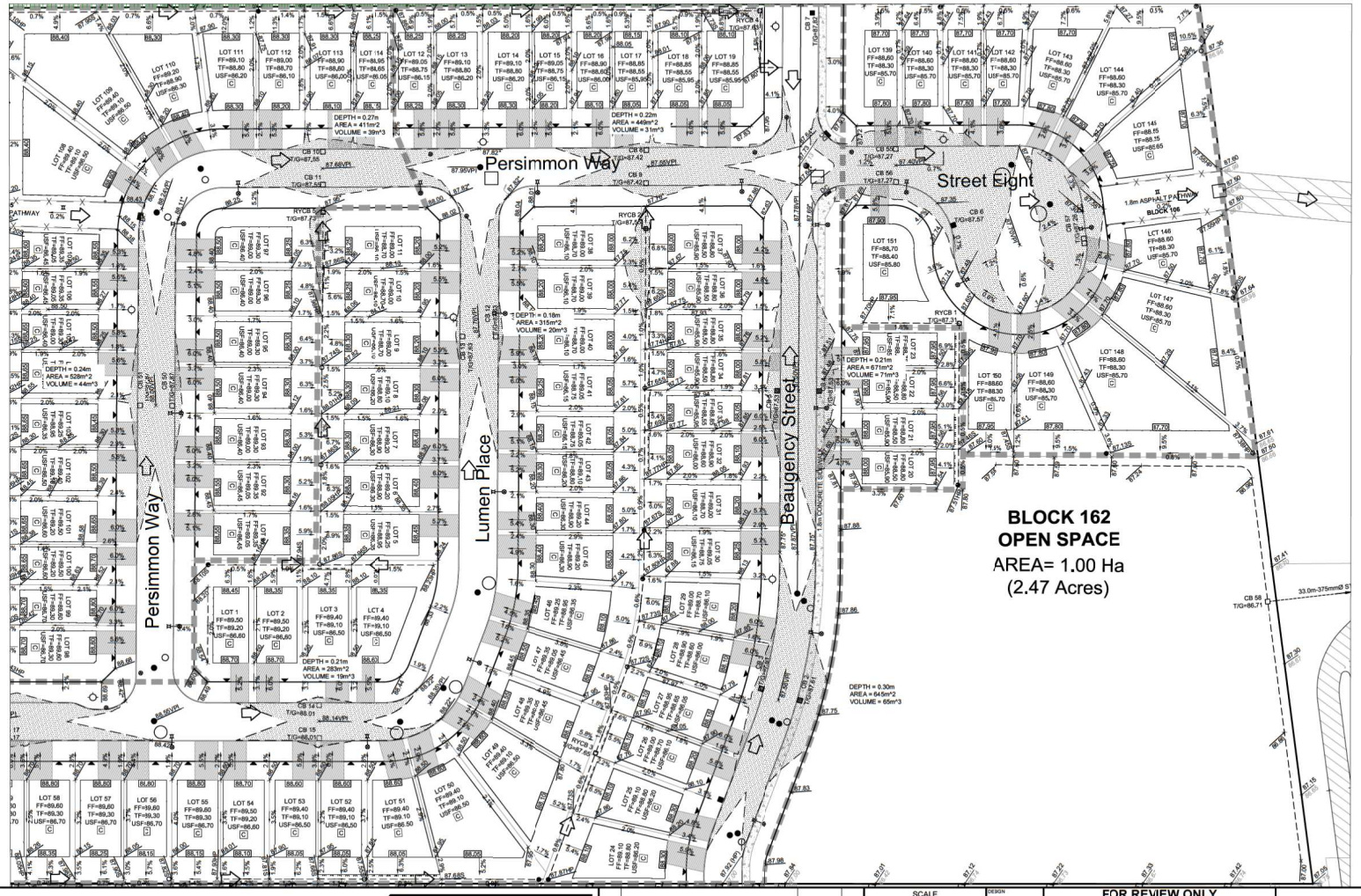
LEGEND

- 120.46 — PROPOSED ELEVATION / EXISTING ELEVATION
- 120.46(S) — PROPOSED SWALE ELEVATON
- 120.46(TG) — PROPOSED TOP OF GRATE ELEVATION
- 120.46(VPI) — PROPOSED VERTICAL POIN" OF INTERSECTION ELEVATION
- 87.19(TW) / 86.99(BW) — PROPOSED TOP OF NOISE WALL ELEVATION / PROPOSED BOTTOM OF NOISE WALL ELEVATION
- [120.46] — PROPOSED ELEVATION BY OTHERS (CAIVAN ORLEANS VILLAGE)
- 3.2% — GRADE AND DIRECTION
- 127.55 / 120.46 — PROPOSED TERRACE ELEVATION / SPILL ELEVATION
- FF= — FINISHED FLOOR ELEVATION
- TF= — TOP OF FOUNDATION ELEVATION
- USF= — UNDERSIDE OF FOOTING ELEVATION
- C/LO/WO — UNIT BASEMENT STYLE (CONVENTIONAL / LOCKOUT / WALKOUT)
- PRV — PRESSURE REDUCING VALVE
- EMERGENCY OVERLAND FLOW
- PROPOSED TERRACING
- PROPOSED SWALE
- MH 100 — PROPOSED STORM MH
- PROPOSED LANDSCAPE TEE CATCH BASIN
- PROPOSED LANDSCAPE ELBOW CATCH BASIN
- PROPOSED REAR YARD CATCH BASIN MANHOLE
- PROPOSED REAR YARD CATCH BASIN
- PROPOSED ROAD CATCHBASIN
- EXISTING TREE TO REMAIN IF POSSIBLE
- 97.84 — STATIC PONDING LIMITS

NORTH

KEY PLAN
N.T.S.





ROADWAY CATCHBASIN TABLE (PHASE 1A)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
1*	7+021	87,82	86,32	127mm	600 x 600 CB
2**	7+047,99	87,60	86,10	83mm	600 x 600 CB
3**	7+048,08	87,60	86,10	102mm	600 x 600 CB
4**	7+117,08	87,53	86,03	94mm	600 x 600 CB
5**	7+117,08	87,53	86,03	102mm	600 x 600 CB
7*	7+203,11	87,82	86,32	--mm	600 x 600 CB
8	6+238,28	87,44	85,94	102mm	600 x 600 CB
9	6+238,19	87,43	85,93	83mm	600 x 600 CB
12	4+421,50	87,63	86,13	127mm	600 x 600 CB
13	4+421,50	87,78	86,28	108mm	600 x 600 CB
14	4+310	88,01	86,51	83mm	600 x 600 CB
15	4+310	88,02	86,52	102mm	600 x 600 CB
16	4+235	88,17	86,67	83mm	600 x 600 CB
17	4+235	88,18	86,68	102mm	600 x 600 CB

* SOLID COVER
** CURB INLET

ROADWAY CATCHBASIN TABLE (PHASE 2B)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
10	6+165,12	87,57	86,07	127mm	600 ; 600 CB
11	6+165,12	87,56	86,06	83mm	600 ; 600 CB
22*	3+106,23	89,08	87,58	127mm	600 ; 600 CB
44	3+135,44	88,92	87,42	102mm	600 ; 600 CB
45	3+135,44	88,92	87,42	83mm	600 ; 600 CB
46	5+063,76	88,88	87,38	102mm	600 ; 600 CB
47	5+063,76	89,03	87,53	83mm	600 ; 600 CB
48	5+129,30	88,37	86,87	102mm	600 ; 600 CB
49	5+129,30	88,52	87,02	94mm	600 ; 600 CB
50	6+080,50	87,87	86,37	108mm	600 ; 600 CB
51	6+080,50	88,02	86,52	127mm	600 ; 600 CB

* SOLID COVER

ROADWAY CATCHBASIN TABLE (PHASE 3B)

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	SIZE
6*	8+077,65	87,62	86,12	152mm	600 x 600 CB
55	8+030	87,27	85,77	127mm	600 x 600 CB
56	8+030	87,27	85,77	127mm	600 x 600 CB
57****	8+069,57	87,26	85,76	108mm	600 x 600 CB

* SOLID COVER
**** DUAL CATCHBASIN

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PRELIMINARY

No.	REVISION	DATE	BY
2.	REVISED AND REISSUED FOR REVIEW	NOV 26/21	BHB
1.	ISSUED FOR REVIEW	JUNE 18/21	BHB

SCALE 1:500

1:500
0 5 10 15 20

DESIGN DJC
CHECKED BCS
DRAWN MFD
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
B. H. BAHIA
100164647
Nov 26, 2021
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

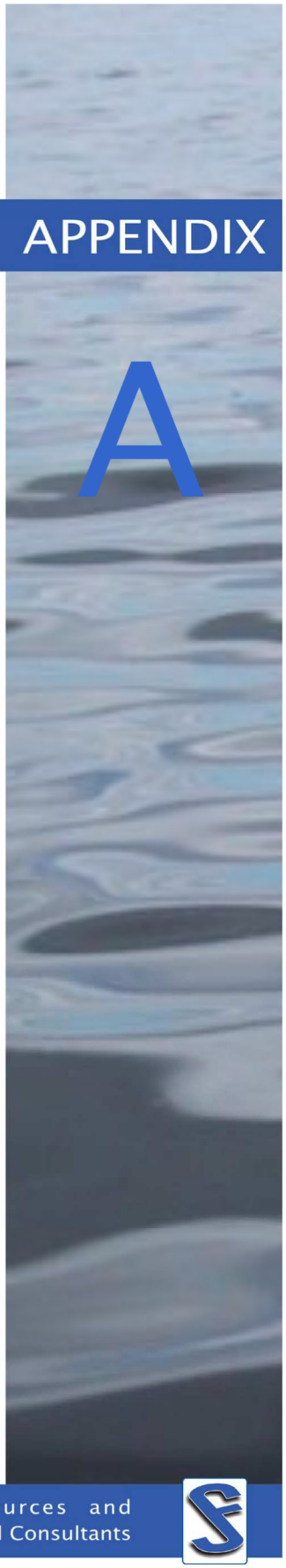
LOCATION
CITY OF OTTAWA
THE COMMONS

DRAWING NAME
PONDING AND ICD PLAN

PROJECT No. 118224-00
REV REV # 2
DRAWING No. 118224-P-ICD3

D07-16-19-0027 #18535

C:\Users\MFollett\...\118224-P-ICD3.dwg, 118224-P-ICD3-A1, Nov 26, 2021 - 3:47pm, fcrest



APPENDIX

A

Rational Method Design Sheets
(as per Novatech)

Example Calculations of
Total Imperviousness/C Value
(as per Novatech)

JFSA Water Resources and Environmental Consultants

STORM SEWER DESIGN SHEET (PRELIMINARY)

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons - 3610 Innes Road
Date Prepared: 10/4/2019
Date Revised: 9/16/2021
Input By: Bradley Reed
Reviewed By: Sam Bahia/ Ben Sweet
Drawing Reference: 118224-STM1, 118224-STM2 and 118224-GP

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION			DEMAND																CAPACITY										
			AREA									FLOW							PROPOSED SEWER PIPE SIZING / DESIGN									PARTIAL FLOW PIPE CHECKS		
															RAIN INTENSITY (mm/hr)				PIPE PROPERTIES										
STREET	FROM MH	TO MH	AREA ID	COMMERCIAL	HGH DENSITY	ROAD 1	REAR YARD 1	REAR YARD 2	PARK	TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	2yr	5yr	100yr	PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (QDesign)	TOTAL RESTRICTED PEAK FLOW (Q)	LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL	d/ D	Actual Flow Velocity (m/s)	Design Check (Capacity, Cleansing, Short Run)
				0.90	0.80	0.70	0.55	0.50	0.40	(ha)				(min.)				(L/s)	(L/s)	(L/s)	(m)		(m)		(%)	(L/s)	(m/s)	(min.)	(%)			
										0.36		0.70	0.70	10.00	76.81			53.81												
	170	168	A1			0.36				0.00		0.00	0.00	10.00				0.00	53.8		93.9	375 PVC	0.381	0.013	0.35	108.2	0.95	1.65	49.7%	49.0%	0.94	OK
										0.00		0.00	0.00	10.00				0.00													
	168	166	B1		1.01					1.01	0.80	0.70	0.70	11.65	71.01			49.74	265.9		93.9	600 CONC	0.6096	0.013	0.35	379.0	1.39	1.21	70.2%	61.0%	1.40	OK
										0.00		0.00	0.00	11.65				0.00													
	166	164								0.00		0.00	0.70	12.85	67.34			47.18	252.0		32.0	600 CONC	0.6096	0.013	0.35	379.0	1.39	0.41	66.5%	59.0%	1.38	OK
										0.00	0.90	0.00	2.25	12.85		91.20		204.85													
										0.00		0.00	0.00	12.85				0.00													
						0.24				0.24	0.70	0.47	1.17	13.26	66.19			77.28													
Street 9	164	162	A2, B2, B3	3.43	1.02					4.45	0.88	10.85	13.10	13.26		89.62		1173.67	1251.0		70.0	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.62	74.2%	64.0%	2.06	OK
										0.00		0.00	0.00	13.26				0.00													
						0.45		0.29		0.74	0.62	1.28	2.45	13.88	64.53			157.88													
	162	160	A3, A4, A5, A6							0.00		0.00	13.10	13.88		87.35		1143.94	1301.8		99.8	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.88	77.2%	65.0%	2.07	OK
										0.00		0.00	0.00	13.88				0.00													
										0.00		0.00	2.45	14.77	62.33			152.47													
	160	158	-							0.00		0.00	13.10	14.77		84.32		1104.32	1256.8		14.3	1050 CONC	1.0668	0.013	0.50	2014.4	2.25	0.11	62.4%	57.0%	2.37	SHORT RUN
										0.00		0.00	0.00	14.77				0.00													
						0.51				0.51	0.70	0.99	3.44	14.87	62.07			213.46													
	158	150	A7							0.00		0.00	13.10	14.87		83.97		1099.78	1313.2		108.0	1050 CONC	1.0668	0.013	0.35	1685.4	1.89	0.95	77.9%	66.0%	2.08	OK
										0.00		0.00	0.00	14.87				0.00													
						0.42				0.42	0.70	0.82	0.82	10.00	76.81			62.77													
	156	154	A8							0.00		0.00	0.00	10.00				0.00	62.8		100.7	375 PVC	0.381	0.013	0.35	108.2	0.95	1.77	58.0%	54.0%	0.98	OK
										0.00		0.00	0.00	10.00				0.00													
										0.00		0.00	0.82	11.77	70.62			57.72													
Street 2	154	152	-							0.00		0.00	0.00	11.77				0.00	57.7		12.6	375 PVC	0.381	0.013	0.50	129.3	1.13	0.19	44.6%	46.0%	1.09	SHORT RUN
										0.00		0.00	0.00	11.77				0.00													
						0.25		0.49		0.74	0.57	1.17	1.98	11.95	70.04			139.02													
	152	150	A9, A10, A11							0.00		0.00	0.00	11.95				0.00	139.0		59.4	525 CONC	0.5334	0.013	0.35	265.4	1.19	0.83	52.4%	51.0%	1.20	OK
										0.00		0.00	0.00	11.95				0.00													
						0.29		0.23		0.52	0.61	0.88	6.31	15.83	59.88			377.74													
Street 2	150	144	A12, A13							0.00		0.00	13.10	15.83		80.98		1060.56	1438.3		76.3	1200 CONC	1.2192	0.013	0.25	2033.7	1.74	0.73	70.7%	62.0%	1.89	OK
										0.00		0.00	0.00	15.83				0.00													
										0.00		0.00	0.00	10.00				0.00													
Street 1	148	146	A14, A15			0.53		0.32		0.85	0.62	1.48	1.48	10.00		104.19		153.81	153.8		78.5	525 CONC	0.5334	0.013	0.35	265.4	1.19	1.10	57.9%	54.0%	1.23	OK
										0.00		0.00	0.00	10.00				0.00													
										0.00		0.00	0.00	11.10				0.00													
	146	144	A16			0.12				0.12	0.70	0.23	1.71	11.10		98.71		168.77	168.8		78.7	600 CONC	0.6096	0.013	0.35	379.0	1.39	1.01	44.5%	46.0%	1.25	OK
										0.00		0.00	0.00	11.10				0.00													
						0.28		0.09		0.37	0.65	0.67	6.98	10.00	76.81			535.93													
Street 3	144	140	A17, A18							0.00		0.00	14.81	10.00		104.19		1542.71	2078.6		77.3	1200 CONC	1.2192	0.013	0.35	2406.2	2.06	0.63	86.4%	71.0%	2.31	OK
										0.00		0.00	0.00	10.00				0.00													
								0.19		0.19	0.50	0.26	0.26	10.00	76.81			20.28													
Street 3	142	140	A19							0.00		0.00	0.00	10.00				0.00	20.3		20.7	250 PVC	0.254	0.013	0.65	50.0	0.99	0.35	40.6%	44.0%	0.93	OK
										0.00		0.00	0.00	10.00				0.00													
						0.40				0.40	0.70	0.78	8.02	10.63	74.49			597.39													
	140	138	A20							0.00		0.00	14.81	10.63		101.00		1495.48	2092.9		113.1	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	1.00	75.2%	64.0%	2.06	OK
										0.00		0.00	0.00	10.63				0.00													
Street 4										0.52		0.79	8.81	11.63	71.08			626.31													
	138	136	A21, A22, A23				0.49	0.03		0.00	0.55	0.00	14.81	11.63		96.33		1426.22	2052.5		14.8	1350 CONC	1.3716	0.013	0.50	3937.3	2.66	0.09	52.1%	51.0%	2.69	SHORT RUN
										0.00		0.00	0.00	11.63				0.00													
						0.35	0.29			0.64	0.63	1.12	9.94	11.72	70.78			703.28													
	136	128	A24, A25							0.00		0.00	14.81	11.72		95.92		1420.17	2123.5		62.5	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.55	76.3%	65.0%	2.07	OK
										0.00		0.00	0.00	11.72				0.00													
						0.23				0.23	0.70	0.45	0.45	10.00	76.81			34.38													
Street 3	142	132	A26							0.00		0.00	0.00	10.00				0.00	34.4		53.4	250 PVC	0.254	0.013	0.65	50.0	0.99	0.90	68.7%	60.0%	1.06	OK
										0.00		0.00	0.00	10.00				0.00													
										0.00		0.00	0.00	10.00				0.00													
Street 5	134	132	-							0.00		0.00	0.00	10.00				0.00	0.0		36.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.61	0.0%	0.0%	0.00	OK
										0.00		0.00	0.00	10.00				0.00													
						0.27				0.27	0.70	0.53	0.97	10.61	74.55			72.53													
	132	130	A27							0.00		0.00	0.00	10.61				0.00	72.5		37.4	375 PVC	0.381	0.013	0.35	108.2	0.95	0.66	67.0%	59.0%	1.01	OK
										0.00		0.00	0.00	10.61				0.00													
						0.28				0.28	0.70	0.54	1.52	11.26	72.27			109.69													
	130	128	A28							0.00		0.00	0.00	11.26				0.00	109.7		88.3	450 PVC	0.4572	0.013	0.35	176.0	1.07	1.37	62.3%	57.0%	1.13	OK
										0.00		0.00	0.00	11.26				0.00													

STORM SEWER DESIGN SHEET (PRELIMINARY)

NOVATECH
Engineers, Planners & Landscape Architects

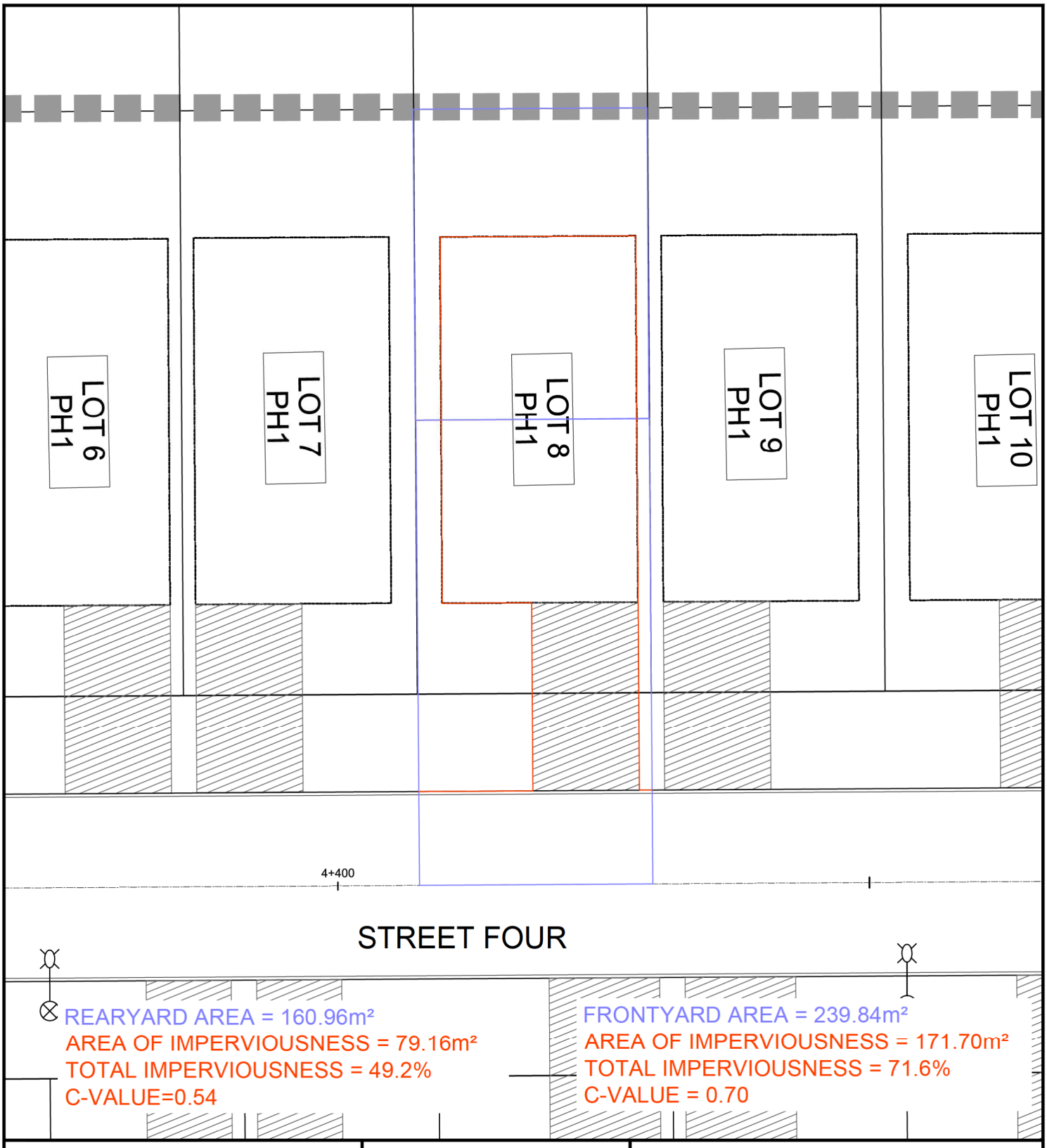
LOCATION			DEMAND																CAPACITY										
			AREA									FLOW							PROPOSED SEWER PIPE SIZING / DESIGN									PARTIAL FLOW PIPE CHECKS		
STREET	FROM MH	TO MH	AREA ID	COMMERCIAL	HGH DENSITY	ROAD 1	REAR YARD 1	REAR YARD 2	PARK	TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	RAIN INTENSITY (mm/hr) 2yr	5yr	100yr	PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (QDesign)	TOTAL RESTRICTED PEAK FLOW (Q)	PIPE PROPERTIES LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL	d/ D	Actual Flow Velocity (m/s)	Design Check (Capacity, Cleansing, Short Run)
				0.90	0.80	0.70	0.55	0.50	0.40	(ha)				(min.)				(L/s)	(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)			
Street 4	128	126	A29, A30, A31, A32			0.24	0.31	0.01		0.56	0.61	0.95	12.41	12.64	67.97			843.42													
										0.00		0.00	14.81	12.64		92.06		1363.03	2206.4		76.0	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.67	79.3%	67.0%	2.09	OK
										0.00		0.00	0.00	12.64				0.00													
	126	124	A33			0.27				0.27	0.70	0.53	12.93	13.31	66.07			854.51													
										0.00		0.00	14.81	13.31		89.45		1324.38	2178.9		53.4	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.47	78.3%	66.0%	2.08	OK
										0.00		0.00	0.00	13.31				0.00													
	124	122	-							0.00		0.00	12.93	13.78	64.80			838.11													
										0.00		0.00	14.81	13.78		87.71		1298.66	2136.8		16.9	1350 CONC	1.3716	0.013	0.50	3937.3	2.66	0.11	54.3%	52.0%	2.71	OK
										0.00		0.00	0.00	13.78				0.00													
	122	120	-							0.00		0.00	12.93	13.89	64.52			834.54													
										0.00		0.00	14.81	13.89		87.33		1293.05	2127.6		24.6	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.22	76.4%	65.0%	2.07	OK
										0.00		0.00	0.00	13.89				0.00													
	120	112	A34			0.49				0.49	0.70	0.95	13.89	14.11	63.96			888.28													
										0.00		0.00	14.81	14.11		86.56		1281.68	2170.0		91.6	1350 CONC	1.3716	0.013	0.25	2784.1	1.88	0.81	77.9%	66.0%	2.08	OK
										0.00		0.00	0.00	14.11				0.00													
Street 6	118	116	A35			0.43				0.43	0.70	0.84	0.84	10.00	76.81			64.27													
										0.00		0.00	0.00	10.00				0.00	64.3		99.6	375 PVC	0.381	0.013	0.35	108.2	0.95	1.75	59.4%	55.0%	0.99	OK
										0.00		0.00	0.00	10.00				0.00													
	116	114	A36, A37, A38				0.53	0.03		0.56	0.55	0.85	1.69	11.75	70.68			119.38													
										0.00		0.00	0.00	11.75				0.00	119.4		11.9	450 PVC	0.4572	0.013	0.50	210.3	1.28	0.15	56.8%	53.0%	1.31	SHORT RUN
										0.00		0.00	0.00	11.75				0.00													
	114	112	A39, A40, A41			0.29	0.30			0.59	0.62	1.02	2.71	11.90	70.19			190.36													
										0.00		0.00	0.00	11.90				0.00	190.4		64.6	525 CONC	0.5334	0.013	0.35	265.4	1.19	0.91	71.7%	62.0%	1.29	OK
										0.00		0.00	0.00	11.90				0.00													
Street 6	112	104	A42, A43			0.25	0.24			0.49	0.63	0.85	17.45	14.92	61.97			1081.50													
										0.00		0.00	14.81	14.92		83.83		1241.22	2322.7		73.8	1350 CONC	1.3716	0.013	0.30	3049.8	2.06	0.60	76.2%	65.0%	2.27	OK
										0.00		0.00	0.00	14.92				0.00													
Street 7	110	108	A44, B4ii				0.20			0.20	0.55	0.31	0.31	10.00	76.81			23.49													
										0.00		0.00	0.00	10.00				0.00	23.5		27.7	250 PVC	0.254	0.013	0.65	50.0	0.99	0.47	47.0%	48.0%	0.97	OK
										0.00		0.00	0.00	10.00				0.00													
	108	106	A45, B4ii			0.23			0.04	0.23	0.70	0.45	0.75	10.47	75.05			56.54													
										0.04	0.40	0.04	0.04	10.47		101.79		4.53	61.1		27.7	450 PVC	0.4572	0.013	0.25	148.7	0.91	0.51	41.1%	44.0%	0.86	OK
										0.00		0.00	0.00	10.47				0.00													
	106	104	A46, B4iii			0.29			0.01	0.29	0.70	0.56	1.32	10.98	73.25			96.52													
										0.01	0.40	0.01	0.06	10.98		99.30		5.52	102.0		97.6	450 PVC	0.4572	0.013	0.20	133.0	0.81	2.01	76.7%	65.0%	0.89	OK
										0.00		0.00	0.00	10.98				0.00													
Street 8	104	102	A47, A48, A49, A50			0.28	0.21			0.49	0.64	0.87	19.64	15.51	60.59			1189.69													
										0.00		0.00	14.86	15.51		81.94		1217.78	2407.5		41.9	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.51	80.1%	67.0%	1.51	OK
										0.00		0.00	0.00	15.51				0.00													
	102	100	-							0.00		0.00	19.64	16.02	59.45			1167.42													
										0.00		0.00	14.86	16.02		80.39		1194.71	2362.1		13.3	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.16	78.6%	66.0%	1.50	SHORT RUN
										0.00		0.00	0.00	16.02				0.00													
	100	2121	A51, A52, A53, A54			0.10	0.34	0.02		0.46	0.58	0.74	20.38	16.19	59.10			1204.41													
										0.00		0.00	14.86	16.19		79.91		1187.59	2392.0		74.8	1650 CONC	1.6764	0.013	0.10	3006.9	1.36	0.92	79.6%	67.0%	1.51	OK
										0.00		0.00	0.00	16.19				0.00													
Park	CB 57	STM Outlet	B4i						0.95	0.95	0.40	1.06	1.06	16.02		80.39		84.92	84.9		33.0	375 PVC	0.381	0.013	0.50	129.3	1.13	0.48	65.7%	59.0%	1.21	OK
										0.00		0.00	0.00	16.02				0.00													
TO TRUNK STORM SEWER																															

DEMAND EQUATION
Q = 2.78 AIR Where : Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
R = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)
Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

CAPACITY EQUATION
Q full= (1/n) A R^(2/3)So^(1/2) Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m²)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

PARTIAL PIPE FLOW
d /D = Partial pipe flow depth / Diameter
Q actual = open channel hydraulics (1/n) A R^(2
V actual = Q_actual / A_actualand uniform dime
PARTIAL PIPE FLOW AND DESIGN CHECK RAT
Design Check Rationale, in order of importance
1
2
3
Output

	Design/Constructability Issue
1	No Good (NG) Increase Capacity
2	Short Run
3	NG Vlul



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

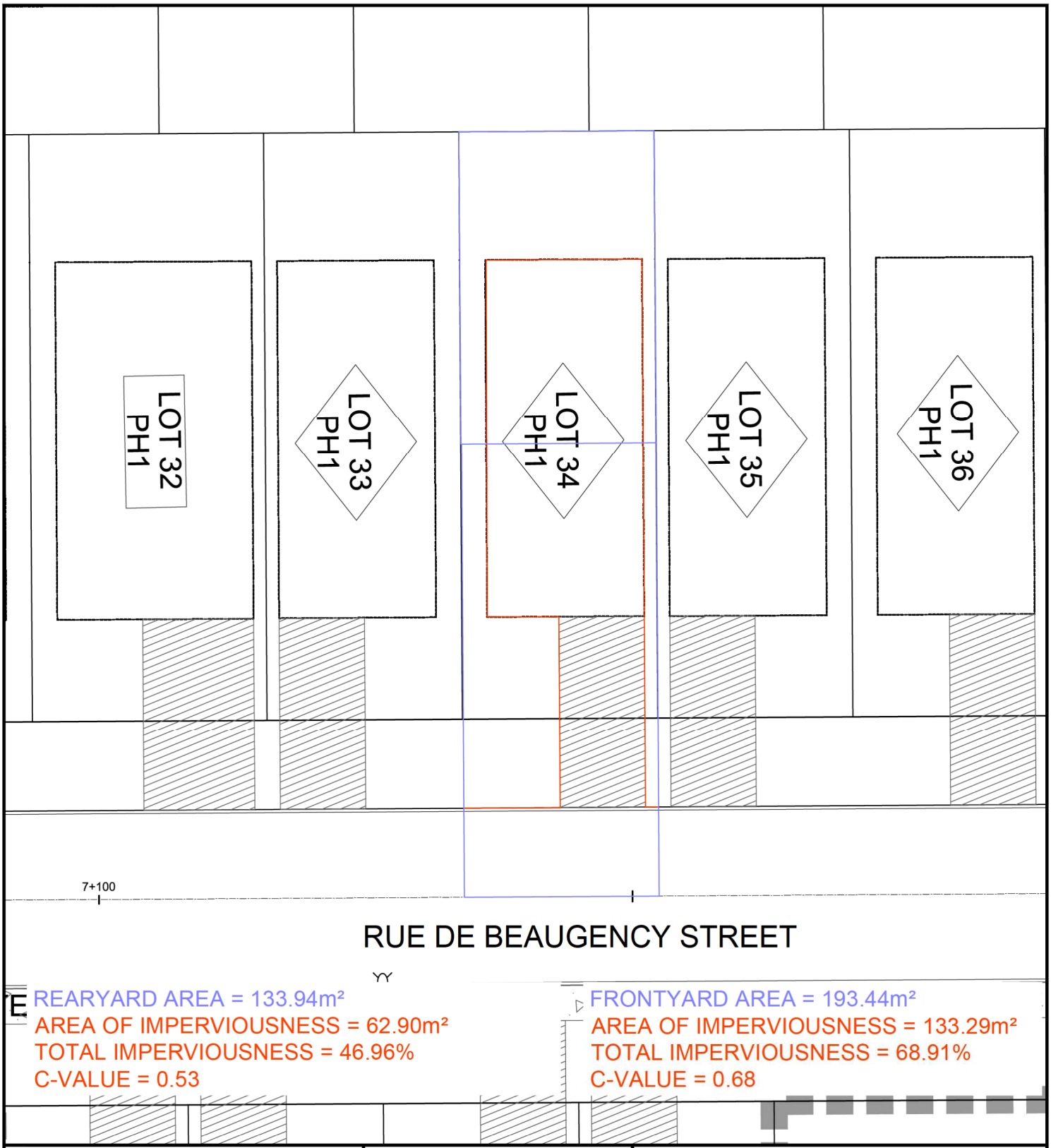
THE COMMONS

EXAMPLE LOT 5
36' SINGLE

DATE	JOB	FIGURE
SEP 2021	118224	SINGLE1

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, SINGLE1, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

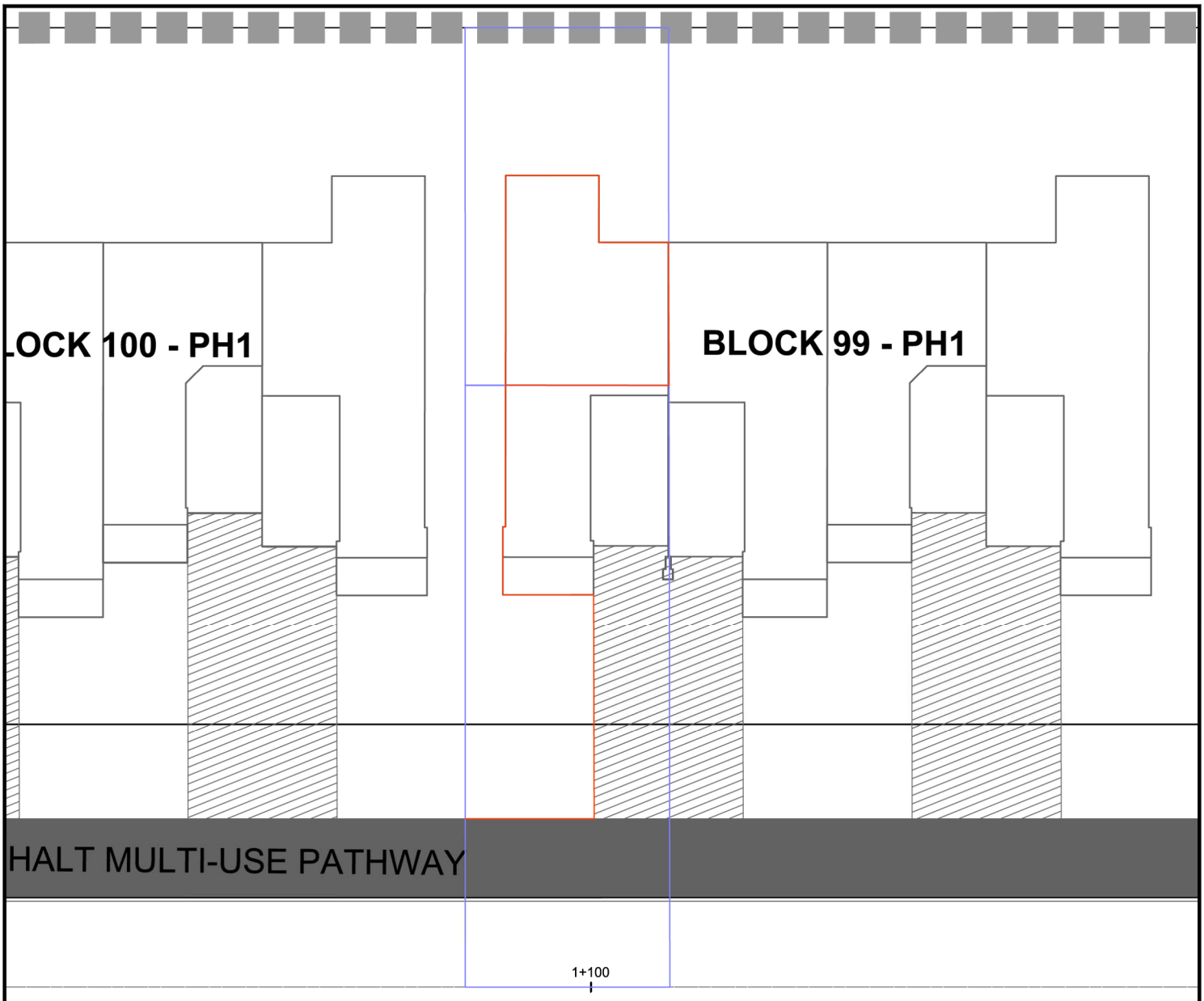
THE COMMONS

EXAMPLE LOT 6
30' SINGLE

DATE	JOB	FIGURE
SEP 2021	118224	SINGLE2

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, SINGLE2, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm



REARYARD AREA = 121.79m²
AREA OF IMPERVIOUSNESS = 49.43m²
TOTAL IMPERVIOUSNESS = 40.59%
C-VALUE = 0.48

FRONTYARD AREA = 205.49m²
AREA OF IMPERVIOUSNESS = 142.32m²
TOTAL IMPERVIOUSNESS = 69.3%
C-VALUE = 0.68

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

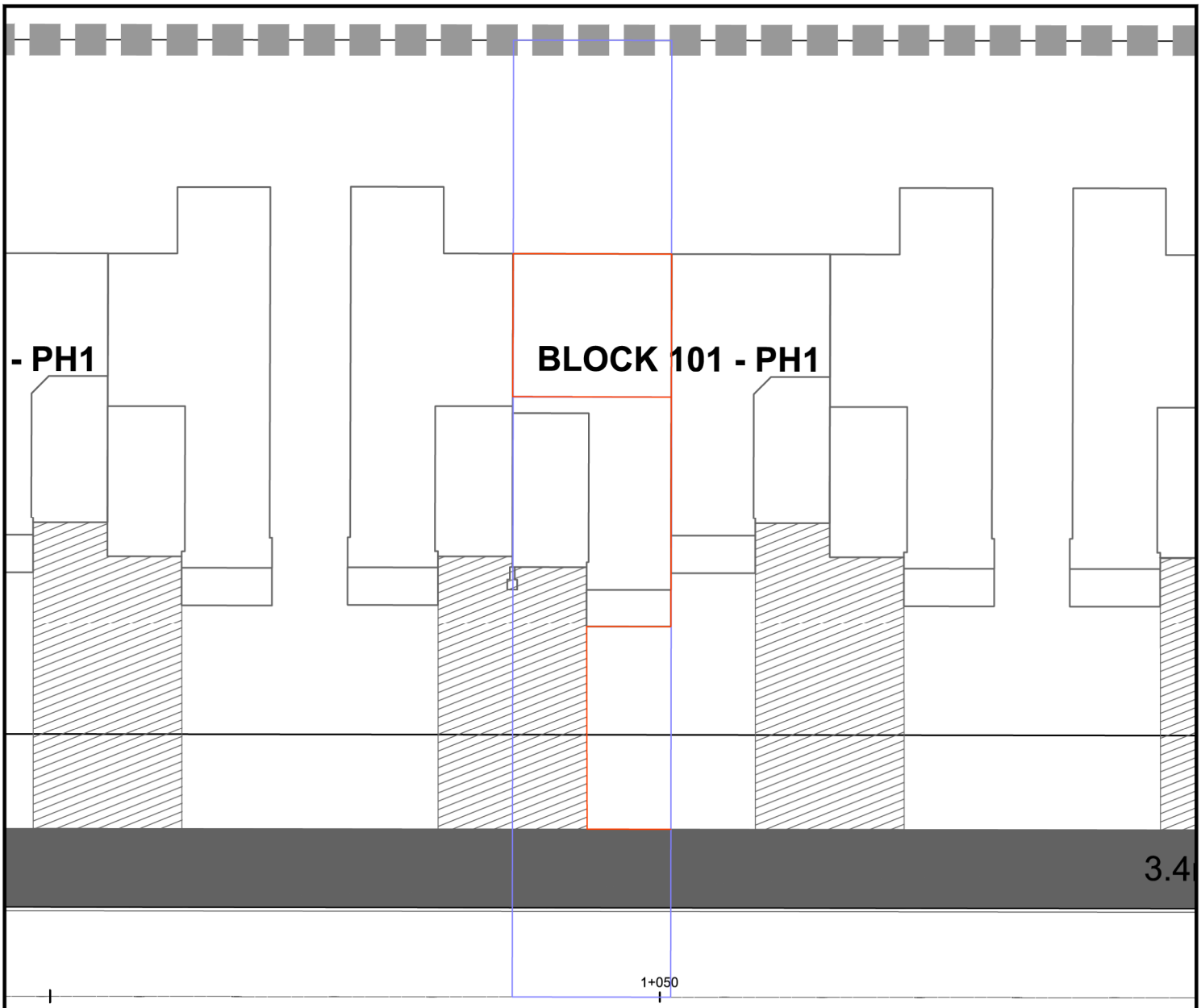
THE COMMONS

EXAMPLE LOT 1
EXTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN1

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN1, Sep 17, 2021 - 3:54pm, breed

SHT8X11.DWG - 216mmx279mm



RUE DE JARGEAU ROAD

REARYARD AREA = 95.00m²
AREA OF IMPERVIOUSNESS = 38.21m²
TOTAL IMPERVIOUSNESS = 40.22%
C-VALUE = 0.48

FRONTYARD AREA = 159.66m²
AREA OF IMPERVIOUSNESS = 131.25m²
TOTAL IMPERVIOUSNESS = 82.21%
C-VALUE = 0.77

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

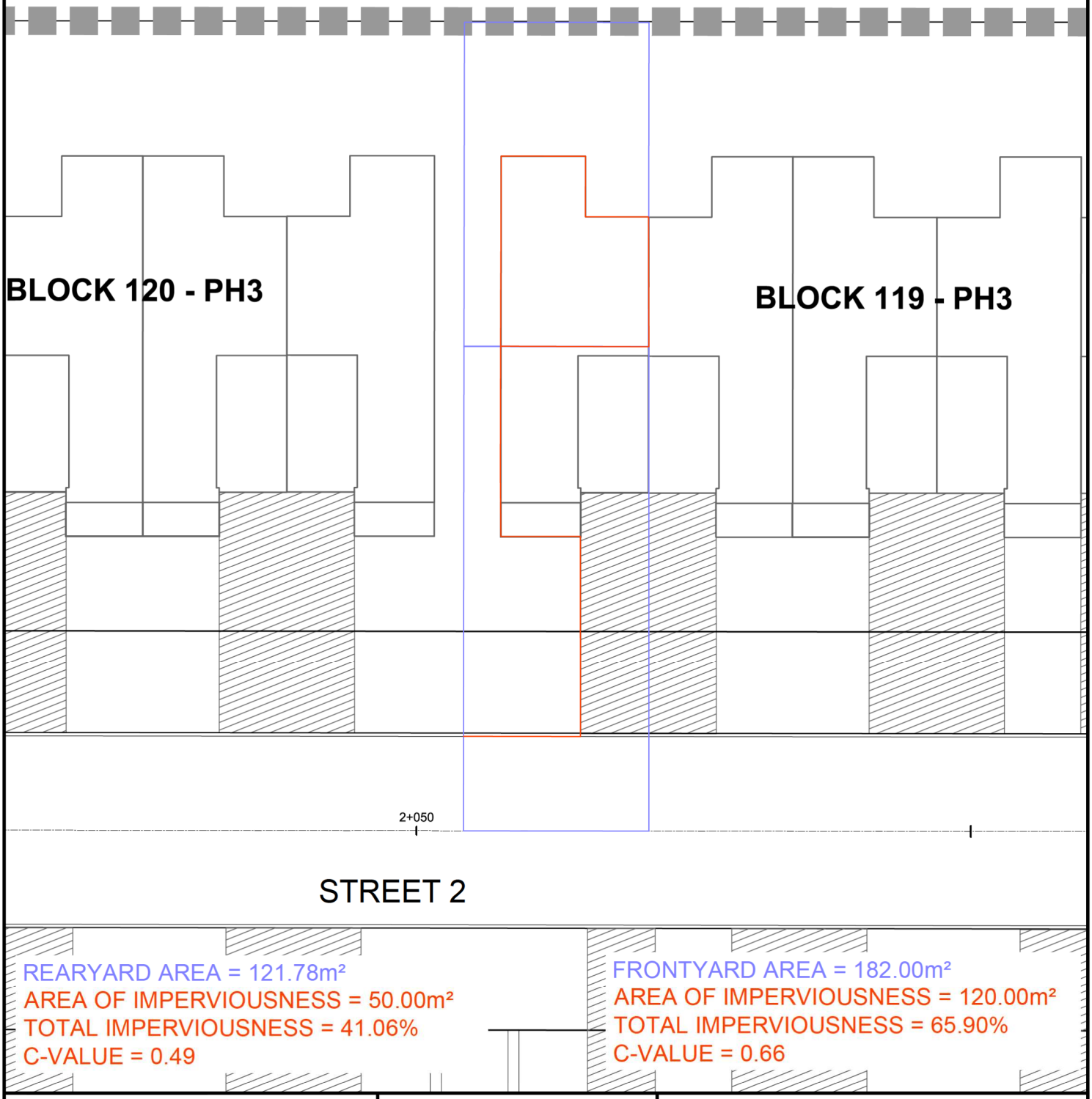
THE COMMONS

EXAMPLE LOT 2
INTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN2

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN2, Sep 17, 2021 - 3:54pm, breed

SHT8X11.DWG - 216mmx279mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

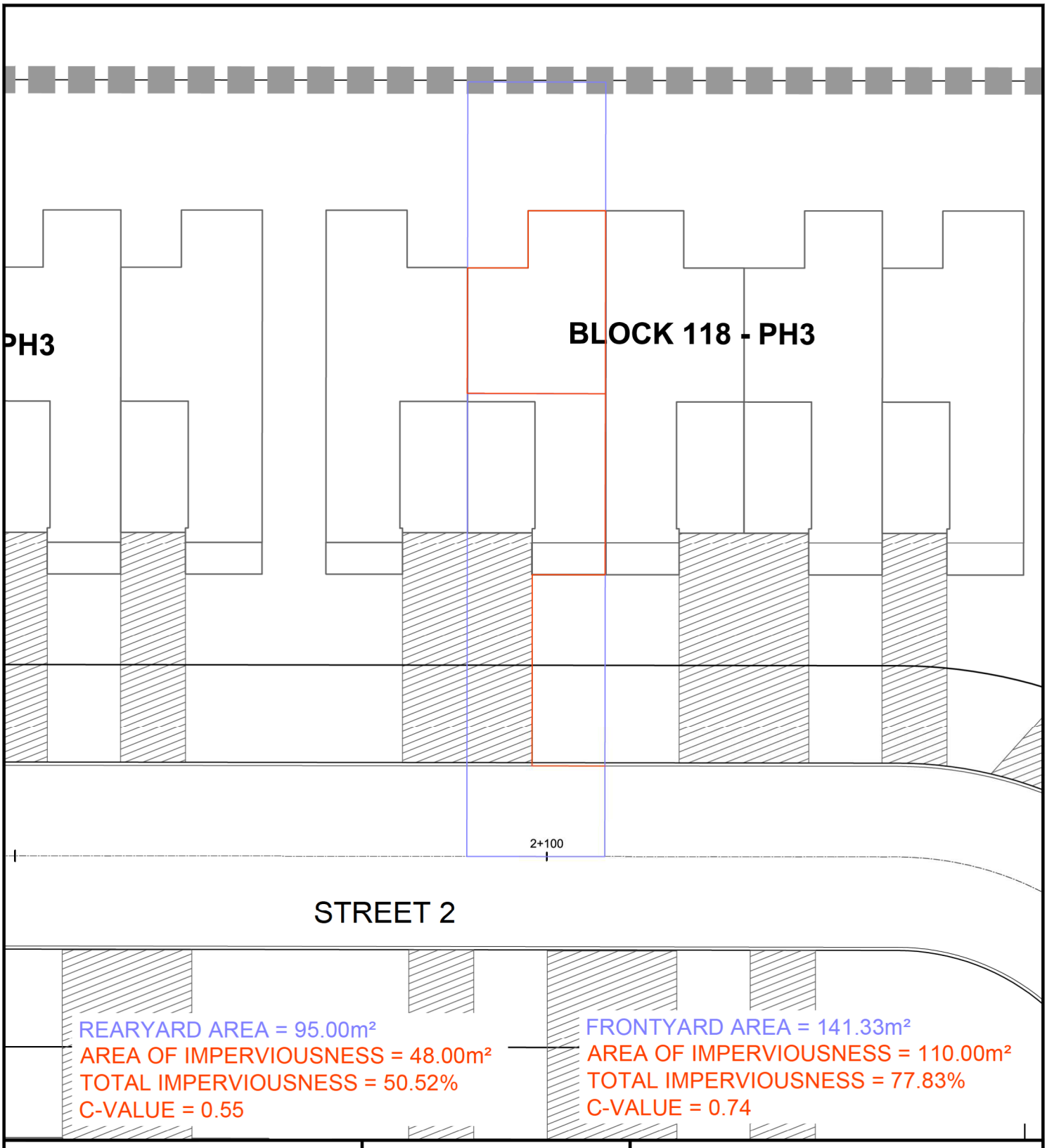
THE COMMONS

EXAMPLE LOT 3
EXTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN3

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN3, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

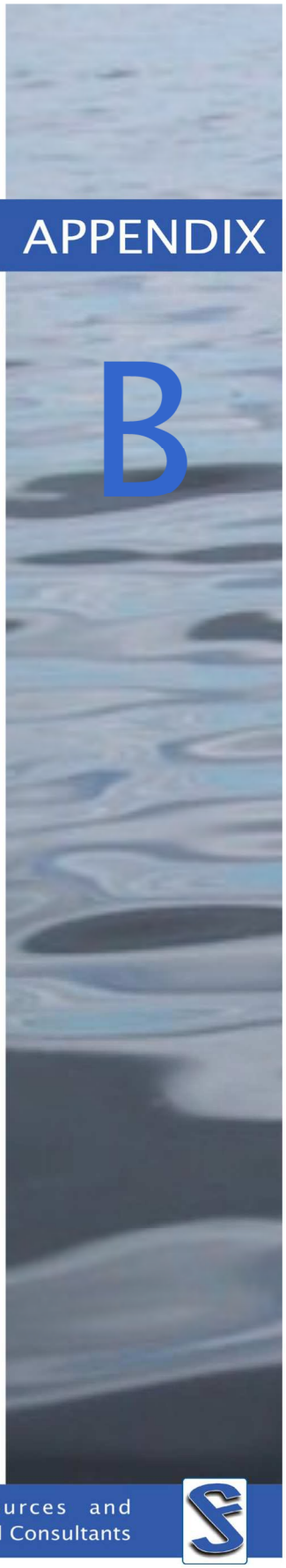
THE COMMONS

EXAMPLE LOT 4
INTERNAL TOWN

DATE	JOB	FIGURE
SEP 2021	118224	TOWN4

C:\temp\AcPublish_25988\118224-IMPdetail.dwg, TOWN4, Sep 28, 2021 - 10:27am, breed

SHT8X11.DWG - 216mmx279mm



APPENDIX

B

Inlet Control Devices

PCSWMM Input Files

JFSA Water Resources and Environmental Consultants

Products – StormTech Orifice Plate

Our StormTech Orifice Plate uses a calibrated orifice to control the outflow at a specific rate at a specific head in the catch basin. This is our simplest and most economical Inlet Control Device (ICD), and can be sometimes used by municipalities as a starting point for storm water management until more information is gathered. As with all our products, it can be swapped out with another StormTech ICD once more is known about the system.

Orifice Plate units can have any shape or size of orifice customized to meet your needs. Standard designs include Round, Diamond, Keyhole and Diamond Keyhole shaped orifices. Keyholes help create a torsional flow pattern through the orifice that can help unblock some debris.

Orifice plate ICD's do not form water traps to prevent odours and are also prone to blockage by floatables like leaves, twigs, bottles and cans, especially during higher rainfall periods. Monitoring of these types of installs is recommended and sometimes leads to recommendations to upgrade to water trap devices, such as Odour Traps and Sumps, to prevent blockage and odours. But in locations where they work properly they are an economical alternative solution.

Primary Function(s): Flow Control for Medium to High Flow Rates (15 to 100 l/s | 237 to 1585 GPM).

Other Functions(s): None.

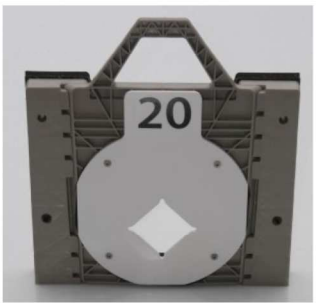
Outflow Pipe Diameter: 150 mm to 300 mm | 6 inch to 12 inch. Special orders can be made for larger sizes.

Catch Basin Types: All – with or without sumps.
Rectangular or Round Catch Basins (Round requires built-in adapter that can be provided).
Standard Round is 600 mm, but larger sizes available (900 mm, 1200 mm, 1600 mm …etc.).
Fits through even small Catch Basin openings (300 mm x 450 mm).

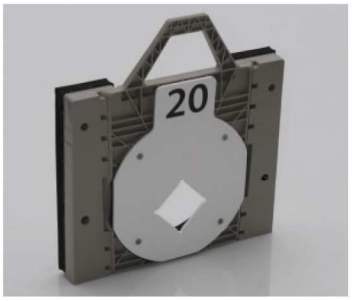
Specifications:
Orifice Plate: HDPE Thermoplastic with UV resistant additives.
Handle Plate (common): HDPE Thermoplastic.
Handle Plate (common): HDPE Thermoplastic.
Mounting Plate (common): HDPE Thermoplastic.
Hardware (common): Stainless Steel Wedge Bolts with Nut and Washer (4).
Welds: None.
Inner Ring Seal: Rubber Bulb Seal EPDM. Held in place and reusable. No need to replace.
Wall Seal: 3/8 or 5/8 inch Neoprene closed cell sponge gasket attached to Mounting Plate.
Identifier: 50 mm high numeric's on top of unit. Peel and stick. Note: Not visible from street surface.
Special Tools: None required.
Weight: Removable Unit: 0.5 kg / 1 lb. Maximum Total Assembly: 2.3 kg / 5 lb.

Products – StormTech Orifice Plate (continued)

Orifice Plate – Square Adapter (with Diamond Orifice pictured)



Front

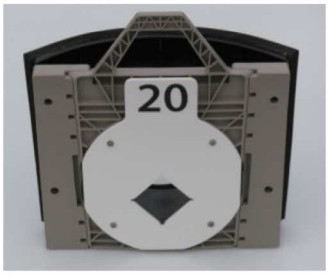


Left Angle

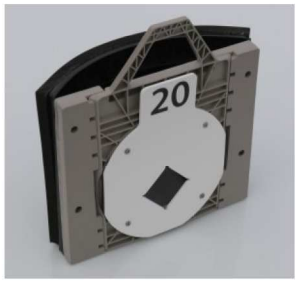


Back – View from Wall

Orifice Plate – Round Adapter



Front



Left Angle



Back – View from Wall

Installation:

1. If necessary, cut protruding out-flowing pipe back flush to Catch Basin wall.
2. Use Mounting Plate as template to mark four hole pattern on Catch Basin wall.
3. Install four Stainless Steel Wedge Bolts (provided) perpendicular to Mounting Plate.
4. Install Mounting Plate and hand secure with four washers and nuts (provided).
5. Torque nuts to 40 N-•m or 30 lbf•ft. Do not over-tighten.
6. Snap unit into place by pushing Handle Plate into dove-tail slot of Mounting Plate.
7. Record Unit Identifier along with Catch Basin Location according to municipal requirements.
8. Note – Unit Identifier with this model is NOT easily seen from street level.

Table B-1: Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD) Capacities [1]

ICD Diameter (mm)	Capture (L/s)							
	CB (1.38 m lead pipe invert depth)				CBMH (1.74 m lead pipe invert depth)			
Water Depth: Head:	*0 cm 1.28 m*	*Average 1.4 m*	*30 cm 1.58 m*	*35 cm 1.63 m*	*0 cm 1.64 m*	*Average 1.76 m*	*30 cm 1.94 m*	*35 cm 1.99 m*
83	17.6	18.4	19.6	19.9	19.9	20.7	21.7	22.0
94	22.6	23.6	25.1	25.5	25.6	26.5	27.8	28.2
102	26.6	27.8	29.6	30.0	30.1	31.2	32.8	33.2
108	29.8	31.2	33.2	33.7	33.8	35.0	36.7	37.2
127	41.3	43.2	45.8	46.6	46.7	48.4	50.8	51.5
152	59.1	61.8	65.7	66.7	66.9	69.3	72.8	73.7
178	81.1	84.8	90.1	91.5	91.8	95.0	99.8	101.1

[1] For circular orifices plate type with diameters as specified by City of Ottawa standards.

[BMR The Commons Ultimate Conditions Model]

;;Project Title/Notes

Base_Model_v1.5 from the Model Build (GIS) folder.

[OPTIONS]

;;Option Value

FLOW_UNITS CMS

INFILTRATION HORTON

FLOW_ROUTING DYNWAVE

LINK_OFFSETS ELEVATION

MIN_SLOPE 0

ALLOW_PONDING YES

SKIP_STEADY_STATE NO

START_DATE 01/01/2019

START_TIME 00:00:00

REPORT_START_DATE 01/01/2019

REPORT_START_TIME 00:00:00

END_DATE 01/02/2019

END_TIME 00:00:00

SWEEP_START 01/01

SWEEP_END 12/31

DRY_DAYS 0

REPORT_STEP 00:01:00

WET_STEP 00:05:00

DRY_STEP 00:05:00

ROUTING_STEP 0.5

RULE_STEP 00:00:00

```
INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.167
MAX_TRIALS           21
HEAD_TOLERANCE       0.0001
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              6

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

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;---------------- --------- -------- -------- ----------
002yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 002yrChicago3hr
002YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 002YrSCS24
005yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 005yrChicago3hr
005YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 005YrSCS24
010yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 010yrChicago3hr
010YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 010YrSCS24
025yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 025yrChicago3hr
```

025YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 025YrSCS24

050yrChicago3hr INTENSITY 0:10 1.0 TIMESERIES 050yrChicago3hr

050YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 050YrSCS24

100yrChicago3hr INTENSITY 0:10 1.0 TIMESERIES 100yrChicago3hr

100yrChicago3hr+20% INTENSITY 0:10 1.0 TIMESERIES 100yrChicago3hr+20%

100YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 100YrSCS12hr

100YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 100YrSCS24

100YrSCS24+20% INTENSITY 0:10 1.0 TIMESERIES 100YrSCS24+20%

1979July01 INTENSITY 0:05 1.0 TIMESERIES 1979July01

1988Aug04 INTENSITY 0:05 1.0 TIMESERIES 1988Aug04

1996Aug08 INTENSITY 0:05 1.0 TIMESERIES 1996Aug08

25mmChicago4Hr INTENSITY 0:10 1.0 TIMESERIES 25mmChicago4Hr

2YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 2YrSCS12hr

5YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 5YrSCS12hr

No_Rain INTENSITY 0:01 1.0 TIMESERIES No_Rain

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
A10	100yrChicago3hr	RYCB_14_(RYCB)	0.202	42.9	19.238	0.5	0	
A11	100yrChicago3hr	RYCB_12_(RYCB)	0.287	42.9	27.333	0.5	0	
A12i	100yrChicago3hr	30_(CB)	0.194	71.4	25.526	0.5	0	
A12ii	100yrChicago3hr	31_(CB)	0.09	71.4	11.842	0.5	0	
A13	100yrChicago3hr	RYCB_11_(RYCB)	0.226	42.9	29.737	0.5	0	
A14	100yrChicago3hr	RYCB_10_(RYCB)	0.319	42.9	42.533	0.5	0	
A15i	100yrChicago3hr	28_(CB)	0.522	71.4	50.68	0.5	0	
A15ii	100yrChicago3hr	27_(CB)	0.522	71.4	50.68	0.5	0	
A16i	100yrChicago3hr	26_(CB)	0.126	71.4	52.5	0.5	0	
A16ii	100yrChicago3hr	25_(CB)	0.126	71.4	50.4	0.5	0	

A17	100yrChicago3hr	TEE_39_(RYCB)	0.091	42.9	13.382	0.5	0
A17ii	100yrChicago3hr	24_(CB)	0.093	71.4	12.078	0.5	0
A18i	100yrChicago3hr	23_(CB)	0.189	71.4	24.545	0.5	0
A19	100yrChicago3hr	RYCB_9_(RYCB)	0.19	42.9	14.844	0.5	0
A1i	100yrChicago3hr	42_(CB)	0.157	71.4	10.538	0.5	0
A1ii	100yrChicago3hr	43_(CB)	0.202	71.4	13.559	0.5	0
A20i	100yrChicago3hr	21_(CB)	0.195	71.4	19.539	0.9	0
A20ii	100yrChicago3hr	20_(CB)	0.206	71.4	20.641	0.9	0
A21	100yrChicago3hr	RYCB_7_(RYCB)	0.325	50	29.018	0.5	0
A22	100yrChicago3hr	RYCB_7_(RYCB)	0.028	42.9	5.87	0.5	0
A23	100yrChicago3hr	RYCB_7_(RYCB)	0.169	50	23.472	0.5	0
A24i	100yrChicago3hr	18_(CB)	0.11	71.4	12.222	0.9	0
A24ii	100yrChicago3hr	19_(CB)	0.237	71.4	18.231	0.9	0
A25	100yrChicago3hr	RYCB_8_(RYCB)	0.294	50	28.824	0.5	0
A26i	100yrChicago3hr	45_(CB)	0.06	71.4	8.219	0.5	0
A26ii	100yrChicago3hr	44_(CB)	0.172	71.4	23.562	0.5	0
A27i	100yrChicago3hr	47_(CB)	0.088	71.4	18.418	0.5	0
A27ii	100yrChicago3hr	46_(CB)	0.181	71.4	21.344	0.5	0
A28i	100yrChicago3hr	49_(CB)	0.143	71.4	22.634	1	0
A28ii	100yrChicago3hr	48_(CB)	0.142	71.4	21.819	1	0
A29	100yrChicago3hr	TEE_11_(RYCB)	0.116	50	14.764	0.5	0
A2i	100yrChicago3hr	40_(CB)	0.12	71.4	10.022	0.5	0
A2ii	100yrChicago3hr	41_(CB)	0.118	71.4	9.855	0.5	0
A3	100yrChicago3hr	ELB_23_(RYCB)	0.154	42.9	13.93	0.5	0
A30	100yrChicago3hr	RYCB_6_(RYCB)	0.014	42.9	7.786	0.5	0
A31	100yrChicago3hr	TEE_5_(RYCB)	0.187	50	14.518	0.5	0
A32i	100yrChicago3hr	17_(CB)	0.155	71.4	21.207	1	0
A32ii	100yrChicago3hr	16_(CB)	0.082	71.4	11.281	1	0
A33i	100yrChicago3hr	14_(CB)	0.11	71.4	6.727	1	0

A33ii	100yrChicago3hr	15_(CB)	0.157	71.4	20.729	1	0
A34i	100yrChicago3hr	13_(CB)	0.212	71.4	17.024	0.5	0
A34ii	100yrChicago3hr	12_(CB)	0.276	71.4	20.636	0.5	0
A35i	100yrChicago3hr	51_(CB)	0.228	71.4	19.63	0.5	0
A35ii	100yrChicago3hr	50_(CB)	0.203	71.4	17.321	0.5	0
A36	100yrChicago3hr	TEE_32_(RYCB)	0.294	50	29.724	0.5	0
A37	100yrChicago3hr	RYCB_18_(RYCB)	0.029	42.9	6.126	0.5	0
A38	100yrChicago3hr	TEE_34_(RYCB)	0.239	50	25.158	0.5	0
A39i	100yrChicago3hr	10_(CB)	0.214	71.4	18.84	1	0
A39ii	100yrChicago3hr	11_(CB)	0.074	71.4	9.928	1	0
A4	100yrChicago3hr	52_(CB)	0.092	71.4	15.333	0.5	0
A40	100yrChicago3hr	RYCB_5_(RYCB)	0.219	50	27.353	0.5	0
A41	100yrChicago3hr	TEE_7_(RYCB)	0.075	50	13.639	0.5	0
A42i	100yrChicago3hr	08_(CB)	0.171	71.4	23.642	0.5	0
A42ii	100yrChicago3hr	09_(CB)	0.083	71.4	11.458	0.5	0
A43	100yrChicago3hr	RYCB_2_(RYCB)	0.236	50	29.161	0.5	0
A44	100yrChicago3hr	RYCB_3_(RYCB)	0.199	50	27.618	0.5	0
A45i	100yrChicago3hr	03_(CB)	0.168	71.4	21.647	0.5	0
A45ii	100yrChicago3hr	02_(CB)	0.075	71.4	9.656	0.5	0
A46i	100yrChicago3hr	05_(CB)	0.157	71.4	21.487	0.5	0
A46ii	100yrChicago3hr	04_(CB)	0.136	71.4	15.627	0.5	0
A47	100yrChicago3hr	RYCB_4_(RYCB)	0.136	50	14.624	0.5	0
A48	100yrChicago3hr	55_(CB)	0.205	71.4	35.883	0.5	0
A49	100yrChicago3hr	RYCB_1_(RYCB)	0.074	50	12.761	0.5	0
A50	100yrChicago3hr	06_(CB)	0.066	71.4	20.484	0.5	0
A51	100yrChicago3hr	57_(CB)	0.186	71.4	25.578	0.5	0
A52	100yrChicago3hr	TEE_43B_(RYCB)	0.021	42.9	8.872	1.2	0
A53	100yrChicago3hr	TEE_44_(RYCB)	0.182	50	14.997	0.5	0
A54	100yrChicago3hr	TEE_43_(RYCB)	0.165	50	20.608	0.5	0

A5i	100yrChicago3hr	36_(CB)	0.102	71.4	15.692	0.5	0
A5ii	100yrChicago3hr	37_(CB)	0.26	71.4	21.317	0.5	0
A6	100yrChicago3hr	RYCB_13_(RYCB)	0.131	42.9	11.664	0.5	0
A7i	100yrChicago3hr	35_(CB)	0.228	71.4	19	0.7	0
A7ii	100yrChicago3hr	34_(CB)	0.282	71.4	21.692	0.7	0
A8i	100yrChicago3hr	53_(CB)	0.22	71.4	20.952	0.5	0
A8ii	100yrChicago3hr	54_(CB)	0.19	71.4	21.839	0.5	0
A9i	100yrChicago3hr	32_(CB)	0.188	71.4	22.118	0.7	0
A9ii	100yrChicago3hr	33_(CB)	0.067	71.4	9.306	0.7	0
B1	100yrChicago3hr	B1_Stor	0.883	85.7	44.15	0.5	0
B1ii	100yrChicago3hr	41_(CB)	0.123	85.7	6.15	0.5	0
B2	100yrChicago3hr	B2_Stor	3.432	100	279.024	1	0
B3i	100yrChicago3hr	B3_Stor	0.965	85.7	111.368	0.5	0
B3ii	100yrChicago3hr	40_(CB)	0.046	85.7	6.571	0.5	0
B4i	100yrChicago3hr	58_(CB)	0.947	28.6	63.561	0.5	0
B4ii	100yrChicago3hr	02_(CB)	0.047	28.6	6.059	0.5	0
B4iii	100yrChicago3hr	04_(CB)	0.008	28.6	5.618	0.5	0
C1	100yrChicago3hr	Maj-01	0.114	71.4	20.847	0.5	0
C2	100yrChicago3hr	Maj-22	0.087	71.4	14.5	0.5	0

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
A10	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A11	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A12i	0.013	0.25	1.57	4.67	25	OUTLET	
A12ii	0.013	0.25	1.57	4.67	25	OUTLET	
A13	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A14	0.013	0.25	1.57	4.67	25	PERVIOUS	100

A15i	0.013	0.25	1.57	4.67	25	OUTLET	
A15ii	0.013	0.25	1.57	4.67	25	OUTLET	
A16i	0.013	0.25	1.57	4.67	25	OUTLET	
A16ii	0.013	0.25	1.57	4.67	25	OUTLET	
A17	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A17ii	0.013	0.25	1.57	4.67	25	OUTLET	
A18i	0.013	0.25	1.57	4.67	25	OUTLET	
A19	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A1i	0.013	0.25	1.57	4.67	25	OUTLET	
A1ii	0.013	0.25	1.57	4.67	25	OUTLET	
A20i	0.013	0.25	1.57	4.67	25	OUTLET	
A20ii	0.013	0.25	1.57	4.67	25	OUTLET	
A21	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A22	0.013	0.25	1.57	4.67	25	OUTLET	
A23	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A24i	0.013	0.25	1.57	4.67	25	OUTLET	
A24ii	0.013	0.25	1.57	4.67	25	OUTLET	
A25	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A26i	0.013	0.25	1.57	4.67	25	OUTLET	
A26ii	0.013	0.25	1.57	4.67	25	OUTLET	
A27i	0.013	0.25	1.57	4.67	25	OUTLET	
A27ii	0.013	0.25	1.57	4.67	25	OUTLET	
A28i	0.013	0.25	1.57	4.67	25	OUTLET	
A28ii	0.013	0.25	1.57	4.67	25	OUTLET	
A29	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A2i	0.013	0.25	1.57	4.67	25	OUTLET	
A2ii	0.013	0.25	1.57	4.67	25	OUTLET	
A3	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A30	0.013	0.25	1.57	4.67	25	OUTLET	

A31	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A32i	0.013	0.25	1.57	4.67	25	OUTLET	
A32ii	0.013	0.25	1.57	4.67	25	OUTLET	
A33i	0.013	0.25	1.57	4.67	25	OUTLET	
A33ii	0.013	0.25	1.57	4.67	25	OUTLET	
A34i	0.013	0.25	1.57	4.67	25	OUTLET	
A34ii	0.013	0.25	1.57	4.67	25	OUTLET	
A35i	0.013	0.25	1.57	4.67	25	OUTLET	
A35ii	0.013	0.25	1.57	4.67	25	OUTLET	
A36	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A37	0.013	0.25	1.57	4.67	25	OUTLET	
A38	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A39i	0.013	0.25	1.57	4.67	25	OUTLET	
A39ii	0.013	0.25	1.57	4.67	25	OUTLET	
A4	0.013	0.25	1.57	4.67	25	OUTLET	
A40	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A41	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A42i	0.013	0.25	1.57	4.67	25	OUTLET	
A42ii	0.013	0.25	1.57	4.67	25	OUTLET	
A43	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A44	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A45i	0.013	0.25	1.57	4.67	25	OUTLET	
A45ii	0.013	0.25	1.57	4.67	25	OUTLET	
A46i	0.013	0.25	1.57	4.67	25	OUTLET	
A46ii	0.013	0.25	1.57	4.67	25	OUTLET	
A47	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A48	0.013	0.25	1.57	4.67	25	OUTLET	
A49	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A50	0.013	0.25	1.57	4.67	25	OUTLET	

A51	0.013	0.25	1.57	4.67	25	OUTLET
A52	0.013	0.25	1.57	4.67	25	OUTLET
A53	0.013	0.25	1.57	4.67	25	PERVIOUS 100
A54	0.013	0.25	1.57	4.67	25	PERVIOUS 100
A5i	0.013	0.25	1.57	4.67	25	OUTLET
A5ii	0.013	0.25	1.57	4.67	25	OUTLET
A6	0.013	0.25	1.57	4.67	25	PERVIOUS 100
A7i	0.013	0.25	1.57	4.67	25	OUTLET
A7ii	0.013	0.25	1.57	4.67	25	OUTLET
A8i	0.013	0.25	1.57	4.67	25	OUTLET
A8ii	0.013	0.25	1.57	4.67	25	OUTLET
A9i	0.013	0.25	1.57	4.67	25	OUTLET
A9ii	0.013	0.25	1.57	4.67	25	OUTLET
B1	0.013	0.25	1.57	4.67	25	OUTLET
B1ii	0.013	0.25	1.57	4.67	25	OUTLET
B2	0.013	0.25	1.57	4.67	25	OUTLET
B3i	0.013	0.25	1.57	4.67	25	OUTLET
B3ii	0.013	0.25	1.57	4.67	25	OUTLET
B4i	0.013	0.25	1.57	4.67	25	PERVIOUS 100
B4ii	0.013	0.25	1.57	4.67	25	OUTLET
B4iii	0.013	0.25	1.57	4.67	25	OUTLET
C1	0.013	0.25	1.57	4.67	25	OUTLET
C2	0.013	0.25	1.57	4.67	25	OUTLET

[INFILTRATION]

;;Subcatchment	Param1	Param2	Param3	Param4	Param5
;;----------	----------	----------	----------	----------	----------
A10	76.2	13.2	4.14	7	0
A11	76.2	13.2	4.14	7	0

A12i	76.2	13.2	4.14	7	0
A12ii	76.2	13.2	4.14	7	0
A13	76.2	13.2	4.14	7	0
A14	76.2	13.2	4.14	7	0
A15i	76.2	13.2	4.14	7	0
A15ii	76.2	13.2	4.14	7	0
A16i	76.2	13.2	4.14	7	0
A16ii	76.2	13.2	4.14	7	0
A17	76.2	13.2	4.14	7	0
A17ii	76.2	13.2	4.14	7	0
A18i	76.2	13.2	4.14	7	0
A19	76.2	13.2	4.14	7	0
A1i	76.2	13.2	4.14	7	0
A1ii	76.2	13.2	4.14	7	0
A20i	76.2	13.2	4.14	7	0
A20ii	76.2	13.2	4.14	7	0
A21	76.2	13.2	4.14	7	0
A22	76.2	13.2	4.14	7	0
A23	76.2	13.2	4.14	7	0
A24i	76.2	13.2	4.14	7	0
A24ii	76.2	13.2	4.14	7	0
A25	76.2	13.2	4.14	7	0
A26i	76.2	13.2	4.14	7	0
A26ii	76.2	13.2	4.14	7	0
A27i	76.2	13.2	4.14	7	0
A27ii	76.2	13.2	4.14	7	0
A28i	76.2	13.2	4.14	7	0
A28ii	76.2	13.2	4.14	7	0
A29	76.2	13.2	4.14	7	0

A2i	76.2	13.2	4.14	7	0
A2ii	76.2	13.2	4.14	7	0
A3	76.2	13.2	4.14	7	0
A30	76.2	13.2	4.14	7	0
A31	76.2	13.2	4.14	7	0
A32i	76.2	13.2	4.14	7	0
A32ii	76.2	13.2	4.14	7	0
A33i	76.2	13.2	4.14	7	0
A33ii	76.2	13.2	4.14	7	0
A34i	76.2	13.2	4.14	7	0
A34ii	76.2	13.2	4.14	7	0
A35i	76.2	13.2	4.14	7	0
A35ii	76.2	13.2	4.14	7	0
A36	76.2	13.2	4.14	7	0
A37	76.2	13.2	4.14	7	0
A38	76.2	13.2	4.14	7	0
A39i	76.2	13.2	4.14	7	0
A39ii	76.2	13.2	4.14	7	0
A4	76.2	13.2	4.14	7	0
A40	76.2	13.2	4.14	7	0
A41	76.2	13.2	4.14	7	0
A42i	76.2	13.2	4.14	7	0
A42ii	76.2	13.2	4.14	7	0
A43	76.2	13.2	4.14	7	0
A44	76.2	13.2	4.14	7	0
A45i	76.2	13.2	4.14	7	0
A45ii	76.2	13.2	4.14	7	0
A46i	76.2	13.2	4.14	7	0
A46ii	76.2	13.2	4.14	7	0

A47	76.2	13.2	4.14	7	0
A48	76.2	13.2	4.14	7	0
A49	76.2	13.2	4.14	7	0
A50	76.2	13.2	4.14	7	0
A51	76.2	13.2	4.14	7	0
A52	76.2	13.2	4.14	7	0
A53	76.2	13.2	4.14	7	0
A54	76.2	13.2	4.14	7	0
A5i	76.2	13.2	4.14	7	0
A5ii	76.2	13.2	4.14	7	0
A6	76.2	13.2	4.14	7	0
A7i	76.2	13.2	4.14	7	0
A7ii	76.2	13.2	4.14	7	0
A8i	76.2	13.2	4.14	7	0
A8ii	76.2	13.2	4.14	7	0
A9i	76.2	13.2	4.14	7	0
A9ii	76.2	13.2	4.14	7	0
B1	76.2	13.2	4.14	7	0
B1ii	76.2	13.2	4.14	7	0
B2	76.2	13.2	4.14	7	0
B3i	76.2	13.2	4.14	7	0
B3ii	76.2	13.2	4.14	7	0
B4i	76.2	13.2	4.14	7	0
B4ii	76.2	13.2	4.14	7	0
B4iii	76.2	13.2	4.14	7	0
C1	76.2	13.2	4.14	7	0
C2	76.2	13.2	4.14	7	0

[JUNCTIONS]

```
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
;T/G 87.6 m
02_(CB)         85.6       2.6        0          0          0
;T/G 87.6 m
03_(CB)         85.6       2.6        0          0          0
;T/G 87.53 m
04_(CB)         85.53      2.6        0          0          0
;T/G 87.531 m
05_(CB)         85.531     2.6        0          0          0
;T/G 87.39 m
06_(CB)         85.39      2.6        0          0          0
;T/G 87.436 m
08_(CB)         85.436     2.6        0          0          0
;T/G 87.425 m
09_(CB)         85.425     2.6        0          0          0
;Mcon-CBMH
1_(RYCB)        85.42      2.993      0          0          1
;T/G 87.565 m
10_(CB)         86.17      1.995      0          0          0
;Mcon MH - Concentric
100_(STM)       81.27      6.246      0          0          0
;Mcon MH - Concentric
102_(STM)       81.341     6.202      0          0          0
;Mcon MH - Concentric
104_(STM)       81.383     6.234      0          0          0
;Mcon MH - Concentric
106_(STM)       83.539     4.124      0          0          0
;Mcon MH - Concentric
```

108_(STM) 83.616 3.887 0 0 0

;T/G 87.555 m

11_(CB) 86.021 2.134 0 0 0

;Mcon MH - Concentric

110_(STM) 83.936 3.813 0 0 0

;Mcon MH - Concentric

112_(STM) 81.904 6.011 0 0 0

;Mcon MH - Concentric

114_(STM) 83.366 4.634 0 0 0

;Mcon MH - Concentric

116_(STM) 83.501 4.673 0 0 0

;Mcon MH - Concentric

118_(STM) 83.88 4.482 0 0 0

;T/G 87.643 m

12_(CB) 85.643 2.6 0 0 0

;Mcon MH - Concentric

120_(STM) 82.664 5.412 0 0 0

;Mcon MH - Concentric

122_(STM) 82.736 5.495 0 0 0

;Mcon MH - Concentric

124_(STM) 82.834 5.361 0 0 0

;Mcon MH - Concentric

126_(STM) 82.974 5.491 0 0 0

;Mcon MH - Concentric

128_(STM) 83.17 5.461 0 0 0

;T/G 87.793 m

13_(CB) 85.793 2.6 0 0 0

;Mcon MH - Concentric

130_(STM) 84.268 4.777 0 0 0

;Mcon MH - Concentric

132_(STM) 84.484 4.697 0 0 0

;Mcon MH - Concentric

134_(STM) 84.804 4.365 0 0 0

;Mcon MH - Concentric

136_(STM) 83.336 5.31 0 0 0

;Mcon MH - Concentric

138_(STM) 83.424 5.349 0 0 0

;T/G 88.012 m

14_(CB) 86.012 2.6 0 0 0

;Mcon MH - Concentric

140_(STM) 83.713 5.538 0 0 0

;Mcon MH - Concentric

142_(STM) 84.907 4.253 0 0 0

;Mcon MH - Concentric

144_(STM) 84.131 5.323 0 0 0

;Mcon MH - Concentric

146_(STM) 85.005 4.118 0 0 0

;Mcon MH - Concentric

148_(STM) 85.365 3.127 0 0 0

;T/G 88.016 m

15_(CB) 86.016 2.6 0 0 0

;Mcon MH - Concentric

150_(STM) 84.379 5.419 0 0 0

;Mcon MH - Concentric

152_(STM) 85.262 4.738 0 0 0

;Mcon MH - Concentric

154_(STM) 85.353 4.738 0 0 0

;Mcon MH - Concentric

156_(STM) 85.728 4.211 0 0 0

;Mcon MH - Concentric

158_(STM) 84.907 5.159 0 0 0

;T/G 88.173 m

16_(CB) 86.173 2.6 0 0 0

;Mcon MH - Concentric

160_(STM) 84.989 5.173 0 0 0

;Mcon MH - Concentric

162_(STM) 85.348 4.955 0 0 0

;Mcon MH - Concentric

164_(STM) 85.603 4.674 0 0 0

;Mcon MH - Concentric

166_(STM) 86.165 4.259 0 0 0

;Mcon MH - Concentric

168_(STM) 86.504 3.886 0 0 0

;T/G 88.176 m

17_(CB) 86.176 2.6 0 0 0

;Mcon MH - Concentric

170_(STM) 87.058 3.997 0 0 0

;T/G 88.277 m

18_(CB) 86.97 1.907 0 0 0

;T/G 88.281 m

19_(CB) 86.281 2.6 0 0 0

;T/G 88.623 m

20_(CB) 86.623 2.6 0 0 0

;T/G 88.773 m

21_(CB) 86.773 2.6 0 0 0

;Mcon MH - Concentric

2121_(STM) 80.231 7.427 0 0 0

;Mcon MH - Concentric

2142_(STM) 80.104 7.267 0 0 0

;Mcon MH - Concentric

2143_(STM) 79.93 6.793 0 0 0

;Mcon MH - Concentric

2144_(STM) 79.854 6.896 0 0 0

;Mcon-CB

22_(RYCB) 87.076 2.824 0 0 1

;T/G 88.923 m

23_(CB) 86.923 2.6 0 0 0

;T/G 88.923 m

24_(CB) 86.923 2.6 0 0 0

;T/G 89.381 m

25_(CB) 86.775 3.206 0 0 0

;T/G 89.381 m

26_(CB) 86.775 3.206 0 0 0

;T/G 88.643 m

27_(CB) 86.775 2.468 0 0 0

;T/G 88.643 m

28_(CB) 86.775 2.468 0 0 0

;Mcon-CBMH

29_(RYCB) 85.31 4.327 0 0 1

;T/G 89.073 m

30_(CB) 86.93 2.743 0 0 0

;T/G 89.148 m

31_(CB) 86.9 2.848 0 0 0

;T/G 89.473 m

32_(CB) 88.283 1.917 0 0 0

;T/G 89.473 m

33_(CB) 87.473 2.6 0 0 0

;T/G 89.507 m

34_(CB) 87.507 2.6 0 0 0

;T/G 89.507 m

35_(CB) 87.507 2.6 0 0 0

;T/G 89.79 m

36_(CB) 87.79 2.6 0 0 0

;T/G 89.792 m

37_(CB) 87.792 2.6 0 0 0

;Mcon-CB

38_(RYCB) 87.378 3.081 0 0 1

;Mcon-CB

39_(RYCB) 88.671 2.279 0 0 1

;T/G 90.226 m

40_(CB) 88.226 2.6 0 0 0

;T/G 90.125 m

41_(CB) 88.125 2.6 0 0 0

;T/G 90.299 m

42_(CB) 88.299 2.6 0 0 0

;T/G 90.294 m

43_(CB) 88.294 2.6 0 0 0

;T/G 88.921 m

44_(CB) 86.921 2.6 0 0 0

;T/G 88.921 m

45_(CB) 86.921 2.6 0 0 0

;T/G 88.884 m

46_(CB) 86.884 2.6 0 0 0

;T/G 89.034 m

47_(CB) 87.034 2.6 0 0 0

;T/G 88.373 m

48_(CB) 86.373 2.6 0 0 0

;T/G 88.523 m

49_(CB) 86.523 2.6 0 0 0

;T/G 87.874 m

50_(CB) 86.03 2.444 0 0 0

;T/G 88.024 m

51_(CB) 86.06 2.564 0 0 0

;T/G 89.807 m

52_(CB) 85.21 5.197 0 0 0

;T/G 89.662 m

53_(CB) 87.662 2.6 0 0 0

;T/G 89.708 m

54_(CB) 87.708 2.6 0 0 0

;T/G 87.27 m

55_(CB) 85.27 2.6 0 0 0

;T/G 87.26 m

57_(CB) 85.21 2.65 0 0 0

58_(CB) 85.4 2.6 0 0 0

;Mcon MH - Concentric

98_(STM) 81.17 6.333 0 0 0

;CB-LANDSCAPE

ELB_1_(RYCB) 86.51 0.997 0 0 1

;Mcon-CBMH

ELB_10_(RYCB) 87.65 1.311 0 0 1

;Mcon-CBMH

ELB_11_(RYCB) 87.6 1.302 0 0 1

;Mcon-CBMH

ELB_12_(RYCB) 88 1.303 0 0 1

;Mcon-CBMH

ELB_13_(RYCB) 87.56 1.301 0 0 1

;Mcon-CBMH

ELB_14_(RYCB) 87.78 1.3 0 0 1

;Mcon-CBMH

ELB_15_(RYCB) 87.2 1.256 0 0 1

;Mcon-CBMH

ELB_16_(RYCB) 88.68 1.304 0 0 1

;Mcon-CBMH

ELB_17_(RYCB) 87.55 1.305 0 0 1

;Mcon-CBMH

ELB_18_(RYCB) 87.58 1.301 0 0 1

;Mcon-CBMH

ELB_19_(RYCB) 86.97 1.332 0 0 1

;Mcon-CBMH

ELB_2_(RYCB) 86.265 1.412 0 0 1

;Mcon-CBMH

ELB_20_(RYCB) 86.384 1.302 0 0 1

;Mcon-CBMH

ELB_21_(RYCB) 88.06 1.303 0 0 1

;Mcon-CBMH

ELB_22_(RYCB) 88.54 1.302 0 0 1

;Mcon-CBMH

ELB_23_(RYCB) 88.99 1.309 0 0 1

;CB-LANDSCAPE

ELB_24_(RYCB) 86.28 1.017 0 0 1

;CB-LANDSCAPE

ELB_25_(RYCB) 86.02 1.07 0 0 1

;Mcon-CBMH

ELB_3_(RYCB) 86.48 1.324 0 0 1

;Mcon-CBMH

ELB_4_(RYCB) 86.53 1.34 0 0 1

;Mcon-CBMH

ELB_5_(RYCB) 86.53 1.325 0 0 1

;Mcon-CBMH

ELB_6_(RYCB) 86.55 1.312 0 0 1

;Mcon-CBMH

ELB_7_(RYCB) 86.8 1.309 0 0 1

;Mcon-CBMH

ELB_8_(RYCB) 86.772 1.308 0 0 1

;Mcon-CBMH

ELB_9_(RYCB) 87.05 1.298 0 0 1

Maj-01_2 90.899 0.622 0 0 0

Maj-02 90.668 0.612 0 0 0

Maj-02_2 90.416 0.624 0 0 0

;LP

Maj-03 90.272 0.618 0 0 0

;HP

Maj-04 90.61 0.61 0 0 0

Maj-04_2 90.507 0.623 0 0 0

Maj-05 90.398 0.612 0 0 0

Maj-05_2 90.369 0.621 0 0 0

Maj-06 90.227 0.613 0 0 0

;LP

Maj-06_2 90.095 0.625 0 0 0

;HP

Maj-07 90.275 0.615 0 0 0

;LP

Maj-08	90.15	0.6	0	0	0
Maj-09	89.846	0.6	0	0	0
;LP					
Maj-10	89.777	0.603	0	0	0
;HP					
Maj-11	89.819	0.901	0	0	0
;LP					
Maj-12	89.664	0.596	0	0	0
;HP					
Maj-13	89.973	0.637	0	0	0
;LP					
Maj-14	89.484	0.586	0	0	0
;HP					
Maj-15	89.666	0.704	0	0	0
Maj-15_2	89.36	0.654	0	0	0
;LP					
Maj-16	89.419	0.601	0	0	0
;HP					
Maj-17	90.064	0.616	0	0	0
Maj-18_2	89.51	0.64	0	0	0
Maj-19	89.388	0.602	0	0	0
;HP					
Maj-19_2	89.527	0.693	0	0	0
Maj-20	89.169	0.601	0	0	0
;LP					
Maj-21	88.595	0.615	0	0	0
Maj-23	89.24	0.58	0	0	0
;LP					
Maj-24	88.904	0.616	0	0	0

;HP

Maj-25	89.152	0.618	0	0	0

;LP

Maj-26	88.605	0.615	0	0	0

;HP

Maj-27	88.848	0.632	0	0	0

;LP

Maj-28	88.251	0.689	0	0	0

;HP

Maj-29	88.595	0.615	0	0	0

;LP

Maj-30	88.398	0.522	0	0	0

;HP

Maj-31	89.025	0.605	0	0	0

;LP

Maj-32	88.874	0.616	0	0	0

;LP

Maj-33	88.918	0.582	0	0	0
Maj-34	89.067	0.583	0	0	0

;HP

Maj-34_2	89.16	0.64	0	0	0

;LP

Maj-35	88.149	0.581	0	0	0

;HP

Maj-36	88.408	0.672	0	0	0

;LP

Maj-37	87.993	0.617	0	0	0

;HP

Maj-38	88.19	0.62	0	0	0

;LP

Maj-39 88.071 0.329 0 0 0

;HP

Maj-40 87.97 0.63 0 0 0

Maj-41 87.62 0.62 0 0 0

;LP

Maj-42 87.881 0.619 0 0 0

;HP

Maj-43 88.074 0.636 0 0 0

;LP

Maj-44 87.539 0.611 0 0 0

;HP

Maj-45 87.812 0.688 0 0 0

;LP

Maj-46 87.407 0.613 0 0 0

Maj-48_2 87.744 0.636 0 0 0

;LP

Maj-50 87.425 0.615 0 0 0

;HP

Maj-51 87.71 0.63 0 0 0

;LP

Maj-52 87.472 0.498 0 0 0

Maj-53 87.588 0.612 0 0 0

;LP

Maj-54 87.251 0.609 0 0 0

;HP

Maj-55 87.494 0.626 0 0 0

;Overland Major Spill Point

Maj-56 88.439 0.661 0 0 0

;LP

Maj-58 87.162 0.608 0 0 0

;Spill Point

Maj-60 88.618 0.679 0 0 0

;Mcon-CBMH

RYCB_1_(RYCB) 86 2.1 0 0 1

;Mcon-CBMH

RYCB_10_(RYCB) 87.02 2.309 0 0 1

;Mcon-CBMH

RYCB_11_(RYCB) 87.35 2.373 0 0 1

;Mcon-CBMH

RYCB_12_(RYCB) 88 2.181 0 0 1

;CB-LANDSCAPE

RYCB_13_(RYCB) 87.54 1.508 0 0 1

;Mcon-CBMH

RYCB_14_(RYCB) 88.14 1.714 0 0 1

;CB-LANDSCAPE

RYCB_15_(RYCB) 88.7 1.554 0 0 1

;Mcon-CBMH

RYCB_18_(RYCB) 85.764 2.339 0 0 1

;TEE

RYCB_2_(RYCB) 86.01 2.17 0 0 1

;Mcon-CBMH

RYCB_3_(RYCB) 86.18 1.472 0 0 1

;Mcon-CBMH

RYCB_4_(RYCB) 86.12 2.28 0 0 1

;Mcon-CBMH

RYCB_5_(RYCB) 86.044 2.295 0 0 1

;Mcon-CBMH

RYCB_6_(RYCB) 85.72 3.209 0 0 1

;Mcon-CBMH

RYCB_7_(RYCB) 86.49 2.266 0 0 1

;Mcon-CBMH

RYCB_8_(RYCB) 86.97 2.23 0 0 1

;Mcon-CBMH

RYCB_9_(RYCB) 87.54 1.452 0 0 1

Slope1 89.066 1.098 0 0 0

;Dummy Null Structure for LandXML purposes

StartNullStruct2 86.62 1.4 0 0 1

;Dummy Null Structure for LandXML purposes

StartNullStruct3 84.091 3.709 0 0 0

;Null Structure

STM-251_(STM) 85.31 4.327 0 0 0

;Mcon-CBMH

Structure_-_(18)_(RYCB) 85.579 3.211 0 0 1

;Mcon-CBMH

TEE_1_(RYCB) 86.21 1.444 0 0 1

;Mcon-CBMH

TEE_10_(RYCB) 86.59 1.311 0 0 1

;CB-LANDSCAPE

TEE_11_(RYCB) 86.68 1.367 0 0 1

;Mcon-CBMH

TEE_12_(RYCB) 86.85 1.334 0 0 1

;CB-LANDSCAPE

TEE_13_(RYCB) 87 1.291 0 0 1

;CB-LANDSCAPE

TEE_14_(RYCB) 86.861 0.57 0 0 1

;CB-LANDSCAPE

TEE_15_(RYCB) 87.38 1.267 0 0 1

;Mcon-CBMH

TEE_16_(RYCB) 87.27 1.484 0 0 1

;Mcon-CBMH

TEE_17_(RYCB) 87.39 1.314 0 0 1

;Mcon-CBMH

TEE_18_(RYCB) 87.54 1.302 0 0 1

;Mcon-CBMH

TEE_19_(RYCB) 87.44 1.317 0 0 1

;Mcon-CBMH

TEE_2_(RYCB) 86.35 1.365 0 0 1

;Mcon-CBMH

TEE_20_(RYCB) 87.29 1.331 0 0 1

;Mcon-CBMH

TEE_21_(RYCB) 87.17 1.438 0 0 1

;Mcon-CBMH

TEE_22_(RYCB) 87.78 1.31 0 0 1

;Mcon-CBMH

TEE_23_(RYCB) 87.4 1.313 0 0 1

;Mcon-CBMH

TEE_24_(RYCB) 87.69 1.32 0 0 1

;Mcon-CBMH

TEE_25_(RYCB) 87.53 1.546 0 0 1

;Mcon-CBMH

TEE_26_(RYCB) 88.39 1.319 0 0 1

;Mcon-CBMH

TEE_27_(RYCB) 88.23 1.399 0 0 1

;Mcon-CBMH

TEE_28_(RYCB) 87.47 1.318 0 0 1

;Mcon-CBMH

TEE_29_(RYCB) 86.87 1.442 0 0 1

;Mcon-CBMH

TEE_3_(RYCB) 86.25 1.309 0 0 1

;Mcon-CBMH

TEE_30_(RYCB) 86.75 1.477 0 0 1

;Mcon-CBMH

TEE_31_(RYCB) 86.62 1.531 0 0 1

;CB-LANDSCAPE

TEE_32_(RYCB) 86.78 1.447 0 0 1

;CB-LANDSCAPE

TEE_33_(RYCB) 86.134 2.093 0 0 1

;Mcon-CBMH

TEE_34_(RYCB) 85.98 2.077 0 0 1

;Mcon-CBMH

TEE_35_(RYCB) 86.044 2.101 0 0 1

;Mcon-CBMH

TEE_36_(RYCB) 88.3 1.519 0 0 1

;Mcon-CBMH

TEE_37_(RYCB) 88.65 1.301 0 0 1

;Mcon-CBMH

TEE_38_(RYCB) 88.52 1.302 0 0 1

;Mcon-CBMH

TEE_39_(RYCB) 88.28 1.384 0 0 1

;Mcon-CBMH

TEE_4_(RYCB) 86.02 1.806 0 0 1

;Mcon-CBMH

TEE_40_(RYCB) 88.83 1.486 0 0 1

;Mcon-CBMH

TEE_41_(RYCB) 88.64 1.665 0 0 1

;CB-LANDSCAPE

TEE_42_(RYCB) 85.98 1.201 0 0 1

;CB-LANDSCAPE

TEE_43_(RYCB) 85.92 1.237 0 0 1

TEE_43B_(RYCB) 85.782 1.674 0 0 1

;CB-LANDSCAPE

TEE_44_(RYCB) 85.61 1.591 0 0 1

;CB-LANDSCAPE

TEE_45_(RYCB) 85.8 1.586 0 0 1

;CB-LANDSCAPE

TEE_5_(RYCB) 86.09 1.934 0 0 1

;Mcon-CBMH

TEE_6_(RYCB) 86.35 1.525 0 0 1

;Mcon-CBMH

TEE_7_(RYCB) 86.46 1.427 0 0 1

;Mcon-CBMH

TEE_8_(RYCB) 86.34 1.523 0 0 1

;Mcon-CBMH

TEE_9_(RYCB) 86.22 1.533 0 0 1

[OUTFALLS]

;;Name Elevation Type Stage Data Gated Route To

;;---------- ---------- ---------- ---------- -------- ----------

Maj-01 91.06 FREE NO

;HP

Maj-18 89.547 FREE NO

Maj-22 88.834 FREE NO

;HP

Maj-48 87.78 FREE NO

;HP

Maj-49 87.673 FREE NO

Maj-57 89.055 FREE NO

Maj-59 87.6 FREE NO

Maj-Park 85 FREE NO

;Rectangular Headwall Variable Height SI

STM-111_(STM) 80.137 TIMESERIES MH-111-100YrCHI3Hr NO

[STORAGE]

;;Name Elev. MaxDepth InitDepth Shape Curve Name/Params N/A Fevap Psi Ksat IMD

;;---------- -------- ---------- ---------- ---------- ---------- -------- -------- -------- --------

B1_Stor 90.5 1.5 0 FUNCTIONAL 383 0 0 0 0

B2_Stor 90.5 1.5 0 TABULAR UHAL_Onsite 0 0

B3_Stor 90.5 1.5 0 FUNCTIONAL 368 0 0 0 0

[CONDUITS]

;;Name From Node To Node Length Roughness InOffset OutOffset InitFlow MaxFlow

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------

;Mcon Circular Conc. Pipe

1_(STM) 156_(STM) 154_(STM) 100.708 0.013 86.028 85.68 0 0

;Mcon Circular Conc. Pipe

10_(STM) 124_(STM) 122_(STM) 16.861 0.013 83.134 83.05 0 0

;Mcon Circular Conc. Pipe

11_(STM) 122_(STM) 120_(STM) 24.629 0.013 83.036 82.974 0 0

;Mcon Circular Conc. Pipe

12_(STM) 120_(STM) 112_(STM) 91.574 0.013 82.964 82.735 0 0

;Mcon Circular Conc. Pipe

13_(STM) 112_(STM) 104_(STM) 73.804 0.013 82.204 81.983 0 0

;Mcon Circular Conc. Pipe

14_(STM) 104_(STM) 102_(STM) 41.856 0.013 81.683 81.641 0 0

;Mcon Circular Conc. Pipe

15_(10)_(STM) 138_(STM) 136_(STM) 14.785 0.013 83.724 83.65 0 0

;Mcon Circular Conc. Pipe

15_(11)_(STM) 136_(STM) 128_(STM) 62.501 0.013 83.636 83.48 0 0

;Mcon Circular Conc. Pipe

15_(12)_(STM) 148_(STM) 146_(STM) 78.542 0.013 85.665 85.39 0 0

;Mcon Circular Conc. Pipe

15_(13)_(STM) 146_(STM) 144_(STM) 78.665 0.013 85.305 85.03 0 0

;Mcon Circular Conc. Pipe

15_(14)_(STM) 162_(STM) 160_(STM) 106.278 0.013 85.648 85.299 0 0

;Mcon Circular Conc. Pipe

15_(15)_(STM) 160_(STM) 158_(STM) 14.296 0.013 85.289 85.217 0 0

;Mcon Circular Conc. Pipe

15_(16)_(STM) 158_(STM) 150_(STM) 108.023 0.013 85.207 84.829 0 0

;Mcon Circular Conc. Pipe

15_(19)_(STM) 170_(STM) 168_(STM) 93.892 0.013 87.358 87.029 0 0

;Mcon Circular Conc. Pipe

15_(20)_(STM) 168_(STM) 166_(STM) 101.148 0.013 86.804 86.475 0 0

;Mcon Circular Conc. Pipe

15_(21)_(STM) 166_(STM) 164_(STM) 29.241 0.013 86.465 86.353 0 0

;Mcon Circular Conc. Pipe

15_(22)_(STM) 164_(STM) 162_(STM) 60.14 0.013 85.903 85.658 0 0

;Ipex PVC DR 35

15_(3)_(STM) 118_(STM) 116_(STM) 99.63 0.013 84.18 83.873 0 0

;Mcon Circular Conc. Pipe

15_(4)_(STM) 116_(STM) 114_(STM) 11.937 0.013 83.801 83.741 0 0

;Mcon Circular Conc. Pipe

15_(5)_(STM) 114_(STM) 112_(STM) 64.641 0.013 83.666 83.44 0 0

;Mcon Circular Conc. Pipe

15_(9)_(STM) 140_(STM) 138_(STM) 113.118 0.013 84.013 83.73 0 0

;Mcon Circular Conc. Pipe

2_(STM) 154_(STM) 152_(STM) 12.573 0.013 85.653 85.59 0 0

;Mcon Circular Conc. Pipe

3_(STM) 152_(STM) 150_(STM) 59.352 0.013 85.562 85.354 0 0

;Mcon Circular Conc. Pipe

4_(STM) 150_(STM) 144_(STM) 76.294 0.013 84.679 84.49 0 0

;Mcon Circular Conc. Pipe

5_(STM) 144_(STM) 140_(STM) 77.327 0.013 84.431 84.16 0 0

;Ipex PVC DR 35

6_(STM) 142_(STM) 132_(STM) 53.44 0.013 85.207 84.909 0 0

;Mcon Circular Conc. Pipe

7_(1)_(STM) 130_(STM) 128_(STM) 88.337 0.013 84.568 84.37 0 0

;Mcon Circular Conc. Pipe

7_(STM) 132_(STM) 130_(STM) 37.406 0.013 84.784 84.642 0 0

;Mcon Circular Conc. Pipe

8_(STM) 128_(STM) 126_(STM) 75.98 0.013 83.47 83.28 0 0

;Mcon Circular Conc. Pipe

9_(STM) 126_(STM) 124_(STM) 53.402 0.013 83.274 83.14 0 0

C1 Maj-55 Maj-58 15.736 0.013 87.494 87.162 0 0

C1_1 Maj-01 Maj-01_2 15.296 0.013 91.06 90.899 0 0

C1_2 Maj-01_2 Maj-02 24.816 0.013 90.899 90.668 0 0

C10 Maj-17 Maj-10 54.682 0.013 90.064 89.777 0 0

C11 Maj-17 Maj-16 86.734 0.013 90.064 89.419 0 0

C12 Maj-11 Maj-09 10.987 0.013 89.819 89.846 0 0

C13 Maj-11 Maj-12 60.306 0.013 89.819 89.664 0 0

C14	Maj-13	Maj-12	46.489	0.013	89.973	89.664	0	0
C15	Maj-15	Maj-16	38.838	0.013	89.666	89.419	0	0
C16	Maj-13	Maj-14	44.234	0.013	89.973	89.484	0	0
C17	Maj-15	Maj-14	29.277	0.013	89.666	89.484	0	0
;Maj RY Spill Point								
C18	29_(RYCB)	Maj-18_2	4.776	0.035	89.84	89.55	0	0
C18_2	Maj-34_2	Maj-57	7.803	0.013	89.16	89.055	0	0
C18_3	Maj-15	Slope1	36.415	0.013	89.666	89.066	0	0
C18_4	Slope1	Maj-15_2	37.347	0.013	89.066	89.36	0	0
C18_5	Maj-19_2	Maj-15_2	13.813	0.013	89.527	89.36	0	0
C18_6	Maj-19_2	Maj-19	27.25	0.013	89.527	89.388	0	0
C18_7	Maj-34_2	Maj-34	28.133	0.013	89.16	89.067	0	0
C18_8	Maj-18	Maj-18_2	5	0.013	89.547	89.51	0	0
C18_9	Maj-18_2	Maj-15_2	31.942	0.013	89.51	89.36	0	0
C19	Maj-15_2	Maj-23	11.274	0.013	89.36	89.24	0	0
C2	Maj-59	Maj-58	33.787	0.013	87.6	87.162	0	0
C2_1	Maj-02	Maj-02_2	25.364	0.013	90.668	90.416	0	0
C2_2	Maj-02_2	Maj-03	14.602	0.013	90.416	90.272	0	0
C20	Maj-19	Maj-20	24.9	0.013	89.388	89.169	0	0
C21	Maj-20	Maj-21	64.337	0.013	89.169	88.595	0	0
C22	Maj-22	Maj-21	13.47	0.013	88.834	88.595	0	0
C23	Maj-23	Maj-24	31.267	0.013	89.24	88.904	0	0
C24	Maj-25	Maj-24	35.922	0.013	89.152	88.904	0	0
C25	Maj-25	Maj-26	59.92	0.013	89.152	88.605	0	0
C26	Maj-27	Maj-26	40.459	0.013	88.848	88.605	0	0
;Maj RY Spill Point								
C27	22_(RYCB)	Maj-25	17.828	0.035	89.3	89.152	0	0
C27_1	Maj-27	Maj-60	20.292	0.013	88.848	88.618	0	0
C27_2	Maj-60	Maj-28	39.649	0.013	88.618	88.251	0	0

C28	Maj-29	Maj-28	31.279	0.013	88.595	88.251	0	0
C29	Maj-25	Maj-33	47.188	0.013	89.152	88.918	0	0
C3	Maj-04	Maj-03	70.051	0.013	90.61	90.272	0	0
C30	Maj-34	Maj-33	24.584	0.013	89.067	88.918	0	0
;Maj RY Spill Point								
C31	RYCB_8_(RYCB)	Maj-28	19.142	0.035	88.6	88.251	0	0
C32	Maj-34	Maj-32	25.871	0.013	89.067	88.874	0	0
C33	Maj-31	Maj-32	22.994	0.013	89.025	88.874	0	0
C34	Maj-31	Maj-30	47.52	0.013	89.025	88.398	0	0
C35	Maj-29	Maj-30	27.889	0.013	88.595	88.398	0	0
C36	Maj-29	Maj-35	35.198	0.013	88.595	88.149	0	0
C37	Maj-36	Maj-35	37.341	0.013	88.408	88.149	0	0
C38	Maj-36	Maj-42	75.802	0.013	88.408	87.881	0	0
C39	Maj-43	Maj-42	39.792	0.013	88.074	87.881	0	0
;Maj RY Spill Point								
C4	RYCB_12_(RYCB)	Maj-14	13.065	0.035	89.581	89.484	0	0
C4_1	Maj-04	Maj-04_2	15.06	0.013	90.61	90.507	0	0
C4_2	Maj-04_2	Maj-05	20.639	0.013	90.507	90.398	0	0
C40	Maj-43	Maj-44	41.644	0.013	88.074	87.539	0	0
C41	Maj-45	Maj-44	34.02	0.013	87.812	87.539	0	0
C42	Maj-45	Maj-41	33.014	0.013	87.812	87.62	0	0
C43	Maj-40	Maj-41	55.256	0.013	87.97	87.62	0	0
C44	Maj-40	Maj-39	14.403	0.013	87.97	88.071	0	0
C45	Maj-38	Maj-39	19.588	0.013	88.19	88.071	0	0
C46	Maj-36	Maj-37	37.582	0.013	88.408	87.993	0	0
C47	Maj-38	Maj-37	23.672	0.013	88.19	87.993	0	0
C48	Maj-45	Maj-46	39.529	0.013	87.812	87.407	0	0
C49	Maj-53	Maj-46	33.614	0.013	87.588	87.407	0	0
C5	58_(CB)	Maj-Park	30	0.035	85.4	85	0	0

C5_1 Maj-05 Maj-05_2 4.665 0.013 90.398 90.369 0 0

C5_2 Maj-05_2 Maj-06 24.629 0.013 90.369 90.227 0 0

;RY Maj System Spill Point

C50 ELB_20_(RYCB) ELB_6_(RYCB) 31.256 0.013 87.694 87.862 0 0

C50_1 Maj-48 Maj-48_2 5 0.013 87.78 87.744 0 0

C50_2 Maj-48_2 Maj-53 31.434 0.013 87.744 87.588 0 0

C51 Maj-53 Maj-52 33.988 0.013 87.588 87.472 0 0

C52 Maj-51 Maj-52 53.407 0.013 87.71 87.472 0 0

C53 Maj-51 Maj-50 33.561 0.013 87.71 87.425 0 0

C54 Maj-49 Maj-50 43.76 0.013 87.673 87.425 0 0

C55 Maj-53 Maj-54 22.82 0.013 87.588 87.251 0 0

C56 Maj-21 Maj-56 22.042 0.035 88.595 88.439 0 0

C57 Maj-55 Maj-54 42.124 0.013 87.494 87.251 0 0

;Maj RY Spill Point

C58 RYCB_2_(RYCB) Maj-46 16.507 0.035 87.58 87.407 0 0

;Maj RY Spill Point

C59 RYCB_4_(RYCB) Maj-48_2 9.706 0.035 87.8 87.744 0 0

;Maj RY Spill Point

C6 39_(RYCB) Maj-08 6.432 0.035 90.35 90.15 0 0

C6_1 Maj-07 Maj-06_2 34.136 0.013 90.275 90.095 0 0

C6_2 Maj-06 Maj-06_2 20.238 0.013 90.227 90.095 0 0

;Major System Overland Spillway

C60 Maj-56 Maj-60 62.349 0.035 88.439 88.618 0 0

C61 RYCB_1_(RYCB) Maj-55 22.269 0.035 87.5 87.494 0 0

C62 1_(RYCB) Maj-50 27.046 0.035 87.813 87.425 0 0

C63 RYCB_5_(RYCB) Maj-44 10.749 0.035 87.739 87.539 0 0

C64 Structure_-_(18)_(RYCB) Maj-43 5 0.035 88.19 88.074 0 0

C65 RYCB_6_(RYCB) Maj-35 37.112 0.035 88.329 88.149 0 0

C66 RYCB_10_(RYCB) Maj-21 47.814 0.035 88.729 88.595 0 0

C67 RYCB_11_(RYCB) Slope1 10.418 0.035 89.123 89.066 0 0

C68 38_(RYCB) Maj-09 5 0.035 89.859 89.846 0 0

C69 32_(CB) Maj-14 5 0.035 89.6 89.484 0 0

C7 Maj-07 Maj-08 17.171 0.013 90.275 90.15 0 0

C8 Maj-08 Maj-09 40.633 0.013 90.15 89.846 0 0

C9 Maj-09 Maj-10 8.974 0.013 89.846 89.777 0 0

;HDPE Pipe SI

Pipe_-_(1)_(RYCB)_1 TEE_43_(RYCB) TEE_43B_(RYCB) 27.615 0.013 85.92 85.782 0 0

;HDPE Pipe SI

Pipe_-_(1)_(RYCB)_2 TEE_43B_(RYCB) 98_(STM) 4.39 0.013 85.782 85.76 0 0

;HDPE Pipe SI

Pipe_-_(10)_(RYCB) TEE_32_(RYCB) RYCB_18_(RYCB) 4.029 0.013 86.78 86.76 0 0

;HDPE Pipe SI

Pipe_-_(100)_(RYCB) TEE_6_(RYCB) RYCB_4_(RYCB) 43.106 0.013 86.65 86.434 0 0

;HDPE Pipe SI

Pipe_-_(101)_(RYCB) ELB_20_(RYCB) TEE_35_(RYCB) 58.134 0.013 86.684 86.393 0 0

;HDPE Pipe SI

Pipe_-_(103)_(1)_(RYCB) TEE_33_(RYCB) RYCB_18_(RYCB) 3.988 0.013 86.134 86.114 0 0

;HDPE Pipe SI

Pipe_-_(103)_(RYCB) TEE_34_(RYCB) TEE_33_(RYCB) 29.299 0.013 86.28 86.134 0 0

;HDPE Pipe SI

Pipe_-_(109)_(RYCB) ELB_21_(RYCB) RYCB_9_(RYCB) 42.607 0.013 88.36 88.147 0 0

;HDPE Pipe SI

Pipe_-_(11)_(RYCB) RYCB_18_(RYCB) Structure_-_(18)_(RYCB) 37.013 0.013 86.064 85.879 0 0

;HDPE Pipe SI

Pipe_-_(110)_(RYCB) ELB_12_(RYCB) TEE_22_(RYCB) 42.796 0.013 88.3 88.086 0 0

;HDPE Pipe SI

Pipe_-_(111)_(RYCB) TEE_22_(RYCB) RYCB_9_(RYCB) 36.137 0.013 88.08 87.899 0 0

;HDPE Pipe SI

Pipe_-_(114)_(RYCB) ELB_10_(RYCB) TEE_18_(RYCB) 20.158 0.013 87.95 87.849 0 0

;HDPE Pipe SI

Pipe_-_(117)_(RYCB) ELB_14_(RYCB) TEE_24_(RYCB) 14.18 0.013 88.08 88.009 0 0

;HDPE Pipe SI

Pipe_-_(118)_(RYCB) TEE_24_(RYCB) TEE_25_(RYCB) 29.666 0.013 87.99 87.842 0 0

;HDPE Pipe SI

Pipe_-_(119)_(RYCB) ELB_13_(RYCB) TEE_23_(RYCB) 29.54 0.013 87.86 87.712 0 0

;HDPE Pipe SI

Pipe_-_(120)_(RYCB) ELB_17_(RYCB) TEE_28_(RYCB) 13.487 0.013 87.85 87.783 0 0

;HDPE Pipe SI

Pipe_-_(121)_(RYCB) TEE_28_(RYCB) RYCB_13_(RYCB) 35.693 0.013 87.77 87.592 0 0

;HDPE Pipe SI

Pipe_-_(122)_(RYCB) ELB_18_(RYCB) RYCB_13_(RYCB) 34.873 0.013 87.88 87.706 0 0

;HDPE Pipe SI

Pipe_-_(123)_(RYCB) ELB_16_(RYCB) TEE_26_(RYCB) 27.685 0.013 88.98 88.703 0 0

;HDPE Pipe SI

Pipe_-_(124)_(RYCB) TEE_26_(RYCB) TEE_27_(RYCB) 29.406 0.013 88.69 88.543 0 0

;HDPE Pipe SI

Pipe_-_(125)_(RYCB) TEE_27_(RYCB) RYCB_12_(RYCB) 39.4 0.013 88.53 88.333 0 0

;HDPE Pipe SI

Pipe_-_(126)_(RYCB) ELB_23_(RYCB) TEE_40_(RYCB) 30.531 0.013 89.29 89.137 0 0

;HDPE Pipe SI

Pipe_-_(127)_(RYCB) TEE_40_(RYCB) TEE_41_(RYCB) 35.765 0.013 89.13 88.951 0 0

;HDPE Pipe SI

Pipe_-_(128)_(RYCB) TEE_41_(RYCB) RYCB_15_(RYCB) 32.603 0.013 88.94 88.777 0 0

;HDPE Pipe SI

Pipe_-_(129)_(RYCB) ELB_22_(RYCB) TEE_36_(RYCB) 47.076 0.013 88.84 88.605 0 0

;HDPE Pipe SI

Pipe_-_(130)_(RYCB) TEE_36_(RYCB) RYCB_14_(RYCB) 21.116 0.013 88.6 88.494 0 0

;HDPE Pipe SI

Pipe_-_(131)_(RYCB) TEE_37_(RYCB) RYCB_14_(RYCB) 21.231 0.013 88.95 88.844 0 0

;HDPE Pipe SI

Pipe_-_(132)_(RYCB) TEE_37_(RYCB) TEE_38_(RYCB) 21.029 0.013 88.95 88.845 0 0

;HDPE Pipe SI

Pipe_-_(133)_(RYCB) TEE_38_(RYCB) TEE_39_(RYCB) 46.6 0.013 88.82 88.587 0 0

;HDPE Pipe SI

Pipe_-_(134)_(RYCB) TEE_10_(RYCB) TEE_11_(RYCB) 40.369 0.013 86.89 86.688 0 0

;HDPE Pipe SI

Pipe_-_(137)_(RYCB) TEE_7_(RYCB) TEE_8_(RYCB) 22.479 0.013 86.76 86.648 0 0

;HDPE Pipe SI

Pipe_-_(138)_(RYCB) TEE_8_(RYCB) TEE_9_(RYCB) 21.988 0.013 86.64 86.53 0 0

;HDPE Pipe SI

Pipe_-_(139)_(RYCB) ELB_3_(RYCB) TEE_2_(RYCB) 20.228 0.013 86.78 86.681 0 0

;HDPE Pipe SI

Pipe_-_(14)_(RYCB) TEE_15_(RYCB) RYCB_7_(RYCB) 4.757 0.013 87.38 87.356 0 0

;HDPE Pipe SI

Pipe_-_(140)_(RYCB) TEE_2_(RYCB) RYCB_3_(RYCB) 20.776 0.013 86.65 86.544 0 0

;HDPE Pipe SI

Pipe_-_(141)_(RYCB) ELB_11_(RYCB) TEE_19_(RYCB) 18.513 0.013 87.9 87.752 0 0

;HDPE Pipe SI

Pipe_-_(142)_(RYCB) TEE_19_(RYCB) TEE_20_(RYCB) 27.38 0.013 87.74 87.603 0 0

;HDPE Pipe SI

Pipe_-_(143)_(RYCB) TEE_20_(RYCB) TEE_21_(RYCB) 22.082 0.013 87.59 87.48 0 0

;HDPE Pipe SI

Pipe_-_(144)_(RYCB) TEE_21_(RYCB) RYCB_8_(RYCB) 33.251 0.013 87.47 87.304 0 0

;HDPE Pipe SI

Pipe_-_(145)_(RYCB) ELB_19_(RYCB) TEE_29_(RYCB) 18.496 0.013 87.27 87.178 0 0

;HDPE Pipe SI

Pipe_-_(146)_(RYCB) TEE_29_(RYCB) TEE_30_(RYCB) 21.926 0.013 87.17 87.06 0 0

;HDPE Pipe SI

Pipe_-_(147)_(RYCB) TEE_30_(RYCB) TEE_31_(RYCB) 23.15 0.013 87.05 86.934 0 0

;HDPE Pipe SI

Pipe_-_(148)_(RYCB) TEE_31_(RYCB) TEE_32_(RYCB) 26.341 0.013 86.92 86.788 0 0

;HDPE Pipe SI

Pipe_-_(149)_(RYCB) TEE_35_(RYCB) TEE_34_(RYCB) 12.115 0.013 86.344 86.284 0 0

;HDPE Pipe SI

Pipe_-_(15)_(RYCB) RYCB_7_(RYCB) 138_(STM) 39.009 0.013 86.79 86.595 0 0

;HDPE Pipe SI

Pipe_-_(150)_(RYCB) TEE_18_(RYCB) TEE_17_(RYCB) 21.983 0.013 87.84 87.73 0 0

;HDPE Pipe SI

Pipe_-_(151)_(RYCB) TEE_17_(RYCB) TEE_16_(RYCB) 22.116 0.013 87.69 87.579 0 0

;HDPE Pipe SI

Pipe_-_(152)_(RYCB) TEE_16_(RYCB) TEE_15_(RYCB) 36.027 0.013 87.57 87.39 0 0

;HDPE Pipe SI

Pipe_-_(153)_(RYCB) ELB_8_(RYCB) TEE_10_(RYCB) 17.189 0.013 87.072 86.9 0 0

;HDPE Pipe SI

Pipe_-_(154)_(RYCB) ELB_9_(RYCB) TEE_12_(RYCB) 38.096 0.013 87.35 87.16 0 0

;HDPE Pipe SI

Pipe_-_(155)_(RYCB) TEE_12_(RYCB) TEE_13_(RYCB) 17.927 0.013 87.15 87.06 0 0

;HDPE Pipe SI

Pipe_-_(156)_(1)_(RYCB) TEE_14_(RYCB) RYCB_7_(RYCB) 3.241 0.013 86.861 86.845 0 0

;HDPE Pipe SI

Pipe_-_(156)_(RYCB) TEE_13_(RYCB) TEE_14_(RYCB) 27.79 0.013 87 86.861 0 0

;HDPE Pipe SI

Pipe_-_(157)_(RYCB) ELB_25_(RYCB) TEE_45_(RYCB) 33.301 0.013 86.02 85.853 0 0

;HDPE Pipe SI

Pipe_-_(158)_(RYCB) TEE_45_(RYCB) TEE_44_(RYCB) 35.308 0.013 85.8 85.623 0 0

;HDPE Pipe SI

Pipe_-_(159)_(RYCB) ELB_24_(RYCB) TEE_42_(RYCB) 57.984 0.013 86.28 85.99 0 0

;HDPE Pipe SI

Pipe_-_(16)_(RYCB) TEE_5_(RYCB) RYCB_6_(RYCB) 3.09 0.013 86.09 86.075 0 0

;HDPE Pipe SI

Pipe_-_(160)_(RYCB) TEE_42_(RYCB) TEE_43_(RYCB) 10.146 0.013 85.98 85.929 0 0

;HDPE Pipe SI

Pipe_-_(161)_(RYCB) ELB_1_(RYCB) RYCB_1_(RYCB) 36.543 0.013 86.51 86.327 0 0

;HDPE Pipe SI

Pipe_-_(162)_(RYCB) ELB_15_(RYCB) RYCB_10_(RYCB) 33.014 0.013 87.5 87.33 0 0

;HDPE Pipe SI

Pipe_-_(164)_(RYCB) TEE_23_(RYCB) RYCB_10_(RYCB) 28.561 0.013 87.7 87.557 0 0

;HDPE Pipe SI

Pipe_-_(165)_(RYCB) TEE_25_(RYCB) RYCB_11_(RYCB) 30.956 0.013 87.83 87.675 0 0

;HDPE Pipe SI

Pipe_-_(17)_(RYCB) TEE_11_(RYCB) RYCB_6_(RYCB) 5.41 0.013 86.68 86.653 0 0

;HDPE Pipe SI

Pipe_-_(19)_(RYCB) RYCB_9_(RYCB) 22_(RYCB) 31.338 0.013 87.84 87.683 0 0

;HDPE Pipe SI

Pipe_-_(2)_(RYCB) TEE_44_(RYCB) 98_(STM) 24.343 0.013 85.61 85.488 0 0

;HDPE Pipe SI

Pipe_-_(22)_(RYCB) RYCB_14_(RYCB) 32_(CB) 31.316 0.013 88.44 88.283 0 0

;HDPE Pipe SI

Pipe_-_(23)_(RYCB) RYCB_12_(RYCB) 33_(CB) 11.395 0.013 88.3 88.243 0 0

;HDPE Pipe SI

Pipe_-_(24)_(RYCB) TEE_39_(RYCB) 29_(RYCB) 8.187 0.013 88.58 88.539 0 0

;HDPE Pipe SI

Pipe_-_(25)_(RYCB) RYCB_11_(RYCB) 31_(CB) 6.05 0.013 87.65 87.62 0 0

;HDPE Pipe SI

Pipe_-_(27)_(RYCB) RYCB_3_(RYCB) 1_(RYCB) 30.6 0.013 86.48 86.327 0 0

;HDPE Pipe SI

Pipe_-_(73)_(RYCB) RYCB_8_(RYCB) 18_(CB) 9.658 0.013 87.27 87.222 0 0

;HDPE Pipe SI

Pipe_-_(74)_(RYCB) RYCB_15_(RYCB) 39_(RYCB) 5.744 0.013 88.7 88.671 0 0

;HDPE Pipe SI

Pipe_-_(77)_(RYCB) RYCB_13_(RYCB) 38_(RYCB) 32.433 0.013 87.54 87.378 0 0

;HDPE Pipe SI

Pipe_-_(87)_(RYCB) StartNullStruct2 TEE_1_(RYCB) 21.137 0.013 86.62 86.515 0 0

;HDPE Pipe SI

Pipe_-_(88)_(RYCB) TEE_1_(RYCB) RYCB_2_(RYCB) 36.065 0.013 86.51 86.33 0 0

;HDPE Pipe SI

Pipe_-_(89)_(RYCB) ELB_4_(RYCB) RYCB_3_(RYCB) 30.528 0.013 86.83 86.677 0 0

;HDPE Pipe SI

Pipe_-_(9)_(RYCB) RYCB_5_(RYCB) 11_(CB) 5.75 0.013 86.35 86.321 0 0

;HDPE Pipe SI

Pipe_-_(90)_(RYCB) StartNullStruct2 ELB_2_(RYCB) 11.016 0.013 86.62 86.565 0 0

;HDPE Pipe SI

Pipe_-_(93)_(RYCB) ELB_5_(RYCB) TEE_3_(RYCB) 39.684 0.013 86.82 86.621 0 0

;HDPE Pipe SI

Pipe_-_(94)_(RYCB) TEE_3_(RYCB) TEE_4_(RYCB) 43.993 0.013 86.55 86.33 0 0

;HDPE Pipe SI

Pipe_-_(95)_(RYCB) TEE_4_(RYCB) TEE_5_(RYCB) 43.248 0.013 86.32 86.104 0 0

;HDPE Pipe SI

Pipe_-_(96)_(RYCB) ELB_7_(RYCB) TEE_7_(RYCB) 25.116 0.013 87.1 86.82 0 0

;HDPE Pipe SI

Pipe_-_(98)_(RYCB) TEE_9_(RYCB) RYCB_5_(RYCB) 35.118 0.013 86.52 86.344 0 0

;HDPE Pipe SI

Pipe_-_(99)_(RYCB) ELB_6_(RYCB) TEE_6_(RYCB) 38.969 0.013 86.85 86.655 0 0

;Mcon Circular Conc. Pipe

STM-23_(STM) 106_(STM) 104_(STM) 97.6 0.013 83.839 83.595 0 0

;Mcon Circular Conc. Pipe

STM-24_(STM) 108_(STM) 106_(STM) 26.241 0.013 83.916 83.85 0 0

;Ipex PVC DR 35

STM-27_(STM) 134_(STM) 132_(STM) 36.012 0.013 85.14 84.906 0 0

;Ipex PVC DR 35

STM-28_(STM) 110_(STM) 108_(STM) 29.106 0.013 84.236 84.114 0 0

;Mcon Circular Conc. Pipe

STM-34_(1)_(1)_(STM) 98_(STM) 2121_(STM) 39.054 0.013 81.47 81.43 0 0

;Mcon Circular Conc. Pipe

STM-34_(1)_(STM) 100_(STM) 98_(STM) 41.189 0.013 81.57 81.529 0 0

;Mcon Circular Conc. Pipe

STM-34_(STM) 102_(STM) 100_(STM) 11.833 0.013 81.641 81.627 0 0

;Mcon Circular Conc. Pipe

STM-35_(STM) 2121_(STM) 2142_(STM) 74.285 0.013 80.531 80.46 0 0

;Mcon Circular Conc. Pipe

STM-36_(STM) 2142_(STM) 2143_(STM) 23.99 0.013 80.404 80.38 0 0

;Mcon Circular Conc. Pipe

STM-37_(STM) 2143_(STM) 2144_(STM) 20.119 0.013 80.23 80.21 0 0

;Mcon Circular Conc. Pipe

STM-38_(STM) 2144_(STM) STM-111_(STM) 17.179 0.013 80.154 80.137 0 0

;HDPE Pipe SI

STM-81_(STM) 142_(STM) 140_(STM) 20.687 0.013 85.244 85.11 0 0

;HDPE Pipe SI

STM-82_(STM) StartNullStruct3 104_(STM) 37.594 0.013 84.091 83.903 0 0

;HDPE Pipe SI

STM-83_(STM) STM-251_(STM) 144_(STM) 38.405 0.013 85.609 85.225 0 0

[ORIFICES]

;;Name	From Node	To Node	Type	Offset	Qcoeff	Gated	CloseTime
CB-02	02_(CB)	106_(STM)	SIDE	85.6	0.62	NO	0
CB-03	03_(CB)	106_(STM)	SIDE	85.6	0.62	NO	0
CB-04	04_(CB)	104_(STM)	SIDE	85.53	0.62	NO	0
CB-05	05_(CB)	104_(STM)	SIDE	85.531	0.62	NO	0
CB-06	06_(CB)	104_(STM)	SIDE	86.19	0.62	NO	0
CB-08	08_(CB)	112_(STM)	SIDE	85.436	0.62	NO	0
CB-09	09_(CB)	112_(STM)	SIDE	85.425	0.62	NO	0
CB-10	10_(CB)	114_(STM)	SIDE	86.17	0.62	NO	0
CB-11	11_(CB)	114_(STM)	SIDE	86.321	0.62	NO	0
CB-12	12_(CB)	120_(STM)	SIDE	85.643	0.62	NO	0
CB-13	13_(CB)	120_(STM)	SIDE	85.793	0.62	NO	0
CB-14	14_(CB)	126_(STM)	SIDE	86.012	0.62	NO	0
CB-15	15_(CB)	126_(STM)	SIDE	86.016	0.62	NO	0
CB-16	16_(CB)	128_(STM)	SIDE	86.173	0.62	NO	0
CB-17	17_(CB)	128_(STM)	SIDE	86.176	0.62	NO	0
CB-18	18_(CB)	136_(STM)	SIDE	87.222	0.62	NO	0
CB-19	19_(CB)	136_(STM)	SIDE	86.281	0.62	NO	0
CB-20	20_(CB)	140_(STM)	SIDE	86.623	0.62	NO	0
CB-21	21_(CB)	140_(STM)	SIDE	86.773	0.62	NO	0
CB-23	23_(CB)	144_(STM)	SIDE	86.923	0.62	NO	0
CB-24	24_(CB)	144_(STM)	SIDE	86.923	0.62	NO	0
CB-25	25_(CB)	146_(STM)	SIDE	86.775	0.62	NO	0
CB-26	26_(CB)	146_(STM)	SIDE	86.775	0.62	NO	0
CB-27	27_(CB)	148_(STM)	SIDE	86.775	0.62	NO	0
CB-28	28_(CB)	148_(STM)	SIDE	86.775	0.62	NO	0
CB-30	30_(CB)	150_(STM)	SIDE	86.93	0.62	NO	0

CB-31	31_(CB)	150_(STM)	SIDE	87.62	0.62	NO	0
CB-32	32_(CB)	152_(STM)	SIDE	88.283	0.62	NO	0
CB-33	33_(CB)	152_(STM)	SIDE	88.243	0.62	NO	0
CB-34	34_(CB)	158_(STM)	SIDE	87.507	0.62	NO	0
CB-35	35_(CB)	158_(STM)	SIDE	87.507	0.62	NO	0
CB-36	36_(CB)	162_(STM)	SIDE	87.79	0.62	NO	0
CB-37	37_(CB)	162_(STM)	SIDE	87.792	0.62	NO	0
CB-40	40_(CB)	164_(STM)	SIDE	88.226	0.62	NO	0
CB-41	41_(CB)	164_(STM)	SIDE	88.125	0.62	NO	0
CB-42	42_(CB)	170_(STM)	SIDE	88.299	0.62	NO	0
CB-43	43_(CB)	170_(STM)	SIDE	88.294	0.62	NO	0
CB-44	44_(CB)	142_(STM)	SIDE	86.921	0.62	NO	0
CB-45	45_(CB)	142_(STM)	SIDE	86.921	0.62	NO	0
CB-46	46_(CB)	132_(STM)	SIDE	86.884	0.62	NO	0
CB-47	47_(CB)	132_(STM)	SIDE	87.034	0.62	NO	0
CB-48	48_(CB)	130_(STM)	SIDE	86.373	0.62	NO	0
CB-49	49_(CB)	130_(STM)	SIDE	86.523	0.62	NO	0
CB-50	50_(CB)	118_(STM)	SIDE	86.03	0.62	NO	0
CB-51	51_(CB)	118_(STM)	SIDE	86.06	0.62	NO	0
CB-52	52_(CB)	162_(STM)	SIDE	85.21	0.62	NO	0
CB-53	53_(CB)	156_(STM)	SIDE	87.662	0.62	NO	0
CB-54	54_(CB)	156_(STM)	SIDE	87.708	0.62	NO	0
CB-55	55_(CB)	104_(STM)	SIDE	85.27	0.62	NO	0
CB-57	57_(CB)	100_(STM)	SIDE	85.21	0.62	NO	0
;CICB							
OR-02	Maj-50	02_(CB)	SIDE	87.425	0.62	NO	0
;CICB							
OR-03	Maj-50	03_(CB)	SIDE	87.425	0.62	NO	0
;CICB							

OR-04 Maj-52 04_(CB) SIDE 87.472 0.62 NO 0

;CICB

OR-05 Maj-52 05_(CB) SIDE 87.472 0.62 NO 0

;CICB

OR-06 Maj-55 06_(CB) SIDE 87.494 0.62 NO 0

OR-08 Maj-46 08_(CB) BOTTOM 87.407 0.62 NO 0

OR-09 Maj-46 09_(CB) BOTTOM 87.407 0.62 NO 0

OR-10 Maj-44 10_(CB) BOTTOM 87.539 0.62 NO 0

OR-11 Maj-44 11_(CB) BOTTOM 87.539 0.62 NO 0

OR-12 Maj-41 12_(CB) BOTTOM 87.62 0.62 NO 0

OR-13 Maj-41 13_(CB) BOTTOM 87.62 0.62 NO 0

OR-14 Maj-37 14_(CB) BOTTOM 87.993 0.62 NO 0

OR-15 Maj-37 15_(CB) BOTTOM 87.993 0.62 NO 0

OR-16 Maj-35 16_(CB) BOTTOM 88.149 0.62 NO 0

OR-17 Maj-35 17_(CB) BOTTOM 88.149 0.62 NO 0

OR-18 Maj-28 18_(CB) BOTTOM 88.251 0.62 NO 0

OR-19 Maj-28 19_(CB) BOTTOM 88.251 0.62 NO 0

OR-20 Maj-26 20_(CB) BOTTOM 88.605 0.62 NO 0

OR-21 Maj-26 21_(CB) BOTTOM 88.605 0.62 NO 0

OR-23 Maj-24 23_(CB) BOTTOM 88.904 0.62 NO 0

OR-24 Maj-24 24_(CB) BOTTOM 88.904 0.62 NO 0

OR-25 Maj-19 25_(CB) BOTTOM 89.388 0.62 NO 0

;CICB

OR-26 Maj-19 26_(CB) SIDE 89.388 0.62 NO 0

;Double CICB

OR-27 Maj-21 27_(CB) SIDE 88.595 0.62 NO 0

;Double CICB

OR-28 Maj-21 28_(CB) SIDE 88.595 0.62 NO 0

OR-30 Slope1 30_(CB) BOTTOM 89.066 0.62 NO 0

;CICB

OR-31	Slope1	31_(CB)	SIDE	89.066	0.62	NO	0
OR-32	Maj-14	32_(CB)	BOTTOM	89.484	0.62	NO	0
OR-33	Maj-14	33_(CB)	BOTTOM	89.484	0.62	NO	0
OR-34	Maj-16	34_(CB)	BOTTOM	89.419	0.62	NO	0
OR-35	Maj-16	35_(CB)	BOTTOM	89.419	0.62	NO	0
OR-36	Maj-10	36_(CB)	BOTTOM	89.777	0.62	NO	0
OR-37	Maj-10	37_(CB)	BOTTOM	89.777	0.62	NO	0
OR-40	Maj-06_2	40_(CB)	BOTTOM	90.095	0.62	NO	0
OR-41	Maj-06_2	41_(CB)	BOTTOM	90.095	0.62	NO	0
OR-42	Maj-03	42_(CB)	BOTTOM	90.272	0.62	NO	0
OR-43	Maj-03	43_(CB)	BOTTOM	90.272	0.62	NO	0
OR-44	Maj-33	44_(CB)	BOTTOM	88.918	0.62	NO	0
OR-45	Maj-33	45_(CB)	BOTTOM	88.918	0.62	NO	0
OR-46	Maj-32	46_(CB)	BOTTOM	88.874	0.62	NO	0
OR-47	Maj-32	47_(CB)	BOTTOM	88.874	0.62	NO	0
OR-48	Maj-30	48_(CB)	BOTTOM	88.398	0.62	NO	0
OR-49	Maj-30	49_(CB)	BOTTOM	88.398	0.62	NO	0
OR-50	Maj-42	50_(CB)	BOTTOM	87.881	0.62	NO	0
OR-51	Maj-42	51_(CB)	BOTTOM	87.881	0.62	NO	0
OR-52	Maj-11	52_(CB)	BOTTOM	89.819	0.62	NO	0
OR-53	Maj-12	53_(CB)	BOTTOM	89.664	0.62	NO	0
OR-54	Maj-12	54_(CB)	BOTTOM	89.664	0.62	NO	0
OR-55	Maj-54	55_(CB)	BOTTOM	87.251	0.62	NO	0

;Double CB Grate

OR-57	Maj-58	57_(CB)	BOTTOM	87.162	0.62	NO	0
RYCB-01	RYCB_1_(RYCB)	06_(CB)	SIDE	86.3	0.62	NO	0
RYCB-02	RYCB_2_(RYCB)	112_(STM)	SIDE	86.33	0.62	NO	0
RYCB-03	1_(RYCB)	110_(STM)	SIDE	86.327	0.62	NO	0

RYCB-04 RYCB_4_(RYCB) StartNullStruct3 SIDE 86.42 0.62 NO 0

RYCB-06 RYCB_6_(RYCB) 128_(STM) SIDE 86.075 0.62 NO 0

RYCB-10 RYCB_10_(RYCB) 148_(STM) SIDE 87.33 0.62 NO 0

RYCB-18 Structure_-_(18)_(RYCB) 116_(STM) SIDE 85.879 0.62 NO 0

RYCB-22 22_(RYCB) 142_(STM) SIDE 87.683 0.62 NO 0

RYCB-29 29_(RYCB) STM-251_(STM) SIDE 88.539 0.62 NO 0

RYCB-38 38_(RYCB) 162_(STM) SIDE 87.378 0.62 NO 0

RYCB-39 39_(RYCB) 162_(STM) SIDE 88.671 0.62 NO 0

[OUTLETS]

;;Name From Node To Node Offset Type QTable/Qcoeff Qexpon Gated

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- --------

B1-Out B1_Stor 164_(STM) 90.5 TABULAR/HEAD B1-Out NO

B2-Out B2_Stor 164_(STM) 90.5 TABULAR/HEAD B2-Out NO

B3-Out B3_Stor 164_(STM) 90.5 TABULAR/HEAD B3-Out NO

B4-Out 58_(CB) 2142_(STM) 85.4 TABULAR/HEAD B4-Out NO

[XSECTIONS]

;;Link Shape Geom1 Geom2 Geom3 Geom4 Barrels Culvert

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------

1_(STM) CIRCULAR 0.375 0 0 0 1

10_(STM) CIRCULAR 1.35 0 0 0 1

11_(STM) CIRCULAR 1.35 0 0 0 1

12_(STM) CIRCULAR 1.35 0 0 0 1

13_(STM) CIRCULAR 1.35 0 0 0 1

14_(STM) CIRCULAR 1.65 0 0 0 1

15_(10)_(STM) CIRCULAR 1.35 0 0 0 1

15_(11)_(STM) CIRCULAR 1.35 0 0 0 1

15_(12)_(STM) CIRCULAR 0.525 0 0 0 1

15_(13)_(STM)	CIRCULAR	0.6	0	0	0	1
15_(14)_(STM)	CIRCULAR	1.05	0	0	0	1
15_(15)_(STM)	CIRCULAR	1.05	0	0	0	1
15_(16)_(STM)	CIRCULAR	1.05	0	0	0	1
15_(19)_(STM)	CIRCULAR	0.375	0	0	0	1
15_(20)_(STM)	CIRCULAR	0.6	0	0	0	1
15_(21)_(STM)	CIRCULAR	0.6	0	0	0	1
15_(22)_(STM)	CIRCULAR	1.05	0	0	0	1
15_(3)_(STM)	CIRCULAR	0.375	0	0	0	1
15_(4)_(STM)	CIRCULAR	0.45	0	0	0	1
15_(5)_(STM)	CIRCULAR	0.525	0	0	0	1
15_(9)_(STM)	CIRCULAR	1.35	0	0	0	1
2_(STM)	CIRCULAR	0.375	0	0	0	1
3_(STM)	CIRCULAR	0.525	0	0	0	1
4_(STM)	CIRCULAR	1.2	0	0	0	1
5_(STM)	CIRCULAR	1.2	0	0	0	1
6_(STM)	CIRCULAR	0.25	0	0	0	1
7_(1)_(STM)	CIRCULAR	0.45	0	0	0	1
7_(STM)	CIRCULAR	0.375	0	0	0	1
8_(STM)	CIRCULAR	1.35	0	0	0	1
9_(STM)	CIRCULAR	1.35	0	0	0	1
C1	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C1_1	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C1_2	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C10	IRREGULAR	18mROWwSidewalk	0	0	0	1
C11	IRREGULAR	18mROWwSidewalk	0	0	0	1
C12	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C13	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C14	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1

C15	IRREGULAR	18mROWwSidewalk	0	0	0	1	
C16	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C17	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C18	TRIANGULAR	0.6	3.6	0	0	1	
C18_2	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C18_3	IRREGULAR	18mROWwSidewalk	0	0	0	1	
C18_4	IRREGULAR	18mROWwSidewalk	0	0	0	1	
C18_5	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C18_6	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C18_7	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C18_8	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C18_9	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C19	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C2	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C2_1	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1	
C2_2	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1	
C20	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C21	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C22	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1	
C23	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C24	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C25	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C26	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C27	TRIANGULAR	0.6	3.6	0	0	1	
C27_1	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C27_2	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C28	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C29	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1	
C3	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1	

C30	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C31	TRIANGULAR	0.6	3.6	0	0	1
C32	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C33	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C34	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C35	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C36	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C37	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C38	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C39	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C4	TRIANGULAR	0.6	3.6	0	0	1
C4_1	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C4_2	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C40	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C41	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C42	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C43	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C44	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C45	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C46	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C47	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C48	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C49	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C5	TRIANGULAR	0.6	3.6	0	0	1
C5_1	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C5_2	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C50	TRIANGULAR	0.6	3.6	0	0	1
C50_1	IRREGULAR	18mROWwSidewalk	0	0	0	1
C50_2	IRREGULAR	18mROWwSidewalk	0	0	0	1

C51	IRREGULAR	18mROWwSidewalk	0	0	0	1
C52	IRREGULAR	18mROWwSidewalk	0	0	0	1
C53	IRREGULAR	18mROWwSidewalk	0	0	0	1
C54	IRREGULAR	18mROWwSidewalk	0	0	0	1
C55	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C56	TRIANGULAR	0.6	3.6	0	0	1
C57	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C58	TRIANGULAR	0.6	3.6	0	0	1
C59	TRIANGULAR	0.6	3.6	0	0	1
C6	TRIANGULAR	0.6	3.6	0	0	1
C6_1	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C6_2	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C60	TRIANGULAR	0.6	3.6	0	0	1
C61	TRIANGULAR	0.6	3.6	0	0	1
C62	TRIANGULAR	0.6	3.6	0	0	1
C63	TRIANGULAR	0.6	3.6	0	0	1
C64	TRIANGULAR	0.6	3.6	0	0	1
C65	TRIANGULAR	0.6	3.6	0	0	1
C66	TRIANGULAR	0.6	3.6	0	0	1
C67	TRIANGULAR	0.6	3.6	0	0	1
C68	TRIANGULAR	0.6	3.6	0	0	1
C69	TRIANGULAR	0.6	3.6	0	0	1
C7	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C8	IRREGULAR	18mROW-Dbl-Sidewalk	0	0	0	1
C9	IRREGULAR	18mROWwSidewalk	0	0	0	1
Pipe_-_(1)_(RYCB)_1	CIRCULAR	0.25	0	0	0	1
Pipe_-_(1)_(RYCB)_2	CIRCULAR	0.25	0	0	0	1
Pipe_-_(10)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(100)_(RYCB)	CIRCULAR	0.25	0	0	0	1

Pipe_-_(101)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(103)_(1)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(103)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(109)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(11)_(RYCB) CIRCULAR 0.3 0 0 0 1

Pipe_-_(110)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(111)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(114)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(117)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(118)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(119)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(120)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(121)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(122)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(123)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(124)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(125)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(126)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(127)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(128)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(129)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(130)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(131)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(132)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(133)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(134)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(137)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(138)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(139)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(14)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(140)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(141)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(142)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(143)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(144)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(145)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(146)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(147)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(148)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(149)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(15)_(RYCB) CIRCULAR 0.3 0 0 0 1

Pipe_-_(150)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(151)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(152)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(153)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(154)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(155)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(156)_(1)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(156)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(157)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(158)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(159)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(16)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(160)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(161)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(162)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(164)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(165)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(17)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(19)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(2)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(22)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(23)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(24)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(25)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(27)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(73)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(74)_(RYCB) CIRCULAR 0.1 0 0 0 1

Pipe_-_(77)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(87)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(88)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(89)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(9)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(90)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(93)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(94)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(95)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(96)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(98)_(RYCB) CIRCULAR 0.25 0 0 0 1

Pipe_-_(99)_(RYCB) CIRCULAR 0.25 0 0 0 1

STM-23_(STM) CIRCULAR 0.45 0 0 0 1

STM-24_(STM) CIRCULAR 0.45 0 0 0 1

STM-27_(STM) CIRCULAR 0.25 0 0 0 1

STM-28_(STM) CIRCULAR 0.25 0 0 0 1

STM-34_(1)_(1)_(STM) CIRCULAR 1.65 0 0 0 1

STM-34_(1)_(STM) CIRCULAR 1.65 0 0 0 1

STM-34_(STM) CIRCULAR 1.65 0 0 0 1

STM-35_(STM)	CIRCULAR	1.65	0	0	0	1
STM-36_(STM)	CIRCULAR	1.65	0	0	0	1
STM-37_(STM)	CIRCULAR	1.8	0	0	0	1
STM-38_(STM)	CIRCULAR	1.8	0	0	0	1
STM-81_(STM)	CIRCULAR	0.25	0	0	0	1
STM-82_(STM)	CIRCULAR	0.25	0	0	0	1
STM-83_(STM)	CIRCULAR	0.25	0	0	0	1
CB-02	CIRCULAR	0.083	0	0	0	
CB-03	CIRCULAR	0.102	0	0	0	
CB-04	CIRCULAR	0.094	0	0	0	
CB-05	CIRCULAR	0.102	0	0	0	
CB-06	CIRCULAR	0.152	0	0	0	
CB-08	CIRCULAR	0.102	0	0	0	
CB-09	CIRCULAR	0.083	0	0	0	
CB-10	CIRCULAR	0.127	0	0	0	
CB-11	CIRCULAR	0.083	0	0	0	
CB-12	CIRCULAR	0.127	0	0	0	
CB-13	CIRCULAR	0.108	0	0	0	
CB-14	CIRCULAR	0.083	0	0	0	
CB-15	CIRCULAR	0.102	0	0	0	
CB-16	CIRCULAR	0.083	0	0	0	
CB-17	CIRCULAR	0.102	0	0	0	
CB-18	CIRCULAR	0.094	0	0	0	
CB-19	CIRCULAR	0.127	0	0	0	
CB-20	CIRCULAR	0.127	0	0	0	
CB-21	CIRCULAR	0.108	0	0	0	
CB-23	CIRCULAR	0.127	0	0	0	
CB-24	CIRCULAR	0.094	0	0	0	
CB-25	CIRCULAR	0.108	0	0	0	

CB-26	CIRCULAR	0.108	0	0	0
CB-27	CIRCULAR	0.178	0	0	0
CB-28	CIRCULAR	0.178	0	0	0
CB-30	CIRCULAR	0.127	0	0	0
CB-31	CIRCULAR	0.102	0	0	0
CB-32	CIRCULAR	0.108	0	0	0
CB-33	CIRCULAR	0.083	0	0	0
CB-34	CIRCULAR	0.127	0	0	0
CB-35	CIRCULAR	0.127	0	0	0
CB-36	CIRCULAR	0.083	0	0	0
CB-37	CIRCULAR	0.127	0	0	0
CB-40	CIRCULAR	0.102	0	0	0
CB-41	CIRCULAR	0.127	0	0	0
CB-42	CIRCULAR	0.094	0	0	0
CB-43	CIRCULAR	0.102	0	0	0
CB-44	CIRCULAR	0.102	0	0	0
CB-45	CIRCULAR	0.083	0	0	0
CB-46	CIRCULAR	0.102	0	0	0
CB-47	CIRCULAR	0.083	0	0	0
CB-48	CIRCULAR	0.102	0	0	0
CB-49	CIRCULAR	0.094	0	0	0
CB-50	CIRCULAR	0.108	0	0	0
CB-51	CIRCULAR	0.127	0	0	0
CB-52	CIRCULAR	0.083	0	0	0
CB-53	CIRCULAR	0.127	0	0	0
CB-54	CIRCULAR	0.108	0	0	0
CB-55	CIRCULAR	0.127	0	0	0
CB-57	CIRCULAR	0.108	0	0	0
OR-02	RECT_CLOSED	0.13	0.65	0	0

OR-03	RECT_CLOSED	0.13	0.65	0	0
OR-04	RECT_CLOSED	0.13	0.65	0	0
OR-05	RECT_CLOSED	0.13	0.65	0	0
OR-06	RECT_CLOSED	0.13	0.65	0	0
OR-08	RECT_CLOSED	0.35	0.35	0	0
OR-09	RECT_CLOSED	0.35	0.35	0	0
OR-10	RECT_CLOSED	0.35	0.35	0	0
OR-11	RECT_CLOSED	0.35	0.35	0	0
OR-12	RECT_CLOSED	0.35	0.35	0	0
OR-13	RECT_CLOSED	0.35	0.35	0	0
OR-14	RECT_CLOSED	0.35	0.35	0	0
OR-15	RECT_CLOSED	0.35	0.35	0	0
OR-16	RECT_CLOSED	0.35	0.35	0	0
OR-17	RECT_CLOSED	0.35	0.35	0	0
OR-18	RECT_CLOSED	0.35	0.35	0	0
OR-19	RECT_CLOSED	0.35	0.35	0	0
OR-20	RECT_CLOSED	0.35	0.35	0	0
OR-21	RECT_CLOSED	0.35	0.35	0	0
OR-23	RECT_CLOSED	0.35	0.35	0	0
OR-24	RECT_CLOSED	0.35	0.35	0	0
OR-25	RECT_CLOSED	0.35	0.35	0	0
OR-26	RECT_CLOSED	0.13	0.65	0	0
OR-27	RECT_CLOSED	0.13	1.3	0	0
OR-28	RECT_CLOSED	0.13	1.3	0	0
OR-30	RECT_CLOSED	0.35	0.35	0	0
OR-31	RECT_CLOSED	0.13	0.65	0	0
OR-32	RECT_CLOSED	0.35	0.35	0	0
OR-33	RECT_CLOSED	0.35	0.35	0	0
OR-34	RECT_CLOSED	0.35	0.35	0	0

OR-35	RECT_CLOSED	0.35	0.35	0	0
OR-36	RECT_CLOSED	0.35	0.35	0	0
OR-37	RECT_CLOSED	0.35	0.35	0	0
OR-40	RECT_CLOSED	0.35	0.35	0	0
OR-41	RECT_CLOSED	0.35	0.35	0	0
OR-42	RECT_CLOSED	0.35	0.35	0	0
OR-43	RECT_CLOSED	0.35	0.35	0	0
OR-44	RECT_CLOSED	0.35	0.35	0	0
OR-45	RECT_CLOSED	0.35	0.35	0	0
OR-46	RECT_CLOSED	0.35	0.35	0	0
OR-47	RECT_CLOSED	0.35	0.35	0	0
OR-48	RECT_CLOSED	0.35	0.35	0	0
OR-49	RECT_CLOSED	0.35	0.35	0	0
OR-50	RECT_CLOSED	0.35	0.35	0	0
OR-51	RECT_CLOSED	0.35	0.35	0	0
OR-52	RECT_CLOSED	0.35	0.35	0	0
OR-53	RECT_CLOSED	0.35	0.35	0	0
OR-54	RECT_CLOSED	0.35	0.35	0	0
OR-55	RECT_CLOSED	0.35	0.35	0	0
OR-57	RECT_CLOSED	0.7	0.35	0	0
RYCB-01	CIRCULAR	0.127	0	0	0
RYCB-02	CIRCULAR	0.127	0	0	0
RYCB-03	CIRCULAR	0.127	0	0	0
RYCB-04	CIRCULAR	0.127	0	0	0
RYCB-06	CIRCULAR	0.152	0	0	0
RYCB-10	CIRCULAR	0.178	0	0	0
RYCB-18	CIRCULAR	0.152	0	0	0
RYCB-22	CIRCULAR	0.127	0	0	0
RYCB-29	CIRCULAR	0.127	0	0	0

RYCB-38 CIRCULAR 0.083 0 0 0

RYCB-39 CIRCULAR 0.083 0 0 0

[TRANSECTS]

;;Transect Data in HEC-2 format

;

NC 0.035 0.035 0.013

X1 16.5mROW-Dbl-Sidewalk 9 2 14.5 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10.9 0.15 2 0.15 4 0 4.01 0.13 8.25

GR 0 12.49 0.15 12.5 0.15 14.5 0.6 25.6

;

NC 0.035 0.035 0.013

X1 16.5mROW-No-Sidewalk 9 3.8 12.7 0.0 0.0 0.0 0.0 0.0

GR 0.6 -9.1 0.15 3.8 0.15 4 0 4.01 0.13 8.25

GR 0 12.49 0.15 12.5 0.15 12.7 0.6 25.6

;

NC 0.035 0.035 0.013

X1 16.5mROWwSidewalk 9 2 12.7 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10.9 0.15 2 0.15 4 0 4.01 0.13 8.25

GR 0 12.49 0.15 12.5 0.15 12.7 0.6 25.6

;

NC 0.035 0.035 0.013

X1 18mROW-Dbl-Sidewalk 9 5.5 18 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.09 5.5 0.08 7.5 0 7.5 0.13 11.75

GR 0 16 0.08 16 0.09 18 0.6 29.25

;

NC 0.035 0.035 0.013

X1 18mROW-No-Sidewalk 7 7.5 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.08 7.5 0 7.5 0.13 11.75 0 16

GR 0.08 16 0.6 29.25

;

NC 0.035 0.035 0.013

X1 18mROWwSidewalk 8 2.75 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.09 2.75 0.08 7.5 0 7.5 0.13 11.75

GR 0 16 0.08 16 0.6 29.25

;

NC 0.035 0.035 0.013

X1 18mROWwSidewalk-Half 5 2.75 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.09 2.75 0.08 7.5 0 7.5 0.13 11.75

;

NC 0.035 0.035 0.013

X1 24mROW-Dbl-Sidewalk 9 3.6 20.4 0.0 0.0 0.0 0.0 0.0

GR 0.6 -9.3 0.15 3.6 0.15 7.5 0 7.51 0.13 12

GR 0 16.49 0.15 16.5 0.15 20.4 0.6 33.3

[LOSSES]

;;Link Kentry Kexit Kavg Flap Gate Seepage

;;---------- ---------- ---------- ---------- ---------- ----------

1_(STM) 0 0.47 0 NO 0

10_(STM) 0 0.26 0 NO 0

11_(STM) 0 0.11 0 NO 0

12_(STM) 0 1.33 0 NO 0

13_(STM) 0 0.02 0 NO 0

14_(STM) 0 0.47 0 NO 0

15_(10)_(STM) 0 0.39 0 NO 0

15_(11)_(STM) 0 0.035 0 NO 0

15_(12)_(STM) 0 0.035 0 NO 0

15_(13)_(STM) 0 1.33 0 NO 0

15_(14)_(STM) 0 0.47 0 NO 0

15_(15)_(STM) 0 0.39 0 NO 0

15_(16)_(STM) 0 1.33 0 NO 0

15_(19)_(STM) 0 0.02 0 NO 0

15_(20)_(STM) 0 0.055 0 NO 0

15_(21)_(STM) 0 0.08 0 NO 0

15_(22)_(STM) 0 0.16 0 NO 0

15_(3)_(STM) 0 0.39 0 NO 0

15_(4)_(STM) 0 0.39 0 NO 0

15_(5)_(STM) 0 0.02 0 NO 0

15_(9)_(STM) 0 0.47 0 NO 0

2_(STM) 0 0.47 0 NO 0

3_(STM) 0 0.035 0 NO 0

4_(STM) 0 0.035 0 NO 0

5_(STM) 0 1.33 0 NO 0

6_(STM) 0 1.33 0 NO 0

7_(1)_(STM) 0 1.33 0 NO 0

7_(STM) 0 0.02 0 NO 0

8_(STM) 0 0.035 0 NO 0

9_(STM) 0 0.32 0 NO 0

Pipe_-_(1)_(RYCB)_2 0 1.07 0 NO 0

Pipe_-_(10)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(101)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(103)_(1)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(103)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(109)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(110)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(111)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(114)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(117)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(118)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(119)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(120)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(121)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(122)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(123)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(124)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(125)_(RYCB)	0	0.635	0	NO	0
Pipe_-_(126)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(127)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(128)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(129)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(130)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(131)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(132)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(133)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(134)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(137)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(138)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(139)_(RYCB)	0	0.08	0	NO	0
Pipe_-_(14)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(140)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(141)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(142)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(143)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(144)_(RYCB)	0	0.54	0	NO	0
Pipe_-_(145)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(146)_(RYCB)	0	0.035	0	NO	0

Pipe_-_(147)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(148)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(149)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(15)_(RYCB) 0 0.84 0 NO 0

Pipe_-_(150)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(151)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(152)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(153)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(154)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(155)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(156)_(1)_(RYCB) 0 0.84 0 NO 0

Pipe_-_(156)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(157)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(158)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(159)_(RYCB) 0 1.19 0 NO 0

Pipe_-_(160)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(161)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(165)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(2)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(87)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(89)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(93)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(94)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(95)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(96)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(98)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(99)_(RYCB) 0 0.035 0 NO 0

STM-23_(STM) 0 1.33 0 NO 0

STM-24_(STM) 0 0.08 0 NO 0

STM-27_(STM) 0 0.035 0 NO 0

STM-28_(STM) 0 0.055 0 NO 0

STM-34_(1)_(1)_(STM) 0 1.07 0 NO 0

STM-34_(1)_(STM) 0 0.08 0 NO 0

STM-34_(STM) 0 0.54 0 NO 0

STM-35_(STM) 0 0.32 0 NO 0

STM-36_(STM) 0 0.39 0 NO 0

STM-37_(STM) 0 0.73 0 NO 0

STM-81_(STM) 0 1.33 0 NO 0

STM-82_(STM) 0 1.33 0 NO 0

STM-83_(STM) 0 1.33 0 NO 0

[CURVES]

;;Name Type X-Value Y-Value

;;---------- ---------- ---------- ----------

;100% capture of flow to this CB

100%_Capture Rating 0 0

100%_Capture 0.01 0.001

100%_Capture 0.1 1

100%_Capture 0.3 5

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

102mm-ICD Rating 0 0

102mm-ICD 0.01 0.0266

102mm-ICD 0.15 0.0278

102mm-ICD 0.3 0.0296

102mm-ICD 0.35 0.03

102mm-ICD-RLCB Rating 0 0

102mm-ICD-RLCB 0.01 0.0301

102mm-ICD-RLCB 0.15 0.0312

102mm-ICD-RLCB 0.3 0.0328

102mm-ICD-RLCB 0.35 0.0332

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

108mm-ICD Rating 0 0

108mm-ICD 0.01 0.0298

108mm-ICD 0.15 0.0312

108mm-ICD 0.3 0.0332

108mm-ICD 0.35 0.0337

108mm-ICD-RLCB Rating 0 0

108mm-ICD-RLCB 0.01 0.0338

108mm-ICD-RLCB 0.15 0.035

108mm-ICD-RLCB 0.3 0.0367

108mm-ICD-RLCB 0.35 0.0372

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

127mm-ICD Rating 0 0

127mm-ICD 0.01 0.0413

127mm-ICD 0.15 0.0432

127mm-ICD 0.3 0.0458

127mm-ICD 0.35 0.0466

127mm-ICD-RLCB Rating 0 0

127mm-ICD-RLCB 0.01 0.047

127mm-ICD-RLCB 0.15 0.048

127mm-ICD-RLCB 0.3 0.051

127mm-ICD-RLCB 0.35 0.052

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

152mm-ICD Rating 0 0

152mm-ICD 0.01 0.0591

152mm-ICD 0.15 0.0618

152mm-ICD 0.3 0.0657

152mm-ICD 0.35 0.0667

152mm-ICD-RLCB Rating 0 0

152mm-ICD-RLCB 0.01 0.067

152mm-ICD-RLCB 0.15 0.069

152mm-ICD-RLCB 0.3 0.073

152mm-ICD-RLCB 0.35 0.074

;Sx0.03

16ROW_1CB_So0.005 Rating 0 0

16ROW_1CB_So0.005 0.01 0.0003

16ROW_1CB_So0.005 0.02 0.0011

16ROW_1CB_So0.005 0.03 0.0037

16ROW_1CB_So0.005 0.04 0.0072

16ROW_1CB_So0.005 0.05 0.0132

16ROW_1CB_So0.005 0.06 0.0168

16ROW_1CB_So0.005 0.07 0.0214

16ROW_1CB_So0.005 0.08 0.0253

16ROW_1CB_So0.005	0.09	0.0286
16ROW_1CB_So0.005	0.1	0.0331
16ROW_1CB_So0.005	0.11	0.0367
16ROW_1CB_So0.005	0.12	0.0409
16ROW_1CB_So0.005	0.13	0.0446
16ROW_1CB_So0.005	0.14	0.048
16ROW_1CB_So0.005	0.15	0.049
16ROW_1CB_So0.005	0.16	0.049
16ROW_1CB_So0.005	0.17	0.049
16ROW_1CB_So0.005	0.18	0.049
16ROW_1CB_So0.005	0.19	0.049
16ROW_1CB_So0.005	0.2	0.049
16ROW_1CB_So0.005	0.21	0.049
16ROW_1CB_So0.005	0.22	0.049
16ROW_1CB_So0.005	0.23	0.049
16ROW_1CB_So0.005	0.24	0.049
16ROW_1CB_So0.005	0.25	0.049
16ROW_1CB_So0.005	0.26	0.049
16ROW_1CB_So0.005	0.27	0.049
16ROW_1CB_So0.005	0.28	0.049
16ROW_1CB_So0.005	0.29	0.049
16ROW_1CB_So0.005	0.3	0.049
16ROW_1CB_So0.005	0.31	0.049
16ROW_1CB_So0.005	0.32	0.049
16ROW_1CB_So0.005	0.33	0.049
16ROW_1CB_So0.005	0.34	0.049
16ROW_1CB_So0.005	0.35	0.049
16ROW_1CB_So0.005	0.36	0.049
16ROW_1CB_So0.005	0.37	0.049

16ROW_1CB_So0.005 0.38 0.049

16ROW_1CB_So0.005 0.39 0.049

16ROW_1CB_So0.005 0.4 0.049

;Sx0.03

16ROW_1CB_So0.01 Rating 0 0

16ROW_1CB_So0.01 0.01 0.0005

16ROW_1CB_So0.01 0.02 0.0016

16ROW_1CB_So0.01 0.03 0.0052

16ROW_1CB_So0.01 0.04 0.0101

16ROW_1CB_So0.01 0.05 0.0158

16ROW_1CB_So0.01 0.06 0.0206

16ROW_1CB_So0.01 0.07 0.0254

16ROW_1CB_So0.01 0.08 0.029

16ROW_1CB_So0.01 0.09 0.0343

16ROW_1CB_So0.01 0.1 0.0382

16ROW_1CB_So0.01 0.11 0.043

16ROW_1CB_So0.01 0.12 0.0463

16ROW_1CB_So0.01 0.13 0.049

16ROW_1CB_So0.01 0.14 0.049

16ROW_1CB_So0.01 0.15 0.049

16ROW_1CB_So0.01 0.16 0.049

16ROW_1CB_So0.01 0.17 0.049

16ROW_1CB_So0.01 0.18 0.049

16ROW_1CB_So0.01 0.19 0.049

16ROW_1CB_So0.01 0.2 0.049

16ROW_1CB_So0.01 0.21 0.049

16ROW_1CB_So0.01 0.22 0.049

16ROW_1CB_So0.01 0.23 0.049

16ROW_1CB_So0.01 0.24 0.049

16ROW_1CB_So0.01 0.25 0.049

16ROW_1CB_So0.01 0.26 0.049

16ROW_1CB_So0.01 0.27 0.049

16ROW_1CB_So0.01 0.28 0.049

16ROW_1CB_So0.01 0.29 0.049

16ROW_1CB_So0.01 0.3 0.049

16ROW_1CB_So0.01 0.31 0.049

16ROW_1CB_So0.01 0.32 0.049

16ROW_1CB_So0.01 0.33 0.049

16ROW_1CB_So0.01 0.34 0.049

16ROW_1CB_So0.01 0.35 0.049

16ROW_1CB_So0.01 0.36 0.049

16ROW_1CB_So0.01 0.37 0.049

;Sx0.03

16ROW_1CB_So0.02 Rating 0 0

16ROW_1CB_So0.02 0.01 0.0006

16ROW_1CB_So0.02 0.02 0.0019

16ROW_1CB_So0.02 0.03 0.0062

16ROW_1CB_So0.02 0.04 0.012

16ROW_1CB_So0.02 0.05 0.0154

16ROW_1CB_So0.02 0.06 0.0192

16ROW_1CB_So0.02 0.07 0.0236

16ROW_1CB_So0.02 0.08 0.0275

16ROW_1CB_So0.02 0.09 0.0316

16ROW_1CB_So0.02 0.1 0.0363

16ROW_1CB_So0.02 0.11 0.041

16ROW_1CB_So0.02 0.12 0.045

16ROW_1CB_So0.02 0.13 0.045

16ROW_1CB_So0.02 0.14 0.045

16ROW_1CB_So0.02 0.15 0.045

16ROW_1CB_So0.02 0.16 0.045

16ROW_1CB_So0.02 0.17 0.045

16ROW_1CB_So0.02 0.18 0.045

16ROW_1CB_So0.02 0.19 0.045

16ROW_1CB_So0.02 0.2 0.045

16ROW_1CB_So0.02 0.21 0.045

16ROW_1CB_So0.02 0.22 0.045

16ROW_1CB_So0.02 0.23 0.045

16ROW_1CB_So0.02 0.24 0.045

16ROW_1CB_So0.02 0.25 0.045

16ROW_1CB_So0.02 0.26 0.045

16ROW_1CB_So0.02 0.27 0.045

16ROW_1CB_So0.02 0.28 0.045

16ROW_1CB_So0.02 0.29 0.045

16ROW_1CB_So0.02 0.3 0.045

16ROW_1CB_So0.02 0.31 0.045

16ROW_1CB_So0.02 0.32 0.045

;Sx0.03

16ROW_1CB_So0.03 Rating 0 0

16ROW_1CB_So0.03 0.01 0.0005

16ROW_1CB_So0.03 0.02 0.0017

16ROW_1CB_So0.03 0.03 0.0057

16ROW_1CB_So0.03 0.04 0.011

16ROW_1CB_So0.03 0.05 0.0146

16ROW_1CB_So0.03 0.06 0.0179

16ROW_1CB_So0.03 0.07 0.0216

16ROW_1CB_So0.03 0.08 0.0256

16ROW_1CB_So0.03 0.09 0.0298

16ROW_1CB_So0.03 0.1 0.0335

16ROW_1CB_So0.03 0.11 0.038

16ROW_1CB_So0.03 0.12 0.039

16ROW_1CB_So0.03 0.13 0.039

16ROW_1CB_So0.03 0.14 0.039

16ROW_1CB_So0.03 0.15 0.039

16ROW_1CB_So0.03 0.16 0.039

16ROW_1CB_So0.03 0.17 0.039

16ROW_1CB_So0.03 0.18 0.039

16ROW_1CB_So0.03 0.19 0.039

16ROW_1CB_So0.03 0.2 0.039

16ROW_1CB_So0.03 0.21 0.039

16ROW_1CB_So0.03 0.22 0.039

16ROW_1CB_So0.03 0.23 0.039

16ROW_1CB_So0.03 0.24 0.039

16ROW_1CB_So0.03 0.25 0.039

16ROW_1CB_So0.03 0.26 0.039

16ROW_1CB_So0.03 0.27 0.039

16ROW_1CB_So0.03 0.28 0.039

16ROW_1CB_So0.03 0.29 0.039

16ROW_1CB_So0.03 0.3 0.039

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

178mm-ICD Rating 0 0

178mm-ICD 0.01 0.0811

178mm-ICD 0.15 0.0848

178mm-ICD 0.3 0.0901

178mm-ICD 0.35 0.0915

178mm-ICD-RLCB Rating 0 0

178mm-ICD-RLCB 0.01 0.092

178mm-ICD-RLCB 0.15 0.095

178mm-ICD-RLCB 0.3 0.1

178mm-ICD-RLCB 0.35 0.101

;1 Single CB on single lead pipe. Single CB is limited by 250mm Lead pipe at 1.2m head. Q=195.3 L/s

1-CB Rating 0 0

1-CB 0.05 0.1953

1-CB 1 0.1954

;1 DCB on single lead pipe. DCB is limited by 300mm Lead pipe at 1.2m head. Q=281.2 L/s

1-DCB Rating 0 0

1-DCB 0.05 0.2812

1-DCB 1 0.2813

;Sx0.03

24ROW_1CB_So0.005 Rating 0 0

24ROW_1CB_So0.005 0.01 0.0004

24ROW_1CB_So0.005 0.02 0.0012

24ROW_1CB_So0.005 0.03 0.0039

24ROW_1CB_So0.005 0.04 0.0076

24ROW_1CB_So0.005 0.05 0.0136

24ROW_1CB_So0.005 0.06 0.0174

24ROW_1CB_So0.005 0.07 0.022

24ROW_1CB_So0.005	0.08	0.0258
24ROW_1CB_So0.005	0.09	0.0296
24ROW_1CB_So0.005	0.1	0.034
24ROW_1CB_So0.005	0.11	0.0378
24ROW_1CB_So0.005	0.12	0.0418
24ROW_1CB_So0.005	0.13	0.0453
24ROW_1CB_So0.005	0.14	0.0486
24ROW_1CB_So0.005	0.15	0.049
24ROW_1CB_So0.005	0.16	0.049
24ROW_1CB_So0.005	0.17	0.049
24ROW_1CB_So0.005	0.18	0.049
24ROW_1CB_So0.005	0.19	0.049
24ROW_1CB_So0.005	0.2	0.049
24ROW_1CB_So0.005	0.21	0.049
24ROW_1CB_So0.005	0.22	0.049
24ROW_1CB_So0.005	0.23	0.049
24ROW_1CB_So0.005	0.24	0.049
24ROW_1CB_So0.005	0.25	0.049
24ROW_1CB_So0.005	0.26	0.049
24ROW_1CB_So0.005	0.27	0.049
24ROW_1CB_So0.005	0.28	0.049
24ROW_1CB_So0.005	0.29	0.049
24ROW_1CB_So0.005	0.3	0.049
24ROW_1CB_So0.005	0.31	0.049
24ROW_1CB_So0.005	0.32	0.049
24ROW_1CB_So0.005	0.33	0.049
24ROW_1CB_So0.005	0.34	0.049
24ROW_1CB_So0.005	0.35	0.049
24ROW_1CB_So0.005	0.36	0.049

24ROW_1CB_So0.005 0.37 0.049

24ROW_1CB_So0.005 0.38 0.049

24ROW_1CB_So0.005 0.39 0.049

24ROW_1CB_So0.005 0.4 0.049

;Sx0.03

24ROW_1CB_So0.01 Rating 0 0

24ROW_1CB_So0.01 0.01 0.0005

24ROW_1CB_So0.01 0.02 0.0017

24ROW_1CB_So0.01 0.03 0.0055

24ROW_1CB_So0.01 0.04 0.0107

24ROW_1CB_So0.01 0.05 0.0164

24ROW_1CB_So0.01 0.06 0.0212

24ROW_1CB_So0.01 0.07 0.0259

24ROW_1CB_So0.01 0.08 0.03

24ROW_1CB_So0.01 0.09 0.0351

24ROW_1CB_So0.01 0.1 0.0396

24ROW_1CB_So0.01 0.11 0.044

24ROW_1CB_So0.01 0.12 0.0473

24ROW_1CB_So0.01 0.13 0.049

24ROW_1CB_So0.01 0.14 0.049

24ROW_1CB_So0.01 0.15 0.049

24ROW_1CB_So0.01 0.16 0.049

24ROW_1CB_So0.01 0.17 0.049

24ROW_1CB_So0.01 0.18 0.049

24ROW_1CB_So0.01 0.19 0.049

24ROW_1CB_So0.01 0.2 0.049

24ROW_1CB_So0.01 0.21 0.049

24ROW_1CB_So0.01 0.22 0.049

24ROW_1CB_So0.01 0.23 0.049

24ROW_1CB_So0.01 0.24 0.049

24ROW_1CB_So0.01 0.25 0.049

24ROW_1CB_So0.01 0.26 0.049

24ROW_1CB_So0.01 0.27 0.049

24ROW_1CB_So0.01 0.28 0.049

24ROW_1CB_So0.01 0.29 0.049

24ROW_1CB_So0.01 0.3 0.049

24ROW_1CB_So0.01 0.31 0.049

24ROW_1CB_So0.01 0.32 0.049

24ROW_1CB_So0.01 0.33 0.049

24ROW_1CB_So0.01 0.34 0.049

24ROW_1CB_So0.01 0.35 0.049

24ROW_1CB_So0.01 0.36 0.049

24ROW_1CB_So0.01 0.37 0.049

;Sx0.03

24ROW_1CB_So0.02 Rating 0 0

24ROW_1CB_So0.02 0.01 0.0006

24ROW_1CB_So0.02 0.02 0.002

24ROW_1CB_So0.02 0.03 0.0066

24ROW_1CB_So0.02 0.04 0.0123

24ROW_1CB_So0.02 0.05 0.0158

24ROW_1CB_So0.02 0.06 0.0198

24ROW_1CB_So0.02 0.07 0.0243

24ROW_1CB_So0.02 0.08 0.0281

24ROW_1CB_So0.02 0.09 0.0325

24ROW_1CB_So0.02 0.1 0.0373

24ROW_1CB_So0.02 0.11 0.0418

24ROW_1CB_So0.02 0.12 0.045

24ROW_1CB_So0.02 0.13 0.045

24ROW_1CB_So0.02 0.14 0.045

24ROW_1CB_So0.02 0.15 0.045

24ROW_1CB_So0.02 0.16 0.045

24ROW_1CB_So0.02 0.17 0.045

24ROW_1CB_So0.02 0.18 0.045

24ROW_1CB_So0.02 0.19 0.045

24ROW_1CB_So0.02 0.2 0.045

24ROW_1CB_So0.02 0.21 0.045

24ROW_1CB_So0.02 0.22 0.045

24ROW_1CB_So0.02 0.23 0.045

24ROW_1CB_So0.02 0.24 0.045

24ROW_1CB_So0.02 0.25 0.045

24ROW_1CB_So0.02 0.26 0.045

24ROW_1CB_So0.02 0.27 0.045

24ROW_1CB_So0.02 0.28 0.045

24ROW_1CB_So0.02 0.29 0.045

24ROW_1CB_So0.02 0.3 0.045

24ROW_1CB_So0.02 0.31 0.045

24ROW_1CB_So0.02 0.32 0.045

;Sx0.03

24ROW_1CB_So0.03 Rating 0 0

24ROW_1CB_So0.03 0.01 0.0006

24ROW_1CB_So0.03 0.02 0.0018

24ROW_1CB_So0.03 0.03 0.006

24ROW_1CB_So0.03 0.04 0.0113

24ROW_1CB_So0.03 0.05 0.015

24ROW_1CB_So0.03	0.06	0.0183
24ROW_1CB_So0.03	0.07	0.0225
24ROW_1CB_So0.03	0.08	0.0264
24ROW_1CB_So0.03	0.09	0.0306
24ROW_1CB_So0.03	0.1	0.0343
24ROW_1CB_So0.03	0.11	0.0388
24ROW_1CB_So0.03	0.12	0.039
24ROW_1CB_So0.03	0.13	0.039
24ROW_1CB_So0.03	0.14	0.039
24ROW_1CB_So0.03	0.15	0.039
24ROW_1CB_So0.03	0.16	0.039
24ROW_1CB_So0.03	0.17	0.039
24ROW_1CB_So0.03	0.18	0.039
24ROW_1CB_So0.03	0.19	0.039
24ROW_1CB_So0.03	0.2	0.039
24ROW_1CB_So0.03	0.21	0.039
24ROW_1CB_So0.03	0.22	0.039
24ROW_1CB_So0.03	0.23	0.039
24ROW_1CB_So0.03	0.24	0.039
24ROW_1CB_So0.03	0.25	0.039
24ROW_1CB_So0.03	0.26	0.039
24ROW_1CB_So0.03	0.27	0.039
24ROW_1CB_So0.03	0.28	0.039
24ROW_1CB_So0.03	0.29	0.039
24ROW_1CB_So0.03	0.3	0.039

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

;Assumes 2 CB's with individual ICD's

2x102mm-ICD Rating 0 0

2x102mm-ICD 0.005 0.0532

2x102mm-ICD 0.15 0.0556

2x102mm-ICD 0.3 0.0592

2x102mm-ICD 0.35 0.06

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

;Assumes 2 CB's with individual ICD's

2x152mm-ICD Rating 0 0

2x152mm-ICD 0.005 0.1182

2x152mm-ICD 0.15 0.1236

2x152mm-ICD 0.3 0.1314

2x152mm-ICD 0.35 0.1334

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

83mm-ICD Rating 0 0

83mm-ICD 0.01 0.0176

83mm-ICD 0.15 0.0184

83mm-ICD 0.3 0.0196

83mm-ICD 0.35 0.0199

83mm-ICD-RLCB Rating 0 0

83mm-ICD-RLCB 0.01 0.0199

83mm-ICD-RLCB 0.15 0.0207

83mm-ICD-RLCB 0.3 0.0217

83mm-ICD-RLCB 0.35 0.022

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

94mm-ICD Rating 0 0

94mm-ICD 0.01 0.0226

94mm-ICD 0.15 0.0236

94mm-ICD 0.3 0.0251

94mm-ICD 0.35 0.0255

94mm-ICD-RLCB Rating 0 0

94mm-ICD-RLCB 0.01 0.0256

94mm-ICD-RLCB 0.15 0.0265

94mm-ICD-RLCB 0.3 0.0278

94mm-ICD-RLCB 0.35 0.0282

;Block 160 - Medium Density Residential

;0.883 ha C=0.80 tc= 10 min

;5 Year Rational = 205 L/s

B1-Out Rating 0 0

B1-Out 0.01 0.205

B1-Out 0.3 0.234

;Existing UHAUL site

;3.43 ha R=0.90 tc= 12 min

;5 Year Rational (via Novatech)= 786.6 L/s

B2-Out Rating 0 0

B2-Out 0.01 0.787

B2-Out 0.3 0.897

;Block 161 - Medium Density Residential

;0.965 ha C=0.80 tc= 10 min

;5 Year Rational = 224 L/s

B3-Out Rating 0 0

B3-Out 0.01 0.224

B3-Out 0.3 0.255

;Park Lands

;1.00 ha R=0.25 tc= 10 min

;5 Year Rational (via Novatech) = 129 L/s

B4-Out Rating 0 0

B4-Out 0.01 0.1297

B4-Out 0.3 0.1479

;540 m³ of storage assumed for site based on MArch 2020 UHAUL site Design Breif

UHAL_Onsite Storage 0 1800

UHAL_Onsite 0.3 1800

UHAL_Onsite 0.31 1

UHAL_Onsite 2 1

;Depth (m)

MH-111-100YrSCS24Hr 01/01/2019 00:00:00 80.571

MH-111-100YrSCS24Hr 01/01/2019 00:05:00 80.571

MH-111-100YrSCS24Hr 01/01/2019 00:10:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:15:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:20:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:25:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:30:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:35:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:40:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:45:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:50:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 00:55:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:00:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:05:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:10:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:15:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:20:00 80.572

MH-111-100YrSCS24Hr 01/01/2019 01:25:00 80.574

MH-111-100YrSCS24Hr 01/01/2019 01:30:00 80.581

MH-111-100YrSCS24Hr 01/01/2019 01:35:00 80.591

MH-111-100YrSCS24Hr 01/01/2019 01:40:00 80.6

MH-111-100YrSCS24Hr 01/01/2019 01:45:00 80.607

MH-111-100YrSCS24Hr 01/01/2019 01:50:00 80.615

MH-111-100YrSCS24Hr 01/01/2019 01:55:00 80.625

MH-111-100YrSCS24Hr 01/01/2019 02:00:00 80.641

MH-111-100YrSCS24Hr 01/01/2019 02:05:00 80.671

MH-111-100YrSCS24Hr 01/01/2019 02:10:00 80.709

MH-111-100YrSCS24Hr 01/01/2019 02:15:00 80.723

MH-111-100YrSCS24Hr 01/01/2019 02:20:00 80.728

MH-111-100YrSCS24Hr 01/01/2019 02:25:00 80.731

MH-111-100YrSCS24Hr 01/01/2019 02:30:00 80.734

MH-111-100YrSCS24Hr 01/01/2019 02:35:00 80.736

MH-111-100YrSCS24Hr 01/01/2019 02:40:00 80.737

MH-111-100YrSCS24Hr 01/01/2019 02:45:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 02:50:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 02:55:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:00:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:05:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:10:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:15:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:20:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:25:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:30:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:35:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:40:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:45:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:50:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 03:55:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 04:00:00 80.738

MH-111-100YrSCS24Hr 01/01/2019 04:05:00 80.739

MH-111-100YrSCS24Hr 01/01/2019 04:10:00 80.74

MH-111-100YrSCS24Hr 01/01/2019 04:15:00 80.742

MH-111-100YrSCS24Hr 01/01/2019 04:20:00 80.744

MH-111-100YrSCS24Hr 01/01/2019 04:25:00 80.746

MH-111-100YrSCS24Hr 01/01/2019 04:30:00 80.75

MH-111-100YrSCS24Hr 01/01/2019 04:35:00 80.752

MH-111-100YrSCS24Hr 01/01/2019 04:40:00 80.754

MH-111-100YrSCS24Hr 01/01/2019 04:45:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 04:50:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 04:55:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:00:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:05:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:10:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:15:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:20:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:25:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:30:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:35:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:40:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:45:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:50:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 05:55:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 06:00:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 06:05:00 80.755

MH-111-100YrSCS24Hr 01/01/2019 06:10:00 80.756

MH-111-100YrSCS24Hr 01/01/2019 06:15:00 80.757

MH-111-100YrSCS24Hr 01/01/2019 06:20:00 80.758

MH-111-100YrSCS24Hr 01/01/2019 06:25:00 80.76

MH-111-100YrSCS24Hr 01/01/2019 06:30:00 80.762

MH-111-100YrSCS24Hr 01/01/2019 06:35:00 80.764

MH-111-100YrSCS24Hr 01/01/2019 06:40:00 80.765

MH-111-100YrSCS24Hr 01/01/2019 06:45:00 80.765

MH-111-100YrSCS24Hr 01/01/2019 06:50:00 80.765

MH-111-100YrSCS24Hr 01/01/2019 06:55:00 80.765

MH-111-100YrSCS24Hr 01/01/2019 07:00:00 80.765

MH-111-100YrSCS24Hr 01/01/2019 07:05:00 80.766

MH-111-100YrSCS24Hr 01/01/2019 07:10:00 80.768

MH-111-100YrSCS24Hr 01/01/2019 07:15:00 80.77

MH-111-100YrSCS24Hr 01/01/2019 07:20:00 80.772

MH-111-100YrSCS24Hr 01/01/2019 07:25:00 80.776

MH-111-100YrSCS24Hr 01/01/2019 07:30:00 80.78

MH-111-100YrSCS24Hr 01/01/2019 07:35:00 80.782

MH-111-100YrSCS24Hr 01/01/2019 07:40:00 80.784

MH-111-100YrSCS24Hr 01/01/2019 07:45:00 80.784

MH-111-100YrSCS24Hr 01/01/2019 07:50:00 80.784

MH-111-100YrSCS24Hr 01/01/2019 07:55:00 80.784

MH-111-100YrSCS24Hr 01/01/2019 08:00:00 80.784

MH-111-100YrSCS24Hr 01/01/2019 08:05:00 80.785

MH-111-100YrSCS24Hr 01/01/2019 08:10:00 80.787

MH-111-100YrSCS24Hr 01/01/2019 08:15:00 80.789

MH-111-100YrSCS24Hr 01/01/2019 08:20:00 80.791

MH-111-100YrSCS24Hr 01/01/2019 08:25:00 80.795

MH-111-100YrSCS24Hr 01/01/2019 08:30:00 80.799

MH-111-100YrSCS24Hr 01/01/2019 08:35:00 80.801

MH-111-100YrSCS24Hr 01/01/2019 08:40:00 80.803

MH-111-100YrSCS24Hr 01/01/2019 08:45:00 80.804

MH-111-100YrSCS24Hr 01/01/2019 08:50:00 80.805

MH-111-100YrSCS24Hr 01/01/2019 08:55:00 80.807

MH-111-100YrSCS24Hr 01/01/2019 09:00:00 80.809

MH-111-100YrSCS24Hr 01/01/2019 09:05:00 80.81

MH-111-100YrSCS24Hr 01/01/2019 09:10:00 80.812

MH-111-100YrSCS24Hr 01/01/2019 09:15:00 80.814

MH-111-100YrSCS24Hr 01/01/2019 09:20:00 80.817

MH-111-100YrSCS24Hr 01/01/2019 09:25:00 80.821

MH-111-100YrSCS24Hr 01/01/2019 09:30:00 80.824

MH-111-100YrSCS24Hr 01/01/2019 09:35:00 80.826

MH-111-100YrSCS24Hr 01/01/2019 09:40:00 80.829

MH-111-100YrSCS24Hr 01/01/2019 09:45:00 80.831

MH-111-100YrSCS24Hr 01/01/2019 09:50:00 80.835

MH-111-100YrSCS24Hr 01/01/2019 09:55:00 80.839

MH-111-100YrSCS24Hr 01/01/2019 10:00:00 80.842

MH-111-100YrSCS24Hr 01/01/2019 10:05:00 80.846

MH-111-100YrSCS24Hr 01/01/2019 10:10:00 80.851

MH-111-100YrSCS24Hr 01/01/2019 10:15:00 80.857

MH-111-100YrSCS24Hr 01/01/2019 10:20:00 80.865

MH-111-100YrSCS24Hr 01/01/2019 10:25:00 80.876

MH-111-100YrSCS24Hr 01/01/2019 10:30:00 80.883

MH-111-100YrSCS24Hr 01/01/2019 10:35:00 80.89

MH-111-100YrSCS24Hr 01/01/2019 10:40:00 80.9

MH-111-100YrSCS24Hr 01/01/2019 10:45:00 80.91

MH-111-100YrSCS24Hr 01/01/2019 10:50:00 80.926

MH-111-100YrSCS24Hr 01/01/2019 10:55:00 80.942

MH-111-100YrSCS24Hr 01/01/2019 11:00:00 80.952

MH-111-100YrSCS24Hr 01/01/2019 11:05:00 80.965

MH-111-100YrSCS24Hr 01/01/2019 11:10:00 80.981

MH-111-100YrSCS24Hr 01/01/2019 11:15:00 81.003

MH-111-100YrSCS24Hr 01/01/2019 11:20:00 81.035

MH-111-100YrSCS24Hr 01/01/2019 11:25:00 81.057

MH-111-100YrSCS24Hr 01/01/2019 11:30:00 81.073

MH-111-100YrSCS24Hr 01/01/2019 11:35:00 81.113

MH-111-100YrSCS24Hr 01/01/2019 11:40:00 81.193

MH-111-100YrSCS24Hr 01/01/2019 11:45:00 81.391

MH-111-100YrSCS24Hr 01/01/2019 11:50:00 81.635

MH-111-100YrSCS24Hr 01/01/2019 11:55:00 81.867

MH-111-100YrSCS24Hr 01/01/2019 12:00:00 82.056

MH-111-100YrSCS24Hr 01/01/2019 12:05:00 82.272

MH-111-100YrSCS24Hr 01/01/2019 12:10:00 82.488

MH-111-100YrSCS24Hr 01/01/2019 12:15:00 82.575

MH-111-100YrSCS24Hr 01/01/2019 12:20:00 82.687

MH-111-100YrSCS24Hr 01/01/2019 12:25:00 82.794

MH-111-100YrSCS24Hr 01/01/2019 12:30:00 82.82

MH-111-100YrSCS24Hr 01/01/2019 12:35:00 82.855

MH-111-100YrSCS24Hr 01/01/2019 12:40:00 82.903

MH-111-100YrSCS24Hr 01/01/2019 12:45:00 82.933

MH-111-100YrSCS24Hr 01/01/2019 12:50:00 82.969

MH-111-100YrSCS24Hr 01/01/2019 12:55:00 82.976

MH-111-100YrSCS24Hr 01/01/2019 13:00:00 82.992

MH-111-100YrSCS24Hr 01/01/2019 13:05:00 82.99

MH-111-100YrSCS24Hr 01/01/2019 13:10:00 82.997

MH-111-100YrSCS24Hr 01/01/2019 13:15:00 82.992

MH-111-100YrSCS24Hr 01/01/2019 13:20:00 82.999

MH-111-100YrSCS24Hr 01/01/2019 13:25:00 82.99

MH-111-100YrSCS24Hr 01/01/2019 13:30:00 82.991

MH-111-100YrSCS24Hr 01/01/2019 13:35:00 82.982

MH-111-100YrSCS24Hr 01/01/2019 13:40:00 82.983

MH-111-100YrSCS24Hr 01/01/2019 13:45:00 82.973

MH-111-100YrSCS24Hr 01/01/2019 13:50:00 82.972

MH-111-100YrSCS24Hr 01/01/2019 13:55:00 82.962

MH-111-100YrSCS24Hr 01/01/2019 14:00:00 82.962

MH-111-100YrSCS24Hr 01/01/2019 14:05:00 82.951

MH-111-100YrSCS24Hr 01/01/2019 14:10:00 82.948

MH-111-100YrSCS24Hr 01/01/2019 14:15:00 82.938

MH-111-100YrSCS24Hr 01/01/2019 14:20:00 82.936

MH-111-100YrSCS24Hr 01/01/2019 14:25:00 82.927

MH-111-100YrSCS24Hr 01/01/2019 14:30:00 82.922

MH-111-100YrSCS24Hr 01/01/2019 14:35:00 82.913

MH-111-100YrSCS24Hr 01/01/2019 14:40:00 82.91

MH-111-100YrSCS24Hr 01/01/2019 14:45:00 82.9

MH-111-100YrSCS24Hr 01/01/2019 14:50:00 82.897

MH-111-100YrSCS24Hr 01/01/2019 14:55:00 82.887

MH-111-100YrSCS24Hr 01/01/2019 15:00:00 82.885

MH-111-100YrSCS24Hr 01/01/2019 15:05:00 82.876

MH-111-100YrSCS24Hr 01/01/2019 15:10:00 82.873

MH-111-100YrSCS24Hr 01/01/2019 15:15:00 82.864

MH-111-100YrSCS24Hr 01/01/2019 15:20:00 82.862

MH-111-100YrSCS24Hr 01/01/2019 15:25:00 82.853

MH-111-100YrSCS24Hr 01/01/2019 15:30:00 82.851

MH-111-100YrSCS24Hr 01/01/2019 15:35:00 82.843

MH-111-100YrSCS24Hr 01/01/2019 15:40:00 82.841

MH-111-100YrSCS24Hr 01/01/2019 15:45:00 82.833

MH-111-100YrSCS24Hr 01/01/2019 15:50:00 82.832

MH-111-100YrSCS24Hr 01/01/2019 15:55:00 82.824

MH-111-100YrSCS24Hr 01/01/2019 16:00:00 82.823

MH-111-100YrSCS24Hr 01/01/2019 16:05:00 82.814

MH-111-100YrSCS24Hr 01/01/2019 16:10:00 82.812

MH-111-100YrSCS24Hr 01/01/2019 16:15:00 82.804

MH-111-100YrSCS24Hr 01/01/2019 16:20:00 82.803

MH-111-100YrSCS24Hr 01/01/2019 16:25:00 82.795

MH-111-100YrSCS24Hr 01/01/2019 16:30:00 82.792

MH-111-100YrSCS24Hr 01/01/2019 16:35:00 82.784

MH-111-100YrSCS24Hr 01/01/2019 16:40:00 82.782

MH-111-100YrSCS24Hr 01/01/2019 16:45:00 82.774

MH-111-100YrSCS24Hr 01/01/2019 16:50:00 82.772

MH-111-100YrSCS24Hr 01/01/2019 16:55:00 82.764

MH-111-100YrSCS24Hr 01/01/2019 17:00:00 82.762

MH-111-100YrSCS24Hr 01/01/2019 17:05:00 82.755

MH-111-100YrSCS24Hr 01/01/2019 17:10:00 82.752

MH-111-100YrSCS24Hr 01/01/2019 17:15:00 82.745

MH-111-100YrSCS24Hr 01/01/2019 17:20:00 82.744

MH-111-100YrSCS24Hr 01/01/2019 17:25:00 82.737

MH-111-100YrSCS24Hr 01/01/2019 17:30:00 82.735

MH-111-100YrSCS24Hr 01/01/2019 17:35:00 82.729

MH-111-100YrSCS24Hr 01/01/2019 17:40:00 82.726

MH-111-100YrSCS24Hr 01/01/2019 17:45:00 82.72

MH-111-100YrSCS24Hr 01/01/2019 17:50:00 82.719

MH-111-100YrSCS24Hr 01/01/2019 17:55:00 82.713

MH-111-100YrSCS24Hr 01/01/2019 18:00:00 82.712

MH-111-100YrSCS24Hr 01/01/2019 18:05:00 82.706

MH-111-100YrSCS24Hr 01/01/2019 18:10:00 82.704

MH-111-100YrSCS24Hr 01/01/2019 18:15:00 82.699

MH-111-100YrSCS24Hr 01/01/2019 18:20:00 82.697

MH-111-100YrSCS24Hr 01/01/2019 18:25:00 82.692

MH-111-100YrSCS24Hr 01/01/2019 18:30:00 82.691

MH-111-100YrSCS24Hr 01/01/2019 18:35:00 82.686

MH-111-100YrSCS24Hr 01/01/2019 18:40:00 82.685

MH-111-100YrSCS24Hr 01/01/2019 18:45:00 82.68

MH-111-100YrSCS24Hr 01/01/2019 18:50:00 82.679

MH-111-100YrSCS24Hr 01/01/2019 18:55:00 82.675

MH-111-100YrSCS24Hr 01/01/2019 19:00:00 82.674

MH-111-100YrSCS24Hr 01/01/2019 19:05:00 82.669

MH-111-100YrSCS24Hr 01/01/2019 19:10:00 82.668

MH-111-100YrSCS24Hr 01/01/2019 19:15:00 82.664

MH-111-100YrSCS24Hr 01/01/2019 19:20:00 82.663

MH-111-100YrSCS24Hr 01/01/2019 19:25:00 82.659

MH-111-100YrSCS24Hr 01/01/2019 19:30:00 82.658

MH-111-100YrSCS24Hr 01/01/2019 19:35:00 82.654

MH-111-100YrSCS24Hr 01/01/2019 19:40:00 82.653

MH-111-100YrSCS24Hr 01/01/2019 19:45:00 82.649

MH-111-100YrSCS24Hr 01/01/2019 19:50:00 82.649

MH-111-100YrSCS24Hr 01/01/2019 19:55:00 82.645

MH-111-100YrSCS24Hr 01/01/2019 20:00:00 82.644

MH-111-100YrSCS24Hr 01/01/2019 20:05:00 82.64

MH-111-100YrSCS24Hr 01/01/2019 20:10:00 82.64

MH-111-100YrSCS24Hr 01/01/2019 20:15:00 82.635

MH-111-100YrSCS24Hr 01/01/2019 20:20:00 82.635

MH-111-100YrSCS24Hr 01/01/2019 20:25:00 82.631

MH-111-100YrSCS24Hr 01/01/2019 20:30:00 82.63

MH-111-100YrSCS24Hr 01/01/2019 20:35:00 82.626

MH-111-100YrSCS24Hr 01/01/2019 20:40:00 82.625

MH-111-100YrSCS24Hr 01/01/2019 20:45:00 82.621

MH-111-100YrSCS24Hr 01/01/2019 20:50:00 82.62

MH-111-100YrSCS24Hr 01/01/2019 20:55:00 82.615

MH-111-100YrSCS24Hr 01/01/2019 21:00:00 82.615

MH-111-100YrSCS24Hr 01/01/2019 21:05:00 82.611

MH-111-100YrSCS24Hr 01/01/2019 21:10:00 82.61

MH-111-100YrSCS24Hr 01/01/2019 21:15:00 82.606

MH-111-100YrSCS24Hr 01/01/2019 21:20:00 82.605

MH-111-100YrSCS24Hr 01/01/2019 21:25:00 82.601

MH-111-100YrSCS24Hr 01/01/2019 21:30:00 82.601

MH-111-100YrSCS24Hr 01/01/2019 21:35:00 82.597

MH-111-100YrSCS24Hr 01/01/2019 21:40:00 82.596

MH-111-100YrSCS24Hr 01/01/2019 21:45:00 82.593

MH-111-100YrSCS24Hr 01/01/2019 21:50:00 82.592

MH-111-100YrSCS24Hr 01/01/2019 21:55:00 82.588

MH-111-100YrSCS24Hr 01/01/2019 22:00:00 82.588

MH-111-100YrSCS24Hr 01/01/2019 22:05:00 82.584

MH-111-100YrSCS24Hr 01/01/2019 22:10:00 82.584

MH-111-100YrSCS24Hr 01/01/2019 22:15:00 82.58

MH-111-100YrSCS24Hr 01/01/2019 22:20:00 82.58

MH-111-100YrSCS24Hr 01/01/2019 22:25:00 82.577

MH-111-100YrSCS24Hr 01/01/2019 22:30:00 82.576

MH-111-100YrSCS24Hr 01/01/2019 22:35:00 82.573

MH-111-100YrSCS24Hr 01/01/2019 22:40:00 82.572

MH-111-100YrSCS24Hr 01/01/2019 22:45:00 82.57

MH-111-100YrSCS24Hr 01/01/2019 22:50:00 82.569

MH-111-100YrSCS24Hr 01/01/2019 22:55:00 82.566

MH-111-100YrSCS24Hr 01/01/2019 23:00:00 82.566

MH-111-100YrSCS24Hr 01/01/2019 23:05:00 82.563

MH-111-100YrSCS24Hr 01/01/2019 23:10:00 82.562

MH-111-100YrSCS24Hr 01/01/2019 23:15:00 82.56

MH-111-100YrSCS24Hr 01/01/2019 23:20:00 82.559

MH-111-100YrSCS24Hr 01/01/2019 23:25:00 82.557

MH-111-100YrSCS24Hr 01/01/2019 23:30:00 82.556

MH-111-100YrSCS24Hr 01/01/2019 23:35:00 82.554

MH-111-100YrSCS24Hr 01/01/2019 23:40:00 82.553

MH-111-100YrSCS24Hr 01/01/2019 23:45:00 82.551

MH-111-100YrSCS24Hr 01/01/2019 23:50:00 82.55

MH-111-100YrSCS24Hr 01/01/2019 23:55:00 82.548

MH-111-100YrSCS24Hr 01/02/2019 00:00:00 82.548

;Depth (m)

MH-111-10YrCHI3Hr 01/01/2019 00:00:00 80.571

MH-111-10YrCHI3Hr 01/01/2019 00:05:00 80.571

MH-111-10YrCHI3Hr 01/01/2019 00:10:00 80.572

MH-111-10YrCHI3Hr 01/01/2019 00:15:00 80.572

MH-111-10YrCHI3Hr 01/01/2019 00:20:00 80.572

MH-111-10YrCHI3Hr 01/01/2019 00:25:00 80.592

MH-111-10YrCHI3Hr 01/01/2019 00:30:00 80.644

MH-111-10YrCHI3Hr 01/01/2019 00:35:00 80.701

MH-111-10YrCHI3Hr 01/01/2019 00:40:00 80.783

MH-111-10YrCHI3Hr 01/01/2019 00:45:00 80.941

MH-111-10YrCHI3Hr 01/01/2019 00:50:00 81.073

MH-111-10YrCHI3Hr 01/01/2019 00:55:00 81.275

MH-111-10YrCHI3Hr 01/01/2019 01:00:00 81.595

MH-111-10YrCHI3Hr 01/01/2019 01:05:00 81.904

MH-111-10YrCHI3Hr 01/01/2019 01:10:00 81.976

MH-111-10YrCHI3Hr 01/01/2019 01:15:00 81.86

MH-111-10YrCHI3Hr 01/01/2019 01:20:00 81.723

MH-111-10YrCHI3Hr 01/01/2019 01:25:00 81.628

MH-111-10YrCHI3Hr 01/01/2019 01:30:00 81.572

MH-111-10YrCHI3Hr 01/01/2019 01:35:00 81.69

MH-111-10YrCHI3Hr 01/01/2019 01:40:00 81.753

MH-111-10YrCHI3Hr 01/01/2019 01:45:00 81.86

MH-111-10YrCHI3Hr 01/01/2019 01:50:00 81.897

MH-111-10YrCHI3Hr 01/01/2019 01:55:00 81.973

MH-111-10YrCHI3Hr 01/01/2019 02:00:00 81.986

MH-111-10YrCHI3Hr 01/01/2019 02:05:00 82.039

MH-111-10YrCHI3Hr 01/01/2019 02:10:00 82.049

MH-111-10YrCHI3Hr 01/01/2019 02:15:00 82.087

MH-111-10YrCHI3Hr 01/01/2019 02:20:00 82.095

MH-111-10YrCHI3Hr 01/01/2019 02:25:00 82.126

MH-111-10YrCHI3Hr 01/01/2019 02:30:00 82.13

MH-111-10YrCHI3Hr 01/01/2019 02:35:00 82.156

MH-111-10YrCHI3Hr 01/01/2019 02:40:00 82.159

MH-111-10YrCHI3Hr 01/01/2019 02:45:00 82.181

MH-111-10YrCHI3Hr 01/01/2019 02:50:00 82.182

MH-111-10YrCHl3Hr 01/01/2019 02:55:00 82.201

MH-111-10YrCHl3Hr 01/01/2019 03:00:00 82.202

MH-111-10YrCHl3Hr 01/01/2019 03:05:00 82.217

MH-111-10YrCHl3Hr 01/01/2019 03:10:00 82.216

MH-111-10YrCHl3Hr 01/01/2019 03:15:00 82.226

MH-111-10YrCHl3Hr 01/01/2019 03:20:00 82.23

MH-111-10YrCHl3Hr 01/01/2019 03:25:00 82.233

MH-111-10YrCHl3Hr 01/01/2019 03:30:00 82.233

MH-111-10YrCHl3Hr 01/01/2019 03:35:00 82.238

MH-111-10YrCHl3Hr 01/01/2019 03:40:00 82.238

MH-111-10YrCHl3Hr 01/01/2019 03:45:00 82.239

MH-111-10YrCHl3Hr 01/01/2019 03:50:00 82.238

MH-111-10YrCHl3Hr 01/01/2019 03:55:00 82.242

MH-111-10YrCHl3Hr 01/01/2019 04:00:00 82.238

MH-111-10YrCHl3Hr 01/01/2019 04:05:00 82.24

MH-111-10YrCHl3Hr 01/01/2019 04:10:00 82.237

MH-111-10YrCHl3Hr 01/01/2019 04:15:00 82.24

MH-111-10YrCHl3Hr 01/01/2019 04:20:00 82.235

MH-111-10YrCHl3Hr 01/01/2019 04:25:00 82.236

MH-111-10YrCHl3Hr 01/01/2019 04:30:00 82.232

MH-111-10YrCHl3Hr 01/01/2019 04:35:00 82.235

MH-111-10YrCHl3Hr 01/01/2019 04:40:00 82.229

MH-111-10YrCHl3Hr 01/01/2019 04:45:00 82.23

MH-111-10YrCHl3Hr 01/01/2019 04:50:00 82.226

MH-111-10YrCHl3Hr 01/01/2019 04:55:00 82.227

MH-111-10YrCHl3Hr 01/01/2019 05:00:00 82.223

MH-111-10YrCHl3Hr 01/01/2019 05:05:00 82.223

MH-111-10YrCHl3Hr 01/01/2019 05:10:00 82.219

MH-111-10YrCHl3Hr 01/01/2019 05:15:00 82.22

MH-111-10YrCHI3Hr 01/01/2019 05:20:00 82.215

MH-111-10YrCHI3Hr 01/01/2019 05:25:00 82.215

MH-111-10YrCHI3Hr 01/01/2019 05:30:00 82.211

MH-111-10YrCHI3Hr 01/01/2019 05:35:00 82.212

MH-111-10YrCHI3Hr 01/01/2019 05:40:00 82.207

MH-111-10YrCHI3Hr 01/01/2019 05:45:00 82.207

MH-111-10YrCHI3Hr 01/01/2019 05:50:00 82.203

MH-111-10YrCHI3Hr 01/01/2019 05:55:00 82.203

MH-111-10YrCHI3Hr 01/01/2019 06:00:00 82.199

MH-111-10YrCHI3Hr 01/01/2019 06:05:00 82.198

MH-111-10YrCHI3Hr 01/01/2019 06:10:00 82.195

MH-111-10YrCHI3Hr 01/01/2019 06:15:00 82.194

MH-111-10YrCHI3Hr 01/01/2019 06:20:00 82.191

MH-111-10YrCHI3Hr 01/01/2019 06:25:00 82.189

MH-111-10YrCHI3Hr 01/01/2019 06:30:00 82.187

MH-111-10YrCHI3Hr 01/01/2019 06:35:00 82.185

MH-111-10YrCHI3Hr 01/01/2019 06:40:00 82.183

MH-111-10YrCHI3Hr 01/01/2019 06:45:00 82.181

MH-111-10YrCHI3Hr 01/01/2019 06:50:00 82.179

MH-111-10YrCHI3Hr 01/01/2019 06:55:00 82.177

MH-111-10YrCHI3Hr 01/01/2019 07:00:00 82.175

MH-111-10YrCHI3Hr 01/01/2019 07:05:00 82.173

MH-111-10YrCHI3Hr 01/01/2019 07:10:00 82.171

MH-111-10YrCHI3Hr 01/01/2019 07:15:00 82.169

MH-111-10YrCHI3Hr 01/01/2019 07:20:00 82.167

MH-111-10YrCHI3Hr 01/01/2019 07:25:00 82.165

MH-111-10YrCHI3Hr 01/01/2019 07:30:00 82.162

MH-111-10YrCHI3Hr 01/01/2019 07:35:00 82.161

MH-111-10YrCHI3Hr 01/01/2019 07:40:00 82.158

MH-111-10YrCHl3Hr 01/01/2019 07:45:00 82.157

MH-111-10YrCHl3Hr 01/01/2019 07:50:00 82.154

MH-111-10YrCHl3Hr 01/01/2019 07:55:00 82.153

MH-111-10YrCHl3Hr 01/01/2019 08:00:00 82.15

MH-111-10YrCHl3Hr 01/01/2019 08:05:00 82.149

MH-111-10YrCHl3Hr 01/01/2019 08:10:00 82.146

MH-111-10YrCHl3Hr 01/01/2019 08:15:00 82.145

MH-111-10YrCHl3Hr 01/01/2019 08:20:00 82.142

MH-111-10YrCHl3Hr 01/01/2019 08:25:00 82.14

MH-111-10YrCHl3Hr 01/01/2019 08:30:00 82.138

MH-111-10YrCHl3Hr 01/01/2019 08:35:00 82.136

MH-111-10YrCHl3Hr 01/01/2019 08:40:00 82.134

MH-111-10YrCHl3Hr 01/01/2019 08:45:00 82.132

MH-111-10YrCHl3Hr 01/01/2019 08:50:00 82.13

MH-111-10YrCHl3Hr 01/01/2019 08:55:00 82.128

MH-111-10YrCHl3Hr 01/01/2019 09:00:00 82.126

MH-111-10YrCHl3Hr 01/01/2019 09:05:00 82.124

MH-111-10YrCHl3Hr 01/01/2019 09:10:00 82.121

MH-111-10YrCHl3Hr 01/01/2019 09:15:00 82.12

MH-111-10YrCHl3Hr 01/01/2019 09:20:00 82.117

MH-111-10YrCHl3Hr 01/01/2019 09:25:00 82.116

MH-111-10YrCHl3Hr 01/01/2019 09:30:00 82.113

MH-111-10YrCHl3Hr 01/01/2019 09:35:00 82.113

MH-111-10YrCHl3Hr 01/01/2019 09:40:00 82.109

MH-111-10YrCHl3Hr 01/01/2019 09:45:00 82.109

MH-111-10YrCHl3Hr 01/01/2019 09:50:00 82.105

MH-111-10YrCHl3Hr 01/01/2019 09:55:00 82.104

MH-111-10YrCHl3Hr 01/01/2019 10:00:00 82.102

MH-111-10YrCHl3Hr 01/01/2019 10:05:00 82.1

MH-111-10YrCHI3Hr 01/01/2019 10:10:00 82.098

MH-111-10YrCHI3Hr 01/01/2019 10:15:00 82.096

MH-111-10YrCHI3Hr 01/01/2019 10:20:00 82.093

MH-111-10YrCHI3Hr 01/01/2019 10:25:00 82.092

MH-111-10YrCHI3Hr 01/01/2019 10:30:00 82.09

MH-111-10YrCHI3Hr 01/01/2019 10:35:00 82.088

MH-111-10YrCHI3Hr 01/01/2019 10:40:00 82.086

MH-111-10YrCHI3Hr 01/01/2019 10:45:00 82.085

MH-111-10YrCHI3Hr 01/01/2019 10:50:00 82.082

MH-111-10YrCHI3Hr 01/01/2019 10:55:00 82.081

MH-111-10YrCHI3Hr 01/01/2019 11:00:00 82.078

MH-111-10YrCHI3Hr 01/01/2019 11:05:00 82.077

MH-111-10YrCHI3Hr 01/01/2019 11:10:00 82.074

MH-111-10YrCHI3Hr 01/01/2019 11:15:00 82.073

MH-111-10YrCHI3Hr 01/01/2019 11:20:00 82.071

MH-111-10YrCHI3Hr 01/01/2019 11:25:00 82.069

MH-111-10YrCHI3Hr 01/01/2019 11:30:00 82.067

MH-111-10YrCHI3Hr 01/01/2019 11:35:00 82.065

MH-111-10YrCHI3Hr 01/01/2019 11:40:00 82.063

MH-111-10YrCHI3Hr 01/01/2019 11:45:00 82.062

MH-111-10YrCHI3Hr 01/01/2019 11:50:00 82.059

MH-111-10YrCHI3Hr 01/01/2019 11:55:00 82.058

MH-111-10YrCHI3Hr 01/01/2019 12:00:00 82.056

MH-111-10YrCHI3Hr 01/01/2019 12:05:00 82.053

MH-111-10YrCHI3Hr 01/01/2019 12:10:00 82.052

MH-111-10YrCHI3Hr 01/01/2019 12:15:00 82.05

MH-111-10YrCHI3Hr 01/01/2019 12:20:00 82.048

MH-111-10YrCHI3Hr 01/01/2019 12:25:00 82.046

MH-111-10YrCHI3Hr 01/01/2019 12:30:00 82.045

MH-111-10YrCHl3Hr 01/01/2019 12:35:00 82.043

MH-111-10YrCHl3Hr 01/01/2019 12:40:00 82.041

MH-111-10YrCHl3Hr 01/01/2019 12:45:00 82.04

MH-111-10YrCHl3Hr 01/01/2019 12:50:00 82.037

MH-111-10YrCHl3Hr 01/01/2019 12:55:00 82.036

MH-111-10YrCHl3Hr 01/01/2019 13:00:00 82.034

MH-111-10YrCHl3Hr 01/01/2019 13:05:00 82.032

MH-111-10YrCHl3Hr 01/01/2019 13:10:00 82.03

MH-111-10YrCHl3Hr 01/01/2019 13:15:00 82.028

MH-111-10YrCHl3Hr 01/01/2019 13:20:00 82.027

MH-111-10YrCHl3Hr 01/01/2019 13:25:00 82.025

MH-111-10YrCHl3Hr 01/01/2019 13:30:00 82.023

MH-111-10YrCHl3Hr 01/01/2019 13:35:00 82.021

MH-111-10YrCHl3Hr 01/01/2019 13:40:00 82.02

MH-111-10YrCHl3Hr 01/01/2019 13:45:00 82.017

MH-111-10YrCHl3Hr 01/01/2019 13:50:00 82.016

MH-111-10YrCHl3Hr 01/01/2019 13:55:00 82.014

MH-111-10YrCHl3Hr 01/01/2019 14:00:00 82.012

MH-111-10YrCHl3Hr 01/01/2019 14:05:00 82.01

MH-111-10YrCHl3Hr 01/01/2019 14:10:00 82.009

MH-111-10YrCHl3Hr 01/01/2019 14:15:00 82.007

MH-111-10YrCHl3Hr 01/01/2019 14:20:00 82.005

MH-111-10YrCHl3Hr 01/01/2019 14:25:00 82.003

MH-111-10YrCHl3Hr 01/01/2019 14:30:00 82.002

MH-111-10YrCHl3Hr 01/01/2019 14:35:00 82

MH-111-10YrCHl3Hr 01/01/2019 14:40:00 81.999

MH-111-10YrCHl3Hr 01/01/2019 14:45:00 81.997

MH-111-10YrCHl3Hr 01/01/2019 14:50:00 81.995

MH-111-10YrCHl3Hr 01/01/2019 14:55:00 81.993

MH-111-10YrCHl3Hr 01/01/2019 15:00:00 81.992

MH-111-10YrCHl3Hr 01/01/2019 15:05:00 81.99

MH-111-10YrCHl3Hr 01/01/2019 15:10:00 81.989

MH-111-10YrCHl3Hr 01/01/2019 15:15:00 81.986

MH-111-10YrCHl3Hr 01/01/2019 15:20:00 81.985

MH-111-10YrCHl3Hr 01/01/2019 15:25:00 81.983

MH-111-10YrCHl3Hr 01/01/2019 15:30:00 81.982

MH-111-10YrCHl3Hr 01/01/2019 15:35:00 81.98

MH-111-10YrCHl3Hr 01/01/2019 15:40:00 81.979

MH-111-10YrCHl3Hr 01/01/2019 15:45:00 81.976

MH-111-10YrCHl3Hr 01/01/2019 15:50:00 81.975

MH-111-10YrCHl3Hr 01/01/2019 15:55:00 81.973

MH-111-10YrCHl3Hr 01/01/2019 16:00:00 81.972

MH-111-10YrCHl3Hr 01/01/2019 16:05:00 81.97

MH-111-10YrCHl3Hr 01/01/2019 16:10:00 81.969

MH-111-10YrCHl3Hr 01/01/2019 16:15:00 81.967

MH-111-10YrCHl3Hr 01/01/2019 16:20:00 81.966

MH-111-10YrCHl3Hr 01/01/2019 16:25:00 81.963

MH-111-10YrCHl3Hr 01/01/2019 16:30:00 81.962

MH-111-10YrCHl3Hr 01/01/2019 16:35:00 81.96

MH-111-10YrCHl3Hr 01/01/2019 16:40:00 81.959

MH-111-10YrCHl3Hr 01/01/2019 16:45:00 81.957

MH-111-10YrCHl3Hr 01/01/2019 16:50:00 81.956

MH-111-10YrCHl3Hr 01/01/2019 16:55:00 81.954

MH-111-10YrCHl3Hr 01/01/2019 17:00:00 81.953

MH-111-10YrCHl3Hr 01/01/2019 17:05:00 81.951

MH-111-10YrCHl3Hr 01/01/2019 17:10:00 81.95

MH-111-10YrCHl3Hr 01/01/2019 17:15:00 81.948

MH-111-10YrCHl3Hr 01/01/2019 17:20:00 81.947

MH-111-10YrCHl3Hr 01/01/2019 17:25:00 81.945

MH-111-10YrCHl3Hr 01/01/2019 17:30:00 81.944

MH-111-10YrCHl3Hr 01/01/2019 17:35:00 81.942

MH-111-10YrCHl3Hr 01/01/2019 17:40:00 81.941

MH-111-10YrCHl3Hr 01/01/2019 17:45:00 81.939

MH-111-10YrCHl3Hr 01/01/2019 17:50:00 81.937

MH-111-10YrCHl3Hr 01/01/2019 17:55:00 81.936

MH-111-10YrCHl3Hr 01/01/2019 18:00:00 81.935

MH-111-10YrCHl3Hr 01/01/2019 18:05:00 81.933

MH-111-10YrCHl3Hr 01/01/2019 18:10:00 81.932

MH-111-10YrCHl3Hr 01/01/2019 18:15:00 81.93

MH-111-10YrCHl3Hr 01/01/2019 18:20:00 81.929

MH-111-10YrCHl3Hr 01/01/2019 18:25:00 81.927

MH-111-10YrCHl3Hr 01/01/2019 18:30:00 81.926

MH-111-10YrCHl3Hr 01/01/2019 18:35:00 81.924

MH-111-10YrCHl3Hr 01/01/2019 18:40:00 81.923

MH-111-10YrCHl3Hr 01/01/2019 18:45:00 81.921

MH-111-10YrCHl3Hr 01/01/2019 18:50:00 81.92

MH-111-10YrCHl3Hr 01/01/2019 18:55:00 81.918

MH-111-10YrCHl3Hr 01/01/2019 19:00:00 81.917

MH-111-10YrCHl3Hr 01/01/2019 19:05:00 81.915

MH-111-10YrCHl3Hr 01/01/2019 19:10:00 81.914

MH-111-10YrCHl3Hr 01/01/2019 19:15:00 81.913

MH-111-10YrCHl3Hr 01/01/2019 19:20:00 81.911

MH-111-10YrCHl3Hr 01/01/2019 19:25:00 81.91

MH-111-10YrCHl3Hr 01/01/2019 19:30:00 81.909

MH-111-10YrCHl3Hr 01/01/2019 19:35:00 81.907

MH-111-10YrCHl3Hr 01/01/2019 19:40:00 81.906

MH-111-10YrCHl3Hr 01/01/2019 19:45:00 81.904

MH-111-10YrCHl3Hr 01/01/2019 19:50:00 81.903

MH-111-10YrCHl3Hr 01/01/2019 19:55:00 81.902

MH-111-10YrCHl3Hr 01/01/2019 20:00:00 81.9

MH-111-10YrCHl3Hr 01/01/2019 20:05:00 81.899

MH-111-10YrCHl3Hr 01/01/2019 20:10:00 81.898

MH-111-10YrCHl3Hr 01/01/2019 20:15:00 81.896

MH-111-10YrCHl3Hr 01/01/2019 20:20:00 81.895

MH-111-10YrCHl3Hr 01/01/2019 20:25:00 81.893

MH-111-10YrCHl3Hr 01/01/2019 20:30:00 81.892

MH-111-10YrCHl3Hr 01/01/2019 20:35:00 81.891

MH-111-10YrCHl3Hr 01/01/2019 20:40:00 81.889

MH-111-10YrCHl3Hr 01/01/2019 20:45:00 81.888

MH-111-10YrCHl3Hr 01/01/2019 20:50:00 81.887

MH-111-10YrCHl3Hr 01/01/2019 20:55:00 81.885

MH-111-10YrCHl3Hr 01/01/2019 21:00:00 81.884

MH-111-10YrCHl3Hr 01/01/2019 21:05:00 81.883

MH-111-10YrCHl3Hr 01/01/2019 21:10:00 81.881

MH-111-10YrCHl3Hr 01/01/2019 21:15:00 81.88

MH-111-10YrCHl3Hr 01/01/2019 21:20:00 81.879

MH-111-10YrCHl3Hr 01/01/2019 21:25:00 81.878

MH-111-10YrCHl3Hr 01/01/2019 21:30:00 81.876

MH-111-10YrCHl3Hr 01/01/2019 21:35:00 81.875

MH-111-10YrCHl3Hr 01/01/2019 21:40:00 81.874

MH-111-10YrCHl3Hr 01/01/2019 21:45:00 81.872

MH-111-10YrCHl3Hr 01/01/2019 21:50:00 81.871

MH-111-10YrCHl3Hr 01/01/2019 21:55:00 81.87

MH-111-10YrCHl3Hr 01/01/2019 22:00:00 81.868

MH-111-10YrCHl3Hr 01/01/2019 22:05:00 81.867

MH-111-10YrCHl3Hr 01/01/2019 22:10:00 81.866

MH-111-10YrCHI3Hr 01/01/2019 22:15:00 81.865

MH-111-10YrCHI3Hr 01/01/2019 22:20:00 81.864

MH-111-10YrCHI3Hr 01/01/2019 22:25:00 81.862

MH-111-10YrCHI3Hr 01/01/2019 22:30:00 81.861

MH-111-10YrCHI3Hr 01/01/2019 22:35:00 81.86

MH-111-10YrCHI3Hr 01/01/2019 22:40:00 81.858

MH-111-10YrCHI3Hr 01/01/2019 22:45:00 81.857

MH-111-10YrCHI3Hr 01/01/2019 22:50:00 81.856

MH-111-10YrCHI3Hr 01/01/2019 22:55:00 81.855

MH-111-10YrCHI3Hr 01/01/2019 23:00:00 81.853

MH-111-10YrCHI3Hr 01/01/2019 23:05:00 81.852

MH-111-10YrCHI3Hr 01/01/2019 23:10:00 81.851

MH-111-10YrCHI3Hr 01/01/2019 23:15:00 81.85

MH-111-10YrCHI3Hr 01/01/2019 23:20:00 81.849

MH-111-10YrCHI3Hr 01/01/2019 23:25:00 81.848

MH-111-10YrCHI3Hr 01/01/2019 23:30:00 81.846

MH-111-10YrCHI3Hr 01/01/2019 23:35:00 81.845

MH-111-10YrCHI3Hr 01/01/2019 23:40:00 81.844

MH-111-10YrCHI3Hr 01/01/2019 23:45:00 81.843

MH-111-10YrCHI3Hr 01/01/2019 23:50:00 81.842

MH-111-10YrCHI3Hr 01/01/2019 23:55:00 81.84

MH-111-10YrCHI3Hr 01/02/2019 00:00:00 81.839

;Depth (m)

MH-111-2YrCHI3Hr 01/01/2019 00:00:00 80.571

MH-111-2YrCHI3Hr 01/01/2019 00:05:00 80.571

MH-111-2YrCHI3Hr 01/01/2019 00:10:00 80.572

MH-111-2YrCHI3Hr 01/01/2019 00:15:00 80.572

MH-111-2YrCHI3Hr 01/01/2019 00:20:00 80.572

MH-111-2YrCHl3Hr 01/01/2019 00:25:00 80.572

MH-111-2YrCHl3Hr 01/01/2019 00:30:00 80.578

MH-111-2YrCHl3Hr 01/01/2019 00:35:00 80.613

MH-111-2YrCHl3Hr 01/01/2019 00:40:00 80.66

MH-111-2YrCHl3Hr 01/01/2019 00:45:00 80.73

MH-111-2YrCHl3Hr 01/01/2019 00:50:00 80.867

MH-111-2YrCHl3Hr 01/01/2019 00:55:00 81.098

MH-111-2YrCHl3Hr 01/01/2019 01:00:00 81.37

MH-111-2YrCHl3Hr 01/01/2019 01:05:00 81.642

MH-111-2YrCHl3Hr 01/01/2019 01:10:00 81.609

MH-111-2YrCHl3Hr 01/01/2019 01:15:00 81.451

MH-111-2YrCHl3Hr 01/01/2019 01:20:00 81.317

MH-111-2YrCHl3Hr 01/01/2019 01:25:00 81.207

MH-111-2YrCHl3Hr 01/01/2019 01:30:00 81.136

MH-111-2YrCHl3Hr 01/01/2019 01:35:00 81.099

MH-111-2YrCHl3Hr 01/01/2019 01:40:00 81.092

MH-111-2YrCHl3Hr 01/01/2019 01:45:00 81.113

MH-111-2YrCHl3Hr 01/01/2019 01:50:00 81.144

MH-111-2YrCHl3Hr 01/01/2019 01:55:00 81.18

MH-111-2YrCHl3Hr 01/01/2019 02:00:00 81.213

MH-111-2YrCHl3Hr 01/01/2019 02:05:00 81.245

MH-111-2YrCHl3Hr 01/01/2019 02:10:00 81.273

MH-111-2YrCHl3Hr 01/01/2019 02:15:00 81.298

MH-111-2YrCHl3Hr 01/01/2019 02:20:00 81.321

MH-111-2YrCHl3Hr 01/01/2019 02:25:00 81.342

MH-111-2YrCHl3Hr 01/01/2019 02:30:00 81.361

MH-111-2YrCHl3Hr 01/01/2019 02:35:00 81.378

MH-111-2YrCHl3Hr 01/01/2019 02:40:00 81.393

MH-111-2YrCHl3Hr 01/01/2019 02:45:00 81.407

MH-111-2YrCHl3Hr 01/01/2019 02:50:00 81.42

MH-111-2YrCHl3Hr 01/01/2019 02:55:00 81.433

MH-111-2YrCHl3Hr 01/01/2019 03:00:00 81.444

MH-111-2YrCHl3Hr 01/01/2019 03:05:00 81.454

MH-111-2YrCHl3Hr 01/01/2019 03:10:00 81.464

MH-111-2YrCHl3Hr 01/01/2019 03:15:00 81.473

MH-111-2YrCHl3Hr 01/01/2019 03:20:00 81.48

MH-111-2YrCHl3Hr 01/01/2019 03:25:00 81.487

MH-111-2YrCHl3Hr 01/01/2019 03:30:00 81.493

MH-111-2YrCHl3Hr 01/01/2019 03:35:00 81.498

MH-111-2YrCHl3Hr 01/01/2019 03:40:00 81.503

MH-111-2YrCHl3Hr 01/01/2019 03:45:00 81.508

MH-111-2YrCHl3Hr 01/01/2019 03:50:00 81.512

MH-111-2YrCHl3Hr 01/01/2019 03:55:00 81.516

MH-111-2YrCHl3Hr 01/01/2019 04:00:00 81.519

MH-111-2YrCHl3Hr 01/01/2019 04:05:00 81.522

MH-111-2YrCHl3Hr 01/01/2019 04:10:00 81.524

MH-111-2YrCHl3Hr 01/01/2019 04:15:00 81.527

MH-111-2YrCHl3Hr 01/01/2019 04:20:00 81.528

MH-111-2YrCHl3Hr 01/01/2019 04:25:00 81.53

MH-111-2YrCHl3Hr 01/01/2019 04:30:00 81.53

MH-111-2YrCHl3Hr 01/01/2019 04:35:00 81.531

MH-111-2YrCHl3Hr 01/01/2019 04:40:00 81.532

MH-111-2YrCHl3Hr 01/01/2019 04:45:00 81.532

MH-111-2YrCHl3Hr 01/01/2019 04:50:00 81.533

MH-111-2YrCHl3Hr 01/01/2019 04:55:00 81.533

MH-111-2YrCHl3Hr 01/01/2019 05:00:00 81.533

MH-111-2YrCHl3Hr 01/01/2019 05:05:00 81.534

MH-111-2YrCHl3Hr 01/01/2019 05:10:00 81.534

MH-111-2YrCHl3Hr 01/01/2019 05:15:00 81.534

MH-111-2YrCHl3Hr 01/01/2019 05:20:00 81.534

MH-111-2YrCHl3Hr 01/01/2019 05:25:00 81.534

MH-111-2YrCHl3Hr 01/01/2019 05:30:00 81.533

MH-111-2YrCHl3Hr 01/01/2019 05:35:00 81.533

MH-111-2YrCHl3Hr 01/01/2019 05:40:00 81.532

MH-111-2YrCHl3Hr 01/01/2019 05:45:00 81.531

MH-111-2YrCHl3Hr 01/01/2019 05:50:00 81.531

MH-111-2YrCHl3Hr 01/01/2019 05:55:00 81.53

MH-111-2YrCHl3Hr 01/01/2019 06:00:00 81.529

MH-111-2YrCHl3Hr 01/01/2019 06:05:00 81.528

MH-111-2YrCHl3Hr 01/01/2019 06:10:00 81.527

MH-111-2YrCHl3Hr 01/01/2019 06:15:00 81.526

MH-111-2YrCHl3Hr 01/01/2019 06:20:00 81.525

MH-111-2YrCHl3Hr 01/01/2019 06:25:00 81.524

MH-111-2YrCHl3Hr 01/01/2019 06:30:00 81.523

MH-111-2YrCHl3Hr 01/01/2019 06:35:00 81.522

MH-111-2YrCHl3Hr 01/01/2019 06:40:00 81.521

MH-111-2YrCHl3Hr 01/01/2019 06:45:00 81.52

MH-111-2YrCHl3Hr 01/01/2019 06:50:00 81.519

MH-111-2YrCHl3Hr 01/01/2019 06:55:00 81.518

MH-111-2YrCHl3Hr 01/01/2019 07:00:00 81.516

MH-111-2YrCHl3Hr 01/01/2019 07:05:00 81.515

MH-111-2YrCHl3Hr 01/01/2019 07:10:00 81.514

MH-111-2YrCHl3Hr 01/01/2019 07:15:00 81.513

MH-111-2YrCHl3Hr 01/01/2019 07:20:00 81.512

MH-111-2YrCHl3Hr 01/01/2019 07:25:00 81.511

MH-111-2YrCHl3Hr 01/01/2019 07:30:00 81.509

MH-111-2YrCHl3Hr 01/01/2019 07:35:00 81.508

MH-111-2YrCHl3Hr 01/01/2019 07:40:00 81.507

MH-111-2YrCHl3Hr 01/01/2019 07:45:00 81.506

MH-111-2YrCHl3Hr 01/01/2019 07:50:00 81.505

MH-111-2YrCHl3Hr 01/01/2019 07:55:00 81.504

MH-111-2YrCHl3Hr 01/01/2019 08:00:00 81.502

MH-111-2YrCHl3Hr 01/01/2019 08:05:00 81.501

MH-111-2YrCHl3Hr 01/01/2019 08:10:00 81.5

MH-111-2YrCHl3Hr 01/01/2019 08:15:00 81.499

MH-111-2YrCHl3Hr 01/01/2019 08:20:00 81.497

MH-111-2YrCHl3Hr 01/01/2019 08:25:00 81.496

MH-111-2YrCHl3Hr 01/01/2019 08:30:00 81.495

MH-111-2YrCHl3Hr 01/01/2019 08:35:00 81.493

MH-111-2YrCHl3Hr 01/01/2019 08:40:00 81.492

MH-111-2YrCHl3Hr 01/01/2019 08:45:00 81.491

MH-111-2YrCHl3Hr 01/01/2019 08:50:00 81.489

MH-111-2YrCHl3Hr 01/01/2019 08:55:00 81.488

MH-111-2YrCHl3Hr 01/01/2019 09:00:00 81.487

MH-111-2YrCHl3Hr 01/01/2019 09:05:00 81.486

MH-111-2YrCHl3Hr 01/01/2019 09:10:00 81.484

MH-111-2YrCHl3Hr 01/01/2019 09:15:00 81.483

MH-111-2YrCHl3Hr 01/01/2019 09:20:00 81.482

MH-111-2YrCHl3Hr 01/01/2019 09:25:00 81.48

MH-111-2YrCHl3Hr 01/01/2019 09:30:00 81.479

MH-111-2YrCHl3Hr 01/01/2019 09:35:00 81.477

MH-111-2YrCHl3Hr 01/01/2019 09:40:00 81.476

MH-111-2YrCHl3Hr 01/01/2019 09:45:00 81.475

MH-111-2YrCHl3Hr 01/01/2019 09:50:00 81.473

MH-111-2YrCHl3Hr 01/01/2019 09:55:00 81.472

MH-111-2YrCHl3Hr 01/01/2019 10:00:00 81.471

MH-111-2YrCHl3Hr 01/01/2019 10:05:00 81.469

MH-111-2YrCHl3Hr 01/01/2019 10:10:00 81.468

MH-111-2YrCHl3Hr 01/01/2019 10:15:00 81.467

MH-111-2YrCHl3Hr 01/01/2019 10:20:00 81.465

MH-111-2YrCHl3Hr 01/01/2019 10:25:00 81.464

MH-111-2YrCHl3Hr 01/01/2019 10:30:00 81.462

MH-111-2YrCHl3Hr 01/01/2019 10:35:00 81.461

MH-111-2YrCHl3Hr 01/01/2019 10:40:00 81.46

MH-111-2YrCHl3Hr 01/01/2019 10:45:00 81.458

MH-111-2YrCHl3Hr 01/01/2019 10:50:00 81.457

MH-111-2YrCHl3Hr 01/01/2019 10:55:00 81.455

MH-111-2YrCHl3Hr 01/01/2019 11:00:00 81.454

MH-111-2YrCHl3Hr 01/01/2019 11:05:00 81.453

MH-111-2YrCHl3Hr 01/01/2019 11:10:00 81.451

MH-111-2YrCHl3Hr 01/01/2019 11:15:00 81.45

MH-111-2YrCHl3Hr 01/01/2019 11:20:00 81.448

MH-111-2YrCHl3Hr 01/01/2019 11:25:00 81.447

MH-111-2YrCHl3Hr 01/01/2019 11:30:00 81.445

MH-111-2YrCHl3Hr 01/01/2019 11:35:00 81.444

MH-111-2YrCHl3Hr 01/01/2019 11:40:00 81.443

MH-111-2YrCHl3Hr 01/01/2019 11:45:00 81.441

MH-111-2YrCHl3Hr 01/01/2019 11:50:00 81.44

MH-111-2YrCHl3Hr 01/01/2019 11:55:00 81.438

MH-111-2YrCHl3Hr 01/01/2019 12:00:00 81.437

MH-111-2YrCHl3Hr 01/01/2019 12:05:00 81.435

MH-111-2YrCHl3Hr 01/01/2019 12:10:00 81.434

MH-111-2YrCHl3Hr 01/01/2019 12:15:00 81.432

MH-111-2YrCHl3Hr 01/01/2019 12:20:00 81.431

MH-111-2YrCHl3Hr 01/01/2019 12:25:00 81.43

MH-111-2YrCHl3Hr 01/01/2019 12:30:00 81.428

MH-111-2YrCHl3Hr 01/01/2019 12:35:00 81.427

MH-111-2YrCHl3Hr 01/01/2019 12:40:00 81.425

MH-111-2YrCHl3Hr 01/01/2019 12:45:00 81.424

MH-111-2YrCHl3Hr 01/01/2019 12:50:00 81.422

MH-111-2YrCHl3Hr 01/01/2019 12:55:00 81.421

MH-111-2YrCHl3Hr 01/01/2019 13:00:00 81.419

MH-111-2YrCHl3Hr 01/01/2019 13:05:00 81.418

MH-111-2YrCHl3Hr 01/01/2019 13:10:00 81.417

MH-111-2YrCHl3Hr 01/01/2019 13:15:00 81.415

MH-111-2YrCHl3Hr 01/01/2019 13:20:00 81.414

MH-111-2YrCHl3Hr 01/01/2019 13:25:00 81.412

MH-111-2YrCHl3Hr 01/01/2019 13:30:00 81.411

MH-111-2YrCHl3Hr 01/01/2019 13:35:00 81.409

MH-111-2YrCHl3Hr 01/01/2019 13:40:00 81.408

MH-111-2YrCHl3Hr 01/01/2019 13:45:00 81.406

MH-111-2YrCHl3Hr 01/01/2019 13:50:00 81.405

MH-111-2YrCHl3Hr 01/01/2019 13:55:00 81.403

MH-111-2YrCHl3Hr 01/01/2019 14:00:00 81.402

MH-111-2YrCHl3Hr 01/01/2019 14:05:00 81.401

MH-111-2YrCHl3Hr 01/01/2019 14:10:00 81.399

MH-111-2YrCHl3Hr 01/01/2019 14:15:00 81.398

MH-111-2YrCHl3Hr 01/01/2019 14:20:00 81.396

MH-111-2YrCHl3Hr 01/01/2019 14:25:00 81.395

MH-111-2YrCHl3Hr 01/01/2019 14:30:00 81.393

MH-111-2YrCHl3Hr 01/01/2019 14:35:00 81.392

MH-111-2YrCHl3Hr 01/01/2019 14:40:00 81.39

MH-111-2YrCHl3Hr 01/01/2019 14:45:00 81.389

MH-111-2YrCHl3Hr 01/01/2019 14:50:00 81.387

MH-111-2YrCHl3Hr 01/01/2019 14:55:00 81.386

MH-111-2YrCHl3Hr 01/01/2019 15:00:00 81.384

MH-111-2YrCHl3Hr 01/01/2019 15:05:00 81.383

MH-111-2YrCHl3Hr 01/01/2019 15:10:00 81.381

MH-111-2YrCHl3Hr 01/01/2019 15:15:00 81.38

MH-111-2YrCHl3Hr 01/01/2019 15:20:00 81.379

MH-111-2YrCHl3Hr 01/01/2019 15:25:00 81.377

MH-111-2YrCHl3Hr 01/01/2019 15:30:00 81.376

MH-111-2YrCHl3Hr 01/01/2019 15:35:00 81.374

MH-111-2YrCHl3Hr 01/01/2019 15:40:00 81.373

MH-111-2YrCHl3Hr 01/01/2019 15:45:00 81.371

MH-111-2YrCHl3Hr 01/01/2019 15:50:00 81.37

MH-111-2YrCHl3Hr 01/01/2019 15:55:00 81.368

MH-111-2YrCHl3Hr 01/01/2019 16:00:00 81.367

MH-111-2YrCHl3Hr 01/01/2019 16:05:00 81.365

MH-111-2YrCHl3Hr 01/01/2019 16:10:00 81.364

MH-111-2YrCHl3Hr 01/01/2019 16:15:00 81.362

MH-111-2YrCHl3Hr 01/01/2019 16:20:00 81.361

MH-111-2YrCHl3Hr 01/01/2019 16:25:00 81.359

MH-111-2YrCHl3Hr 01/01/2019 16:30:00 81.358

MH-111-2YrCHl3Hr 01/01/2019 16:35:00 81.356

MH-111-2YrCHl3Hr 01/01/2019 16:40:00 81.355

MH-111-2YrCHl3Hr 01/01/2019 16:45:00 81.353

MH-111-2YrCHl3Hr 01/01/2019 16:50:00 81.352

MH-111-2YrCHl3Hr 01/01/2019 16:55:00 81.35

MH-111-2YrCHl3Hr 01/01/2019 17:00:00 81.349

MH-111-2YrCHl3Hr 01/01/2019 17:05:00 81.347

MH-111-2YrCHl3Hr 01/01/2019 17:10:00 81.346

MH-111-2YrCHl3Hr 01/01/2019 17:15:00 81.345

MH-111-2YrCHl3Hr 01/01/2019 17:20:00 81.343

MH-111-2YrCHl3Hr 01/01/2019 17:25:00 81.342

MH-111-2YrCHl3Hr 01/01/2019 17:30:00 81.34

MH-111-2YrCHl3Hr 01/01/2019 17:35:00 81.339

MH-111-2YrCHl3Hr 01/01/2019 17:40:00 81.337

MH-111-2YrCHl3Hr 01/01/2019 17:45:00 81.336

MH-111-2YrCHl3Hr 01/01/2019 17:50:00 81.334

MH-111-2YrCHl3Hr 01/01/2019 17:55:00 81.333

MH-111-2YrCHl3Hr 01/01/2019 18:00:00 81.331

MH-111-2YrCHl3Hr 01/01/2019 18:05:00 81.33

MH-111-2YrCHl3Hr 01/01/2019 18:10:00 81.328

MH-111-2YrCHl3Hr 01/01/2019 18:15:00 81.327

MH-111-2YrCHl3Hr 01/01/2019 18:20:00 81.325

MH-111-2YrCHl3Hr 01/01/2019 18:25:00 81.324

MH-111-2YrCHl3Hr 01/01/2019 18:30:00 81.322

MH-111-2YrCHl3Hr 01/01/2019 18:35:00 81.321

MH-111-2YrCHl3Hr 01/01/2019 18:40:00 81.319

MH-111-2YrCHl3Hr 01/01/2019 18:45:00 81.318

MH-111-2YrCHl3Hr 01/01/2019 18:50:00 81.316

MH-111-2YrCHl3Hr 01/01/2019 18:55:00 81.315

MH-111-2YrCHl3Hr 01/01/2019 19:00:00 81.313

MH-111-2YrCHl3Hr 01/01/2019 19:05:00 81.312

MH-111-2YrCHl3Hr 01/01/2019 19:10:00 81.31

MH-111-2YrCHl3Hr 01/01/2019 19:15:00 81.309

MH-111-2YrCHl3Hr 01/01/2019 19:20:00 81.307

MH-111-2YrCHl3Hr 01/01/2019 19:25:00 81.306

MH-111-2YrCHl3Hr 01/01/2019 19:30:00 81.304

MH-111-2YrCHl3Hr 01/01/2019 19:35:00 81.303

MH-111-2YrCHl3Hr 01/01/2019 19:40:00 81.302

MH-111-2YrCHl3Hr 01/01/2019 19:45:00 81.3

MH-111-2YrCHl3Hr 01/01/2019 19:50:00 81.299

MH-111-2YrCHl3Hr 01/01/2019 19:55:00 81.297

MH-111-2YrCHl3Hr 01/01/2019 20:00:00 81.296

MH-111-2YrCHl3Hr 01/01/2019 20:05:00 81.294

MH-111-2YrCHl3Hr 01/01/2019 20:10:00 81.293

MH-111-2YrCHl3Hr 01/01/2019 20:15:00 81.291

MH-111-2YrCHl3Hr 01/01/2019 20:20:00 81.29

MH-111-2YrCHl3Hr 01/01/2019 20:25:00 81.288

MH-111-2YrCHl3Hr 01/01/2019 20:30:00 81.287

MH-111-2YrCHl3Hr 01/01/2019 20:35:00 81.285

MH-111-2YrCHl3Hr 01/01/2019 20:40:00 81.284

MH-111-2YrCHl3Hr 01/01/2019 20:45:00 81.282

MH-111-2YrCHl3Hr 01/01/2019 20:50:00 81.281

MH-111-2YrCHl3Hr 01/01/2019 20:55:00 81.279

MH-111-2YrCHl3Hr 01/01/2019 21:00:00 81.278

MH-111-2YrCHl3Hr 01/01/2019 21:05:00 81.276

MH-111-2YrCHl3Hr 01/01/2019 21:10:00 81.275

MH-111-2YrCHl3Hr 01/01/2019 21:15:00 81.273

MH-111-2YrCHl3Hr 01/01/2019 21:20:00 81.272

MH-111-2YrCHl3Hr 01/01/2019 21:25:00 81.271

MH-111-2YrCHl3Hr 01/01/2019 21:30:00 81.269

MH-111-2YrCHl3Hr 01/01/2019 21:35:00 81.268

MH-111-2YrCHl3Hr 01/01/2019 21:40:00 81.266

MH-111-2YrCHl3Hr 01/01/2019 21:45:00 81.265

MH-111-2YrCHl3Hr 01/01/2019 21:50:00 81.263

MH-111-2YrCHl3Hr 01/01/2019 21:55:00 81.262

MH-111-2YrCHl3Hr 01/01/2019 22:00:00 81.26

MH-111-2YrCHl3Hr 01/01/2019 22:05:00 81.259

MH-111-2YrCHl3Hr 01/01/2019 22:10:00 81.257

MH-111-2YrCHl3Hr 01/01/2019 22:15:00 81.256

MH-111-2YrCHl3Hr 01/01/2019 22:20:00 81.254

MH-111-2YrCHl3Hr 01/01/2019 22:25:00 81.253

MH-111-2YrCHl3Hr 01/01/2019 22:30:00 81.251

MH-111-2YrCHl3Hr 01/01/2019 22:35:00 81.25

MH-111-2YrCHl3Hr 01/01/2019 22:40:00 81.248

MH-111-2YrCHl3Hr 01/01/2019 22:45:00 81.247

MH-111-2YrCHl3Hr 01/01/2019 22:50:00 81.245

MH-111-2YrCHl3Hr 01/01/2019 22:55:00 81.244

MH-111-2YrCHl3Hr 01/01/2019 23:00:00 81.242

MH-111-2YrCHl3Hr 01/01/2019 23:05:00 81.241

MH-111-2YrCHl3Hr 01/01/2019 23:10:00 81.239

MH-111-2YrCHl3Hr 01/01/2019 23:15:00 81.238

MH-111-2YrCHl3Hr 01/01/2019 23:20:00 81.236

MH-111-2YrCHl3Hr 01/01/2019 23:25:00 81.235

MH-111-2YrCHl3Hr 01/01/2019 23:30:00 81.233

MH-111-2YrCHl3Hr 01/01/2019 23:35:00 81.232

MH-111-2YrCHl3Hr 01/01/2019 23:40:00 81.23

MH-111-2YrCHl3Hr 01/01/2019 23:45:00 81.229

MH-111-2YrCHl3Hr 01/01/2019 23:50:00 81.228

MH-111-2YrCHl3Hr 01/01/2019 23:55:00 81.226

MH-111-2YrCHl3Hr 01/02/2019 00:00:00 81.225

;Depth (m)

MH-111-5YrCHl3Hr 01/01/2019 00:00:00 80.571

MH-111-5YrCHl3Hr 01/01/2019 00:05:00 80.571

MH-111-5YrCHl3Hr 01/01/2019 00:10:00 80.572

MH-111-5YrCHl3Hr 01/01/2019 00:15:00 80.572

MH-111-5YrCHl3Hr 01/01/2019 00:20:00 80.572

MH-111-5YrCHl3Hr 01/01/2019 00:25:00 80.58

MH-111-5YrCHl3Hr 01/01/2019 00:30:00 80.616

MH-111-5YrCHl3Hr 01/01/2019 00:35:00 80.665

MH-111-5YrCHl3Hr 01/01/2019 00:40:00 80.726

MH-111-5YrCHl3Hr 01/01/2019 00:45:00 80.859

MH-111-5YrCHl3Hr 01/01/2019 00:50:00 81.015

MH-111-5YrCHl3Hr 01/01/2019 00:55:00 81.22

MH-111-5YrCHl3Hr 01/01/2019 01:00:00 81.522

MH-111-5YrCHl3Hr 01/01/2019 01:05:00 81.851

MH-111-5YrCHl3Hr 01/01/2019 01:10:00 81.877

MH-111-5YrCHl3Hr 01/01/2019 01:15:00 81.724

MH-111-5YrCHl3Hr 01/01/2019 01:20:00 81.52

MH-111-5YrCHl3Hr 01/01/2019 01:25:00 81.385

MH-111-5YrCHl3Hr 01/01/2019 01:30:00 81.358

MH-111-5YrCHl3Hr 01/01/2019 01:35:00 81.404

MH-111-5YrCHl3Hr 01/01/2019 01:40:00 81.481

MH-111-5YrCHl3Hr 01/01/2019 01:45:00 81.544

MH-111-5YrCHl3Hr 01/01/2019 01:50:00 81.608

MH-111-5YrCHl3Hr 01/01/2019 01:55:00 81.656

MH-111-5YrCHl3Hr 01/01/2019 02:00:00 81.703

MH-111-5YrCHl3Hr 01/01/2019 02:05:00 81.739

MH-111-5YrCHl3Hr 01/01/2019 02:10:00 81.774

MH-111-5YrCHl3Hr 01/01/2019 02:15:00 81.8

MH-111-5YrCHl3Hr 01/01/2019 02:20:00 81.823

MH-111-5YrCHl3Hr 01/01/2019 02:25:00 81.841

MH-111-5YrCHl3Hr 01/01/2019 02:30:00 81.86

MH-111-5YrCHl3Hr 01/01/2019 02:35:00 81.875

MH-111-5YrCHl3Hr 01/01/2019 02:40:00 81.89

MH-111-5YrCHl3Hr 01/01/2019 02:45:00 81.902

MH-111-5YrCHl3Hr 01/01/2019 02:50:00 81.915

MH-111-5YrCHl3Hr 01/01/2019 02:55:00 81.925

MH-111-5YrCHl3Hr 01/01/2019 03:00:00 81.936

MH-111-5YrCHl3Hr 01/01/2019 03:05:00 81.944

MH-111-5YrCHl3Hr 01/01/2019 03:10:00 81.953

MH-111-5YrCHl3Hr 01/01/2019 03:15:00 81.959

MH-111-5YrCHl3Hr 01/01/2019 03:20:00 81.966

MH-111-5YrCHl3Hr 01/01/2019 03:25:00 81.969

MH-111-5YrCHl3Hr 01/01/2019 03:30:00 81.976

MH-111-5YrCHl3Hr 01/01/2019 03:35:00 81.977

MH-111-5YrCHl3Hr 01/01/2019 03:40:00 81.983

MH-111-5YrCHl3Hr 01/01/2019 03:45:00 81.982

MH-111-5YrCHl3Hr 01/01/2019 03:50:00 81.988

MH-111-5YrCHl3Hr 01/01/2019 03:55:00 81.984

MH-111-5YrCHl3Hr 01/01/2019 04:00:00 81.991

MH-111-5YrCHl3Hr 01/01/2019 04:05:00 81.986

MH-111-5YrCHl3Hr 01/01/2019 04:10:00 81.992

MH-111-5YrCHl3Hr 01/01/2019 04:15:00 81.987

MH-111-5YrCHl3Hr 01/01/2019 04:20:00 81.992

MH-111-5YrCHl3Hr 01/01/2019 04:25:00 81.986

MH-111-5YrCHl3Hr 01/01/2019 04:30:00 81.99

MH-111-5YrCHl3Hr 01/01/2019 04:35:00 81.986

MH-111-5YrCHl3Hr 01/01/2019 04:40:00 81.989

MH-111-5YrCHl3Hr 01/01/2019 04:45:00 81.984

MH-111-5YrCHl3Hr 01/01/2019 04:50:00 81.987

MH-111-5YrCHl3Hr 01/01/2019 04:55:00 81.982

MH-111-5YrCHl3Hr 01/01/2019 05:00:00 81.986

MH-111-5YrCHl3Hr 01/01/2019 05:05:00 81.98

MH-111-5YrCHl3Hr 01/01/2019 05:10:00 81.984

MH-111-5YrCHl3Hr 01/01/2019 05:15:00 81.979

MH-111-5YrCHl3Hr 01/01/2019 05:20:00 81.981

MH-111-5YrCHl3Hr 01/01/2019 05:25:00 81.976

MH-111-5YrCHl3Hr 01/01/2019 05:30:00 81.979

MH-111-5YrCHl3Hr 01/01/2019 05:35:00 81.974

MH-111-5YrCHl3Hr 01/01/2019 05:40:00 81.976

MH-111-5YrCHl3Hr 01/01/2019 05:45:00 81.971

MH-111-5YrCHl3Hr 01/01/2019 05:50:00 81.973

MH-111-5YrCHl3Hr 01/01/2019 05:55:00 81.968

MH-111-5YrCHl3Hr 01/01/2019 06:00:00 81.97

MH-111-5YrCHl3Hr 01/01/2019 06:05:00 81.964

MH-111-5YrCHl3Hr 01/01/2019 06:10:00 81.966

MH-111-5YrCHl3Hr 01/01/2019 06:15:00 81.962

MH-111-5YrCHl3Hr 01/01/2019 06:20:00 81.963

MH-111-5YrCHl3Hr 01/01/2019 06:25:00 81.958

MH-111-5YrCHl3Hr 01/01/2019 06:30:00 81.96

MH-111-5YrCHl3Hr 01/01/2019 06:35:00 81.955

MH-111-5YrCHl3Hr 01/01/2019 06:40:00 81.956

MH-111-5YrCHl3Hr 01/01/2019 06:45:00 81.951

MH-111-5YrCHl3Hr 01/01/2019 06:50:00 81.952

MH-111-5YrCHl3Hr 01/01/2019 06:55:00 81.948

MH-111-5YrCHl3Hr 01/01/2019 07:00:00 81.948

MH-111-5YrCHl3Hr 01/01/2019 07:05:00 81.944

MH-111-5YrCHl3Hr 01/01/2019 07:10:00 81.945

MH-111-5YrCHl3Hr 01/01/2019 07:15:00 81.941

MH-111-5YrCHl3Hr 01/01/2019 07:20:00 81.941

MH-111-5YrCHl3Hr 01/01/2019 07:25:00 81.938

MH-111-5YrCHl3Hr 01/01/2019 07:30:00 81.937

MH-111-5YrCHI3Hr 01/01/2019 07:35:00 81.934

MH-111-5YrCHI3Hr 01/01/2019 07:40:00 81.933

MH-111-5YrCHI3Hr 01/01/2019 07:45:00 81.931

MH-111-5YrCHI3Hr 01/01/2019 07:50:00 81.93

MH-111-5YrCHI3Hr 01/01/2019 07:55:00 81.928

MH-111-5YrCHI3Hr 01/01/2019 08:00:00 81.926

MH-111-5YrCHI3Hr 01/01/2019 08:05:00 81.924

MH-111-5YrCHI3Hr 01/01/2019 08:10:00 81.923

MH-111-5YrCHI3Hr 01/01/2019 08:15:00 81.921

MH-111-5YrCHI3Hr 01/01/2019 08:20:00 81.92

MH-111-5YrCHI3Hr 01/01/2019 08:25:00 81.918

MH-111-5YrCHI3Hr 01/01/2019 08:30:00 81.916

MH-111-5YrCHI3Hr 01/01/2019 08:35:00 81.914

MH-111-5YrCHI3Hr 01/01/2019 08:40:00 81.913

MH-111-5YrCHI3Hr 01/01/2019 08:45:00 81.911

MH-111-5YrCHI3Hr 01/01/2019 08:50:00 81.909

MH-111-5YrCHI3Hr 01/01/2019 08:55:00 81.907

MH-111-5YrCHI3Hr 01/01/2019 09:00:00 81.905

MH-111-5YrCHI3Hr 01/01/2019 09:05:00 81.903

MH-111-5YrCHI3Hr 01/01/2019 09:10:00 81.902

MH-111-5YrCHI3Hr 01/01/2019 09:15:00 81.899

MH-111-5YrCHI3Hr 01/01/2019 09:20:00 81.899

MH-111-5YrCHI3Hr 01/01/2019 09:25:00 81.895

MH-111-5YrCHI3Hr 01/01/2019 09:30:00 81.895

MH-111-5YrCHI3Hr 01/01/2019 09:35:00 81.892

MH-111-5YrCHI3Hr 01/01/2019 09:40:00 81.891

MH-111-5YrCHI3Hr 01/01/2019 09:45:00 81.889

MH-111-5YrCHI3Hr 01/01/2019 09:50:00 81.888

MH-111-5YrCHI3Hr 01/01/2019 09:55:00 81.885

MH-111-5YrCHl3Hr 01/01/2019 10:00:00 81.884

MH-111-5YrCHl3Hr 01/01/2019 10:05:00 81.882

MH-111-5YrCHl3Hr 01/01/2019 10:10:00 81.881

MH-111-5YrCHl3Hr 01/01/2019 10:15:00 81.879

MH-111-5YrCHl3Hr 01/01/2019 10:20:00 81.878

MH-111-5YrCHl3Hr 01/01/2019 10:25:00 81.875

MH-111-5YrCHl3Hr 01/01/2019 10:30:00 81.875

MH-111-5YrCHl3Hr 01/01/2019 10:35:00 81.872

MH-111-5YrCHl3Hr 01/01/2019 10:40:00 81.871

MH-111-5YrCHl3Hr 01/01/2019 10:45:00 81.869

MH-111-5YrCHl3Hr 01/01/2019 10:50:00 81.868

MH-111-5YrCHl3Hr 01/01/2019 10:55:00 81.865

MH-111-5YrCHl3Hr 01/01/2019 11:00:00 81.864

MH-111-5YrCHl3Hr 01/01/2019 11:05:00 81.862

MH-111-5YrCHl3Hr 01/01/2019 11:10:00 81.86

MH-111-5YrCHl3Hr 01/01/2019 11:15:00 81.858

MH-111-5YrCHl3Hr 01/01/2019 11:20:00 81.857

MH-111-5YrCHl3Hr 01/01/2019 11:25:00 81.854

MH-111-5YrCHl3Hr 01/01/2019 11:30:00 81.853

MH-111-5YrCHl3Hr 01/01/2019 11:35:00 81.851

MH-111-5YrCHl3Hr 01/01/2019 11:40:00 81.85

MH-111-5YrCHl3Hr 01/01/2019 11:45:00 81.848

MH-111-5YrCHl3Hr 01/01/2019 11:50:00 81.847

MH-111-5YrCHl3Hr 01/01/2019 11:55:00 81.845

MH-111-5YrCHl3Hr 01/01/2019 12:00:00 81.843

MH-111-5YrCHl3Hr 01/01/2019 12:05:00 81.841

MH-111-5YrCHl3Hr 01/01/2019 12:10:00 81.84

MH-111-5YrCHl3Hr 01/01/2019 12:15:00 81.838

MH-111-5YrCHl3Hr 01/01/2019 12:20:00 81.836

MH-111-5YrCHl3Hr 01/01/2019 12:25:00 81.835

MH-111-5YrCHl3Hr 01/01/2019 12:30:00 81.833

MH-111-5YrCHl3Hr 01/01/2019 12:35:00 81.831

MH-111-5YrCHl3Hr 01/01/2019 12:40:00 81.829

MH-111-5YrCHl3Hr 01/01/2019 12:45:00 81.828

MH-111-5YrCHl3Hr 01/01/2019 12:50:00 81.826

MH-111-5YrCHl3Hr 01/01/2019 12:55:00 81.825

MH-111-5YrCHl3Hr 01/01/2019 13:00:00 81.823

MH-111-5YrCHl3Hr 01/01/2019 13:05:00 81.821

MH-111-5YrCHl3Hr 01/01/2019 13:10:00 81.819

MH-111-5YrCHl3Hr 01/01/2019 13:15:00 81.818

MH-111-5YrCHl3Hr 01/01/2019 13:20:00 81.816

MH-111-5YrCHl3Hr 01/01/2019 13:25:00 81.815

MH-111-5YrCHl3Hr 01/01/2019 13:30:00 81.813

MH-111-5YrCHl3Hr 01/01/2019 13:35:00 81.811

MH-111-5YrCHl3Hr 01/01/2019 13:40:00 81.81

MH-111-5YrCHl3Hr 01/01/2019 13:45:00 81.808

MH-111-5YrCHl3Hr 01/01/2019 13:50:00 81.806

MH-111-5YrCHl3Hr 01/01/2019 13:55:00 81.805

MH-111-5YrCHl3Hr 01/01/2019 14:00:00 81.803

MH-111-5YrCHl3Hr 01/01/2019 14:05:00 81.802

MH-111-5YrCHl3Hr 01/01/2019 14:10:00 81.799

MH-111-5YrCHl3Hr 01/01/2019 14:15:00 81.798

MH-111-5YrCHl3Hr 01/01/2019 14:20:00 81.796

MH-111-5YrCHl3Hr 01/01/2019 14:25:00 81.795

MH-111-5YrCHl3Hr 01/01/2019 14:30:00 81.793

MH-111-5YrCHl3Hr 01/01/2019 14:35:00 81.792

MH-111-5YrCHl3Hr 01/01/2019 14:40:00 81.79

MH-111-5YrCHl3Hr 01/01/2019 14:45:00 81.789

MH-111-5YrCHl3Hr 01/01/2019 14:50:00 81.787

MH-111-5YrCHl3Hr 01/01/2019 14:55:00 81.785

MH-111-5YrCHl3Hr 01/01/2019 15:00:00 81.783

MH-111-5YrCHl3Hr 01/01/2019 15:05:00 81.782

MH-111-5YrCHl3Hr 01/01/2019 15:10:00 81.78

MH-111-5YrCHl3Hr 01/01/2019 15:15:00 81.779

MH-111-5YrCHl3Hr 01/01/2019 15:20:00 81.777

MH-111-5YrCHl3Hr 01/01/2019 15:25:00 81.776

MH-111-5YrCHl3Hr 01/01/2019 15:30:00 81.774

MH-111-5YrCHl3Hr 01/01/2019 15:35:00 81.773

MH-111-5YrCHl3Hr 01/01/2019 15:40:00 81.771

MH-111-5YrCHl3Hr 01/01/2019 15:45:00 81.77

MH-111-5YrCHl3Hr 01/01/2019 15:50:00 81.768

MH-111-5YrCHl3Hr 01/01/2019 15:55:00 81.766

MH-111-5YrCHl3Hr 01/01/2019 16:00:00 81.765

MH-111-5YrCHl3Hr 01/01/2019 16:05:00 81.763

MH-111-5YrCHl3Hr 01/01/2019 16:10:00 81.762

MH-111-5YrCHl3Hr 01/01/2019 16:15:00 81.76

MH-111-5YrCHl3Hr 01/01/2019 16:20:00 81.758

MH-111-5YrCHl3Hr 01/01/2019 16:25:00 81.757

MH-111-5YrCHl3Hr 01/01/2019 16:30:00 81.755

MH-111-5YrCHl3Hr 01/01/2019 16:35:00 81.754

MH-111-5YrCHl3Hr 01/01/2019 16:40:00 81.752

MH-111-5YrCHl3Hr 01/01/2019 16:45:00 81.751

MH-111-5YrCHl3Hr 01/01/2019 16:50:00 81.749

MH-111-5YrCHl3Hr 01/01/2019 16:55:00 81.748

MH-111-5YrCHl3Hr 01/01/2019 17:00:00 81.746

MH-111-5YrCHl3Hr 01/01/2019 17:05:00 81.745

MH-111-5YrCHl3Hr 01/01/2019 17:10:00 81.743

MH-111-5YrCHI3Hr 01/01/2019 17:15:00 81.742

MH-111-5YrCHI3Hr 01/01/2019 17:20:00 81.74

MH-111-5YrCHI3Hr 01/01/2019 17:25:00 81.739

MH-111-5YrCHI3Hr 01/01/2019 17:30:00 81.737

MH-111-5YrCHI3Hr 01/01/2019 17:35:00 81.736

MH-111-5YrCHI3Hr 01/01/2019 17:40:00 81.734

MH-111-5YrCHI3Hr 01/01/2019 17:45:00 81.733

MH-111-5YrCHI3Hr 01/01/2019 17:50:00 81.731

MH-111-5YrCHI3Hr 01/01/2019 17:55:00 81.73

MH-111-5YrCHI3Hr 01/01/2019 18:00:00 81.728

MH-111-5YrCHI3Hr 01/01/2019 18:05:00 81.727

MH-111-5YrCHI3Hr 01/01/2019 18:10:00 81.725

MH-111-5YrCHI3Hr 01/01/2019 18:15:00 81.724

MH-111-5YrCHI3Hr 01/01/2019 18:20:00 81.722

MH-111-5YrCHI3Hr 01/01/2019 18:25:00 81.721

MH-111-5YrCHI3Hr 01/01/2019 18:30:00 81.719

MH-111-5YrCHI3Hr 01/01/2019 18:35:00 81.718

MH-111-5YrCHI3Hr 01/01/2019 18:40:00 81.716

MH-111-5YrCHI3Hr 01/01/2019 18:45:00 81.715

MH-111-5YrCHI3Hr 01/01/2019 18:50:00 81.713

MH-111-5YrCHI3Hr 01/01/2019 18:55:00 81.712

MH-111-5YrCHI3Hr 01/01/2019 19:00:00 81.71

MH-111-5YrCHI3Hr 01/01/2019 19:05:00 81.709

MH-111-5YrCHI3Hr 01/01/2019 19:10:00 81.707

MH-111-5YrCHI3Hr 01/01/2019 19:15:00 81.706

MH-111-5YrCHI3Hr 01/01/2019 19:20:00 81.705

MH-111-5YrCHI3Hr 01/01/2019 19:25:00 81.703

MH-111-5YrCHI3Hr 01/01/2019 19:30:00 81.702

MH-111-5YrCHI3Hr 01/01/2019 19:35:00 81.7

MH-111-5YrCHl3Hr 01/01/2019 19:40:00 81.699

MH-111-5YrCHl3Hr 01/01/2019 19:45:00 81.698

MH-111-5YrCHl3Hr 01/01/2019 19:50:00 81.696

MH-111-5YrCHl3Hr 01/01/2019 19:55:00 81.695

MH-111-5YrCHl3Hr 01/01/2019 20:00:00 81.693

MH-111-5YrCHl3Hr 01/01/2019 20:05:00 81.692

MH-111-5YrCHl3Hr 01/01/2019 20:10:00 81.69

MH-111-5YrCHl3Hr 01/01/2019 20:15:00 81.689

MH-111-5YrCHl3Hr 01/01/2019 20:20:00 81.687

MH-111-5YrCHl3Hr 01/01/2019 20:25:00 81.686

MH-111-5YrCHl3Hr 01/01/2019 20:30:00 81.684

MH-111-5YrCHl3Hr 01/01/2019 20:35:00 81.683

MH-111-5YrCHl3Hr 01/01/2019 20:40:00 81.681

MH-111-5YrCHl3Hr 01/01/2019 20:45:00 81.68

MH-111-5YrCHl3Hr 01/01/2019 20:50:00 81.678

MH-111-5YrCHl3Hr 01/01/2019 20:55:00 81.677

MH-111-5YrCHl3Hr 01/01/2019 21:00:00 81.675

MH-111-5YrCHl3Hr 01/01/2019 21:05:00 81.674

MH-111-5YrCHl3Hr 01/01/2019 21:10:00 81.673

MH-111-5YrCHl3Hr 01/01/2019 21:15:00 81.671

MH-111-5YrCHl3Hr 01/01/2019 21:20:00 81.67

MH-111-5YrCHl3Hr 01/01/2019 21:25:00 81.669

MH-111-5YrCHl3Hr 01/01/2019 21:30:00 81.667

MH-111-5YrCHl3Hr 01/01/2019 21:35:00 81.666

MH-111-5YrCHl3Hr 01/01/2019 21:40:00 81.664

MH-111-5YrCHl3Hr 01/01/2019 21:45:00 81.663

MH-111-5YrCHl3Hr 01/01/2019 21:50:00 81.662

MH-111-5YrCHl3Hr 01/01/2019 21:55:00 81.661

MH-111-5YrCHl3Hr 01/01/2019 22:00:00 81.659

MH-111-5YrCHl3Hr 01/01/2019 22:05:00 81.658

MH-111-5YrCHl3Hr 01/01/2019 22:10:00 81.656

MH-111-5YrCHl3Hr 01/01/2019 22:15:00 81.655

MH-111-5YrCHl3Hr 01/01/2019 22:20:00 81.653

MH-111-5YrCHl3Hr 01/01/2019 22:25:00 81.652

MH-111-5YrCHl3Hr 01/01/2019 22:30:00 81.65

MH-111-5YrCHl3Hr 01/01/2019 22:35:00 81.649

MH-111-5YrCHl3Hr 01/01/2019 22:40:00 81.647

MH-111-5YrCHl3Hr 01/01/2019 22:45:00 81.646

MH-111-5YrCHl3Hr 01/01/2019 22:50:00 81.644

MH-111-5YrCHl3Hr 01/01/2019 22:55:00 81.643

MH-111-5YrCHl3Hr 01/01/2019 23:00:00 81.642

MH-111-5YrCHl3Hr 01/01/2019 23:05:00 81.64

MH-111-5YrCHl3Hr 01/01/2019 23:10:00 81.639

MH-111-5YrCHl3Hr 01/01/2019 23:15:00 81.638

MH-111-5YrCHl3Hr 01/01/2019 23:20:00 81.636

MH-111-5YrCHl3Hr 01/01/2019 23:25:00 81.635

MH-111-5YrCHl3Hr 01/01/2019 23:30:00 81.633

MH-111-5YrCHl3Hr 01/01/2019 23:35:00 81.632

MH-111-5YrCHl3Hr 01/01/2019 23:40:00 81.63

MH-111-5YrCHl3Hr 01/01/2019 23:45:00 81.629

MH-111-5YrCHl3Hr 01/01/2019 23:50:00 81.627

MH-111-5YrCHl3Hr 01/01/2019 23:55:00 81.626

MH-111-5YrCHl3Hr 01/02/2019 00:00:00 81.624

;Depth (m)

MH-111-August_4_1988 01/01/2019 00:00:00 80.571

MH-111-August_4_1988 01/01/2019 00:05:00 80.571

MH-111-August_4_1988 01/01/2019 00:10:00 80.572

MH-111-August_4_1988 01/01/2019 00:15:00 80.572

MH-111-August_4_1988 01/01/2019 00:20:00 80.572

MH-111-August_4_1988 01/01/2019 00:25:00 80.572

MH-111-August_4_1988 01/01/2019 00:30:00 80.781

MH-111-August_4_1988 01/01/2019 00:35:00 81.04

MH-111-August_4_1988 01/01/2019 00:40:00 81.421

MH-111-August_4_1988 01/01/2019 00:45:00 81.364

MH-111-August_4_1988 01/01/2019 00:50:00 81.279

MH-111-August_4_1988 01/01/2019 00:55:00 81.169

MH-111-August_4_1988 01/01/2019 01:00:00 81.034

MH-111-August_4_1988 01/01/2019 01:05:00 80.962

MH-111-August_4_1988 01/01/2019 01:10:00 80.977

MH-111-August_4_1988 01/01/2019 01:15:00 81.134

MH-111-August_4_1988 01/01/2019 01:20:00 81.252

MH-111-August_4_1988 01/01/2019 01:25:00 81.279

MH-111-August_4_1988 01/01/2019 01:30:00 81.304

MH-111-August_4_1988 01/01/2019 01:35:00 81.56

MH-111-August_4_1988 01/01/2019 01:40:00 81.776

MH-111-August_4_1988 01/01/2019 01:45:00 81.776

MH-111-August_4_1988 01/01/2019 01:50:00 81.812

MH-111-August_4_1988 01/01/2019 01:55:00 81.957

MH-111-August_4_1988 01/01/2019 02:00:00 82.179

MH-111-August_4_1988 01/01/2019 02:05:00 82.479

MH-111-August_4_1988 01/01/2019 02:10:00 82.708

MH-111-August_4_1988 01/01/2019 02:15:00 82.753

MH-111-August_4_1988 01/01/2019 02:20:00 82.753

MH-111-August_4_1988 01/01/2019 02:25:00 82.771

MH-111-August_4_1988 01/01/2019 02:30:00 82.814

MH-111-August_4_1988 01/01/2019 02:35:00 82.874

MH-111-August_4_1988 01/01/2019 02:40:00 82.887

MH-111-August_4_1988 01/01/2019 02:45:00 82.88

MH-111-August_4_1988 01/01/2019 02:50:00 82.883

MH-111-August_4_1988 01/01/2019 02:55:00 82.892

MH-111-August_4_1988 01/01/2019 03:00:00 82.886

MH-111-August_4_1988 01/01/2019 03:05:00 82.895

MH-111-August_4_1988 01/01/2019 03:10:00 82.904

MH-111-August_4_1988 01/01/2019 03:15:00 82.92

MH-111-August_4_1988 01/01/2019 03:20:00 82.92

MH-111-August_4_1988 01/01/2019 03:25:00 82.899

MH-111-August_4_1988 01/01/2019 03:30:00 82.897

MH-111-August_4_1988 01/01/2019 03:35:00 82.912

MH-111-August_4_1988 01/01/2019 03:40:00 82.901

MH-111-August_4_1988 01/01/2019 03:45:00 82.882

MH-111-August_4_1988 01/01/2019 03:50:00 82.874

MH-111-August_4_1988 01/01/2019 03:55:00 82.876

MH-111-August_4_1988 01/01/2019 04:00:00 82.862

MH-111-August_4_1988 01/01/2019 04:05:00 82.845

MH-111-August_4_1988 01/01/2019 04:10:00 82.837

MH-111-August_4_1988 01/01/2019 04:15:00 82.833

MH-111-August_4_1988 01/01/2019 04:20:00 82.819

MH-111-August_4_1988 01/01/2019 04:25:00 82.805

MH-111-August_4_1988 01/01/2019 04:30:00 82.796

MH-111-August_4_1988 01/01/2019 04:35:00 82.793

MH-111-August_4_1988 01/01/2019 04:40:00 82.779

MH-111-August_4_1988 01/01/2019 04:45:00 82.767

MH-111-August_4_1988 01/01/2019 04:50:00 82.759

MH-111-August_4_1988 01/01/2019 04:55:00 82.755

MH-111-August_4_1988 01/01/2019 05:00:00 82.744

MH-111-August_4_1988 01/01/2019 05:05:00 82.738

MH-111-August_4_1988 01/01/2019 05:10:00 82.739

MH-111-August_4_1988 01/01/2019 05:15:00 82.736

MH-111-August_4_1988 01/01/2019 05:20:00 82.726

MH-111-August_4_1988 01/01/2019 05:25:00 82.728

MH-111-August_4_1988 01/01/2019 05:30:00 82.733

MH-111-August_4_1988 01/01/2019 05:35:00 82.726

MH-111-August_4_1988 01/01/2019 05:40:00 82.718

MH-111-August_4_1988 01/01/2019 05:45:00 82.72

MH-111-August_4_1988 01/01/2019 05:50:00 82.719

MH-111-August_4_1988 01/01/2019 05:55:00 82.712

MH-111-August_4_1988 01/01/2019 06:00:00 82.701

MH-111-August_4_1988 01/01/2019 06:05:00 82.698

MH-111-August_4_1988 01/01/2019 06:10:00 82.694

MH-111-August_4_1988 01/01/2019 06:15:00 82.687

MH-111-August_4_1988 01/01/2019 06:20:00 82.676

MH-111-August_4_1988 01/01/2019 06:25:00 82.671

MH-111-August_4_1988 01/01/2019 06:30:00 82.666

MH-111-August_4_1988 01/01/2019 06:35:00 82.66

MH-111-August_4_1988 01/01/2019 06:40:00 82.65

MH-111-August_4_1988 01/01/2019 06:45:00 82.644

MH-111-August_4_1988 01/01/2019 06:50:00 82.639

MH-111-August_4_1988 01/01/2019 06:55:00 82.634

MH-111-August_4_1988 01/01/2019 07:00:00 82.625

MH-111-August_4_1988 01/01/2019 07:05:00 82.619

MH-111-August_4_1988 01/01/2019 07:10:00 82.614

MH-111-August_4_1988 01/01/2019 07:15:00 82.611

MH-111-August_4_1988 01/01/2019 07:20:00 82.602

MH-111-August_4_1988 01/01/2019 07:25:00 82.596

MH-111-August_4_1988 01/01/2019 07:30:00 82.59

MH-111-August_4_1988 01/01/2019 07:35:00 82.588

MH-111-August_4_1988 01/01/2019 07:40:00 82.58

MH-111-August_4_1988 01/01/2019 07:45:00 82.574

MH-111-August_4_1988 01/01/2019 07:50:00 82.569

MH-111-August_4_1988 01/01/2019 07:55:00 82.567

MH-111-August_4_1988 01/01/2019 08:00:00 82.56

MH-111-August_4_1988 01/01/2019 08:05:00 82.555

MH-111-August_4_1988 01/01/2019 08:10:00 82.549

MH-111-August_4_1988 01/01/2019 08:15:00 82.548

MH-111-August_4_1988 01/01/2019 08:20:00 82.541

MH-111-August_4_1988 01/01/2019 08:25:00 82.537

MH-111-August_4_1988 01/01/2019 08:30:00 82.531

MH-111-August_4_1988 01/01/2019 08:35:00 82.529

MH-111-August_4_1988 01/01/2019 08:40:00 82.524

MH-111-August_4_1988 01/01/2019 08:45:00 82.52

MH-111-August_4_1988 01/01/2019 08:50:00 82.514

MH-111-August_4_1988 01/01/2019 08:55:00 82.512

MH-111-August_4_1988 01/01/2019 09:00:00 82.508

MH-111-August_4_1988 01/01/2019 09:05:00 82.505

MH-111-August_4_1988 01/01/2019 09:10:00 82.499

MH-111-August_4_1988 01/01/2019 09:15:00 82.496

MH-111-August_4_1988 01/01/2019 09:20:00 82.492

MH-111-August_4_1988 01/01/2019 09:25:00 82.49

MH-111-August_4_1988 01/01/2019 09:30:00 82.484

MH-111-August_4_1988 01/01/2019 09:35:00 82.481

MH-111-August_4_1988 01/01/2019 09:40:00 82.477

MH-111-August_4_1988 01/01/2019 09:45:00 82.476

MH-111-August_4_1988 01/01/2019 09:50:00 82.47

MH-111-August_4_1988 01/01/2019 09:55:00 82.467

MH-111-August_4_1988 01/01/2019 10:00:00 82.464

MH-111-August_4_1988 01/01/2019 10:05:00 82.462

MH-111-August_4_1988 01/01/2019 10:10:00 82.458

MH-111-August_4_1988 01/01/2019 10:15:00 82.455

MH-111-August_4_1988 01/01/2019 10:20:00 82.451

MH-111-August_4_1988 01/01/2019 10:25:00 82.449

MH-111-August_4_1988 01/01/2019 10:30:00 82.446

MH-111-August_4_1988 01/01/2019 10:35:00 82.443

MH-111-August_4_1988 01/01/2019 10:40:00 82.44

MH-111-August_4_1988 01/01/2019 10:45:00 82.437

MH-111-August_4_1988 01/01/2019 10:50:00 82.435

MH-111-August_4_1988 01/01/2019 10:55:00 82.431

MH-111-August_4_1988 01/01/2019 11:00:00 82.429

MH-111-August_4_1988 01/01/2019 11:05:00 82.426

MH-111-August_4_1988 01/01/2019 11:10:00 82.425

MH-111-August_4_1988 01/01/2019 11:15:00 82.421

MH-111-August_4_1988 01/01/2019 11:20:00 82.419

MH-111-August_4_1988 01/01/2019 11:25:00 82.415

MH-111-August_4_1988 01/01/2019 11:30:00 82.414

MH-111-August_4_1988 01/01/2019 11:35:00 82.41

MH-111-August_4_1988 01/01/2019 11:40:00 82.409

MH-111-August_4_1988 01/01/2019 11:45:00 82.404

MH-111-August_4_1988 01/01/2019 11:50:00 82.403

MH-111-August_4_1988 01/01/2019 11:55:00 82.399

MH-111-August_4_1988 01/01/2019 12:00:00 82.398

MH-111-August_4_1988 01/01/2019 12:05:00 82.394

MH-111-August_4_1988 01/01/2019 12:10:00 82.393

MH-111-August_4_1988 01/01/2019 12:15:00 82.389

MH-111-August_4_1988 01/01/2019 12:20:00 82.389

MH-111-August_4_1988 01/01/2019 12:25:00 82.386

MH-111-August_4_1988 01/01/2019 12:30:00 82.384

MH-111-August_4_1988 01/01/2019 12:35:00 82.382

MH-111-August_4_1988 01/01/2019 12:40:00 82.38

MH-111-August_4_1988 01/01/2019 12:45:00 82.378

MH-111-August_4_1988 01/01/2019 12:50:00 82.375

MH-111-August_4_1988 01/01/2019 12:55:00 82.373

MH-111-August_4_1988 01/01/2019 13:00:00 82.37

MH-111-August_4_1988 01/01/2019 13:05:00 82.368

MH-111-August_4_1988 01/01/2019 13:10:00 82.366

MH-111-August_4_1988 01/01/2019 13:15:00 82.363

MH-111-August_4_1988 01/01/2019 13:20:00 82.362

MH-111-August_4_1988 01/01/2019 13:25:00 82.36

MH-111-August_4_1988 01/01/2019 13:30:00 82.357

MH-111-August_4_1988 01/01/2019 13:35:00 82.355

MH-111-August_4_1988 01/01/2019 13:40:00 82.353

MH-111-August_4_1988 01/01/2019 13:45:00 82.351

MH-111-August_4_1988 01/01/2019 13:50:00 82.349

MH-111-August_4_1988 01/01/2019 13:55:00 82.346

MH-111-August_4_1988 01/01/2019 14:00:00 82.345

MH-111-August_4_1988 01/01/2019 14:05:00 82.342

MH-111-August_4_1988 01/01/2019 14:10:00 82.341

MH-111-August_4_1988 01/01/2019 14:15:00 82.338

MH-111-August_4_1988 01/01/2019 14:20:00 82.337

MH-111-August_4_1988 01/01/2019 14:25:00 82.334

MH-111-August_4_1988 01/01/2019 14:30:00 82.333

MH-111-August_4_1988 01/01/2019 14:35:00 82.329

MH-111-August_4_1988 01/01/2019 14:40:00 82.329

MH-111-August_4_1988 01/01/2019 14:45:00 82.326

MH-111-August_4_1988 01/01/2019 14:50:00 82.326

MH-111-August_4_1988 01/01/2019 14:55:00 82.322

MH-111-August_4_1988 01/01/2019 15:00:00 82.32

MH-111-August_4_1988 01/01/2019 15:05:00 82.318

MH-111-August_4_1988 01/01/2019 15:10:00 82.316

MH-111-August_4_1988 01/01/2019 15:15:00 82.314

MH-111-August_4_1988 01/01/2019 15:20:00 82.312

MH-111-August_4_1988 01/01/2019 15:25:00 82.31

MH-111-August_4_1988 01/01/2019 15:30:00 82.309

MH-111-August_4_1988 01/01/2019 15:35:00 82.308

MH-111-August_4_1988 01/01/2019 15:40:00 82.305

MH-111-August_4_1988 01/01/2019 15:45:00 82.303

MH-111-August_4_1988 01/01/2019 15:50:00 82.301

MH-111-August_4_1988 01/01/2019 15:55:00 82.3

MH-111-August_4_1988 01/01/2019 16:00:00 82.298

MH-111-August_4_1988 01/01/2019 16:05:00 82.295

MH-111-August_4_1988 01/01/2019 16:10:00 82.293

MH-111-August_4_1988 01/01/2019 16:15:00 82.292

MH-111-August_4_1988 01/01/2019 16:20:00 82.29

MH-111-August_4_1988 01/01/2019 16:25:00 82.288

MH-111-August_4_1988 01/01/2019 16:30:00 82.286

MH-111-August_4_1988 01/01/2019 16:35:00 82.285

MH-111-August_4_1988 01/01/2019 16:40:00 82.283

MH-111-August_4_1988 01/01/2019 16:45:00 82.281

MH-111-August_4_1988 01/01/2019 16:50:00 82.279

MH-111-August_4_1988 01/01/2019 16:55:00 82.278

MH-111-August_4_1988 01/01/2019 17:00:00 82.275

MH-111-August_4_1988 01/01/2019 17:05:00 82.274

MH-111-August_4_1988 01/01/2019 17:10:00 82.272

MH-111-August_4_1988 01/01/2019 17:15:00 82.271

MH-111-August_4_1988 01/01/2019 17:20:00 82.268

MH-111-August_4_1988 01/01/2019 17:25:00 82.267

MH-111-August_4_1988 01/01/2019 17:30:00 82.265

MH-111-August_4_1988 01/01/2019 17:35:00 82.263

MH-111-August_4_1988 01/01/2019 17:40:00 82.262

MH-111-August_4_1988 01/01/2019 17:45:00 82.26

MH-111-August_4_1988 01/01/2019 17:50:00 82.258

MH-111-August_4_1988 01/01/2019 17:55:00 82.257

MH-111-August_4_1988 01/01/2019 18:00:00 82.255

MH-111-August_4_1988 01/01/2019 18:05:00 82.253

MH-111-August_4_1988 01/01/2019 18:10:00 82.251

MH-111-August_4_1988 01/01/2019 18:15:00 82.25

MH-111-August_4_1988 01/01/2019 18:20:00 82.248

MH-111-August_4_1988 01/01/2019 18:25:00 82.247

MH-111-August_4_1988 01/01/2019 18:30:00 82.245

MH-111-August_4_1988 01/01/2019 18:35:00 82.243

MH-111-August_4_1988 01/01/2019 18:40:00 82.242

MH-111-August_4_1988 01/01/2019 18:45:00 82.24

MH-111-August_4_1988 01/01/2019 18:50:00 82.238

MH-111-August_4_1988 01/01/2019 18:55:00 82.237

MH-111-August_4_1988 01/01/2019 19:00:00 82.236

MH-111-August_4_1988 01/01/2019 19:05:00 82.233

MH-111-August_4_1988 01/01/2019 19:10:00 82.232

MH-111-August_4_1988 01/01/2019 19:15:00 82.23

MH-111-August_4_1988 01/01/2019 19:20:00 82.229

MH-111-August_4_1988 01/01/2019 19:25:00 82.227

MH-111-August_4_1988 01/01/2019 19:30:00 82.226

MH-111-August_4_1988 01/01/2019 19:35:00 82.224

MH-111-August_4_1988 01/01/2019 19:40:00 82.223

MH-111-August_4_1988 01/01/2019 19:45:00 82.22

MH-111-August_4_1988 01/01/2019 19:50:00 82.22

MH-111-August_4_1988 01/01/2019 19:55:00 82.217

MH-111-August_4_1988 01/01/2019 20:00:00 82.217

MH-111-August_4_1988 01/01/2019 20:05:00 82.214

MH-111-August_4_1988 01/01/2019 20:10:00 82.214

MH-111-August_4_1988 01/01/2019 20:15:00 82.211

MH-111-August_4_1988 01/01/2019 20:20:00 82.211

MH-111-August_4_1988 01/01/2019 20:25:00 82.208

MH-111-August_4_1988 01/01/2019 20:30:00 82.208

MH-111-August_4_1988 01/01/2019 20:35:00 82.205

MH-111-August_4_1988 01/01/2019 20:40:00 82.205

MH-111-August_4_1988 01/01/2019 20:45:00 82.203

MH-111-August_4_1988 01/01/2019 20:50:00 82.203

MH-111-August_4_1988 01/01/2019 20:55:00 82.2

MH-111-August_4_1988 01/01/2019 21:00:00 82.2

MH-111-August_4_1988 01/01/2019 21:05:00 82.197

MH-111-August_4_1988 01/01/2019 21:10:00 82.197

MH-111-August_4_1988 01/01/2019 21:15:00 82.194

MH-111-August_4_1988 01/01/2019 21:20:00 82.194

MH-111-August_4_1988 01/01/2019 21:25:00 82.192

MH-111-August_4_1988 01/01/2019 21:30:00 82.191

MH-111-August_4_1988 01/01/2019 21:35:00 82.189

MH-111-August_4_1988 01/01/2019 21:40:00 82.188

MH-111-August_4_1988 01/01/2019 21:45:00 82.186

MH-111-August_4_1988 01/01/2019 21:50:00 82.185

MH-111-August_4_1988 01/01/2019 21:55:00 82.183

MH-111-August_4_1988 01/01/2019 22:00:00 82.182

MH-111-August_4_1988 01/01/2019 22:05:00 82.181

MH-111-August_4_1988 01/01/2019 22:10:00 82.18

MH-111-August_4_1988 01/01/2019 22:15:00 82.178

MH-111-August_4_1988 01/01/2019 22:20:00 82.177

MH-111-August_4_1988 01/01/2019 22:25:00 82.175

MH-111-August_4_1988 01/01/2019 22:30:00 82.174

MH-111-August_4_1988 01/01/2019 22:35:00 82.173

MH-111-August_4_1988 01/01/2019 22:40:00 82.172

MH-111-August_4_1988 01/01/2019 22:45:00 82.17

MH-111-August_4_1988 01/01/2019 22:50:00 82.169

MH-111-August_4_1988 01/01/2019 22:55:00 82.167

MH-111-August_4_1988 01/01/2019 23:00:00 82.167

MH-111-August_4_1988 01/01/2019 23:05:00 82.165

MH-111-August_4_1988 01/01/2019 23:10:00 82.164

MH-111-August_4_1988 01/01/2019 23:15:00 82.162

MH-111-August_4_1988 01/01/2019 23:20:00 82.161

MH-111-August_4_1988 01/01/2019 23:25:00 82.16

MH-111-August_4_1988 01/01/2019 23:30:00 82.159

MH-111-August_4_1988 01/01/2019 23:35:00 82.157

MH-111-August_4_1988 01/01/2019 23:40:00 82.157

MH-111-August_4_1988 01/01/2019 23:45:00 82.155

MH-111-August_4_1988 01/01/2019 23:50:00 82.154

MH-111-August_4_1988 01/01/2019 23:55:00 82.152

MH-111-August_4_1988 01/02/2019 00:00:00 82.152

;Depth (m)

MH-111-August_8_1996 01/01/2019 00:00:00 80.571

MH-111-August_8_1996 01/01/2019 00:05:00 80.571

MH-111-August_8_1996 01/01/2019 00:10:00 80.572

MH-111-August_8_1996 01/01/2019 00:15:00 80.638

MH-111-August_8_1996 01/01/2019 00:20:00 80.749

MH-111-August_8_1996 01/01/2019 00:25:00 80.842

MH-111-August_8_1996 01/01/2019 00:30:00 80.973

MH-111-August_8_1996 01/01/2019 00:35:00 80.951

MH-111-August_8_1996 01/01/2019 00:40:00 80.886

MH-111-August_8_1996 01/01/2019 00:45:00 80.873

MH-111-August_8_1996 01/01/2019 00:50:00 80.89

MH-111-August_8_1996 01/01/2019 00:55:00 80.995

MH-111-August_8_1996 01/01/2019 01:00:00 81.062

MH-111-August_8_1996 01/01/2019 01:05:00 81.057

MH-111-August_8_1996 01/01/2019 01:10:00 81.017

MH-111-August_8_1996 01/01/2019 01:15:00 81.043

MH-111-August_8_1996 01/01/2019 01:20:00 81.248

MH-111-August_8_1996 01/01/2019 01:25:00 81.594

MH-111-August_8_1996 01/01/2019 01:30:00 81.816

MH-111-August_8_1996 01/01/2019 01:35:00 81.952

MH-111-August_8_1996 01/01/2019 01:40:00 81.89

MH-111-August_8_1996 01/01/2019 01:45:00 81.71

MH-111-August_8_1996 01/01/2019 01:50:00 81.607

MH-111-August_8_1996 01/01/2019 01:55:00 81.675

MH-111-August_8_1996 01/01/2019 02:00:00 81.772

MH-111-August_8_1996 01/01/2019 02:05:00 81.847

MH-111-August_8_1996 01/01/2019 02:10:00 81.903

MH-111-August_8_1996 01/01/2019 02:15:00 81.936

MH-111-August_8_1996 01/01/2019 02:20:00 81.966

MH-111-August_8_1996 01/01/2019 02:25:00 81.988

MH-111-August_8_1996 01/01/2019 02:30:00 82.004

MH-111-August_8_1996 01/01/2019 02:35:00 82.017

MH-111-August_8_1996 01/01/2019 02:40:00 82.032

MH-111-August_8_1996 01/01/2019 02:45:00 82.039

MH-111-August_8_1996 01/01/2019 02:50:00 82.049

MH-111-August_8_1996 01/01/2019 02:55:00 82.072

MH-111-August_8_1996 01/01/2019 03:00:00 82.161

MH-111-August_8_1996 01/01/2019 03:05:00 82.339

MH-111-August_8_1996 01/01/2019 03:10:00 82.466

MH-111-August_8_1996 01/01/2019 03:15:00 82.582

MH-111-August_8_1996 01/01/2019 03:20:00 82.656

MH-111-August_8_1996 01/01/2019 03:25:00 82.669

MH-111-August_8_1996 01/01/2019 03:30:00 82.693

MH-111-August_8_1996 01/01/2019 03:35:00 82.726

MH-111-August_8_1996 01/01/2019 03:40:00 82.76

MH-111-August_8_1996 01/01/2019 03:45:00 82.786

MH-111-August_8_1996 01/01/2019 03:50:00 82.802

MH-111-August_8_1996 01/01/2019 03:55:00 82.808

MH-111-August_8_1996 01/01/2019 04:00:00 82.812

MH-111-August_8_1996 01/01/2019 04:05:00 82.812

MH-111-August_8_1996 01/01/2019 04:10:00 82.812

MH-111-August_8_1996 01/01/2019 04:15:00 82.808

MH-111-August_8_1996 01/01/2019 04:20:00 82.805

MH-111-August_8_1996 01/01/2019 04:25:00 82.798

MH-111-August_8_1996 01/01/2019 04:30:00 82.795

MH-111-August_8_1996 01/01/2019 04:35:00 82.789

MH-111-August_8_1996 01/01/2019 04:40:00 82.782

MH-111-August_8_1996 01/01/2019 04:45:00 82.773

MH-111-August_8_1996 01/01/2019 04:50:00 82.768

MH-111-August_8_1996 01/01/2019 04:55:00 82.76

MH-111-August_8_1996 01/01/2019 05:00:00 82.751

MH-111-August_8_1996 01/01/2019 05:05:00 82.742

MH-111-August_8_1996 01/01/2019 05:10:00 82.734

MH-111-August_8_1996 01/01/2019 05:15:00 82.726

MH-111-August_8_1996 01/01/2019 05:20:00 82.715

MH-111-August_8_1996 01/01/2019 05:25:00 82.706

MH-111-August_8_1996 01/01/2019 05:30:00 82.7

MH-111-August_8_1996 01/01/2019 05:35:00 82.691

MH-111-August_8_1996 01/01/2019 05:40:00 82.681

MH-111-August_8_1996 01/01/2019 05:45:00 82.672

MH-111-August_8_1996 01/01/2019 05:50:00 82.666

MH-111-August_8_1996 01/01/2019 05:55:00 82.659

MH-111-August_8_1996 01/01/2019 06:00:00 82.648

MH-111-August_8_1996 01/01/2019 06:05:00 82.64

MH-111-August_8_1996 01/01/2019 06:10:00 82.634

MH-111-August_8_1996 01/01/2019 06:15:00 82.627

MH-111-August_8_1996 01/01/2019 06:20:00 82.618

MH-111-August_8_1996 01/01/2019 06:25:00 82.61

MH-111-August_8_1996 01/01/2019 06:30:00 82.603

MH-111-August_8_1996 01/01/2019 06:35:00 82.598

MH-111-August_8_1996 01/01/2019 06:40:00 82.59

MH-111-August_8_1996 01/01/2019 06:45:00 82.582

MH-111-August_8_1996 01/01/2019 06:50:00 82.575

MH-111-August_8_1996 01/01/2019 06:55:00 82.57

MH-111-August_8_1996 01/01/2019 07:00:00 82.563

MH-111-August_8_1996 01/01/2019 07:05:00 82.556

MH-111-August_8_1996 01/01/2019 07:10:00 82.549

MH-111-August_8_1996 01/01/2019 07:15:00 82.544

MH-111-August_8_1996 01/01/2019 07:20:00 82.538

MH-111-August_8_1996 01/01/2019 07:25:00 82.531

MH-111-August_8_1996 01/01/2019 07:30:00 82.525

MH-111-August_8_1996 01/01/2019 07:35:00 82.52

MH-111-August_8_1996 01/01/2019 07:40:00 82.515

MH-111-August_8_1996 01/01/2019 07:45:00 82.508

MH-111-August_8_1996 01/01/2019 07:50:00 82.502

MH-111-August_8_1996 01/01/2019 07:55:00 82.497

MH-111-August_8_1996 01/01/2019 08:00:00 82.492

MH-111-August_8_1996 01/01/2019 08:05:00 82.487

MH-111-August_8_1996 01/01/2019 08:10:00 82.481

MH-111-August_8_1996 01/01/2019 08:15:00 82.476

MH-111-August_8_1996 01/01/2019 08:20:00 82.471

MH-111-August_8_1996 01/01/2019 08:25:00 82.467

MH-111-August_8_1996 01/01/2019 08:30:00 82.461

MH-111-August_8_1996 01/01/2019 08:35:00 82.456

MH-111-August_8_1996 01/01/2019 08:40:00 82.452

MH-111-August_8_1996 01/01/2019 08:45:00 82.447

MH-111-August_8_1996 01/01/2019 08:50:00 82.442

MH-111-August_8_1996 01/01/2019 08:55:00 82.437

MH-111-August_8_1996 01/01/2019 09:00:00 82.433

MH-111-August_8_1996 01/01/2019 09:05:00 82.429

MH-111-August_8_1996 01/01/2019 09:10:00 82.424

MH-111-August_8_1996 01/01/2019 09:15:00 82.42

MH-111-August_8_1996 01/01/2019 09:20:00 82.415

MH-111-August_8_1996 01/01/2019 09:25:00 82.411

MH-111-August_8_1996 01/01/2019 09:30:00 82.407

MH-111-August_8_1996 01/01/2019 09:35:00 82.403

MH-111-August_8_1996 01/01/2019 09:40:00 82.398

MH-111-August_8_1996 01/01/2019 09:45:00 82.394

MH-111-August_8_1996 01/01/2019 09:50:00 82.39

MH-111-August_8_1996 01/01/2019 09:55:00 82.386

MH-111-August_8_1996 01/01/2019 10:00:00 82.382

MH-111-August_8_1996 01/01/2019 10:05:00 82.378

MH-111-August_8_1996 01/01/2019 10:10:00 82.374

MH-111-August_8_1996 01/01/2019 10:15:00 82.37

MH-111-August_8_1996 01/01/2019 10:20:00 82.366

MH-111-August_8_1996 01/01/2019 10:25:00 82.362

MH-111-August_8_1996 01/01/2019 10:30:00 82.358

MH-111-August_8_1996 01/01/2019 10:35:00 82.354

MH-111-August_8_1996 01/01/2019 10:40:00 82.35

MH-111-August_8_1996 01/01/2019 10:45:00 82.346

MH-111-August_8_1996 01/01/2019 10:50:00 82.342

MH-111-August_8_1996 01/01/2019 10:55:00 82.339

MH-111-August_8_1996 01/01/2019 11:00:00 82.335

MH-111-August_8_1996 01/01/2019 11:05:00 82.331

MH-111-August_8_1996 01/01/2019 11:10:00 82.327

MH-111-August_8_1996 01/01/2019 11:15:00 82.323

MH-111-August_8_1996 01/01/2019 11:20:00 82.32

MH-111-August_8_1996 01/01/2019 11:25:00 82.316

MH-111-August_8_1996 01/01/2019 11:30:00 82.312

MH-111-August_8_1996 01/01/2019 11:35:00 82.308

MH-111-August_8_1996 01/01/2019 11:40:00 82.305

MH-111-August_8_1996 01/01/2019 11:45:00 82.301

MH-111-August_8_1996 01/01/2019 11:50:00 82.297

MH-111-August_8_1996 01/01/2019 11:55:00 82.294

MH-111-August_8_1996 01/01/2019 12:00:00 82.29

MH-111-August_8_1996 01/01/2019 12:05:00 82.287

MH-111-August_8_1996 01/01/2019 12:10:00 82.283

MH-111-August_8_1996 01/01/2019 12:15:00 82.279

MH-111-August_8_1996 01/01/2019 12:20:00 82.276

MH-111-August_8_1996 01/01/2019 12:25:00 82.273

MH-111-August_8_1996 01/01/2019 12:30:00 82.269

MH-111-August_8_1996 01/01/2019 12:35:00 82.266

MH-111-August_8_1996 01/01/2019 12:40:00 82.262

MH-111-August_8_1996 01/01/2019 12:45:00 82.259

MH-111-August_8_1996 01/01/2019 12:50:00 82.255

MH-111-August_8_1996 01/01/2019 12:55:00 82.252

MH-111-August_8_1996 01/01/2019 13:00:00 82.248

MH-111-August_8_1996 01/01/2019 13:05:00 82.245

MH-111-August_8_1996 01/01/2019 13:10:00 82.242

MH-111-August_8_1996 01/01/2019 13:15:00 82.238

MH-111-August_8_1996 01/01/2019 13:20:00 82.235

MH-111-August_8_1996 01/01/2019 13:25:00 82.232

MH-111-August_8_1996 01/01/2019 13:30:00 82.229

MH-111-August_8_1996 01/01/2019 13:35:00 82.225

MH-111-August_8_1996 01/01/2019 13:40:00 82.222

MH-111-August_8_1996 01/01/2019 13:45:00 82.219

MH-111-August_8_1996 01/01/2019 13:50:00 82.216

MH-111-August_8_1996 01/01/2019 13:55:00 82.212

MH-111-August_8_1996 01/01/2019 14:00:00 82.209

MH-111-August_8_1996 01/01/2019 14:05:00 82.206

MH-111-August_8_1996 01/01/2019 14:10:00 82.203

MH-111-August_8_1996 01/01/2019 14:15:00 82.2

MH-111-August_8_1996 01/01/2019 14:20:00 82.197

MH-111-August_8_1996 01/01/2019 14:25:00 82.193

MH-111-August_8_1996 01/01/2019 14:30:00 82.19

MH-111-August_8_1996 01/01/2019 14:35:00 82.187

MH-111-August_8_1996 01/01/2019 14:40:00 82.184

MH-111-August_8_1996 01/01/2019 14:45:00 82.181

MH-111-August_8_1996 01/01/2019 14:50:00 82.178

MH-111-August_8_1996 01/01/2019 14:55:00 82.175

MH-111-August_8_1996 01/01/2019 15:00:00 82.171

MH-111-August_8_1996 01/01/2019 15:05:00 82.168

MH-111-August_8_1996 01/01/2019 15:10:00 82.165

MH-111-August_8_1996 01/01/2019 15:15:00 82.162

MH-111-August_8_1996 01/01/2019 15:20:00 82.159

MH-111-August_8_1996 01/01/2019 15:25:00 82.156

MH-111-August_8_1996 01/01/2019 15:30:00 82.153

MH-111-August_8_1996 01/01/2019 15:35:00 82.15

MH-111-August_8_1996 01/01/2019 15:40:00 82.147

MH-111-August_8_1996 01/01/2019 15:45:00 82.144

MH-111-August_8_1996 01/01/2019 15:50:00 82.141

MH-111-August_8_1996 01/01/2019 15:55:00 82.138

MH-111-August_8_1996 01/01/2019 16:00:00 82.135

MH-111-August_8_1996 01/01/2019 16:05:00 82.132

MH-111-August_8_1996 01/01/2019 16:10:00 82.129

MH-111-August_8_1996 01/01/2019 16:15:00 82.126

MH-111-August_8_1996 01/01/2019 16:20:00 82.123

MH-111-August_8_1996 01/01/2019 16:25:00 82.12

MH-111-August_8_1996 01/01/2019 16:30:00 82.117

MH-111-August_8_1996 01/01/2019 16:35:00 82.114

MH-111-August_8_1996 01/01/2019 16:40:00 82.111

MH-111-August_8_1996 01/01/2019 16:45:00 82.108

MH-111-August_8_1996 01/01/2019 16:50:00 82.105

MH-111-August_8_1996 01/01/2019 16:55:00 82.102

MH-111-August_8_1996 01/01/2019 17:00:00 82.099

MH-111-August_8_1996 01/01/2019 17:05:00 82.096

MH-111-August_8_1996 01/01/2019 17:10:00 82.093

MH-111-August_8_1996 01/01/2019 17:15:00 82.091

MH-111-August_8_1996 01/01/2019 17:20:00 82.088

MH-111-August_8_1996 01/01/2019 17:25:00 82.085

MH-111-August_8_1996 01/01/2019 17:30:00 82.082

MH-111-August_8_1996 01/01/2019 17:35:00 82.079

MH-111-August_8_1996 01/01/2019 17:40:00 82.077

MH-111-August_8_1996 01/01/2019 17:45:00 82.074

MH-111-August_8_1996 01/01/2019 17:50:00 82.071

MH-111-August_8_1996 01/01/2019 17:55:00 82.068

MH-111-August_8_1996 01/01/2019 18:00:00 82.066

MH-111-August_8_1996 01/01/2019 18:05:00 82.063

MH-111-August_8_1996 01/01/2019 18:10:00 82.06

MH-111-August_8_1996 01/01/2019 18:15:00 82.058

MH-111-August_8_1996 01/01/2019 18:20:00 82.055

MH-111-August_8_1996 01/01/2019 18:25:00 82.052

MH-111-August_8_1996 01/01/2019 18:30:00 82.05

MH-111-August_8_1996 01/01/2019 18:35:00 82.047

MH-111-August_8_1996 01/01/2019 18:40:00 82.044

MH-111-August_8_1996 01/01/2019 18:45:00 82.042

MH-111-August_8_1996 01/01/2019 18:50:00 82.039

MH-111-August_8_1996 01/01/2019 18:55:00 82.036

MH-111-August_8_1996 01/01/2019 19:00:00 82.034

MH-111-August_8_1996 01/01/2019 19:05:00 82.031

MH-111-August_8_1996 01/01/2019 19:10:00 82.029

MH-111-August_8_1996 01/01/2019 19:15:00 82.026

MH-111-August_8_1996 01/01/2019 19:20:00 82.023

MH-111-August_8_1996 01/01/2019 19:25:00 82.021

MH-111-August_8_1996 01/01/2019 19:30:00 82.018

MH-111-August_8_1996 01/01/2019 19:35:00 82.016

MH-111-August_8_1996 01/01/2019 19:40:00 82.013

MH-111-August_8_1996 01/01/2019 19:45:00 82.011

MH-111-August_8_1996 01/01/2019 19:50:00 82.008

MH-111-August_8_1996 01/01/2019 19:55:00 82.006

MH-111-August_8_1996 01/01/2019 20:00:00 82.003

MH-111-August_8_1996 01/01/2019 20:05:00 82.001

MH-111-August_8_1996 01/01/2019 20:10:00 81.998

MH-111-August_8_1996 01/01/2019 20:15:00 81.996

MH-111-August_8_1996 01/01/2019 20:20:00 81.993

MH-111-August_8_1996 01/01/2019 20:25:00 81.991

MH-111-August_8_1996 01/01/2019 20:30:00 81.988

MH-111-August_8_1996 01/01/2019 20:35:00 81.986

MH-111-August_8_1996 01/01/2019 20:40:00 81.983

MH-111-August_8_1996 01/01/2019 20:45:00 81.981

MH-111-August_8_1996 01/01/2019 20:50:00 81.979

MH-111-August_8_1996 01/01/2019 20:55:00 81.976

MH-111-August_8_1996 01/01/2019 21:00:00 81.974

MH-111-August_8_1996 01/01/2019 21:05:00 81.971

MH-111-August_8_1996 01/01/2019 21:10:00 81.969

MH-111-August_8_1996 01/01/2019 21:15:00 81.967

MH-111-August_8_1996 01/01/2019 21:20:00 81.964

MH-111-August_8_1996 01/01/2019 21:25:00 81.962

MH-111-August_8_1996 01/01/2019 21:30:00 81.96

MH-111-August_8_1996 01/01/2019 21:35:00 81.957

MH-111-August_8_1996 01/01/2019 21:40:00 81.955

MH-111-August_8_1996 01/01/2019 21:45:00 81.953

MH-111-August_8_1996 01/01/2019 21:50:00 81.95

MH-111-August_8_1996 01/01/2019 21:55:00 81.948

MH-111-August_8_1996 01/01/2019 22:00:00 81.946

MH-111-August_8_1996 01/01/2019 22:05:00 81.944

MH-111-August_8_1996 01/01/2019 22:10:00 81.941

MH-111-August_8_1996 01/01/2019 22:15:00 81.939

MH-111-August_8_1996 01/01/2019 22:20:00 81.937

MH-111-August_8_1996 01/01/2019 22:25:00 81.935

MH-111-August_8_1996 01/01/2019 22:30:00 81.933

MH-111-August_8_1996 01/01/2019 22:35:00 81.931

MH-111-August_8_1996 01/01/2019 22:40:00 81.928

MH-111-August_8_1996 01/01/2019 22:45:00 81.926

MH-111-August_8_1996 01/01/2019 22:50:00 81.924

MH-111-August_8_1996 01/01/2019 22:55:00 81.922

MH-111-August_8_1996 01/01/2019 23:00:00 81.92

MH-111-August_8_1996 01/01/2019 23:05:00 81.918

MH-111-August_8_1996 01/01/2019 23:10:00 81.916

MH-111-August_8_1996 01/01/2019 23:15:00 81.914

MH-111-August_8_1996 01/01/2019 23:20:00 81.911

MH-111-August_8_1996 01/01/2019 23:25:00 81.909

MH-111-August_8_1996 01/01/2019 23:30:00 81.907

MH-111-August_8_1996 01/01/2019 23:35:00 81.905

MH-111-August_8_1996 01/01/2019 23:40:00 81.903

MH-111-August_8_1996 01/01/2019 23:45:00 81.901

MH-111-August_8_1996 01/01/2019 23:50:00 81.899

MH-111-August_8_1996 01/01/2019 23:55:00 81.897

MH-111-August_8_1996 01/02/2019 00:00:00 81.895

;Depth (m)

MH-111-July_1_1979 01/01/2019 00:00:00 80.571

MH-111-July_1_1979 01/01/2019 00:05:00 80.571

MH-111-July_1_1979 01/01/2019 00:10:00 80.572

MH-111-July_1_1979 01/01/2019 00:15:00 80.572

MH-111-July_1_1979 01/01/2019 00:20:00 80.58

MH-111-July_1_1979 01/01/2019 00:25:00 80.622

MH-111-July_1_1979 01/01/2019 00:30:00 80.678

MH-111-July_1_1979 01/01/2019 00:35:00 80.805

MH-111-July_1_1979 01/01/2019 00:40:00 81.02

MH-111-July_1_1979 01/01/2019 00:45:00 81.284

MH-111-July_1_1979 01/01/2019 00:50:00 81.386

MH-111-July_1_1979 01/01/2019 00:55:00 81.419

MH-111-July_1_1979 01/01/2019 01:00:00 81.438

MH-111-July_1_1979 01/01/2019 01:05:00 81.451

MH-111-July_1_1979 01/01/2019 01:10:00 81.477

MH-111-July_1_1979 01/01/2019 01:15:00 81.54

MH-111-July_1_1979 01/01/2019 01:20:00 81.632

MH-111-July_1_1979 01/01/2019 01:25:00 81.749

MH-111-July_1_1979 01/01/2019 01:30:00 81.912

MH-111-July_1_1979 01/01/2019 01:35:00 82.05

MH-111-July_1_1979 01/01/2019 01:40:00 82.221

MH-111-July_1_1979 01/01/2019 01:45:00 82.412

MH-111-July_1_1979 01/01/2019 01:50:00 82.591

MH-111-July_1_1979 01/01/2019 01:55:00 82.739

MH-111-July_1_1979 01/01/2019 02:00:00 82.9

MH-111-July_1_1979 01/01/2019 02:05:00 83.012

MH-111-July_1_1979 01/01/2019 02:10:00 83.02

MH-111-July_1_1979 01/01/2019 02:15:00 83.029

MH-111-July_1_1979 01/01/2019 02:20:00 83.077

MH-111-July_1_1979 01/01/2019 02:25:00 83.11

MH-111-July_1_1979 01/01/2019 02:30:00 83.124

MH-111-July_1_1979 01/01/2019 02:35:00 83.117

MH-111-July_1_1979 01/01/2019 02:40:00 83.123

MH-111-July_1_1979 01/01/2019 02:45:00 83.117

MH-111-July_1_1979 01/01/2019 02:50:00 83.113

MH-111-July_1_1979 01/01/2019 02:55:00 83.097

MH-111-July_1_1979 01/01/2019 03:00:00 83.094

MH-111-July_1_1979 01/01/2019 03:05:00 83.081

MH-111-July_1_1979 01/01/2019 03:10:00 83.068

MH-111-July_1_1979 01/01/2019 03:15:00 83.055

MH-111-July_1_1979 01/01/2019 03:20:00 83.045

MH-111-July_1_1979 01/01/2019 03:25:00 83.032

MH-111-July_1_1979 01/01/2019 03:30:00 83.016

MH-111-July_1_1979 01/01/2019 03:35:00 83

MH-111-July_1_1979 01/01/2019 03:40:00 82.986

MH-111-July_1_1979 01/01/2019 03:45:00 82.973

MH-111-July_1_1979 01/01/2019 03:50:00 82.957

MH-111-July_1_1979 01/01/2019 03:55:00 82.942

MH-111-July_1_1979 01/01/2019 04:00:00 82.929

MH-111-July_1_1979 01/01/2019 04:05:00 82.916

MH-111-July_1_1979 01/01/2019 04:10:00 82.902

MH-111-July_1_1979 01/01/2019 04:15:00 82.889

MH-111-July_1_1979 01/01/2019 04:20:00 82.876

MH-111-July_1_1979 01/01/2019 04:25:00 82.864

MH-111-July_1_1979 01/01/2019 04:30:00 82.852

MH-111-July_1_1979 01/01/2019 04:35:00 82.84

MH-111-July_1_1979 01/01/2019 04:40:00 82.827

MH-111-July_1_1979 01/01/2019 04:45:00 82.817

MH-111-July_1_1979 01/01/2019 04:50:00 82.805

MH-111-July_1_1979 01/01/2019 04:55:00 82.794

MH-111-July_1_1979 01/01/2019 05:00:00 82.783

MH-111-July_1_1979 01/01/2019 05:05:00 82.774

MH-111-July_1_1979 01/01/2019 05:10:00 82.764

MH-111-July_1_1979 01/01/2019 05:15:00 82.754

MH-111-July_1_1979 01/01/2019 05:20:00 82.743

MH-111-July_1_1979 01/01/2019 05:25:00 82.736

MH-111-July_1_1979 01/01/2019 05:30:00 82.726

MH-111-July_1_1979 01/01/2019 05:35:00 82.717

MH-111-July_1_1979 01/01/2019 05:40:00 82.707

MH-111-July_1_1979 01/01/2019 05:45:00 82.699

MH-111-July_1_1979 01/01/2019 05:50:00 82.691

MH-111-July_1_1979 01/01/2019 05:55:00 82.683

MH-111-July_1_1979 01/01/2019 06:00:00 82.674

MH-111-July_1_1979 01/01/2019 06:05:00 82.667

MH-111-July_1_1979 01/01/2019 06:10:00 82.659

MH-111-July_1_1979 01/01/2019 06:15:00 82.653

MH-111-July_1_1979 01/01/2019 06:20:00 82.644

MH-111-July_1_1979 01/01/2019 06:25:00 82.638

MH-111-July_1_1979 01/01/2019 06:30:00 82.63

MH-111-July_1_1979 01/01/2019 06:35:00 82.625

MH-111-July_1_1979 01/01/2019 06:40:00 82.617

MH-111-July_1_1979 01/01/2019 06:45:00 82.611

MH-111-July_1_1979 01/01/2019 06:50:00 82.604

MH-111-July_1_1979 01/01/2019 06:55:00 82.599

MH-111-July_1_1979 01/01/2019 07:00:00 82.592

MH-111-July_1_1979 01/01/2019 07:05:00 82.587

MH-111-July_1_1979 01/01/2019 07:10:00 82.58

MH-111-July_1_1979 01/01/2019 07:15:00 82.575

MH-111-July_1_1979 01/01/2019 07:20:00 82.568

MH-111-July_1_1979 01/01/2019 07:25:00 82.564

MH-111-July_1_1979 01/01/2019 07:30:00 82.557

MH-111-July_1_1979 01/01/2019 07:35:00 82.554

MH-111-July_1_1979 01/01/2019 07:40:00 82.547

MH-111-July_1_1979 01/01/2019 07:45:00 82.543

MH-111-July_1_1979 01/01/2019 07:50:00 82.536

MH-111-July_1_1979 01/01/2019 07:55:00 82.533

MH-111-July_1_1979 01/01/2019 08:00:00 82.527

MH-111-July_1_1979 01/01/2019 08:05:00 82.524

MH-111-July_1_1979 01/01/2019 08:10:00 82.517

MH-111-July_1_1979 01/01/2019 08:15:00 82.514

MH-111-July_1_1979 01/01/2019 08:20:00 82.508

MH-111-July_1_1979 01/01/2019 08:25:00 82.506

MH-111-July_1_1979 01/01/2019 08:30:00 82.499

MH-111-July_1_1979 01/01/2019 08:35:00 82.497

MH-111-July_1_1979 01/01/2019 08:40:00 82.491

MH-111-July_1_1979 01/01/2019 08:45:00 82.489

MH-111-July_1_1979 01/01/2019 08:50:00 82.482

MH-111-July_1_1979 01/01/2019 08:55:00 82.481

MH-111-July_1_1979 01/01/2019 09:00:00 82.475

MH-111-July_1_1979 01/01/2019 09:05:00 82.473

MH-111-July_1_1979 01/01/2019 09:10:00 82.467

MH-111-July_1_1979 01/01/2019 09:15:00 82.466

MH-111-July_1_1979 01/01/2019 09:20:00 82.459

MH-111-July_1_1979 01/01/2019 09:25:00 82.458

MH-111-July_1_1979 01/01/2019 09:30:00 82.452

MH-111-July_1_1979 01/01/2019 09:35:00 82.451

MH-111-July_1_1979 01/01/2019 09:40:00 82.445

MH-111-July_1_1979 01/01/2019 09:45:00 82.444

MH-111-July_1_1979 01/01/2019 09:50:00 82.438

MH-111-July_1_1979 01/01/2019 09:55:00 82.437

MH-111-July_1_1979 01/01/2019 10:00:00 82.431

MH-111-July_1_1979 01/01/2019 10:05:00 82.43

MH-111-July_1_1979 01/01/2019 10:10:00 82.425

MH-111-July_1_1979 01/01/2019 10:15:00 82.424

MH-111-July_1_1979 01/01/2019 10:20:00 82.419

MH-111-July_1_1979 01/01/2019 10:25:00 82.417

MH-111-July_1_1979 01/01/2019 10:30:00 82.413

MH-111-July_1_1979 01/01/2019 10:35:00 82.411

MH-111-July_1_1979 01/01/2019 10:40:00 82.407

MH-111-July_1_1979 01/01/2019 10:45:00 82.405

MH-111-July_1_1979 01/01/2019 10:50:00 82.401

MH-111-July_1_1979 01/01/2019 10:55:00 82.399

MH-111-July_1_1979 01/01/2019 11:00:00 82.395

MH-111-July_1_1979 01/01/2019 11:05:00 82.392

MH-111-July_1_1979 01/01/2019 11:10:00 82.389

MH-111-July_1_1979 01/01/2019 11:15:00 82.387

MH-111-July_1_1979 01/01/2019 11:20:00 82.384

MH-111-July_1_1979 01/01/2019 11:25:00 82.381

MH-111-July_1_1979 01/01/2019 11:30:00 82.378

MH-111-July_1_1979 01/01/2019 11:35:00 82.375

MH-111-July_1_1979 01/01/2019 11:40:00 82.372

MH-111-July_1_1979 01/01/2019 11:45:00 82.369

MH-111-July_1_1979 01/01/2019 11:50:00 82.366

MH-111-July_1_1979 01/01/2019 11:55:00 82.364

MH-111-July_1_1979 01/01/2019 12:00:00 82.361

MH-111-July_1_1979 01/01/2019 12:05:00 82.359

MH-111-July_1_1979 01/01/2019 12:10:00 82.355

MH-111-July_1_1979 01/01/2019 12:15:00 82.353

MH-111-July_1_1979 01/01/2019 12:20:00 82.35

MH-111-July_1_1979 01/01/2019 12:25:00 82.348

MH-111-July_1_1979 01/01/2019 12:30:00 82.345

MH-111-July_1_1979 01/01/2019 12:35:00 82.343

MH-111-July_1_1979 01/01/2019 12:40:00 82.339

MH-111-July_1_1979 01/01/2019 12:45:00 82.337

MH-111-July_1_1979 01/01/2019 12:50:00 82.334

MH-111-July_1_1979 01/01/2019 12:55:00 82.332

MH-111-July_1_1979 01/01/2019 13:00:00 82.329

MH-111-July_1_1979 01/01/2019 13:05:00 82.327

MH-111-July_1_1979 01/01/2019 13:10:00 82.324

MH-111-July_1_1979 01/01/2019 13:15:00 82.321

MH-111-July_1_1979 01/01/2019 13:20:00 82.319

MH-111-July_1_1979 01/01/2019 13:25:00 82.316

MH-111-July_1_1979 01/01/2019 13:30:00 82.314

MH-111-July_1_1979 01/01/2019 13:35:00 82.311

MH-111-July_1_1979 01/01/2019 13:40:00 82.308

MH-111-July_1_1979 01/01/2019 13:45:00 82.306

MH-111-July_1_1979 01/01/2019 13:50:00 82.303

MH-111-July_1_1979 01/01/2019 13:55:00 82.301

MH-111-July_1_1979 01/01/2019 14:00:00 82.298

MH-111-July_1_1979 01/01/2019 14:05:00 82.296

MH-111-July_1_1979 01/01/2019 14:10:00 82.293

MH-111-July_1_1979 01/01/2019 14:15:00 82.291

MH-111-July_1_1979 01/01/2019 14:20:00 82.288

MH-111-July_1_1979 01/01/2019 14:25:00 82.286

MH-111-July_1_1979 01/01/2019 14:30:00 82.283

MH-111-July_1_1979 01/01/2019 14:35:00 82.281

MH-111-July_1_1979 01/01/2019 14:40:00 82.278

MH-111-July_1_1979 01/01/2019 14:45:00 82.276

MH-111-July_1_1979 01/01/2019 14:50:00 82.273

MH-111-July_1_1979 01/01/2019 14:55:00 82.271

MH-111-July_1_1979 01/01/2019 15:00:00 82.268

MH-111-July_1_1979 01/01/2019 15:05:00 82.266

MH-111-July_1_1979 01/01/2019 15:10:00 82.264

MH-111-July_1_1979 01/01/2019 15:15:00 82.261

MH-111-July_1_1979 01/01/2019 15:20:00 82.259

MH-111-July_1_1979 01/01/2019 15:25:00 82.257

MH-111-July_1_1979 01/01/2019 15:30:00 82.254

MH-111-July_1_1979 01/01/2019 15:35:00 82.252

MH-111-July_1_1979 01/01/2019 15:40:00 82.25

MH-111-July_1_1979 01/01/2019 15:45:00 82.247

MH-111-July_1_1979 01/01/2019 15:50:00 82.245

MH-111-July_1_1979 01/01/2019 15:55:00 82.243

MH-111-July_1_1979 01/01/2019 16:00:00 82.24

MH-111-July_1_1979 01/01/2019 16:05:00 82.238

MH-111-July_1_1979 01/01/2019 16:10:00 82.236

MH-111-July_1_1979 01/01/2019 16:15:00 82.233

MH-111-July_1_1979 01/01/2019 16:20:00 82.231

MH-111-July_1_1979 01/01/2019 16:25:00 82.229

MH-111-July_1_1979 01/01/2019 16:30:00 82.227

MH-111-July_1_1979 01/01/2019 16:35:00 82.224

MH-111-July_1_1979 01/01/2019 16:40:00 82.222

MH-111-July_1_1979 01/01/2019 16:45:00 82.22

MH-111-July_1_1979 01/01/2019 16:50:00 82.218

MH-111-July_1_1979 01/01/2019 16:55:00 82.215

MH-111-July_1_1979 01/01/2019 17:00:00 82.213

MH-111-July_1_1979 01/01/2019 17:05:00 82.211

MH-111-July_1_1979 01/01/2019 17:10:00 82.209

MH-111-July_1_1979 01/01/2019 17:15:00 82.207

MH-111-July_1_1979 01/01/2019 17:20:00 82.205

MH-111-July_1_1979 01/01/2019 17:25:00 82.202

MH-111-July_1_1979 01/01/2019 17:30:00 82.2

MH-111-July_1_1979 01/01/2019 17:35:00 82.198

MH-111-July_1_1979 01/01/2019 17:40:00 82.196

MH-111-July_1_1979 01/01/2019 17:45:00 82.194

MH-111-July_1_1979 01/01/2019 17:50:00 82.192

MH-111-July_1_1979 01/01/2019 17:55:00 82.189

MH-111-July_1_1979 01/01/2019 18:00:00 82.187

MH-111-July_1_1979 01/01/2019 18:05:00 82.185

MH-111-July_1_1979 01/01/2019 18:10:00 82.183

MH-111-July_1_1979 01/01/2019 18:15:00 82.181

MH-111-July_1_1979 01/01/2019 18:20:00 82.179

MH-111-July_1_1979 01/01/2019 18:25:00 82.177

MH-111-July_1_1979 01/01/2019 18:30:00 82.175

MH-111-July_1_1979 01/01/2019 18:35:00 82.173

MH-111-July_1_1979 01/01/2019 18:40:00 82.171

MH-111-July_1_1979 01/01/2019 18:45:00 82.169

MH-111-July_1_1979 01/01/2019 18:50:00 82.167

MH-111-July_1_1979 01/01/2019 18:55:00 82.164

MH-111-July_1_1979 01/01/2019 19:00:00 82.163

MH-111-July_1_1979 01/01/2019 19:05:00 82.16

MH-111-July_1_1979 01/01/2019 19:10:00 82.159

MH-111-July_1_1979 01/01/2019 19:15:00 82.156

MH-111-July_1_1979 01/01/2019 19:20:00 82.154

MH-111-July_1_1979 01/01/2019 19:25:00 82.152

MH-111-July_1_1979 01/01/2019 19:30:00 82.151

MH-111-July_1_1979 01/01/2019 19:35:00 82.148

MH-111-July_1_1979 01/01/2019 19:40:00 82.147

MH-111-July_1_1979 01/01/2019 19:45:00 82.144

MH-111-July_1_1979 01/01/2019 19:50:00 82.143

MH-111-July_1_1979 01/01/2019 19:55:00 82.141

MH-111-July_1_1979 01/01/2019 20:00:00 82.139

MH-111-July_1_1979 01/01/2019 20:05:00 82.137

MH-111-July_1_1979 01/01/2019 20:10:00 82.135

MH-111-July_1_1979 01/01/2019 20:15:00 82.133

MH-111-July_1_1979 01/01/2019 20:20:00 82.131

MH-111-July_1_1979 01/01/2019 20:25:00 82.129

MH-111-July_1_1979 01/01/2019 20:30:00 82.127

MH-111-July_1_1979 01/01/2019 20:35:00 82.125

MH-111-July_1_1979 01/01/2019 20:40:00 82.123

MH-111-July_1_1979 01/01/2019 20:45:00 82.121

MH-111-July_1_1979 01/01/2019 20:50:00 82.12

MH-111-July_1_1979 01/01/2019 20:55:00 82.118

MH-111-July_1_1979 01/01/2019 21:00:00 82.116

MH-111-July_1_1979 01/01/2019 21:05:00 82.114

MH-111-July_1_1979 01/01/2019 21:10:00 82.112

MH-111-July_1_1979 01/01/2019 21:15:00 82.11

MH-111-July_1_1979 01/01/2019 21:20:00 82.108

MH-111-July_1_1979 01/01/2019 21:25:00 82.106

MH-111-July_1_1979 01/01/2019 21:30:00 82.105

MH-111-July_1_1979 01/01/2019 21:35:00 82.103

MH-111-July_1_1979 01/01/2019 21:40:00 82.101

MH-111-July_1_1979 01/01/2019 21:45:00 82.099

MH-111-July_1_1979 01/01/2019 21:50:00 82.097

MH-111-July_1_1979 01/01/2019 21:55:00 82.095

MH-111-July_1_1979 01/01/2019 22:00:00 82.094

MH-111-July_1_1979 01/01/2019 22:05:00 82.092

MH-111-July_1_1979 01/01/2019 22:10:00 82.09

MH-111-July_1_1979 01/01/2019 22:15:00 82.088

MH-111-July_1_1979 01/01/2019 22:20:00 82.087

MH-111-July_1_1979 01/01/2019 22:25:00 82.084

MH-111-July_1_1979 01/01/2019 22:30:00 82.083

MH-111-July_1_1979 01/01/2019 22:35:00 82.081

MH-111-July_1_1979 01/01/2019 22:40:00 82.08

MH-111-July_1_1979 01/01/2019 22:45:00 82.077

MH-111-July_1_1979 01/01/2019 22:50:00 82.076

MH-111-July_1_1979 01/01/2019 22:55:00 82.074

MH-111-July_1_1979 01/01/2019 23:00:00 82.072

MH-111-July_1_1979 01/01/2019 23:05:00 82.07

MH-111-July_1_1979 01/01/2019 23:10:00 82.069

MH-111-July_1_1979 01/01/2019 23:15:00 82.067

MH-111-July_1_1979 01/01/2019 23:20:00 82.066

MH-111-July_1_1979 01/01/2019 23:25:00 82.064

MH-111-July_1_1979 01/01/2019 23:30:00 82.062

MH-111-July_1_1979 01/01/2019 23:35:00 82.06

MH-111-July_1_1979 01/01/2019 23:40:00 82.059

MH-111-July_1_1979 01/01/2019 23:45:00 82.057

MH-111-July_1_1979 01/01/2019 23:50:00 82.055

MH-111-July_1_1979 01/01/2019 23:55:00 82.053

MH-111-July_1_1979 01/02/2019 00:00:00 82.052

No_Rain 01/01/2019 00:00 0

No_Rain 12/31/2019 0:00 0

[REPORT]

;;Reporting Options

INPUT YES

CONTROLS NO

SUBCATCHMENTS ALL

NODES ALL

LINKS ALL

[TAGS]

Node 02_(CB) CB

Node 03_(CB) CB

Node 04_(CB) CB

Node 05_(CB) CB

Node 06_(CB) CB

Node 08_(CB) CB

Node 09_(CB) CB

Node 1_(RYCB) RY

Node 10_(CB) CB

Node 100_(STM) STM

Node 102_(STM) STM

Node 104_(STM) STM

Node 106_(STM) STM

Node 108_(STM) STM

Node 11_(CB) CB

Node 110_(STM) STM

Node 112_(STM) STM

Node 114_(STM) STM

Node	116_(STM)	STM
Node	118_(STM)	STM
Node	12_(CB)	CB
Node	120_(STM)	STM
Node	122_(STM)	STM
Node	124_(STM)	STM
Node	126_(STM)	STM
Node	128_(STM)	STM
Node	13_(CB)	CB
Node	130_(STM)	STM
Node	132_(STM)	STM
Node	134_(STM)	STM
Node	136_(STM)	STM
Node	138_(STM)	STM
Node	14_(CB)	CB
Node	140_(STM)	STM
Node	142_(STM)	STM
Node	144_(STM)	STM
Node	146_(STM)	STM
Node	148_(STM)	STM
Node	15_(CB)	CB
Node	150_(STM)	STM
Node	152_(STM)	STM
Node	154_(STM)	STM
Node	156_(STM)	STM
Node	158_(STM)	STM
Node	16_(CB)	CB
Node	160_(STM)	STM
Node	162_(STM)	STM

Node 164_(STM) STM

Node 166_(STM) STM

Node 168_(STM) STM

Node 17_(CB) CB

Node 170_(STM) STM

Node 18_(CB) CB

Node 19_(CB) CB

Node 20_(CB) CB

Node 21_(CB) CB

Node 2121_(STM) STM

Node 2142_(STM) STM

Node 2143_(STM) STM

Node 2144_(STM) STM

Node 22_(RYCB) RY

Node 23_(CB) CB

Node 24_(CB) CB

Node 25_(CB) CB

Node 26_(CB) CB

Node 27_(CB) CB

Node 28_(CB) CB

Node 29_(RYCB) RY

Node 30_(CB) CB

Node 31_(CB) CB

Node 32_(CB) CB

Node 33_(CB) CB

Node 34_(CB) CB

Node 35_(CB) CB

Node 36_(CB) CB

Node 37_(CB) CB

Node 38_(RYCB) RY

Node 39_(RYCB) RY

Node 40_(CB) CB

Node 41_(CB) CB

Node 42_(CB) CB

Node 43_(CB) CB

Node 44_(CB) CB

Node 45_(CB) CB

Node 46_(CB) CB

Node 47_(CB) CB

Node 48_(CB) CB

Node 49_(CB) CB

Node 50_(CB) CB

Node 51_(CB) CB

Node 52_(CB) CB

Node 53_(CB) CB

Node 54_(CB) CB

Node 55_(CB) CB

Node 57_(CB) CB

Node 58_(CB) CB

Node 98_(STM) STM

Node ELB_1_(RYCB) RY

Node ELB_10_(RYCB) RY

Node ELB_11_(RYCB) RY

Node ELB_12_(RYCB) RY

Node ELB_13_(RYCB) RY

Node ELB_14_(RYCB) RY

Node ELB_15_(RYCB) RY

Node ELB_16_(RYCB) RY

Node ELB_17_(RYCB) RY

Node ELB_18_(RYCB) RY

Node ELB_19_(RYCB) RY

Node ELB_2_(RYCB) RY

Node ELB_20_(RYCB) RY

Node ELB_21_(RYCB) RY

Node ELB_22_(RYCB) RY

Node ELB_23_(RYCB) RY

Node ELB_24_(RYCB) RY

Node ELB_25_(RYCB) RY

Node ELB_3_(RYCB) RY

Node ELB_4_(RYCB) RY

Node ELB_5_(RYCB) RY

Node ELB_6_(RYCB) RY

Node ELB_7_(RYCB) RY

Node ELB_8_(RYCB) RY

Node ELB_9_(RYCB) RY

Node Maj-01_2 Maj

Node Maj-02 Maj

Node Maj-02_2 Maj

Node Maj-03 Maj

Node Maj-04 Maj

Node Maj-04_2 Maj

Node Maj-05 Maj

Node Maj-05_2 Maj

Node Maj-06 Maj

Node Maj-06_2 Maj

Node Maj-07 Maj

Node Maj-08 Maj

Node	Maj-09	Maj
Node	Maj-10	Maj
Node	Maj-11	Maj
Node	Maj-12	Maj
Node	Maj-13	Maj
Node	Maj-14	Maj
Node	Maj-15	Maj
Node	Maj-15_2	Maj
Node	Maj-16	Maj
Node	Maj-17	Maj
Node	Maj-18_2	Maj
Node	Maj-19	Maj
Node	Maj-19_2	Maj
Node	Maj-20	Maj
Node	Maj-21	Maj
Node	Maj-23	Maj
Node	Maj-24	Maj
Node	Maj-25	Maj
Node	Maj-26	Maj
Node	Maj-27	Maj
Node	Maj-28	Maj
Node	Maj-29	Maj
Node	Maj-30	Maj
Node	Maj-31	Maj
Node	Maj-32	Maj
Node	Maj-33	Maj
Node	Maj-34	Maj
Node	Maj-34_2	Maj
Node	Maj-35	Maj

Node	Maj-36	Maj
Node	Maj-37	Maj
Node	Maj-38	Maj
Node	Maj-39	Maj
Node	Maj-40	Maj
Node	Maj-41	Maj
Node	Maj-42	Maj
Node	Maj-43	Maj
Node	Maj-44	Maj
Node	Maj-45	Maj
Node	Maj-46	Maj
Node	Maj-48_2	Maj
Node	Maj-50	Maj
Node	Maj-51	Maj
Node	Maj-52	Maj
Node	Maj-53	Maj
Node	Maj-54	Maj
Node	Maj-55	Maj
Node	Maj-56	Maj
Node	Maj-58	Maj
Node	Maj-60	Maj
Node	RYCB_1_(RYCB)	RY
Node	RYCB_10_(RYCB)	RY
Node	RYCB_11_(RYCB)	RY
Node	RYCB_12_(RYCB)	RY
Node	RYCB_13_(RYCB)	RY
Node	RYCB_14_(RYCB)	RY
Node	RYCB_15_(RYCB)	RY
Node	RYCB_18_(RYCB)	RY

Node RYCB_2_(RYCB) RY

Node RYCB_3_(RYCB) RY

Node RYCB_4_(RYCB) RY

Node RYCB_5_(RYCB) RY

Node RYCB_6_(RYCB) RY

Node RYCB_7_(RYCB) RY

Node RYCB_8_(RYCB) RY

Node RYCB_9_(RYCB) RY

Node Slope1 Maj

Node StartNullStruct2 RY

Node StartNullStruct3 STM

Node STM-251_(STM) STM

Node Structure_-_(18)_(RYCB) RY

Node TEE_1_(RYCB) RY

Node TEE_10_(RYCB) RY

Node TEE_11_(RYCB) RY

Node TEE_12_(RYCB) RY

Node TEE_13_(RYCB) RY

Node TEE_14_(RYCB) RY

Node TEE_15_(RYCB) RY

Node TEE_16_(RYCB) RY

Node TEE_17_(RYCB) RY

Node TEE_18_(RYCB) RY

Node TEE_19_(RYCB) RY

Node TEE_2_(RYCB) RY

Node TEE_20_(RYCB) RY

Node TEE_21_(RYCB) RY

Node TEE_22_(RYCB) RY

Node TEE_23_(RYCB) RY

Node TEE_24_(RYCB) RY

Node TEE_25_(RYCB) RY

Node TEE_26_(RYCB) RY

Node TEE_27_(RYCB) RY

Node TEE_28_(RYCB) RY

Node TEE_29_(RYCB) RY

Node TEE_3_(RYCB) RY

Node TEE_30_(RYCB) RY

Node TEE_31_(RYCB) RY

Node TEE_32_(RYCB) RY

Node TEE_33_(RYCB) RY

Node TEE_34_(RYCB) RY

Node TEE_35_(RYCB) RY

Node TEE_36_(RYCB) RY

Node TEE_37_(RYCB) RY

Node TEE_38_(RYCB) RY

Node TEE_39_(RYCB) RY

Node TEE_4_(RYCB) RY

Node TEE_40_(RYCB) RY

Node TEE_41_(RYCB) RY

Node TEE_42_(RYCB) RY

Node TEE_43_(RYCB) RY

Node TEE_43B_(RYCB) RY

Node TEE_44_(RYCB) RY

Node TEE_45_(RYCB) RY

Node TEE_5_(RYCB) RY

Node TEE_6_(RYCB) RY

Node TEE_7_(RYCB) RY

Node TEE_8_(RYCB) RY

Node	TEE_9_(RYCB)	RY
Node	Maj-01	Maj
Node	Maj-18	Maj
Node	Maj-22	Maj
Node	Maj-48	Maj
Node	Maj-49	Maj
Node	Maj-57	Maj
Node	Maj-59	Maj
Node	STM-111_(STM)	STM
Link	1_(STM)	STM
Link	10_(STM)	STM
Link	11_(STM)	STM
Link	12_(STM)	STM
Link	13_(STM)	STM
Link	14_(STM)	STM
Link	15_(10)_(STM)	STM
Link	15_(11)_(STM)	STM
Link	15_(12)_(STM)	STM
Link	15_(13)_(STM)	STM
Link	15_(14)_(STM)	STM
Link	15_(15)_(STM)	STM
Link	15_(16)_(STM)	STM
Link	15_(19)_(STM)	STM
Link	15_(20)_(STM)	STM
Link	15_(21)_(STM)	STM
Link	15_(22)_(STM)	STM
Link	15_(3)_(STM)	STM
Link	15_(4)_(STM)	STM
Link	15_(5)_(STM)	STM

Link	15_(9)_(STM)	STM
Link	2_(STM)	STM
Link	3_(STM)	STM
Link	4_(STM)	STM
Link	5_(STM)	STM
Link	6_(STM)	STM
Link	7_(1)_(STM)	STM
Link	7_(STM)	STM
Link	8_(STM)	STM
Link	9_(STM)	STM
Link	C1	Maj
Link	C1_1	Maj
Link	C1_2	Maj
Link	C10	Maj
Link	C11	Maj
Link	C12	Maj
Link	C13	Maj
Link	C14	Maj
Link	C15	Maj
Link	C16	Maj
Link	C17	Maj
Link	C18	Maj
Link	C18_2	Maj
Link	C18_3	Maj
Link	C18_4	Maj
Link	C18_5	Maj
Link	C18_6	Maj
Link	C18_7	Maj
Link	C18_8	Maj

Link	C18_9	Maj
Link	C19	Maj
Link	C2	Maj
Link	C2_1	Maj
Link	C2_2	Maj
Link	C20	Maj
Link	C21	Maj
Link	C22	Maj
Link	C23	Maj
Link	C24	Maj
Link	C25	Maj
Link	C26	Maj
Link	C27	Maj
Link	C27_1	Maj
Link	C27_2	Maj
Link	C28	Maj
Link	C29	Maj
Link	C3	Maj
Link	C30	Maj
Link	C31	Maj
Link	C32	Maj
Link	C33	Maj
Link	C34	Maj
Link	C35	Maj
Link	C36	Maj
Link	C37	Maj
Link	C38	Maj
Link	C39	Maj
Link	C4	Maj

Link	C4_1	Maj
Link	C4_2	Maj
Link	C40	Maj
Link	C41	Maj
Link	C42	Maj
Link	C43	Maj
Link	C44	Maj
Link	C45	Maj
Link	C46	Maj
Link	C47	Maj
Link	C48	Maj
Link	C49	Maj
Link	C5	Maj
Link	C5_1	Maj
Link	C5_2	Maj
Link	C50	Maj
Link	C50_1	Maj
Link	C50_2	Maj
Link	C51	Maj
Link	C52	Maj
Link	C53	Maj
Link	C54	Maj
Link	C55	Maj
Link	C56	Maj
Link	C57	Maj
Link	C58	Maj
Link	C59	Maj
Link	C6	Maj
Link	C6_1	Maj

Link C6_2 Maj

Link C60 Maj

Link C61 Maj

Link C62 Maj

Link C63 Maj

Link C64 Maj

Link C65 Maj

Link C66 Maj

Link C67 Maj

Link C68 Maj

Link C69 Maj

Link C7 Maj

Link C8 Maj

Link C9 Maj

Link Pipe_-_(1)_(RYCB)_1 RY

Link Pipe_-_(1)_(RYCB)_2 RY

Link Pipe_-_(10)_(RYCB) RY

Link Pipe_-_(100)_(RYCB) RY

Link Pipe_-_(101)_(RYCB) RY

Link Pipe_-_(103)_(1)_(RYCB) RY

Link Pipe_-_(103)_(RYCB) RY

Link Pipe_-_(109)_(RYCB) RY

Link Pipe_-_(11)_(RYCB) RY

Link Pipe_-_(110)_(RYCB) RY

Link Pipe_-_(111)_(RYCB) RY

Link Pipe_-_(114)_(RYCB) RY

Link Pipe_-_(117)_(RYCB) RY

Link Pipe_-_(118)_(RYCB) RY

Link Pipe_-_(119)_(RYCB) RY

Link Pipe_-_(120)_(RYCB) RY

Link Pipe_-_(121)_(RYCB) RY

Link Pipe_-_(122)_(RYCB) RY

Link Pipe_-_(123)_(RYCB) RY

Link Pipe_-_(124)_(RYCB) RY

Link Pipe_-_(125)_(RYCB) RY

Link Pipe_-_(126)_(RYCB) RY

Link Pipe_-_(127)_(RYCB) RY

Link Pipe_-_(128)_(RYCB) RY

Link Pipe_-_(129)_(RYCB) RY

Link Pipe_-_(130)_(RYCB) RY

Link Pipe_-_(131)_(RYCB) RY

Link Pipe_-_(132)_(RYCB) RY

Link Pipe_-_(133)_(RYCB) RY

Link Pipe_-_(134)_(RYCB) RY

Link Pipe_-_(137)_(RYCB) RY

Link Pipe_-_(138)_(RYCB) RY

Link Pipe_-_(139)_(RYCB) RY

Link Pipe_-_(14)_(RYCB) RY

Link Pipe_-_(140)_(RYCB) RY

Link Pipe_-_(141)_(RYCB) RY

Link Pipe_-_(142)_(RYCB) RY

Link Pipe_-_(143)_(RYCB) RY

Link Pipe_-_(144)_(RYCB) RY

Link Pipe_-_(145)_(RYCB) RY

Link Pipe_-_(146)_(RYCB) RY

Link Pipe_-_(147)_(RYCB) RY

Link Pipe_-_(148)_(RYCB) RY

Link Pipe_-_(149)_(RYCB) RY

Link Pipe_-_(15)_(RYCB) RY

Link Pipe_-_(150)_(RYCB) RY

Link Pipe_-_(151)_(RYCB) RY

Link Pipe_-_(152)_(RYCB) RY

Link Pipe_-_(153)_(RYCB) RY

Link Pipe_-_(154)_(RYCB) RY

Link Pipe_-_(155)_(RYCB) RY

Link Pipe_-_(156)_(1)_(RYCB) RY

Link Pipe_-_(156)_(RYCB) RY

Link Pipe_-_(157)_(RYCB) RY

Link Pipe_-_(158)_(RYCB) RY

Link Pipe_-_(159)_(RYCB) RY

Link Pipe_-_(16)_(RYCB) RY

Link Pipe_-_(160)_(RYCB) RY

Link Pipe_-_(161)_(RYCB) RY

Link Pipe_-_(162)_(RYCB) RY

Link Pipe_-_(164)_(RYCB) RY

Link Pipe_-_(165)_(RYCB) RY

Link Pipe_-_(17)_(RYCB) RY

Link Pipe_-_(19)_(RYCB) RY

Link Pipe_-_(2)_(RYCB) RY

Link Pipe_-_(22)_(RYCB) RY

Link Pipe_-_(23)_(RYCB) RY

Link Pipe_-_(24)_(RYCB) RY

Link Pipe_-_(25)_(RYCB) RY

Link Pipe_-_(27)_(RYCB) RY

Link Pipe_-_(73)_(RYCB) RY

Link Pipe_-_(74)_(RYCB) RY

Link Pipe_-_(77)_(RYCB) RY

Link Pipe_-_(87)_(RYCB) RY

Link Pipe_-_(88)_(RYCB) RY

Link Pipe_-_(89)_(RYCB) RY

Link Pipe_-_(9)_(RYCB) RY

Link Pipe_-_(90)_(RYCB) RY

Link Pipe_-_(93)_(RYCB) RY

Link Pipe_-_(94)_(RYCB) RY

Link Pipe_-_(95)_(RYCB) RY

Link Pipe_-_(96)_(RYCB) RY

Link Pipe_-_(98)_(RYCB) RY

Link Pipe_-_(99)_(RYCB) RY

Link STM-23_(STM) STM

Link STM-24_(STM) STM

Link STM-27_(STM) STM

Link STM-28_(STM) STM

Link STM-34_(1)_(1)_(STM) STM

Link STM-34_(1)_(STM) STM

Link STM-34_(STM) STM

Link STM-35_(STM) STM

Link STM-36_(STM) STM

Link STM-37_(STM) STM

Link STM-38_(STM) STM

Link STM-81_(STM) STM

Link STM-82_(STM) STM

Link STM-83_(STM) STM

Link CB-02 ICD

Link CB-03 ICD

Link CB-04 ICD

Link CB-05 ICD

Link	CB-06	ICD
Link	CB-08	ICD
Link	CB-09	ICD
Link	CB-10	ICD
Link	CB-11	ICD
Link	CB-12	ICD
Link	CB-13	ICD
Link	CB-14	ICD
Link	CB-15	ICD
Link	CB-16	ICD
Link	CB-17	ICD
Link	CB-18	ICD
Link	CB-19	ICD
Link	CB-20	ICD
Link	CB-21	ICD
Link	CB-23	ICD
Link	CB-24	ICD
Link	CB-25	ICD
Link	CB-26	ICD
Link	CB-27	ICD
Link	CB-28	ICD
Link	CB-30	ICD
Link	CB-31	ICD
Link	CB-32	ICD
Link	CB-33	ICD
Link	CB-34	ICD
Link	CB-35	ICD
Link	CB-36	ICD
Link	CB-37	ICD

Link	CB-40	ICD
Link	CB-41	ICD
Link	CB-42	ICD
Link	CB-43	ICD
Link	CB-44	ICD
Link	CB-45	ICD
Link	CB-46	ICD
Link	CB-47	ICD
Link	CB-48	ICD
Link	CB-49	ICD
Link	CB-50	ICD
Link	CB-51	ICD
Link	CB-52	ICD
Link	CB-53	ICD
Link	CB-54	ICD
Link	CB-55	ICD
Link	CB-57	ICD
Link	OR-02	Grate
Link	OR-03	Grate
Link	OR-04	Grate
Link	OR-05	Grate
Link	OR-06	Grate
Link	OR-08	Grate
Link	OR-09	Grate
Link	OR-10	Grate
Link	OR-11	Grate
Link	OR-12	Grate
Link	OR-13	Grate
Link	OR-14	Grate

Link	OR-15	Grate
Link	OR-16	Grate
Link	OR-17	Grate
Link	OR-18	Grate
Link	OR-19	Grate
Link	OR-20	Grate
Link	OR-21	Grate
Link	OR-23	Grate
Link	OR-24	Grate
Link	OR-25	Grate
Link	OR-26	Grate
Link	OR-27	Grate
Link	OR-28	Grate
Link	OR-30	Grate
Link	OR-31	Grate
Link	OR-32	Grate
Link	OR-33	Grate
Link	OR-34	Grate
Link	OR-35	Grate
Link	OR-36	Grate
Link	OR-37	Grate
Link	OR-40	Grate
Link	OR-41	Grate
Link	OR-42	Grate
Link	OR-43	Grate
Link	OR-44	Grate
Link	OR-45	Grate
Link	OR-46	Grate
Link	OR-47	Grate

Link OR-48 Grate

Link OR-49 Grate

Link OR-50 Grate

Link OR-51 Grate

Link OR-52 Grate

Link OR-53 Grate

Link OR-54 Grate

Link OR-55 Grate

Link OR-57 Grate

Link RYCB-01 ICD

Link RYCB-02 ICD

Link RYCB-03 ICD

Link RYCB-04 ICD

Link RYCB-06 ICD

Link RYCB-10 ICD

Link RYCB-18 ICD

Link RYCB-22 ICD

Link RYCB-29 ICD

Link RYCB-38 ICD

Link RYCB-39 ICD

[MAP]

DIMENSIONS 381264.26565 5033747.5339 381848.96735 5034901.0841

UNITS Meters

[COORDINATES]

;;Node X-Coord Y-Coord

;;---------- ---------- ----------

02_(CB) 381640.363 5033940.449

03_(CB)	381639.319	5033948.683
04_(CB)	381707.362	5033964.513
05_(CB)	381704.042	5033972.256
06_(CB)	381744.277	5033945.622
08_(CB)	381742.356	5034021.942
09_(CB)	381735.199	5034018.381
1_(RYCB)	381613.893	5033947.165
10_(CB)	381712.816	5034088.875
100_(STM)	381764.117	5033934.567
102_(STM)	381768.733	5033945.462
104_(STM)	381751.832	5033983.755
106_(STM)	381661.746	5033946.201
108_(STM)	381636.072	5033940.78
11_(CB)	381705.04	5034085.441
110_(STM)	381606.992	5033939.535
112_(STM)	381722.061	5034051.287
114_(STM)	381695.933	5034110.412
116_(STM)	381684.826	5034114.785
118_(STM)	381593.257	5034075.528
12_(CB)	381693.043	5034036.978
120_(STM)	381637.884	5034015.234
122_(STM)	381613.388	5034012.674
124_(STM)	381598.561	5034020.702
126_(STM)	381577.374	5034069.721
128_(STM)	381546.966	5034139.351
13_(CB)	381689.694	5034044.79
130_(STM)	381628.129	5034174.222
132_(STM)	381662.497	5034188.987
134_(STM)	381695.108	5034204.263

136_(STM)	381522.723	5034196.958
138_(STM)	381527.988	5034210.775
14_(CB)	381597.707	5034039.587
140_(STM)	381631.534	5034256.315
142_(STM)	381640.84	5034237.84
144_(STM)	381600.199	5034327.009
146_(STM)	381528.36	5034294.959
148_(STM)	381456.173	5034264.012
15_(CB)	381589.912	5034036.197
150_(STM)	381569.837	5034397.001
152_(STM)	381547.042	5034451.801
154_(STM)	381535.402	5034456.553
156_(STM)	381442.843	5034416.871
158_(STM)	381470.942	5034353.543
16_(CB)	381567.802	5034108.366
160_(STM)	381457.588	5034358.648
162_(STM)	381416.076	5034456.483
164_(STM)	381413.768	5034516.578
166_(STM)	381406.574	5034544.92
168_(STM)	381365.805	5034637.487
17_(CB)	381560.007	5034104.977
170_(STM)	381327.98	5034723.422
18_(CB)	381541.884	5034167.976
19_(CB)	381534.089	5034164.586
20_(CB)	381581.406	5034227.395
21_(CB)	381578.057	5034235.207
2121_(STM)	381797.506	5033862.116
2142_(STM)	381733.715	5033824.051
2143_(STM)	381710.028	5033827.852

2144_(STM)	381693.076	5033817.017
22_(RYCB)	381646.054	5034240.141
23_(CB)	381624.155	5034289.758
24_(CB)	381616.38	5034286.326
25_(CB)	381569.18	5034305.469
26_(CB)	381565.878	5034313.223
27_(CB)	381486.175	5034268.55
28_(CB)	381482.272	5034277.449
29_(RYCB)	381634.571	5034343.916
30_(CB)	381592.282	5034362.433
31_(CB)	381584.351	5034358.98
32_(CB)	381567.034	5034420.338
33_(CB)	381559.242	5034416.94
34_(CB)	381537.986	5034376.241
35_(CB)	381534.823	5034383.637
36_(CB)	381439.974	5034407.723
37_(CB)	381431.96	5034404.589
38_(RYCB)	381428.516	5034412.648
39_(RYCB)	381422.234	5034448.442
40_(CB)	381417.006	5034502.802
41_(CB)	381408.506	5034502.869
42_(CB)	381362.704	5034648.887
43_(CB)	381354.995	5034645.351
44_(CB)	381657.847	5034213.423
45_(CB)	381650.071	5034209.99
46_(CB)	381640.714	5034173.395
47_(CB)	381637.365	5034181.208
48_(CB)	381580.475	5034147.57
49_(CB)	381577.127	5034155.38

50_(CB)	381646.323	5034096.374
51_(CB)	381642.974	5034104.186
52_(CB)	381437.977	5034421.78
53_(CB)	381495.276	5034445.607
54_(CB)	381498.626	5034437.794
55_(CB)	381765.154	5033970.288
57_(CB)	381763.267	5033922.607
58_(CB)	381708.111	5033853.995
98_(STM)	381785.194	5033899.178
ELB_1_(RYCB)	381700.573	5033926.894
ELB_10_(RYCB)	381599.13	5034277.804
ELB_11_(RYCB)	381637.075	5034217.32
ELB_12_(RYCB)	381642.665	5034324.923
ELB_13_(RYCB)	381495.849	5034321.044
ELB_14_(RYCB)	381510.037	5034327.133
ELB_15_(RYCB)	381429.255	5034328.779
ELB_16_(RYCB)	381461.331	5034385.698
ELB_17_(RYCB)	381418.154	5034354.74
ELB_18_(RYCB)	381384.507	5034431.762
ELB_19_(RYCB)	381584.211	5034112.987
ELB_2_(RYCB)	381662.86	5033987.854
ELB_20_(RYCB)	381735.662	5034114.708
ELB_21_(RYCB)	381691.942	5034213.823
ELB_22_(RYCB)	381568.311	5034495.286
ELB_23_(RYCB)	381518.443	5034489.592
ELB_24_(RYCB)	381798.126	5033973.718
ELB_25_(RYCB)	381720.467	5033899.08
ELB_3_(RYCB)	381652.666	5033983.757
ELB_4_(RYCB)	381581.795	5033976.053

ELB_5_(RYCB)	381580.949	5033978.006
ELB_6_(RYCB)	381748.325	5034086.133
ELB_7_(RYCB)	381616.382	5034075.058
ELB_8_(RYCB)	381504.046	5034155.002
ELB_9_(RYCB)	381496.419	5034172.819
Maj-01_2	381331.798	5034706.095
Maj-02	381342.288	5034683.606
Maj-02_2	381353.136	5034660.68
Maj-03	381359.381	5034647.481
Maj-04	381387.564	5034583.352
Maj-04_2	381393.958	5034569.717
Maj-05	381401.951	5034550.69
Maj-05_2	381402.995	5034546.144
Maj-06	381411.465	5034523.018
Maj-06_2	381411.962	5034502.787
Maj-07	381413.465	5034468.686
Maj-08	381416.91	5034452.058
Maj-09	381432.186	5034414.406
Maj-10	381435.592	5034406.105
Maj-11	381442.75	5034417.427
Maj-12	381497.775	5034442.101
Maj-13	381540.5	5034456.444
Maj-14	381562.795	5034420.84
Maj-15	381573.401	5034393.553
Maj-15_2	381603.958	5034326.421
Maj-16	381536.878	5034380.349
Maj-17	381457.696	5034356.091
Maj-18_2	381633.162	5034339.357
Maj-19	381566.414	5034309.792

Maj-19_2	381591.329	5034320.826
Maj-20	381543.507	5034300.033
Maj-21	381484.13	5034275.269
Maj-23	381608.541	5034316.121
Maj-24	381621.369	5034287.607
Maj-25	381635.742	5034254.688
Maj-26	381580.14	5034232.359
Maj-27	381542.959	5034216.408
Maj-28	381537.056	5034166.524
Maj-29	381551.053	5034138.553
Maj-30	381575.916	5034151.186
Maj-31	381619.905	5034169.158
Maj-32	381640.736	5034178.892
Maj-33	381654.551	5034211.412
Maj-34	381664.566	5034188.961
Maj-34_2	381690.114	5034200.739
Maj-35	381565.153	5034106.303
Maj-36	381580.163	5034072.113
Maj-37	381594.925	5034037.553
Maj-38	381607.643	5034017.588
Maj-39	381627.215	5034016.837
Maj-40	381641.204	5034020.262
Maj-41	381691.979	5034042.056
Maj-42	381649.35	5034103.078
Maj-43	381686.268	5034117.921
Maj-44	381709.885	5034086.785
Maj-45	381722.3	5034055.112
Maj-46	381739.691	5034019.616
Maj-48_2	381781.911	5034001.189

Maj-50	381640.747	5033943.96
Maj-51	381672.455	5033954.954
Maj-52	381721.553	5033975.967
Maj-53	381753.038	5033988.766
Maj-54	381762.396	5033967.954
Maj-55	381756.035	5033936.811
Maj-56	381494.997	5034256.092
Maj-58	381766.255	5033924.846
Maj-60	381528.438	5034203.663
RYCB_1_(RYCB)	381734.202	5033941.191
RYCB_10_(RYCB)	381442.319	5034298.46
RYCB_11_(RYCB)	381578.806	5034356.559
RYCB_12_(RYCB)	381550.039	5034423.66
RYCB_13_(RYCB)	381398.692	5034399.905
RYCB_14_(RYCB)	381595.739	5034432.854
RYCB_15_(RYCB)	381427.566	5034450.578
RYCB_18_(RYCB)	381670.55	5034150.009
RYCB_2_(RYCB)	381725.556	5034014.74
RYCB_3_(RYCB)	381612.277	5033977.722
RYCB_4_(RYCB)	381781.005	5034010.848
RYCB_5_(RYCB)	381699.781	5034083.118
RYCB_6_(RYCB)	381529.161	5034097.261
RYCB_7_(RYCB)	381502.626	5034236.326
RYCB_8_(RYCB)	381544.063	5034177.384
RYCB_9_(RYCB)	381674.723	5034252.795
Slope1	381588.486	5034360.411
StartNullStruct2	381672.996	5033992.169
StartNullStruct3	381785.825	5033999.81
STM-251_(STM)	381634.726	5034343.823

Structure_-_(18)_(RYCB) 381684.258 5034115.629

TEE_1_(RYCB) 381692.419 5034000.507

TEE_10_(RYCB) 381510.902 5034139.24

TEE_11_(RYCB) 381526.967 5034102.206

TEE_12_(RYCB) 381481.223 5034207.753

TEE_13_(RYCB) 381474.067 5034224.19

TEE_14_(RYCB) 381499.643 5034235.058

TEE_15_(RYCB) 381507.237 5034238.213

TEE_16_(RYCB) 381540.082 5034252.461

TEE_17_(RYCB) 381560.408 5034261.179

TEE_18_(RYCB) 381580.624 5034269.812

TEE_19_(RYCB) 381620.112 5034209.907

TEE_2_(RYCB) 381633.017 5033978.954

TEE_20_(RYCB) 381594.914 5034199.197

TEE_21_(RYCB) 381574.635 5034190.459

TEE_22_(RYCB) 381660.032 5034285.809

TEE_23_(RYCB) 381468.715 5034309.368

TEE_24_(RYCB) 381523.065 5034332.731

TEE_25_(RYCB) 381550.359 5034344.355

TEE_26_(RYCB) 381486.817 5034396.509

TEE_27_(RYCB) 381513.832 5034408.124

TEE_28_(RYCB) 381412.802 5034367.12

TEE_29_(RYCB) 381601.179 5034120.349

TEE_3_(RYCB) 381565.175 5034014.419

TEE_30_(RYCB) 381621.361 5034128.918

TEE_31_(RYCB) 381642.632 5034138.054

TEE_32_(RYCB) 381666.847 5034148.422

TEE_33_(RYCB) 381674.215 5034151.582

TEE_34_(RYCB) 381701.138 5034163.137

TEE_35_(RYCB)	381712.266	5034167.926
TEE_36_(RYCB)	381587.21	5034452.17
TEE_37_(RYCB)	381604.181	5034413.374
TEE_38_(RYCB)	381612.601	5034394.104
TEE_39_(RYCB)	381631.287	5034351.415
TEE_4_(RYCB)	381547.662	5034054.776
TEE_40_(RYCB)	381490.353	5034477.632
TEE_41_(RYCB)	381457.485	5034463.531
TEE_42_(RYCB)	381821.397	5033920.61
TEE_43_(RYCB)	381812.604	5033915.548
TEE_43B_(RYCB)	381788.954	5033901.424
TEE_44_(RYCB)	381764.223	5033886.665
TEE_45_(RYCB)	381733.885	5033868.603
TEE_5_(RYCB)	381530.407	5034094.432
TEE_6_(RYCB)	381764.108	5034050.504
TEE_7_(RYCB)	381626.502	5034052.072
TEE_8_(RYCB)	381647.239	5034060.747
TEE_9_(RYCB)	381667.469	5034069.361
Maj-01	381325.332	5034719.952
Maj-18	381637.356	5034341.21
Maj-22	381471.715	5034270.038
Maj-48	381786.497	5034003.157
Maj-49	381597.176	5033939.913
Maj-57	381697.2	5034204
Maj-59	381784.088	5033896.145
Maj-Park	381713.84	5033832.09
STM-111_(STM)	381695.19	5033799.968
B1_Stor	381381.8	5034524.754
B2_Stor	381428.703	5034532.135

B3_Stor 381440.972 5034513.72

[VERTICES]

;;Link X-Coord Y-Coord

;;---------- ---------- ----------

C11 381471.189 5034350.534

C14 381535.443 5034458.427

C16 381548.571 5034453.532

C27_1 381530.457 5034209.127

C27_2 381525.808 5034196.544

C31 381544.884 5034166.116

C40 381698.314 5034112.953

C57 381771.794 5033946.005

C58 381736.37 5034014.996

C60 381504.843 5034236.868

C60 381519.73 5034216.354

C60 381524.654 5034209.673

C63 381705.821 5034083.025

C65 381548.805 5034099.267

C67 381582.176 5034355.673

C69 381565.796 5034418.085

C7 381415.014 5034455.824

RYCB-18 381686.563 5034115.935

[POLYGONS]

;;Subcatchment X-Coord Y-Coord

;;---------- ---------- ----------

A10 381531.292 5034480.532

A10 381531.128 5034496.069

A10	381563.233	5034509.833
A10	381605.188	5034413.776
A10	381592.341	5034408.174
A10	381570.154	5034459.096
A10	381567.314	5034471.541
A10	381536.247	5034482.099
A10	381531.292	5034480.532
A11	381550.593	5034424.99
A11	381554.875	5034415.041
A11	381550.639	5034413.231
A11	381552.014	5034410.123
A11	381543.267	5034404.984
A11	381478.565	5034378.543
A11	381464.501	5034373.697
A11	381461.563	5034380.465
A11	381454.288	5034383.802
A11	381456.724	5034391.402
A11	381453.346	5034399.308
A11	381522.435	5034428.826
A11	381539.434	5034435.2
A11	381540.743	5034435.76
A11	381543.807	5034428.59
A11	381550.593	5034424.99
A12i	381603.575	5034325.904
A12i	381573.156	5034395.733
A12i	381589.032	5034403.102
A12i	381587.702	5034406.152
A12i	381592.446	5034408.22
A12i	381618.261	5034349.82

A12i	381624.954	5034352.71
A12i	381626.891	5034348.374
A12i	381632.397	5034351
A12i	381636.88	5034340.972
A12i	381603.575	5034325.904
A12ii	381573.156	5034395.733
A12ii	381603.575	5034325.904
A12ii	381590.101	5034319.808
A12ii	381582.52	5034337.492
A12ii	381585.089	5034338.593
A12ii	381579.688	5034351.312
A12ii	381579.992	5034357.472
A12ii	381573.409	5034361.654
A12ii	381568.251	5034373.511
A12ii	381566.784	5034377.24
A12ii	381567.964	5034381.301
A12ii	381569.546	5034386.864
A12ii	381573.156	5034395.733
A13	381530.192	5034320.178
A13	381515.153	5034313.748
A13	381509.139	5034327.791
A13	381503.199	5034341.647
A13	381569.774	5034370.189
A13	381573.409	5034361.654
A13	381579.992	5034357.472
A13	381579.648	5034351.406
A13	381585.024	5034338.57
A13	381582.52	5034337.492
A13	381580.785	5034341.808

A13	381558.955	5034332.475
A13	381530.192	5034320.178
A14	381447.103	5034284.654
A14	381417.289	5034354.315
A14	381424.587	5034357.425
A14	381431.404	5034360.379
A14	381437.223	5034347.192
A14	381439.373	5034337.785
A14	381464.724	5034330.505
A14	381472.2	5034328.358
A14	381503.199	5034341.647
A14	381509.139	5034327.791
A14	381512.599	5034319.721
A14	381515.151	5034313.747
A14	381493.903	5034304.663
A14	381466.674	5034293.021
A14	381447.103	5034284.654
A15i	381567.244	5034310.002
A15i	381567.244	5034310.002
A15i	381472.296	5034269.296
A15i	381462.819	5034291.373
A15i	381493.903	5034304.663
A15i	381515.153	5034313.748
A15i	381546.959	5034327.346
A15i	381557.84	5034331.998
A15i	381567.244	5034310.002
A15ii	381472.296	5034269.296
A15ii	381567.244	5034310.002
A15ii	381567.244	5034310.002

A15ii	381577.731	5034285.474
A15ii	381499.928	5034251.954
A15ii	381498.003	5034256.002
A15ii	381492.764	5034253.757
A15ii	381494.517	5034249.639
A15ii	381482.768	5034244.552
A15ii	381472.789	5034268.148
A15ii	381472.296	5034269.296
A16i	381590.176	5034319.842
A16i	381590.1	5034319.81
A16i	381568.321	5034310.464
A16i	381567.244	5034310.002
A16i	381557.84	5034331.998
A16i	381580.785	5034341.808
A16i	381590.176	5034319.842
A16ii	381567.244	5034310.002
A16ii	381568.321	5034310.464
A16ii	381590.1	5034319.81
A16ii	381590.176	5034319.842
A16ii	381600.673	5034295.291
A16ii	381577.792	5034285.449
A16ii	381569.597	5034304.499
A16ii	381567.244	5034310.002
A17	381605.188	5034413.776
A17	381632.595	5034350.922
A17	381626.871	5034348.366
A17	381624.954	5034352.71
A17	381618.261	5034349.82
A17	381592.434	5034408.246

A17	381605.188	5034413.776
A17ii	381603.575	5034325.904
A17ii	381634.735	5034255.086
A17ii	381634.856	5034255.039
A17ii	381625.735	5034258.586
A17ii	381621.236	5034263.563
A17ii	381617.344	5034261.852
A17ii	381610.829	5034276.619
A17ii	381611.967	5034284.565
A17ii	381606.225	5034288.349
A17ii	381602.709	5034296.167
A17ii	381600.627	5034295.272
A17ii	381590.101	5034319.808
A17ii	381603.575	5034325.904
A18i	381634.856	5034255.039
A18i	381634.735	5034255.086
A18i	381603.575	5034325.904
A18i	381636.881	5034340.972
A18i	381642.191	5034328.913
A18i	381628.738	5034322.599
A18i	381638.99	5034299.797
A18i	381644.221	5034287.878
A18i	381654.793	5034263.788
A18i	381634.856	5034255.039
A19	381642.191	5034328.913
A19	381694.037	5034211.811
A19	381685.879	5034207.767
A19	381680.622	5034205.162
A19	381676.575	5034214.333

A19	381662.063	5034247.212
A19	381656.121	5034260.762
A19	381643.608	5034289.274
A19	381633.156	5034313.091
A19	381628.751	5034322.572
A19	381642.191	5034328.913
A1i	381386.831	5034583.572
A1i	381357.656	5034649.855
A1i	381324.99	5034719.106
A1i	381335.973	5034723.941
A1i	381395.985	5034587.599
A1i	381386.831	5034583.572
A1ii	381324.99	5034719.106
A1ii	381357.656	5034649.855
A1ii	381386.831	5034583.572
A1ii	381377.678	5034579.544
A1ii	381351.366	5034639.322
A1ii	381348.253	5034637.952
A1ii	381345.965	5034636.945
A1ii	381331.724	5034634.567
A1ii	381331.943	5034634.725
A1ii	381332.151	5034634.897
A1ii	381332.347	5034635.083
A1ii	381332.529	5034635.281
A1ii	381332.698	5034635.492
A1ii	381332.853	5034635.713
A1ii	381332.991	5034635.944
A1ii	381333.114	5034636.185
A1ii	381333.22	5034636.433

A1ii	381333.31	5034636.687
A1ii	381333.381	5034636.947
A1ii	381333.435	5034637.212
A1ii	381333.471	5034637.479
A1ii	381333.489	5034637.748
A1ii	381333.488	5034638.018
A1ii	381331.194	5034646.567
A1ii	381323.214	5034649.432
A1ii	381332.596	5034655.255
A1ii	381338.741	5034658.094
A1ii	381314.008	5034714.27
A1ii	381324.99	5034719.106
A20i	381634.488	5034254.988
A20i	381543.015	5034215.565
A20i	381534.487	5034235.449
A20i	381614.086	5034269.236
A20i	381617.343	5034261.859
A20i	381621.236	5034263.563
A20i	381625.735	5034258.586
A20i	381634.488	5034254.988
A20ii	381543.081	5034215.412
A20ii	381634.809	5034254.918
A20ii	381631.345	5034245.978
A20ii	381631.936	5034239.319
A20ii	381635.518	5034231.203
A20ii	381551.831	5034194.996
A20ii	381543.081	5034215.412
A21	381611.967	5034284.565
A21	381610.829	5034276.619

A21	381614.086	5034269.236
A21	381570.95	5034251.169
A21	381525.154	5034231.426
A21	381514.208	5034225.655
A21	381507.271	5034235.078
A21	381499.928	5034251.954
A21	381602.709	5034296.167
A21	381606.078	5034288.284
A21	381611.967	5034284.565
A22	381498.141	5034256.061
A22	381507.271	5034235.078
A22	381520.172	5034217.553
A22	381516.384	5034212.577
A22	381502.03	5034232.083
A22	381492.764	5034253.757
A22	381498.141	5034256.061
A23	381509.221	5034177.744
A23	381495.8	5034171.963
A23	381472.748	5034224.61
A23	381467.289	5034237.916
A23	381482.787	5034244.56
A23	381494.55	5034249.652
A23	381502.03	5034232.083
A23	381509.754	5034221.839
A23	381508.667	5034221.039
A23	381500.297	5034204.233
A23	381504.385	5034189.257
A23	381509.221	5034177.744
A24i	381549.922	5034138.762

A24i	381526.351	5034193.134
A24i	381526.04	5034194.114
A24i	381525.797	5034195.112
A24i	381525.623	5034196.125
A24i	381525.518	5034197.147
A24i	381525.484	5034198.174
A24i	381525.52	5034199.201
A24i	381525.627	5034200.223
A24i	381525.803	5034201.235
A24i	381526.048	5034202.233
A24i	381526.361	5034203.212
A24i	381526.74	5034204.167
A24i	381527.183	5034205.094
A24i	381527.689	5034205.989
A24i	381528.255	5034206.846
A24i	381528.879	5034207.663
A24i	381529.557	5034208.435
A24i	381530.286	5034209.159
A24i	381531.063	5034209.832
A24i	381531.884	5034210.449
A24i	381532.746	5034211.009
A24i	381533.644	5034211.509
A24i	381534.574	5034211.946
A24i	381543.015	5034215.565
A24i	381543.081	5034215.412
A24i	381546.561	5034207.293
A24i	381551.831	5034194.996
A24i	381543.421	5034191.366
A24i	381541.924	5034190.72

A24i	381545.113	5034183.28
A24i	381543.011	5034177.3
A24i	381549.92	5034172.284
A24i	381556.16	5034157.729
A24i	381552.823	5034154.734
A24i	381558.434	5034147.596
A24i	381560.273	5034143.444
A24i	381549.922	5034138.762
A24ii	381543.015	5034215.565
A24ii	381534.574	5034211.946
A24ii	381533.644	5034211.509
A24ii	381532.746	5034211.009
A24ii	381531.884	5034210.449
A24ii	381531.063	5034209.832
A24ii	381530.286	5034209.159
A24ii	381529.557	5034208.435
A24ii	381528.879	5034207.663
A24ii	381528.255	5034206.846
A24ii	381527.689	5034205.989
A24ii	381527.183	5034205.094
A24ii	381526.74	5034204.167
A24ii	381526.361	5034203.212
A24ii	381526.048	5034202.233
A24ii	381525.803	5034201.235
A24ii	381525.627	5034200.223
A24ii	381525.52	5034199.201
A24ii	381525.484	5034198.174
A24ii	381525.518	5034197.147
A24ii	381525.623	5034196.125

A24ii	381525.797	5034195.112
A24ii	381526.04	5034194.114
A24ii	381526.351	5034193.134
A24ii	381549.922	5034138.762
A24ii	381529.865	5034130.075
A24ii	381504.385	5034189.257
A24ii	381500.297	5034204.233
A24ii	381508.667	5034221.039
A24ii	381509.633	5034221.75
A24ii	381516.384	5034212.577
A24ii	381520.078	5034217.429
A24ii	381514.208	5034225.655
A24ii	381525.154	5034231.426
A24ii	381534.487	5034235.449
A24ii	381539.469	5034223.837
A24ii	381543.015	5034215.565
A25	381635.518	5034231.203
A25	381646.455	5034206.422
A25	381642.567	5034204.706
A25	381643.209	5034203.155
A25	381553.216	5034164.599
A25	381549.92	5034172.284
A25	381543.011	5034177.3
A25	381545.108	5034183.386
A25	381541.921	5034190.773
A25	381551.831	5034194.996
A25	381631.649	5034229.445
A25	381635.518	5034231.203
A26i	381634.809	5034254.919

A26i	381664.016	5034188.923
A26i	381651.238	5034195.586
A26i	381650.63	5034196.963
A26i	381646.508	5034195.185
A26i	381642.567	5034204.706
A26i	381646.455	5034206.422
A26i	381633.932	5034234.796
A26i	381631.936	5034239.319
A26i	381631.345	5034245.978
A26i	381634.809	5034254.919
A26ii	381664.016	5034188.923
A26ii	381634.809	5034254.919
A26ii	381634.856	5034255.039
A26ii	381654.793	5034263.788
A26ii	381670.667	5034227.717
A26ii	381680.688	5034205.013
A26ii	381694.039	5034211.806
A26ii	381697.738	5034203.163
A26ii	381664.852	5034188.487
A26ii	381664.016	5034188.923
A27i	381664.852	5034188.487
A27i	381620.034	5034169.224
A27i	381611.297	5034189.483
A27i	381643.332	5034203.207
A27i	381646.742	5034195.247
A27i	381650.63	5034196.963
A27i	381651.238	5034195.586
A27i	381664.852	5034188.487
A27ii	381620.034	5034169.224

A27ii	381664.852	5034188.487
A27ii	381697.738	5034203.163
A27ii	381699.512	5034199.142
A27ii	381703.079	5034191.06
A27ii	381706.635	5034183.003
A27ii	381667.371	5034165.673
A27ii	381664.02	5034173.466
A27ii	381658.59	5034171.287
A27ii	381661.861	5034163.285
A27ii	381628.695	5034149.041
A27ii	381625.277	5034156.999
A27ii	381620.398	5034168.379
A27ii	381620.034	5034169.224
A28i	381620.03	5034169.222
A28i	381560.238	5034143.523
A28i	381558.434	5034147.596
A28i	381552.823	5034154.734
A28i	381556.16	5034157.729
A28i	381553.216	5034164.599
A28i	381581.28	5034176.62
A28i	381590.287	5034180.481
A28i	381611.19	5034189.437
A28i	381620.03	5034169.222
A28ii	381560.238	5034143.523
A28ii	381620.03	5034169.222
A28ii	381620.398	5034168.379
A28ii	381628.702	5034149.044
A28ii	381570.953	5034124.316
A28ii	381567.791	5034132.197

A28ii	381563.39	5034130.431
A28ii	381562.044	5034139.444
A28ii	381560.238	5034143.523
A29	381495.658	5034171.847
A29	381509.292	5034177.575
A29	381520.124	5034152.567
A29	381540.518	5034105.476
A29	381532.563	5034102.017
A29	381526.506	5034100.783
A29	381495.658	5034171.847
A2i	381412.794	5034468.768
A2i	381412.624	5034470.116
A2i	381412.041	5034475.937
A2i	381411.783	5034481.782
A2i	381411.85	5034487.633
A2i	381412.242	5034493.471
A2i	381412.69	5034499.907
A2i	381412.722	5034506.359
A2i	381412.338	5034512.8
A2i	381411.539	5034519.203
A2i	381410.329	5034525.544
A2i	381408.711	5034531.794
A2i	381406.694	5034537.927
A2i	381404.285	5034543.917
A2i	381386.832	5034583.57
A2i	381395.985	5034587.599
A2i	381415.298	5034543.454
A2i	381417.7	5034536.541
A2i	381419.65	5034529.488

A2i	381421.14	5034522.323
A2i	381422.162	5034515.077
A2i	381422.713	5034507.78
A2i	381422.791	5034500.463
A2i	381422.395	5034493.155
A2i	381421.526	5034485.889
A2i	381421.306	5034480.562
A2i	381421.4	5034475.23
A2i	381421.825	5034469.744
A2i	381412.794	5034468.768
A2ii	381386.832	5034583.57
A2ii	381404.285	5034543.917
A2ii	381406.694	5034537.927
A2ii	381408.711	5034531.794
A2ii	381410.329	5034525.544
A2ii	381411.539	5034519.203
A2ii	381412.338	5034512.8
A2ii	381412.722	5034506.359
A2ii	381412.69	5034499.907
A2ii	381412.242	5034493.471
A2ii	381411.85	5034487.633
A2ii	381411.783	5034481.782
A2ii	381412.041	5034475.937
A2ii	381412.624	5034470.116
A2ii	381412.794	5034468.768
A2ii	381402.85	5034467.694
A2ii	381402.139	5034473.849
A2ii	381401.777	5034480.035
A2ii	381401.765	5034486.231

A2ii	381402.102	5034492.419
A2ii	381402.639	5034498.464
A2ii	381402.771	5034504.531
A2ii	381402.496	5034510.594
A2ii	381401.816	5034516.625
A2ii	381400.734	5034522.597
A2ii	381399.254	5034528.482
A2ii	381397.384	5034534.256
A2ii	381395.131	5034539.891
A2ii	381377.679	5034579.541
A2ii	381386.832	5034583.57
A3	381425.905	5034450.972
A3	381531.128	5034496.071
A3	381531.292	5034480.532
A3	381527.053	5034479.191
A3	381493.352	5034464.605
A3	381451.065	5034445.777
A3	381436.796	5034440.638
A3	381433.819	5034447.569
A3	381428.166	5034445.311
A3	381425.905	5034450.972
A30	381526.565	5034100.795
A30	381532.563	5034102.017
A30	381548.474	5034108.935
A30	381550.866	5034103.433
A30	381534.376	5034096.263
A30	381528.997	5034095.171
A30	381526.565	5034100.795
A31	381592.957	5033994.457

A31	381583.104	5033977.186
A31	381580.359	5033977.041
A31	381534.283	5034083.013
A31	381528.997	5034095.171
A31	381534.376	5034096.263
A31	381542.909	5034099.979
A31	381577.987	5034019.272
A31	381583.698	5034007.256
A31	381591.935	5033995.041
A31	381592.957	5033994.457
A32i	381549.922	5034138.762
A32i	381579.085	5034071.762
A32i	381558.972	5034063.02
A32i	381542.909	5034099.979
A32i	381550.866	5034103.433
A32i	381548.472	5034108.939
A32i	381540.517	5034105.478
A32i	381529.865	5034130.075
A32i	381549.922	5034138.762
A32ii	381579.085	5034071.762
A32ii	381549.948	5034138.774
A32ii	381560.273	5034143.444
A32ii	381562.044	5034139.444
A32ii	381563.39	5034130.431
A32ii	381567.791	5034132.197
A32ii	381574.164	5034116.309
A32ii	381572.521	5034109.076
A32ii	381578.962	5034105.309
A32ii	381583.973	5034093.75

A32ii	381585.829	5034089.482
A32ii	381584.397	5034085.879
A32ii	381582.507	5034081.119
A32ii	381579.085	5034071.762
A33i	381607.69	5034016.517
A33i	381607.338	5034016.66
A33i	381606.429	5034017.102
A33i	381605.552	5034017.605
A33i	381604.71	5034018.165
A33i	381603.908	5034018.781
A33i	381603.15	5034019.45
A33i	381602.438	5034020.168
A33i	381601.776	5034020.932
A33i	381601.168	5034021.74
A33i	381600.615	5034022.586
A33i	381600.12	5034023.468
A33i	381599.686	5034024.381
A33i	381579.093	5034071.743
A33i	381588.029	5034068.502
A33i	381594.759	5034069.099
A33i	381602.598	5034072.459
A33i	381621.758	5034029.049
A33i	381612.521	5034028.874
A33i	381611.043	5034024.972
A33i	381609.318	5034020.435
A33i	381607.69	5034016.517
A33ii	381579.077	5034071.756
A33ii	381599.686	5034024.381
A33ii	381600.12	5034023.468

A33ii	381600.615	5034022.586
A33ii	381601.168	5034021.74
A33ii	381601.776	5034020.932
A33ii	381602.438	5034020.168
A33ii	381603.15	5034019.45
A33ii	381603.908	5034018.781
A33ii	381604.71	5034018.165
A33ii	381605.552	5034017.605
A33ii	381606.429	5034017.102
A33ii	381607.338	5034016.66
A33ii	381607.69	5034016.517
A33ii	381605.999	5034012.447
A33ii	381593.066	5033994.395
A33ii	381591.935	5033995.041
A33ii	381583.698	5034007.256
A33ii	381577.993	5034019.275
A33ii	381558.974	5034063.016
A33ii	381579.077	5034071.756
A34i	381723.329	5034054.572
A34i	381639.998	5034018.866
A34i	381638.115	5034018.123
A34i	381636.191	5034017.492
A34i	381634.233	5034016.975
A34i	381632.249	5034016.573
A34i	381630.244	5034016.289
A34i	381628.226	5034016.123
A34i	381614.234	5034015.383
A34i	381613.223	5034015.364
A34i	381612.213	5034015.412

A34i	381611.209	5034015.529
A34i	381610.215	5034015.713
A34i	381609.235	5034015.964
A34i	381608.275	5034016.28
A34i	381607.69	5034016.517
A34i	381609.318	5034020.435
A34i	381612.521	5034028.874
A34i	381621.758	5034029.049
A34i	381630.507	5034029.725
A34i	381632.048	5034025.707
A34i	381633.576	5034026.109
A34i	381635.08	5034026.593
A34i	381636.556	5034027.159
A34i	381637.998	5034027.804
A34i	381632.965	5034039.378
A34i	381702.128	5034069.506
A34i	381705.586	5034061.921
A34i	381709.474	5034063.637
A34i	381714.153	5034058.186
A34i	381723.329	5034054.572
A34ii	381607.69	5034016.517
A34ii	381608.275	5034016.28
A34ii	381609.235	5034015.964
A34ii	381610.215	5034015.713
A34ii	381611.209	5034015.529
A34ii	381612.213	5034015.412
A34ii	381613.223	5034015.364
A34ii	381614.234	5034015.383
A34ii	381628.226	5034016.123

A34ii	381630.244	5034016.289
A34ii	381632.249	5034016.573
A34ii	381634.233	5034016.975
A34ii	381636.191	5034017.492
A34ii	381638.115	5034018.123
A34ii	381639.998	5034018.866
A34ii	381723.329	5034054.572
A34ii	381719.791	5034045.445
A34ii	381720.368	5034038.953
A34ii	381716.479	5034037.237
A34ii	381719.87	5034029.337
A34ii	381648.09	5033998.713
A34ii	381644.337	5033997.195
A34ii	381632.243	5033994.489
A34ii	381608.729	5033993.33
A34ii	381593.066	5033994.395
A34ii	381606.057	5034012.585
A34ii	381607.69	5034016.517
A35i	381686.171	5034116.734
A35i	381685.113	5034116.703
A35i	381684.101	5034116.602
A35i	381683.098	5034116.432
A35i	381682.109	5034116.195
A35i	381681.138	5034115.891
A35i	381680.19	5034115.522
A35i	381582.839	5034073.787
A35i	381579.282	5034072.261
A35i	381582.507	5034081.119
A35i	381584.397	5034085.879

A35i	381585.879	5034089.366
A35i	381582.579	5034096.956
A35i	381647.532	5034125.182
A35i	381671.763	5034135.619
A35i	381673.014	5034136.12
A35i	381676.106	5034128.004
A35i	381682.089	5034129.703
A35i	381684.95	5034121.102
A35i	381685.722	5034117.779
A35i	381686.171	5034116.734
A35ii	381579.281	5034072.261
A35ii	381582.839	5034073.787
A35ii	381680.19	5034115.522
A35ii	381681.138	5034115.891
A35ii	381682.109	5034116.195
A35ii	381683.098	5034116.432
A35ii	381684.101	5034116.602
A35ii	381685.113	5034116.703
A35ii	381686.13	5034116.736
A35ii	381690.943	5034105.623
A35ii	381686.1	5034103.486
A35ii	381687.701	5034102.442
A35ii	381690.743	5034095.549
A35ii	381621.386	5034066.026
A35ii	381616.071	5034078.235
A35ii	381594.759	5034069.099
A35ii	381588.029	5034068.502
A35ii	381579.101	5034071.768
A35ii	381579.281	5034072.261

A36	381578.962	5034105.309
A36	381572.521	5034109.076
A36	381574.164	5034116.309
A36	381570.953	5034124.316
A36	381628.695	5034149.041
A36	381661.833	5034163.273
A36	381667.39	5034149.76
A36	381673.014	5034136.12
A36	381671.763	5034135.619
A36	381655.941	5034128.836
A36	381582.582	5034096.957
A36	381578.962	5034105.309
A37	381664.069	5034173.742
A37	381682.089	5034129.703
A37	381676.106	5034128.004
A37	381658.59	5034171.287
A37	381664.069	5034173.742
A38	381745.243	5034095.526
A38	381731.801	5034089.59
A38	381722.915	5034109.719
A38	381717.369	5034121.774
A38	381711.003	5034135.091
A38	381695.388	5034143.054
A38	381679.809	5034138.443
A38	381678.698	5034137.988
A38	381667.371	5034165.673
A38	381706.466	5034182.972
A38	381745.243	5034095.526
A39i	381723.308	5034054.581

A39i	381699.823	5034107.792
A39i	381699.381	5034108.709
A39i	381698.878	5034109.593
A39i	381698.316	5034110.441
A39i	381697.698	5034111.249
A39i	381697.026	5034112.013
A39i	381696.305	5034112.73
A39i	381695.536	5034113.396
A39i	381694.724	5034114.009
A39i	381693.872	5034114.565
A39i	381692.985	5034115.063
A39i	381692.066	5034115.499
A39i	381691.119	5034115.871
A39i	381690.149	5034116.179
A39i	381689.161	5034116.42
A39i	381688.159	5034116.594
A39i	381687.147	5034116.699
A39i	381686.267	5034116.731
A39i	381685.83	5034117.825
A39i	381684.998	5034120.954
A39i	381678.698	5034137.988
A39i	381679.809	5034138.443
A39i	381695.388	5034143.054
A39i	381711.003	5034135.091
A39i	381717.369	5034121.774
A39i	381718.471	5034119.639
A39i	381722.915	5034109.719
A39i	381731.799	5034089.596
A39i	381743.35	5034063.437

A39i	381723.308	5034054.581
A39ii	381686.267	5034116.731
A39ii	381687.147	5034116.699
A39ii	381688.159	5034116.594
A39ii	381689.161	5034116.42
A39ii	381690.149	5034116.179
A39ii	381691.119	5034115.871
A39ii	381692.066	5034115.499
A39ii	381692.985	5034115.063
A39ii	381693.872	5034114.565
A39ii	381694.724	5034114.009
A39ii	381695.536	5034113.396
A39ii	381696.305	5034112.73
A39ii	381697.026	5034112.013
A39ii	381697.698	5034111.249
A39ii	381698.316	5034110.441
A39ii	381698.878	5034109.593
A39ii	381699.381	5034108.709
A39ii	381699.823	5034107.792
A39ii	381723.308	5034054.581
A39ii	381714.153	5034058.186
A39ii	381709.474	5034063.637
A39ii	381705.477	5034061.918
A39ii	381698.78	5034077.094
A39ii	381700.697	5034083.527
A39ii	381693.974	5034088.23
A39ii	381687.701	5034102.442
A39ii	381686.1	5034103.486
A39ii	381690.744	5034105.535

A39ii	381686.267	5034116.731
A4	381412.811	5034468.77
A4	381421.825	5034469.744
A4	381421.666	5034471.785
A4	381421.996	5034468.268
A4	381422.467	5034464.976
A4	381422.944	5034462.427
A4	381423.363	5034460.249
A4	381424.283	5034456.664
A4	381424.51	5034455.577
A4	381425.905	5034450.972
A4	381428.166	5034445.311
A4	381433.819	5034447.569
A4	381436.998	5034440.722
A4	381447.236	5034444.398
A4	381455.754	5034424.132
A4	381432.252	5034414.084
A4	381419.416	5034444.108
A4	381417.189	5034450.155
A4	381415.336	5034456.328
A4	381413.864	5034462.602
A4	381412.811	5034468.77
A40	381621.386	5034066.026
A40	381662.094	5034083.267
A40	381690.716	5034095.538
A40	381693.968	5034088.244
A40	381700.697	5034083.527
A40	381698.831	5034077.225
A40	381702.208	5034069.573

A40	381632.99	5034039.389
A40	381621.386	5034066.026
A41	381616.019	5034078.356
A41	381637.998	5034027.804
A41	381636.454	5034027.133
A41	381635.015	5034026.57
A41	381633.544	5034026.094
A41	381632.048	5034025.707
A41	381630.471	5034029.819
A41	381621.758	5034029.049
A41	381618.854	5034035.628
A41	381616.498	5034040.564
A41	381612.427	5034050.189
A41	381602.577	5034072.506
A41	381616.019	5034078.356
A42i	381752.52	5033988.394
A42i	381723.321	5034054.551
A42i	381743.359	5034063.417
A42i	381767.382	5034009.019
A42i	381769.257	5034004.646
A42i	381782.794	5034010.445
A42i	381786.165	5034002.806
A42i	381752.52	5033988.394
A42ii	381723.329	5034054.572
A42ii	381752.52	5033988.394
A42ii	381740.112	5033983.079
A42ii	381735.054	5033995.152
A42ii	381728.327	5034010.394
A42ii	381730.178	5034016.726

A42ii	381723.331	5034021.466
A42ii	381716.47	5034037.26
A42ii	381720.368	5034038.953
A42ii	381719.776	5034045.612
A42ii	381723.329	5034054.572
A43	381658.29	5033971.559
A43	381652.974	5033984.733
A43	381650.434	5033983.765
A43	381645.443	5033997.642
A43	381655.556	5034001.733
A43	381719.905	5034029.352
A43	381723.331	5034021.466
A43	381730.257	5034016.76
A43	381728.308	5034010.436
A43	381731.729	5034002.815
A43	381668.635	5033975.791
A43	381658.29	5033971.559
A44	381587.259	5033961.173
A44	381580.359	5033977.041
A44	381583.104	5033977.186
A44	381593.066	5033994.395
A44	381608.729	5033993.33
A44	381632.243	5033994.489
A44	381644.337	5033997.195
A44	381645.441	5033997.641
A44	381650.431	5033983.764
A44	381652.974	5033984.733
A44	381658.352	5033971.585
A44	381647.327	5033967.806

A44	381635.91	5033965.77
A44	381588.359	5033961.652
A44	381587.259	5033961.173
A45i	381587.259	5033961.173
A45i	381588.359	5033961.652
A45i	381588.217	5033961.59
A45i	381588.359	5033961.652
A45i	381635.985	5033965.776
A45i	381647.327	5033967.806
A45i	381658.352	5033971.585
A45i	381664.49	5033974.096
A45i	381672.844	5033954.229
A45i	381662.673	5033950.069
A45i	381656.714	5033948.114
A45i	381650.651	5033946.512
A45i	381644.505	5033945.268
A45i	381638.296	5033944.386
A45i	381632.047	5033943.869
A45i	381607.333	5033942.562
A45i	381605.976	5033942.469
A45i	381604.627	5033942.296
A45i	381603.29	5033942.044
A45i	381601.971	5033941.712
A45i	381600.673	5033941.303
A45i	381599.403	5033940.817
A45i	381596.633	5033939.613
A45i	381587.259	5033961.173
A45ii	381596.633	5033939.613
A45ii	381599.403	5033940.817

A45ii	381600.673	5033941.303
A45ii	381601.971	5033941.712
A45ii	381603.29	5033942.044
A45ii	381604.627	5033942.296
A45ii	381605.976	5033942.469
A45ii	381607.333	5033942.562
A45ii	381632.047	5033943.869
A45ii	381638.296	5033944.386
A45ii	381644.505	5033945.268
A45ii	381650.651	5033946.512
A45ii	381656.714	5033948.114
A45ii	381662.673	5033950.069
A45ii	381672.844	5033954.229
A45ii	381676.204	5033945.164
A45ii	381662.718	5033939.873
A45ii	381652.843	5033937.109
A45ii	381646.586	5033935.831
A45ii	381639.597	5033934.819
A45ii	381632.558	5033934.232
A45ii	381607.711	5033932.918
A45ii	381602.883	5033931.977
A45ii	381600.42	5033930.904
A45ii	381596.633	5033939.613
A46i	381740.213	5033983.122
A46i	381740.056	5033982.939
A46i	381672.844	5033954.229
A46i	381672.521	5033955.1
A46i	381664.49	5033974.096
A46i	381668.606	5033975.86

A46i	381678.748	5033980.123
A46i	381731.69	5034002.773
A46i	381740.213	5033983.122
A46ii	381672.844	5033954.229
A46ii	381740.056	5033982.939
A46ii	381740.213	5033983.122
A46ii	381752.566	5033988.289
A46ii	381744.291	5033974.348
A46ii	381746.161	5033969.986
A46ii	381724.771	5033960.685
A46ii	381728.024	5033953.086
A46ii	381694.461	5033938.716
A46ii	381689.214	5033950.742
A46ii	381676.204	5033945.164
A46ii	381672.844	5033954.229
A47	381745.243	5034095.526
A47	381782.791	5034010.45
A47	381769.257	5034004.647
A47	381767.382	5034009.019
A47	381763.615	5034017.555
A47	381735.495	5034081.222
A47	381731.8	5034089.593
A47	381745.243	5034095.526
A48	381786.259	5034002.846
A48	381790.062	5033993.977
A48	381776.62	5033988.214
A48	381793.627	5033949.261
A48	381755.829	5033934.716
A48	381753.569	5033951.672

A48	381746.309	5033957.612
A48	381743.579	5033956.274
A48	381741.476	5033959.954
A48	381738.326	5033966.562
A48	381746.161	5033969.986
A48	381744.291	5033974.348
A48	381752.566	5033988.289
A48	381786.259	5034002.846
A49	381707.071	5033928.476
A49	381700.017	5033925.509
A49	381694.461	5033938.716
A49	381728.024	5033953.086
A49	381724.769	5033960.689
A49	381730.49	5033963.138
A49	381738.326	5033966.562
A49	381741.476	5033959.954
A49	381743.579	5033956.274
A49	381742.194	5033955.418
A49	381740.869	5033954.471
A49	381739.612	5033953.436
A49	381738.428	5033952.318
A49	381737.323	5033951.122
A49	381736.301	5033949.854
A49	381735.368	5033948.52
A49	381734.527	5033947.126
A49	381733.782	5033945.677
A49	381733.138	5033944.182
A49	381732.038	5033943.711
A49	381733.678	5033939.884

A49	381707.071	5033928.476
A50	381746.309	5033957.612
A50	381753.569	5033951.672
A50	381755.829	5033934.716
A50	381726.439	5033921.508
A50	381725.162	5033923.592
A50	381722.078	5033934.91
A50	381733.678	5033939.884
A50	381732.038	5033943.711
A50	381733.138	5033944.182
A50	381733.537	5033945.108
A50	381733.847	5033945.804
A50	381734.238	5033946.564
A50	381734.592	5033947.234
A50	381735.037	5033947.971
A50	381735.431	5033948.611
A50	381735.929	5033949.323
A50	381736.36	5033949.928
A50	381736.913	5033950.614
A50	381737.376	5033951.18
A50	381737.985	5033951.839
A50	381738.474	5033952.361
A50	381739.145	5033952.994
A50	381739.649	5033953.466
A50	381740.396	5033954.081
A50	381740.895	5033954.489
A50	381741.769	5033955.115
A50	381742.207	5033955.427
A50	381743.579	5033956.274

A50	381746.309	5033957.612
A51	381726.418	5033921.499
A51	381755.829	5033934.716
A51	381785.386	5033946.409
A51	381793.627	5033949.261
A51	381797.388	5033937.885
A51	381795.808	5033924.099
A51	381781.903	5033913.459
A51	381777.427	5033920.956
A51	381769.864	5033916.069
A51	381770.494	5033915.014
A51	381774.311	5033908.62
A51	381761.475	5033902.013
A51	381757.54	5033901.457
A51	381745.005	5033899.685
A51	381733.121	5033910.597
A51	381726.418	5033921.499
A52	381789.561	5033900.633
A52	381781.834	5033896.02
A52	381769.864	5033916.069
A52	381777.427	5033920.956
A52	381789.561	5033900.633
A53	381722.078	5033934.91
A53	381725.162	5033923.592
A53	381732.761	5033910.927
A53	381745.005	5033899.685
A53	381761.475	5033902.013
A53	381773.281	5033908.005
A53	381774.44	5033908.697

A53	381781.834	5033896.02
A53	381733.358	5033867.077
A53	381707.071	5033928.476
A53	381722.078	5033934.91
A54	381789.558	5033900.625
A54	381781.903	5033913.459
A54	381782.932	5033914.073
A54	381795.808	5033924.099
A54	381797.388	5033937.885
A54	381793.252	5033950.395
A54	381778.504	5033983.819
A54	381776.62	5033988.214
A54	381790.062	5033993.975
A54	381822.39	5033920.729
A54	381789.558	5033900.625
A5i	381432.252	5034414.084
A5i	381455.786	5034424.057
A5i	381464.369	5034404.032
A5i	381522.435	5034428.826
A5i	381453.346	5034399.308
A5i	381456.724	5034391.402
A5i	381454.288	5034383.802
A5i	381461.563	5034380.465
A5i	381464.501	5034373.697
A5i	381466.593	5034368.637
A5i	381461.678	5034366.533
A5i	381460.265	5034359.751
A5i	381458.035	5034356.257
A5i	381457.532	5034356.791

A5i	381456.947	5034357.497
A5i	381456.41	5034358.239
A5i	381455.921	5034359.013
A5i	381455.483	5034359.818
A5i	381455.098	5034360.649
A5i	381432.252	5034414.084
A5ii	381412.794	5034468.768
A5ii	381413.864	5034462.602
A5ii	381415.336	5034456.328
A5ii	381417.189	5034450.155
A5ii	381419.416	5034444.108
A5ii	381432.252	5034414.084
A5ii	381455.098	5034360.649
A5ii	381455.483	5034359.818
A5ii	381455.921	5034359.013
A5ii	381456.41	5034358.239
A5ii	381456.947	5034357.497
A5ii	381457.532	5034356.791
A5ii	381458.027	5034356.243
A5ii	381457.889	5034356.028
A5ii	381455.23	5034353.398
A5ii	381447.444	5034340.784
A5ii	381446.034	5034335.872
A5ii	381439.373	5034337.785
A5ii	381437.223	5034347.192
A5ii	381431.404	5034360.379
A5ii	381397.323	5034438.703
A5ii	381409.135	5034443.769
A5ii	381406.699	5034450.733

A5ii	381404.738	5034457.846
A5ii	381403.261	5034465.075
A5ii	381402.907	5034467.7
A5ii	381412.794	5034468.768
A6	381417.244	5034354.295
A6	381398.694	5034397.404
A6	381382.967	5034432.55
A6	381397.323	5034438.703
A6	381431.404	5034360.379
A6	381417.244	5034354.295
A7i	381573.115	5034395.633
A7i	381473.864	5034353.167
A7i	381472.982	5034352.817
A7i	381472.077	5034352.526
A7i	381471.156	5034352.297
A7i	381470.221	5034352.13
A7i	381469.277	5034352.026
A7i	381468.328	5034351.985
A7i	381467.378	5034352.008
A7i	381466.433	5034352.095
A7i	381465.495	5034352.245
A7i	381464.569	5034352.457
A7i	381463.66	5034352.731
A7i	381462.771	5034353.066
A7i	381461.906	5034353.459
A7i	381461.07	5034353.909
A7i	381460.266	5034354.414
A7i	381459.497	5034354.972
A7i	381458.768	5034355.581

A7i	381458.081	5034356.236
A7i	381460.265	5034359.751
A7i	381461.663	5034366.527
A7i	381466.593	5034368.637
A7i	381464.501	5034373.697
A7i	381478.565	5034378.543
A7i	381543.267	5034404.984
A7i	381552.014	5034410.123
A7i	381553.865	5034405.938
A7i	381558.052	5034407.79
A7i	381560.351	5034402.517
A7i	381565.33	5034399.258
A7i	381573.156	5034395.733
A7i	381573.115	5034395.633
A7ii	381458.027	5034356.243
A7ii	381458.768	5034355.581
A7ii	381459.497	5034354.972
A7ii	381460.266	5034354.414
A7ii	381461.07	5034353.909
A7ii	381461.906	5034353.459
A7ii	381462.771	5034353.066
A7ii	381463.66	5034352.731
A7ii	381464.569	5034352.457
A7ii	381465.495	5034352.245
A7ii	381466.433	5034352.095
A7ii	381467.378	5034352.008
A7ii	381468.328	5034351.985
A7ii	381469.277	5034352.026
A7ii	381470.221	5034352.13

A7ii	381471.156	5034352.297
A7ii	381472.077	5034352.526
A7ii	381472.982	5034352.817
A7ii	381473.864	5034353.167
A7ii	381573.115	5034395.633
A7ii	381569.546	5034386.864
A7ii	381567.964	5034381.301
A7ii	381566.784	5034377.24
A7ii	381569.708	5034370.161
A7ii	381472.2	5034328.358
A7ii	381464.724	5034330.505
A7ii	381446.034	5034335.872
A7ii	381447.444	5034340.784
A7ii	381455.23	5034353.398
A7ii	381457.889	5034356.028
A7ii	381458.027	5034356.243
A8i	381539.134	5034457.074
A8i	381538.17	5034457.216
A8i	381537.199	5034457.296
A8i	381536.224	5034457.313
A8i	381535.251	5034457.267
A8i	381534.283	5034457.158
A8i	381533.323	5034456.986
A8i	381532.377	5034456.753
A8i	381531.448	5034456.459
A8i	381530.54	5034456.106
A8i	381455.755	5034424.132
A8i	381447.235	5034444.4
A8i	381451.065	5034445.777

A8i	381510.203	5034471.898
A8i	381527.053	5034479.191
A8i	381536.247	5034482.099
A8i	381545.867	5034478.83
A8i	381539.895	5034461.259
A8i	381539.134	5034457.074
A8ii	381539.134	5034457.074
A8ii	381538.374	5034452.896
A8ii	381542.855	5034442.499
A8ii	381538.657	5034440.641
A8ii	381540.745	5034435.761
A8ii	381539.404	5034435.27
A8ii	381522.435	5034428.826
A8ii	381464.369	5034404.032
A8ii	381455.786	5034424.057
A8ii	381530.54	5034456.106
A8ii	381531.448	5034456.459
A8ii	381532.377	5034456.753
A8ii	381533.323	5034456.986
A8ii	381534.283	5034457.158
A8ii	381535.251	5034457.267
A8ii	381536.224	5034457.313
A8ii	381537.199	5034457.296
A8ii	381538.17	5034457.216
A8ii	381539.134	5034457.074
A9i	381573.156	5034395.733
A9i	381550.598	5034447.402
A9i	381550.238	5034448.313
A9i	381549.818	5034449.199

A9i	381549.341	5034450.055
A9i	381548.807	5034450.878
A9i	381548.22	5034451.663
A9i	381547.582	5034452.407
A9i	381546.896	5034453.107
A9i	381546.165	5034453.761
A9i	381545.392	5034454.364
A9i	381544.581	5034454.915
A9i	381543.735	5034455.41
A9i	381542.858	5034455.848
A9i	381541.954	5034456.227
A9i	381541.027	5034456.546
A9i	381540.08	5034456.801
A9i	381539.119	5034456.994
A9i	381539.895	5034461.259
A9i	381545.867	5034478.83
A9i	381567.314	5034471.541
A9i	381570.363	5034458.178
A9i	381592.341	5034408.174
A9i	381587.702	5034406.152
A9i	381589.032	5034403.102
A9i	381585.165	5034401.277
A9i	381573.156	5034395.733
A9ii	381539.119	5034456.994
A9ii	381540.08	5034456.801
A9ii	381541.027	5034456.546
A9ii	381541.954	5034456.227
A9ii	381542.858	5034455.848
A9ii	381543.735	5034455.41

A9ii	381544.581	5034454.915
A9ii	381545.392	5034454.364
A9ii	381546.165	5034453.761
A9ii	381546.896	5034453.107
A9ii	381547.582	5034452.407
A9ii	381548.22	5034451.663
A9ii	381548.807	5034450.878
A9ii	381549.341	5034450.055
A9ii	381549.818	5034449.199
A9ii	381550.238	5034448.313
A9ii	381550.598	5034447.402
A9ii	381573.156	5034395.733
A9ii	381565.33	5034399.258
A9ii	381560.351	5034402.517
A9ii	381558.087	5034407.805
A9ii	381553.865	5034405.938
A9ii	381550.663	5034413.177
A9ii	381554.942	5034415.069
A9ii	381550.593	5034424.99
A9ii	381543.767	5034428.681
A9ii	381538.648	5034440.663
A9ii	381542.828	5034442.487
A9ii	381538.374	5034452.896
A9ii	381539.119	5034456.994
B1	381382.967	5034432.55
B1	381300.46	5034616.904
B1	381306.314	5034623.312
B1	381331.724	5034634.567
B1	381345.964	5034636.945

B1	381389.639	5034537.477
B1	381391.747	5034532.199
B1	381393.497	5034526.791
B1	381394.88	5034521.278
B1	381395.89	5034515.685
B1	381396.522	5034510.037
B1	381396.774	5034504.359
B1	381396.644	5034498.677
B1	381396.133	5034493.016
B1	381395.726	5034485.529
B1	381395.824	5034478.032
B1	381396.426	5034470.558
B1	381397.528	5034463.141
B1	381399.127	5034455.815
B1	381401.214	5034448.613
B1	381403.781	5034441.568
B1	381382.967	5034432.55
B1ii	381345.964	5034636.944
B1ii	381351.366	5034639.322
B1ii	381395.133	5034539.889
B1ii	381397.3	5034534.499
B1ii	381399.115	5034528.981
B1ii	381400.571	5034523.358
B1ii	381401.66	5034517.652
B1ii	381402.379	5034511.888
B1ii	381402.725	5034506.09
B1ii	381402.697	5034500.281
B1ii	381402.293	5034494.487
B1ii	381401.79	5034487.126

B1ii	381401.784	5034479.748
B1ii	381402.275	5034472.386
B1ii	381403.261	5034465.075
B1ii	381404.738	5034457.846
B1ii	381406.699	5034450.733
B1ii	381409.135	5034443.769
B1ii	381403.814	5034441.488
B1ii	381401.522	5034447.684
B1ii	381399.602	5034454.006
B1ii	381398.06	5034460.429
B1ii	381396.901	5034466.933
B1ii	381396.154	5034473.427
B1ii	381395.777	5034479.953
B1ii	381395.77	5034486.49
B1ii	381396.133	5034493.016
B1ii	381396.644	5034498.677
B1ii	381396.774	5034504.359
B1ii	381396.522	5034510.037
B1ii	381395.89	5034515.685
B1ii	381394.88	5034521.278
B1ii	381393.497	5034526.791
B1ii	381391.747	5034532.199
B1ii	381389.639	5034537.477
B1ii	381345.964	5034636.944
B2	381530.741	5034583.975
B2	381424.704	5034522.35
B2	381316.325	5034768.58
B2	381315.387	5034770.71
B2	381447.869	5034848.65

B2	381463.21	5034813.696
B2	381436.808	5034798.092
B2	381530.741	5034583.975
B3i	381431.785	5034453.492
B3i	381430.333	5034457.869
B3i	381429.155	5034462.326
B3i	381428.255	5034466.848
B3i	381427.638	5034471.418
B3i	381427.305	5034476.016
B3i	381427.257	5034480.627
B3i	381427.326	5034481.699
B3i	381428.245	5034489.879
B3i	381428.351	5034492.892
B3i	381428.717	5034500.592
B3i	381428.593	5034508.299
B3i	381427.978	5034515.982
B3i	381426.875	5034523.611
B3i	381530.743	5034583.97
B3i	381563.223	5034509.829
B3i	381431.785	5034453.492
B3ii	381427.177	5034522.719
B3ii	381428.155	5034514.546
B3ii	381428.66	5034506.33
B3ii	381428.69	5034498.098
B3ii	381428.245	5034489.879
B3ii	381427.326	5034481.699
B3ii	381427.295	5034476.908
B3ii	381427.577	5034472.125
B3ii	381428.17	5034467.371

B3ii	381429.073	5034462.666
B3ii	381430.281	5034458.029
B3ii	381431.785	5034453.492
B3ii	381426.008	5034451.003
B3ii	381425.905	5034450.972
B3ii	381424.51	5034455.577
B3ii	381424.283	5034456.664
B3ii	381423.363	5034460.249
B3ii	381422.944	5034462.427
B3ii	381422.467	5034464.976
B3ii	381421.996	5034468.268
B3ii	381421.444	5034474.16
B3ii	381421.289	5034480.075
B3ii	381421.533	5034485.988
B3ii	381422.397	5034493.242
B3ii	381422.789	5034500.537
B3ii	381422.709	5034507.842
B3ii	381422.157	5034515.127
B3ii	381421.134	5034522.36
B3ii	381419.645	5034529.512
B3ii	381417.697	5034536.553
B3ii	381415.298	5034543.454
B3ii	381424.704	5034522.34
B3ii	381426.926	5034523.496
B3ii	381427.177	5034522.719
B4i	381691.588	5033945.198
B4i	381699.904	5033925.461
B4i	381707.071	5033928.476
B4i	381733.358	5033867.077

B4i	381726.731	5033863.113
B4i	381649.852	5033817.212
B4i	381602.985	5033925.012
B4i	381605.53	5033926.1
B4i	381608.677	5033926.961
B4i	381632.876	5033928.241
B4i	381640.276	5033928.858
B4i	381647.625	5033929.921
B4i	381654.461	5033931.331
B4i	381664.627	5033934.177
B4i	381686.036	5033942.851
B4i	381691.588	5033945.198
B4ii	381600.42	5033930.904
B4ii	381602.883	5033931.977
B4ii	381607.711	5033932.918
B4ii	381632.558	5033934.232
B4ii	381639.597	5033934.819
B4ii	381646.586	5033935.831
B4ii	381652.843	5033937.109
B4ii	381662.718	5033939.873
B4ii	381676.204	5033945.164
B4ii	381678.395	5033939.755
B4ii	381691.563	5033945.188
B4ii	381690.549	5033944.759
B4ii	381686.036	5033942.851
B4ii	381664.627	5033934.177
B4ii	381654.461	5033931.331
B4ii	381647.625	5033929.921
B4ii	381640.276	5033928.858

B4ii 381632.876 5033928.241

B4ii 381608.677 5033926.961

B4ii 381605.53 5033926.1

B4ii 381602.985 5033925.012

B4ii 381600.42 5033930.904

B4iii 381676.204 5033945.164

B4iii 381689.214 5033950.742

B4iii 381691.563 5033945.188

B4iii 381678.395 5033939.755

B4iii 381676.204 5033945.164

C1 381295.775 5034755.874

C1 381316.325 5034768.58

C1 381335.973 5034723.941

C1 381314.105 5034714.313

C1 381298.068 5034750.52

C1 381290.843 5034752.831

C1 381295.775 5034755.874

C2 381447.104 5034284.654

C2 381462.819 5034291.373

C2 381482.826 5034244.577

C2 381467.309 5034237.869

C2 381447.104 5034284.654

[SYMBOLS]

;;Gage X-Coord Y-Coord

;;---------- ---------- ----------

[PROFILES]

;;Name Links

;;---------- ----------

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" Pipe_-_(141)_(RYCB) Pipe_-_(142)_(RYCB) Pipe_-_(143)_(RYCB) Pipe_-_(144)_(RYCB) C31

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" OR19 CB-21 15_(11)_(STM) 8_(STM) 9_(STM)

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" 10_(STM) 11_(STM) 12_(STM) 13_(STM) STM-23_(STM)

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" STM-24_(STM)

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" C1_1 C1_2 C2_1 C2_2 CB-06

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" CB-43 15_(19)_(STM) 15_(20)_(STM) 15_(21)_(STM) 15_(22)_(STM)

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" 15_(14)_(STM) 15_(15)_(STM) 15_(16)_(STM) 4_(STM) STM-83_(STM)

"Profile 003. Junction RYCB_6_(1)_(9)_(RYCB) to Junction 112_(STM)" Pipe_-_(145)_(RYCB) Pipe_-_(146)_(RYCB) Pipe_-_(147)_(RYCB) Pipe_-_(148)_(RYCB) Pipe_-_(10)_(RYCB)

"Profile 003. Junction RYCB_6_(1)_(9)_(RYCB) to Junction 112_(STM)" Pipe_-_(11)_(RYCB) RYCB-18 15_(4)_(STM) 15_(5)_(STM)

"Profile 004. Junction RYCB_6_(1)_(13)_(RYCB) to Junction 104_(STM)" C50 Pipe_-_(99)_(RYCB) Pipe_-_(100)_(RYCB) C59 C50_2

"Profile 004. Junction RYCB_6_(1)_(13)_(RYCB) to Junction 104_(STM)" C55 OR44 CB-56

"Profile 005. Junction RYCB_6_(1)_(21)_(RYCB) to Junction 144_(STM)" Pipe_-_(110)_(RYCB) Pipe_-_(111)_(RYCB) Pipe_-_(19)_(RYCB) C27 C24

"Profile 005. Junction RYCB_6_(1)_(21)_(RYCB) to Junction 144_(STM)" OR-15 CB-26

"Profile 006. Junction Maj-04 to Junction 164_(STM)" C4_1 C4_2 C5_1 C5_2 C6_2

"Profile 006. Junction Maj-04 to Junction 164_(STM)" OR4 CB-41

"Profile 007. Junction RYCB_6_(1)_(24)_(RYCB) to Junction 136_(STM)" Pipe_-_(114)_(RYCB) Pipe_-_(150)_(RYCB) Pipe_-_(151)_(RYCB) Pipe_-_(152)_(RYCB) Pipe_-_(14)_(RYCB)

"Profile 007. Junction RYCB_6_(1)_(24)_(RYCB) to Junction 136_(STM)" Pipe_-_(15)_(RYCB) 15_(10)_(STM)_2

"Profile 008. Junction RYCB_6_(1)_(31)_(RYCB) to Junction 150_(STM)" Pipe_-_(123)_(RYCB) Pipe_-_(124)_(RYCB) Pipe_-_(125)_(RYCB) Pipe_-_(23)_(RYCB) CB-35

"Profile 008. Junction RYCB_6_(1)_(31)_(RYCB) to Junction 150_(STM)" 3_(STM)

"Profile 009. Junction RYCB_6_(1)_(6)_(RYCB) to Junction 114_(STM)" Pipe_-_(96)_(RYCB) Pipe_-_(137)_(RYCB) Pipe_-_(138)_(RYCB) Pipe_-_(98)_(RYCB) Pipe_-_(9)_(RYCB)

"Profile 009. Junction RYCB_6_(1)_(6)_(RYCB) to Junction 114_(STM)" CB-11

"Profile 010. Junction Maj-34_2 to Junction 128_(STM)" C18_7 C32 OR23 CB-47 7_(STM)

"Profile 010. Junction Maj-34_2 to Junction 128_(STM)" 7_(1)_(STM)

"Profile 011. Junction Maj-19 to Junction 144_(STM)" C20 C21 OR46 CB-30 15_(12)_(STM)

"Profile 011. Junction Maj-19 to Junction 144_(STM)" 15_(13)_(STM)

"Profile 012. Junction RYCB_6_(1)_(26)_(RYCB) to Junction 150_(STM)" Pipe_-_(117)_(RYCB) Pipe_-_(118)_(RYCB) Pipe_-_(165)_(RYCB) Pipe_-_(25)_(RYCB) CB-33

"Profile 013. Junction Maj-11 to Junction 152_(STM)" C13 OR8 CB-54 1_(STM) 2_(STM)

"Profile 014. Junction RYCB_6_(1)_(36)_(RYCB) to Junction 162_(STM)" Pipe_-_(126)_(RYCB) Pipe_-_(127)_(RYCB) Pipe_-_(128)_(RYCB) Pipe_-_(74)_(RYCB) RYCB-52

"Profile 015. Junction Maj-07 to Junction 162_(STM)" C7 C8 C9 OR5 CB-39

"Profile 016. Junction RYCB_6_(1)_(2)_(1)_(RYCB) to Junction 108_(STM)" Pipe_-_(139)_(RYCB) Pipe_-_(140)_(RYCB) Pipe_-_(27)_(RYCB) RYCB-03 STM-28_(STM)

"Profile 017. Junction TEE_2_(2)_(RYCB) to Outfall 2121_(STM)" Pipe_-_(159)_(RYCB) Pipe_-_(160)_(RYCB) Pipe_-_(1)_(RYCB)_1 Pipe_-_(1)_(RYCB)_2 Pipe_-_(4)_(RYCB)

"Profile 017. Junction TEE_2_(2)_(RYCB) to Outfall 2121_(STM)" STM-34_(1)_(STM)_2

"Profile 018. Junction RYCB_6_(1)_(3)_(RYCB) to Junction 128_(STM)" Pipe_-_(93)_(RYCB) Pipe_-_(94)_(RYCB) Pipe_-_(95)_(RYCB) Pipe_-_(16)_(RYCB) RYCB-26

"Profile 019. Junction Maj-25 to Junction STM-Split" C25 OR-16 CB-23 15_(9)_(STM) 15_(10)_(STM)_1

"Profile 020. Junction Maj-15 to Junction Maj-24" C18_3 C18_4 C19 C23

"Profile 021. Junction RYCB_6_(1)_(37)_(RYCB) to Junction 152_(STM)" Pipe_-_(129)_(RYCB) Pipe_-_(130)_(RYCB) Pipe_-_(22)_(RYCB) CB-31a

"Profile 022. Junction RYCB_6_(1)_(28)_(RYCB) to Junction 162_(STM)" Pipe_-_(120)_(RYCB) Pipe_-_(121)_(RYCB) Pipe_-_(77)_(RYCB) RYCB-34

"Profile 023. Junction RYCB_6_(1)_(2)_(RYCB) to Junction 112_(STM)" Pipe_-_(87)_(RYCB) Pipe_-_(88)_(RYCB) Pipe_-_(7)_(RYCB) CB-9

"Profile 024. Junction Maj-36 to Junction 116_(STM)" C38 OR28 CB-51 15_(3)_(STM)

"Profile 025. Junction TEE_1_(1)_(RYCB) to Junction STM-Split3" Pipe_-_(157)_(RYCB) Pipe_-_(158)_(RYCB) Pipe_-_(2)_(RYCB) Pipe_-_(3)_(RYCB)

"Profile 026. Junction RYCB_6_(1)_(40)_(RYCB) to Junction STM-251_(STM)" Pipe_-_(132)_(RYCB) Pipe_-_(133)_(RYCB) Pipe_-_(24)_(RYCB) CB-31

"Profile 027. Junction Maj-25 to Junction 132_(STM)" C29 OR25 CB-45 6_(STM)

"Profile 028. Junction Maj-55 to Junction STM-Split3" C1 OR-51 CB-57 STM-34_(1)_(STM)_1

"Profile 029. Junction Maj-17 to Junction 158_(STM)" C11 OR-10 CB-37

"Profile 030. Junction RYCB_6_(1)_(25)_(RYCB) to Junction 148_(STM)" Pipe_-_(119)_(RYCB) Pipe_-_(164)_(RYCB) RYCB-10

"Profile 031. Junction Maj-51 to Junction 106_(STM)" C53 OR42 CB-3

"Profile 032. Junction TEE_1_(1)_(1)_(RYCB) to Junction 104_(STM)" Pipe_-_(161)_(RYCB) RYCB-01 CB-06

"Profile 033. Junction Maj-40 to Junction 120_(STM)" C43 OR32 CB-13-C

"Profile 034. Junction Maj-38 to Junction 122_(STM)" C45 OR34 CB-15

"Profile 035. Junction RYCB_6_(1)_(16)_(1)_(RYCB) to Junction Structure_-_(26)_(RYCB)" Pipe_-_(153)_(RYCB) Pipe_-_(134)_(RYCB) Pipe_-_(17)_(RYCB)

"Profile 036. Junction Maj-29 to Junction 128_(STM)" C36 OR27 CB-19

"Profile 037. Junction Maj-31 to Junction 130_(STM)" C34 OR21 CB-49

"Profile 038. Junction RYCB_6_(1)_(16)_(2)_(RYCB) to Junction Structure_-_(7)_(RYCB)" Pipe_-_(154)_(RYCB) Pipe_-_(155)_(RYCB) Pipe_-_(156)_(RYCB)

"Profile 039. Junction Maj-19_2 to Junction 146_(STM)" C18_6 OR-13 CB-28

"Profile 040. Junction Maj-53 to Junction 104_(STM)" C51 OR40 CB-5

"Profile 041. Junction TEE_4_(RYCB) to Junction 104_(STM)" RYCB-04 RYCB-04 STM-82_(STM)

"Profile 042. Junction RYCB_6_(1)_(13)_(RYCB) to Junction Structure_-_(17)_(RYCB)" Pipe_-_(101)_(RYCB) Pipe_-_(149)_(RYCB) Pipe_-_(103)_(RYCB)

"Profile 043. Junction Maj-36 to Junction 126_(STM)" C46 OR37 CB-17

"Profile 044. Junction Maj-21 to Junction Maj-28" C56 C60 C27_2

"Profile 045. Junction Maj-13 to Junction 35_(CB)" C16 OR-50

"Profile 046. Junction Maj-45 to Junction 9_(1)_(RYCB)" C48 OR39

"Profile 047. Junction Maj-43 to Junction 11_(2)_(RYCB)" C40 OR31

"Profile 048. Outfall Maj-18 to Junction Maj-15_2" C18_8 C18_9

"Profile 049. Junction Maj-24 to Junction 144_(STM)" OR-14 CB-25

"Profile 050. Junction Slope1 to Junction 150_(STM)" OR-11 CB-32

"Profile 051. Junction Maj-12 to Junction 156_(STM)" OR7 CB-53

"Profile 052. Junction Maj-16 to Junction 158_(STM)" OR9 CB-36

"Profile 053. Junction Maj-10 to Junction 162_(STM)" OR6 CB-38

"Profile 054. Junction Maj-06_2 to Junction 164_(STM)" OR-03 CB-40

"Profile 055. Junction Maj-03 to Junction 170_(STM)" OR-02 CB-42

"Profile 056. Junction Maj-19 to Junction 146_(STM)" OR-12 CB-27(1)

"Profile 057. Junction Maj-21 to Junction 148_(STM)" OR47 CB-29

"Profile 058. Junction Maj-50 to Junction 106_(STM)" OR43 CB-2

"Profile 059. Junction Maj-54 to Junction 104_(STM)" OR45 CB-55

"Profile 060. Junction Maj-52 to Junction 104_(STM)" OR41 CB-4

"Profile 061. Junction Maj-46 to Junction 112_(STM)" OR38 CB-8

"Profile 062. Junction Maj-44 to Junction 114_(STM)" OR30 CB-10

"Profile 063. Junction Maj-42 to Junction 118_(STM)" OR29 CB-50

"Profile 064. Junction Maj-41 to Junction 120_(STM)" OR33 CB-12-C

"Profile 065. Junction Maj-39 to Junction 122_(STM)" OR35 CB-14

"Profile 066. Junction Maj-37 to Junction 126_(STM)" OR36 CB-16

"Profile 067. Junction Maj-35 to Junction 128_(STM)" OR26 CB-18

"Profile 068. Junction Maj-30 to Junction 130_(STM)" OR20 CB-48

"Profile 069. Junction Maj-32 to Junction 132_(STM)" OR22 CB-46

"Profile 070. Junction Maj-33 to Junction 142_(STM)" OR24 CB-44

"Profile 071. Junction Maj-28 to Junction 136_(STM)" OR18 CB-20

"Profile 072. Junction Maj-26 to Junction 140_(STM)" OR-17 CB-22

"Profile 073. Junction 104_(STM) to Junction 100_(STM)" 14_(STM) STM-34_(STM)

"Profile 074. Junction RYCB_6_(1)_(20)_(RYCB) to Junction Structure_-_(29)_(RYCB)" Pipe_-_(109)_(RYCB)

"Profile 075. Junction Maj-19_2 to Junction Maj-15_2" C18_5

"Profile 076. Junction RYCB_6_(1)_(40)_(RYCB) to Junction Structure_-_(35)_(RYCB)" Pipe_-_(131)_(RYCB)

"Profile 077. Junction RYCB_6_(1)_(30)_(RYCB) to Junction Structure_-_(132)_(RYCB)" Pipe_-_(122)_(RYCB)

"Profile 078. Storage B3_Stor to Junction 164_(STM)" B3-Out

"Profile 079. Storage B2_Stor to Junction 164_(STM)" B2-Out

"Profile 080. Storage B1_Stor to Junction 164_(STM)" B1-Out

"Profile 081. Junction RYCB_6_(1)_(25)_(2)_(RYCB) to Junction RYCB_10" Pipe_-_(162)_(RYCB)

"Profile 082. Junction RYCB_6_(1)_(3)_(RYCB) to Junction TEE_3_(RYCB)" Pipe_-_(89)_(RYCB)

"Profile 083. Storage B4_Stor to Junction 106_(STM)" B4-Out

"Profile 084. Junction Maj-55 to Junction Maj-54" C57

"Profile 085. Junction 134_(STM) to Junction 132_(STM)" STM-27_(STM)

"Profile 086. Junction Maj-27 to Junction Maj-60" C27_1

"Profile 087. Junction 31_(RYCB) to Junction Maj-18_2" C18

"Profile 088. Junction Slope1 to Junction 33_(RYCB)" OR48

"Profile 089. Junction Maj-15 to Junction Maj-14" C17

"Profile 090. Junction Structure_-_(12)_(RYCB) to Junction Maj-14" C4

"Profile 091. Junction Maj-14 to Junction 31a_(RYCB)" OR49

"Profile 092. Junction Maj-13 to Junction Maj-12" C14

"Profile 093. Junction Maj-15 to Junction Maj-16" C15

"Profile 094. Junction Maj-17 to Junction Maj-10" C10

"Profile 095. Junction Maj-11 to Junction Maj-09" C12

"Profile 096. Junction 52_(RYCB) to Junction Maj-08" C6

"Profile 097. Junction Maj-07 to Junction Maj-06_2" C6_1

"Profile 098. Storage B2_Stor to Junction Maj-06" B2-Outflow

"Profile 099. Junction Maj-04 to Junction Maj-03" C3

"Profile 100. Outfall Maj-22 to Junction Maj-21" C22

"Profile 101. Outfall Maj-49 to Junction Maj-50" C54

"Profile 102. Outfall Maj-48 to Junction Maj-48_2" C50_1

"Profile 103. Junction Maj-51 to Junction Maj-52" C52

"Profile 104. Junction Maj-53 to Junction Maj-46" C49

"Profile 105. Junction TEE_6_(RYCB) to Junction Maj-46" C58

"Profile 106. Junction Maj-45 to Junction Maj-44" C41

"Profile 107. Junction Maj-43 to Junction Maj-42" C39

"Profile 108. Junction Maj-45 to Junction Maj-41" C42

"Profile 109. Junction Maj-40 to Junction Maj-39" C44

"Profile 110. Junction Maj-38 to Junction Maj-37" C47

"Profile 111. Junction Maj-36 to Junction Maj-35" C37

"Profile 112. Junction Maj-29 to Junction Maj-30" C35

"Profile 113. Junction Maj-31 to Junction Maj-32" C33

"Profile 114. Junction 24_(RYCB) to Junction 142_(STM)" RYCB-24

"Profile 115. Junction Maj-34 to Junction Maj-33" C30

"Profile 116. Junction Maj-29 to Junction Maj-28" C28

"Profile 117. Junction STM-Split to Junction Maj-60" C5

"Profile 118. Junction Structure_-_(115)_(RYCB) to Junction 20_(CB)" Pipe_-_(73)_(RYCB)

"Profile 119. Junction 144_(STM) to Junction 140_(STM)" 5_(STM)

"Profile 120. Junction 142_(STM) to Junction 140_(STM)" STM-81_(STM)

"Profile 121. Junction Maj-27 to Junction Maj-26" C26

"Profile 122. Junction Maj-34_2 to Outfall Maj-57" C18_2

"Profile 123. Outfall Maj-59 to Junction Maj-58" C2

[BMR The Commons Interim Model]

;;Project Title/Notes

Base_Model_v1.5 from the Model Build (GIS) folder.

[OPTIONS]

;;Option Value

FLOW_UNITS CMS

INFILTRATION HORTON

FLOW_ROUTING DYNWAVE

LINK_OFFSETS ELEVATION

MIN_SLOPE 0

ALLOW_PONDING YES

SKIP_STEADY_STATE NO

START_DATE 01/01/2019

START_TIME 00:00:00

REPORT_START_DATE 01/01/2019

REPORT_START_TIME 00:00:00

END_DATE 01/02/2019

END_TIME 00:00:00

SWEEP_START 01/01

SWEEP_END 12/31

DRY_DAYS 0

REPORT_STEP 00:01:00

WET_STEP 00:05:00

DRY_STEP 00:05:00

ROUTING_STEP 0.5

RULE_STEP 00:00:00

```
INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.167
MAX_TRIALS           21
HEAD_TOLERANCE       0.0001
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              6

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

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;---------------- --------- -------- -------- ----------
002yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 002yrChicago3hr
002YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 002YrSCS24
005yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 005yrChicago3hr
005YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 005YrSCS24
010yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 010yrChicago3hr
010YrSCS24       INTENSITY 0:10     1.0      TIMESERIES 010YrSCS24
025yrChicago3hr  INTENSITY 0:10     1.0      TIMESERIES 025yrChicago3hr
```

025YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 025YrSCS24

050yrChicago3hr INTENSITY 0:10 1.0 TIMESERIES 050yrChicago3hr

050YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 050YrSCS24

100yrChicago3hr INTENSITY 0:10 1.0 TIMESERIES 100yrChicago3hr

100yrChicago3hr+20% INTENSITY 0:10 1.0 TIMESERIES 100yrChicago3hr+20%

100YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 100YrSCS12hr

100YrSCS24 INTENSITY 0:10 1.0 TIMESERIES 100YrSCS24

100YrSCS24+20% INTENSITY 0:10 1.0 TIMESERIES 100YrSCS24+20%

1979July01 INTENSITY 0:05 1.0 TIMESERIES 1979July01

1988Aug04 INTENSITY 0:05 1.0 TIMESERIES 1988Aug04

1996Aug08 INTENSITY 0:05 1.0 TIMESERIES 1996Aug08

25mmChicago4Hr INTENSITY 0:10 1.0 TIMESERIES 25mmChicago4Hr

2YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 2YrSCS12hr

5YrSCS12hr INTENSITY 0:15 1.0 TIMESERIES 5YrSCS12hr

No_Rain INTENSITY 0:01 1.0 TIMESERIES No_Rain

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
A12i	100yrChicago3hr+20%	144_(STM)	0.0397	71.4	5.224	0.5	0	
A12ii	100yrChicago3hr+20%	31_(CB)	0.0513	71.4	6.75	0.5	0	
A13	100yrChicago3hr+20%	RYCB_11_(RYCB)	0.1156	42.9	15.211	0.5	0	
A14	100yrChicago3hr+20%	RYCB_10_(RYCB)	0.1158	42.9	15.44	0.5	0	
A15i	100yrChicago3hr+20%	28_(CB)	0.522	71.4	50.68	0.5	0	
A15ii	100yrChicago3hr+20%	27_(CB)	0.522	71.4	50.68	0.5	0	
A16i	100yrChicago3hr+20%	26_(CB)	0.126	71.4	52.5	0.5	0	
A16ii	100yrChicago3hr+20%	25_(CB)	0.126	71.4	50.4	0.5	0	
A17ii	100yrChicago3hr+20%	24_(CB)	0.093	71.4	12.078	0.5	0	
A18i	100yrChicago3hr+20%	23_(CB)	0.189	71.4	24.545	0.5	0	

A19	100yrChicago3hr+20%	RYCB_9_(RYCB)	0.1311	42.9	10.242	0.5	0
A20i	100yrChicago3hr+20%	21_(CB)	0.195	71.4	19.539	0.9	0
A20ii	100yrChicago3hr+20%	20_(CB)	0.206	71.4	20.641	0.9	0
A21	100yrChicago3hr+20%	RYCB_7_(RYCB)	0.325	50	29.018	0.5	0
A22	100yrChicago3hr+20%	RYCB_7_(RYCB)	0.028	42.9	5.87	0.5	0
A23	100yrChicago3hr+20%	RYCB_7_(RYCB)	0.169	50	23.472	0.5	0
A24i	100yrChicago3hr+20%	18_(CB)	0.11	71.4	12.222	0.9	0
A24ii	100yrChicago3hr+20%	19_(CB)	0.237	71.4	18.231	0.9	0
A25	100yrChicago3hr+20%	RYCB_8_(RYCB)	0.153	50	15	0.5	0
A26i	100yrChicago3hr+20%	142_(STM)	0.0153	71.4	2.096	0.5	0
A26ii	100yrChicago3hr+20%	22_(RYCB)	0.0508	71.4	6.959	0.5	0
A28i	100yrChicago3hr+20%	114_(STM)	2.1908	7	346.761	0.5	0
A29	100yrChicago3hr+20%	TEE_11_(RYCB)	0.116	50	14.764	0.5	0
A3	100yrChicago3hr+20%	150_(STM)	3.0011	7	133.382	1	0
A30	100yrChicago3hr+20%	RYCB_6_(RYCB)	0.014	42.9	7.786	0.5	0
A31	100yrChicago3hr+20%	TEE_5_(RYCB)	0.187	50	14.518	0.5	0
A32i	100yrChicago3hr+20%	17_(CB)	0.155	71.4	21.207	1	0
A32ii	100yrChicago3hr+20%	16_(CB)	0.082	71.4	11.281	1	0
A33i	100yrChicago3hr+20%	14_(CB)	0.11	71.4	6.727	1	0
A33ii	100yrChicago3hr+20%	15_(CB)	0.157	71.4	20.729	1	0
A34i	100yrChicago3hr+20%	13_(CB)	0.212	71.4	17.024	0.5	0
A34ii	100yrChicago3hr+20%	12_(CB)	0.276	71.4	20.636	0.5	0
A39i	100yrChicago3hr+20%	10_(CB)	0.0811	71.4	7.14	1	0
A39ii	100yrChicago3hr+20%	11_(CB)	0.0371	71.4	4.977	1	0
A40	100yrChicago3hr+20%	RYCB_5_(RYCB)	0.1101	50	13.751	0.5	0
A41	100yrChicago3hr+20%	TEE_7_(RYCB)	0.075	50	13.639	0.5	0
A42i	100yrChicago3hr+20%	08_(CB)	0.171	71.4	23.642	0.5	0
A42ii	100yrChicago3hr+20%	09_(CB)	0.083	71.4	11.458	0.5	0
A43	100yrChicago3hr+20%	RYCB_2_(RYCB)	0.236	50	29.161	0.5	0

A44	100yrChicago3hr+20%	RYCB_3_(RYCB)	0.199	50	27.618	0.5	0
A45i	100yrChicago3hr+20%	03_(CB)	0.168	71.4	21.647	0.5	0
A45ii	100yrChicago3hr+20%	02_(CB)	0.075	71.4	9.656	0.5	0
A46i	100yrChicago3hr+20%	05_(CB)	0.157	71.4	21.487	0.5	0
A46ii	100yrChicago3hr+20%	04_(CB)	0.136	71.4	15.627	0.5	0
A47	100yrChicago3hr+20%	RYCB_4_(RYCB)	0.136	50	14.624	0.5	0
A48	100yrChicago3hr+20%	104_(STM)	0.0498	71.4	8.717	0.5	0
A49	100yrChicago3hr+20%	RYCB_1_(RYCB)	0.0525	50	9.053	0.5	0
A54	100yrChicago3hr+20%	100_(STM)	0.7963	7	69.172	0.2	0
B1	100yrChicago3hr+20%	150_(STM)	1.9535	7	97.675	1	0
B2	100yrChicago3hr+20%	B2_Stor	3.432	100	279.024	1	0
B3i	100yrChicago3hr+20%	150_(STM)	0.965	85.7	111.368	1	0
B4i	100yrChicago3hr+20%	58_(CB)	0.947	28.6	63.561	0.5	0
B4ii	100yrChicago3hr+20%	02_(CB)	0.047	28.6	6.059	0.5	0
B4iii	100yrChicago3hr+20%	04_(CB)	0.008	28.6	5.618	0.5	0
C2	100yrChicago3hr+20%	Maj-22	0.087	71.4	14.5	0.5	0

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
A12i	0.013	0.25	1.57	4.67	25	OUTLET	
A12ii	0.013	0.25	1.57	4.67	25	OUTLET	
A13	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A14	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A15i	0.013	0.25	1.57	4.67	25	OUTLET	
A15ii	0.013	0.25	1.57	4.67	25	OUTLET	
A16i	0.013	0.25	1.57	4.67	25	OUTLET	
A16ii	0.013	0.25	1.57	4.67	25	OUTLET	
A17ii	0.013	0.25	1.57	4.67	25	OUTLET	

A18i	0.013	0.25	1.57	4.67	25	OUTLET	
A19	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A20i	0.013	0.25	1.57	4.67	25	OUTLET	
A20ii	0.013	0.25	1.57	4.67	25	OUTLET	
A21	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A22	0.013	0.25	1.57	4.67	25	OUTLET	
A23	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A24i	0.013	0.25	1.57	4.67	25	OUTLET	
A24ii	0.013	0.25	1.57	4.67	25	OUTLET	
A25	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A26i	0.013	0.25	1.57	4.67	25	OUTLET	
A26ii	0.013	0.25	1.57	4.67	25	OUTLET	
A28i	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A29	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A3	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A30	0.013	0.25	1.57	4.67	25	OUTLET	
A31	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A32i	0.013	0.25	1.57	4.67	25	OUTLET	
A32ii	0.013	0.25	1.57	4.67	25	OUTLET	
A33i	0.013	0.25	1.57	4.67	25	OUTLET	
A33ii	0.013	0.25	1.57	4.67	25	OUTLET	
A34i	0.013	0.25	1.57	4.67	25	OUTLET	
A34ii	0.013	0.25	1.57	4.67	25	OUTLET	
A39i	0.013	0.25	1.57	4.67	25	OUTLET	
A39ii	0.013	0.25	1.57	4.67	25	OUTLET	
A40	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A41	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A42i	0.013	0.25	1.57	4.67	25	OUTLET	
A42ii	0.013	0.25	1.57	4.67	25	OUTLET	

A43	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A44	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A45i	0.013	0.25	1.57	4.67	25	OUTLET	
A45ii	0.013	0.25	1.57	4.67	25	OUTLET	
A46i	0.013	0.25	1.57	4.67	25	OUTLET	
A46ii	0.013	0.25	1.57	4.67	25	OUTLET	
A47	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A48	0.013	0.25	1.57	4.67	25	OUTLET	
A49	0.013	0.25	1.57	4.67	25	PERVIOUS	100
A54	0.013	0.25	1.57	4.67	25	PERVIOUS	100
B1	0.013	0.25	1.57	4.67	25	PERVIOUS	100
B2	0.013	0.25	1.57	4.67	25	OUTLET	
B3i	0.013	0.25	1.57	4.67	25	OUTLET	
B4i	0.013	0.25	1.57	4.67	25	PERVIOUS	100
B4ii	0.013	0.25	1.57	4.67	25	OUTLET	
B4iii	0.013	0.25	1.57	4.67	25	OUTLET	
C2	0.013	0.25	1.57	4.67	25	OUTLET	

[INFILTRATION]

;;Subcatchment	Param1	Param2	Param3	Param4	Param5
;;----------	----------	----------	----------	----------	----------
A12i	76.2	13.2	4.14	7	0
A12ii	76.2	13.2	4.14	7	0
A13	76.2	13.2	4.14	7	0
A14	76.2	13.2	4.14	7	0
A15i	76.2	13.2	4.14	7	0
A15ii	76.2	13.2	4.14	7	0
A16i	76.2	13.2	4.14	7	0
A16ii	76.2	13.2	4.14	7	0

A17ii	76.2	13.2	4.14	7	0
A18i	76.2	13.2	4.14	7	0
A19	76.2	13.2	4.14	7	0
A20i	76.2	13.2	4.14	7	0
A20ii	76.2	13.2	4.14	7	0
A21	76.2	13.2	4.14	7	0
A22	76.2	13.2	4.14	7	0
A23	76.2	13.2	4.14	7	0
A24i	76.2	13.2	4.14	7	0
A24ii	76.2	13.2	4.14	7	0
A25	76.2	13.2	4.14	7	0
A26i	76.2	13.2	4.14	7	0
A26ii	76.2	13.2	4.14	7	0
A28i	76.2	13.2	4.14	7	0
A29	76.2	13.2	4.14	7	0
A3	76.2	13.2	4.14	7	0
A30	76.2	13.2	4.14	7	0
A31	76.2	13.2	4.14	7	0
A32i	76.2	13.2	4.14	7	0
A32ii	76.2	13.2	4.14	7	0
A33i	76.2	13.2	4.14	7	0
A33ii	76.2	13.2	4.14	7	0
A34i	76.2	13.2	4.14	7	0
A34ii	76.2	13.2	4.14	7	0
A39i	76.2	13.2	4.14	7	0
A39ii	76.2	13.2	4.14	7	0
A40	76.2	13.2	4.14	7	0
A41	76.2	13.2	4.14	7	0
A42i	76.2	13.2	4.14	7	0

A42ii	76.2	13.2	4.14	7	0
A43	76.2	13.2	4.14	7	0
A44	76.2	13.2	4.14	7	0
A45i	76.2	13.2	4.14	7	0
A45ii	76.2	13.2	4.14	7	0
A46i	76.2	13.2	4.14	7	0
A46ii	76.2	13.2	4.14	7	0
A47	76.2	13.2	4.14	7	0
A48	76.2	13.2	4.14	7	0
A49	76.2	13.2	4.14	7	0
A54	76.2	13.2	4.14	7	0
B1	76.2	13.2	4.14	7	0
B2	76.2	13.2	4.14	7	0
B3i	76.2	13.2	4.14	7	0
B4i	76.2	13.2	4.14	7	0
B4ii	76.2	13.2	4.14	7	0
B4iii	76.2	13.2	4.14	7	0
C2	76.2	13.2	4.14	7	0

[JUNCTIONS]

;;Name	Elevation	MaxDepth	InitDepth	SurDepth	Aponded
;;----------	----------	----------	----------	----------	----------
;T/G 87.6 m					
02_(CB)	85.6	2.6	0	0	0
;T/G 87.6 m					
03_(CB)	85.6	2.6	0	0	0
;T/G 87.53 m					
04_(CB)	85.53	2.6	0	0	0
;T/G 87.531 m					

05_(CB) 85.531 2.6 0 0 0

;T/G 87.436 m

08_(CB) 85.436 2.6 0 0 0

;T/G 87.425 m

09_(CB) 85.425 2.6 0 0 0

;Mcon-CBMH

1_(RYCB) 85.42 2.993 0 0 1

;T/G 87.565 m

10_(CB) 86.17 1.995 0 0 0

;Mcon MH - Concentric

100_(STM) 81.27 6.246 0 0 0

;Mcon MH - Concentric

102_(STM) 81.341 6.202 0 0 0

;Mcon MH - Concentric

104_(STM) 81.383 6.234 0 0 0

;Mcon MH - Concentric

106_(STM) 83.539 4.124 0 0 0

;Mcon MH - Concentric

108_(STM) 83.616 3.887 0 0 0

;T/G 87.555 m

11_(CB) 86.021 2.134 0 0 0

;Mcon MH - Concentric

110_(STM) 83.936 3.813 0 0 0

;Mcon MH - Concentric

112_(STM) 81.904 6.011 0 0 0

;Mcon MH - Concentric

114_(STM) 83.366 4.634 0 0 0

;T/G 87.643 m

12_(CB) 85.643 2.6 0 0 0

;Mcon MH - Concentric

120_(STM) 82.664 5.412 0 0 0

;Mcon MH - Concentric

122_(STM) 82.736 5.495 0 0 0

;Mcon MH - Concentric

124_(STM) 82.834 5.361 0 0 0

;Mcon MH - Concentric

126_(STM) 82.974 5.491 0 0 0

;Mcon MH - Concentric

128_(STM) 83.17 5.461 0 0 0

;T/G 87.793 m

13_(CB) 85.793 2.6 0 0 0

;Mcon MH - Concentric

136_(STM) 83.336 5.31 0 0 0

;Mcon MH - Concentric

138_(STM) 83.424 5.349 0 0 0

;T/G 88.012 m

14_(CB) 86.012 2.6 0 0 0

;Mcon MH - Concentric

140_(STM) 83.713 5.538 0 0 0

;Mcon MH - Concentric

142_(STM) 84.907 4.253 0 0 0

;Mcon MH - Concentric

144_(STM) 84.131 5.323 0 0 0

;Mcon MH - Concentric

146_(STM) 85.005 4.118 0 0 0

;Mcon MH - Concentric

148_(STM) 85.365 3.127 0 0 0

;T/G 88.016 m

15_(CB) 86.016 2.6 0 0 0

;Mcon MH - Concentric

150_(STM) 84.379 5.419 0 0 0

;T/G 88.173 m

16_(CB) 86.173 2.6 0 0 0

;T/G 88.176 m

17_(CB) 86.176 2.6 0 0 0

;T/G 88.277 m

18_(CB) 86.97 1.907 0 0 0

;T/G 88.281 m

19_(CB) 86.281 2.6 0 0 0

;T/G 88.623 m

20_(CB) 86.623 2.6 0 0 0

;T/G 88.773 m

21_(CB) 86.773 2.6 0 0 0

;Mcon MH - Concentric

2121_(STM) 80.231 7.427 0 0 0

;Mcon MH - Concentric

2142_(STM) 80.104 7.267 0 0 0

;Mcon MH - Concentric

2143_(STM) 79.93 6.793 0 0 0

;Mcon MH - Concentric

2144_(STM) 79.854 6.896 0 0 0

;Mcon-CB

22_(RYCB) 87.076 2.824 0 0 1

;T/G 88.923 m

23_(CB) 86.923 2.6 0 0 0

;T/G 88.923 m

24_(CB) 86.923 2.6 0 0 0

;T/G 89.381 m

25_(CB) 86.775 3.206 0 0 0

;T/G 89.381 m

26_(CB) 86.775 3.206 0 0 0

;T/G 88.643 m

27_(CB) 86.775 2.468 0 0 0

;T/G 88.643 m

28_(CB) 86.775 2.468 0 0 0

;Mcon-CBMH

29_(RYCB) 85.31 4.327 0 0 1

;T/G 89.073 m

30_(CB) 86.93 2.743 0 0 0

;T/G 89.148 m

31_(CB) 86.9 2.848 0 0 0

58_(CB) 85.4 2.6 0 0 0

;Mcon MH - Concentric

98_(STM) 81.17 6.333 0 0 0

;CB-LANDSCAPE

ELB_1_(RYCB) 86.51 0.997 0 0 1

;Mcon-CBMH

ELB_10_(RYCB) 87.65 1.311 0 0 1

;Mcon-CBMH

ELB_11_(RYCB) 87.6 1.302 0 0 1

;Mcon-CBMH

ELB_12_(RYCB) 88 1.303 0 0 1

;Mcon-CBMH

ELB_13_(RYCB) 87.56 1.301 0 0 1

;Mcon-CBMH

ELB_14_(RYCB) 87.78 1.3 0 0 1

;Mcon-CBMH

ELB_2_(RYCB) 86.265 1.412 0 0 1

;Mcon-CBMH

ELB_3_(RYCB) 86.48 1.324 0 0 1

;Mcon-CBMH

ELB_4_(RYCB) 86.53 1.34 0 0 1

;Mcon-CBMH

ELB_5_(RYCB) 86.53 1.325 0 0 1

;Mcon-CBMH

ELB_6_(RYCB) 86.55 1.312 0 0 1

;Mcon-CBMH

ELB_7_(RYCB) 86.8 1.309 0 0 1

;Mcon-CBMH

ELB_8_(RYCB) 86.772 1.308 0 0 1

;Mcon-CBMH

ELB_9_(RYCB) 87.05 1.298 0 0 1

;HP

Maj-15 89.666 0.704 0 0 0

Maj-15_2 89.36 0.654 0 0 0

Maj-18_2 89.51 0.64 0 0 0

Maj-19 89.388 0.602 0 0 0

;HP

Maj-19_2 89.527 0.693 0 0 0

Maj-20 89.169 0.601 0 0 0

;LP

Maj-21 88.595 0.615 0 0 0

Maj-23 89.24 0.58 0 0 0

;LP

Maj-24 88.904 0.616 0 0 0

;HP					
Maj-25	89.152	0.618	0	0	0
;LP					
Maj-26	88.605	0.615	0	0	0
;HP					
Maj-27	88.848	0.632	0	0	0
;LP					
Maj-28	88.251	0.689	0	0	0
;HP					
Maj-29	88.595	0.615	0	0	0
;LP					
Maj-35	88.149	0.581	0	0	0
;HP					
Maj-36	88.408	0.672	0	0	0
;LP					
Maj-37	87.993	0.617	0	0	0
;HP					
Maj-38	88.19	0.62	0	0	0
;LP					
Maj-39	88.071	0.329	0	0	0
;HP					
Maj-40	87.97	0.63	0	0	0
Maj-41	87.62	0.62	0	0	0
;LP					
Maj-44	87.539	0.611	0	0	0
;HP					
Maj-45	87.812	0.688	0	0	0
;LP					
Maj-46	87.407	0.613	0	0	0

Maj-48_2 87.744 0.636 0 0 0

;LP

Maj-50 87.425 0.615 0 0 0

;HP

Maj-51 87.71 0.63 0 0 0

;LP

Maj-52 87.472 0.498 0 0 0

Maj-53 87.588 0.612 0 0 0

;Overland Major Spill Point

Maj-56 88.439 0.661 0 0 0

;Spill Point

Maj-60 88.618 0.679 0 0 0

;Mcon-CBMH

RYCB_1_(RYCB) 86 2.1 0 0 1

;Mcon-CBMH

RYCB_10_(RYCB) 87.02 2.309 0 0 1

;Mcon-CBMH

RYCB_11_(RYCB) 87.35 2.373 0 0 1

;TEE

RYCB_2_(RYCB) 86.01 2.17 0 0 1

;Mcon-CBMH

RYCB_3_(RYCB) 86.18 2.233 0 0 1

;Mcon-CBMH

RYCB_4_(RYCB) 86.12 2.28 0 0 1

;Mcon-CBMH

RYCB_5_(RYCB) 86.044 2.295 0 0 1

;Mcon-CBMH

RYCB_6_(RYCB) 85.72 3.209 0 0 1

;Mcon-CBMH

RYCB_7_(RYCB) 86.49 2.266 0 0 1

;Mcon-CBMH

RYCB_8_(RYCB) 86.97 2.23 0 0 1

;Mcon-CBMH

RYCB_9_(RYCB) 87.54 1.452 0 0 1

Slope1 89.066 1.098 0 0 0

;Dummy Null Structure for LandXML purposes

StartNullStruct2 86.62 1.4 0 0 1

;Dummy Null Structure for LandXML purposes

StartNullStruct3 84.091 3.709 0 0 0

;Null Structure

STM-251_(STM) 85.31 4.327 0 0 0

;Mcon-CBMH

TEE_1_(RYCB) 86.21 1.444 0 0 1

;Mcon-CBMH

TEE_10_(RYCB) 86.59 1.311 0 0 1

;CB-LANDSCAPE

TEE_11_(RYCB) 86.68 1.367 0 0 1

;Mcon-CBMH

TEE_12_(RYCB) 86.85 1.334 0 0 1

;CB-LANDSCAPE

TEE_13_(RYCB) 87 1.291 0 0 1

;CB-LANDSCAPE

TEE_14_(RYCB) 86.861 0.57 0 0 1

;CB-LANDSCAPE

TEE_15_(RYCB) 87.38 1.267 0 0 1

;Mcon-CBMH

TEE_16_(RYCB) 87.27 1.484 0 0 1

;Mcon-CBMH

TEE_17_(RYCB) 87.39 1.314 0 0 1

;Mcon-CBMH

TEE_18_(RYCB) 87.54 1.302 0 0 1

;Mcon-CBMH

TEE_19_(RYCB) 87.44 1.317 0 0 1

;Mcon-CBMH

TEE_2_(RYCB) 86.35 1.365 0 0 1

;Mcon-CBMH

TEE_20_(RYCB) 87.29 1.331 0 0 1

;Mcon-CBMH

TEE_21_(RYCB) 87.17 1.438 0 0 1

;Mcon-CBMH

TEE_22_(RYCB) 87.78 1.31 0 0 1

;Mcon-CBMH

TEE_23_(RYCB) 87.4 1.313 0 0 1

;Mcon-CBMH

TEE_24_(RYCB) 87.69 1.32 0 0 1

;Mcon-CBMH

TEE_25_(RYCB) 87.53 1.546 0 0 1

;Mcon-CBMH

TEE_3_(RYCB) 86.25 1.309 0 0 1

;Mcon-CBMH

TEE_4_(RYCB) 86.02 1.806 0 0 1

;CB-LANDSCAPE

TEE_5_(RYCB) 86.09 1.934 0 0 1

;Mcon-CBMH

TEE_6_(RYCB) 86.35 1.525 0 0 1

;Mcon-CBMH

TEE_7_(RYCB) 86.46 1.427 0 0 1

;Mcon-CBMH

TEE_8_(RYCB) 86.34 1.523 0 0 1

;Mcon-CBMH

TEE_9_(RYCB) 86.22 1.533 0 0 1

[OUTFALLS]

;;Name Elevation Type Stage Data Gated Route To

;;---------- ---------- ---------- ---------- -------- ----------

;HP

Maj-18 89.547 FREE NO

Maj-22 88.834 FREE NO

;HP

Maj-48 87.78 FREE NO

;HP

Maj-49 87.673 FREE NO

Maj-Park 85 FREE NO

OF1 0 FREE NO

;Rectangular Headwall Variable Height SI

STM-111_(STM) 80.137 FREE NO

[STORAGE]

;;Name Elev. MaxDepth InitDepth Shape Curve Name/Params N/A Fevap Psi Ksat IMD

;;---------- -------- ---------- ---------- ---------- ---------- -------- -------- -------- --------

B2_Stor 90.5 1.5 0 TABULAR UHAL_Onsite 0 0

[CONDUITS]

;;Name From Node To Node Length Roughness InOffset OutOffset InitFlow MaxFlow

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------

;Mcon Circular Conc. Pipe

10_(STM) 124_(STM) 122_(STM) 16.861 0.013 83.134 83.05 0 0

;Mcon Circular Conc. Pipe

11_(STM) 122_(STM) 120_(STM) 24.629 0.013 83.036 82.974 0 0

;Mcon Circular Conc. Pipe

12_(STM) 120_(STM) 112_(STM) 91.574 0.013 82.964 82.735 0 0

;Mcon Circular Conc. Pipe

13_(STM) 112_(STM) 104_(STM) 73.804 0.013 82.204 81.983 0 0

;Mcon Circular Conc. Pipe

14_(STM) 104_(STM) 102_(STM) 41.856 0.013 81.683 81.641 0 0

;Mcon Circular Conc. Pipe

15_(10)_(STM) 138_(STM) 136_(STM) 14.785 0.013 83.724 83.65 0 0

;Mcon Circular Conc. Pipe

15_(11)_(STM) 136_(STM) 128_(STM) 62.501 0.013 83.636 83.48 0 0

;Mcon Circular Conc. Pipe

15_(12)_(STM) 148_(STM) 146_(STM) 78.542 0.013 85.665 85.39 0 0

;Mcon Circular Conc. Pipe

15_(13)_(STM) 146_(STM) 144_(STM) 78.665 0.013 85.305 85.03 0 0

;Mcon Circular Conc. Pipe

15_(5)_(STM) 114_(STM) 112_(STM) 64.641 0.013 83.666 83.44 0 0

;Mcon Circular Conc. Pipe

15_(9)_(STM) 140_(STM) 138_(STM) 113.118 0.013 84.013 83.73 0 0

;Mcon Circular Conc. Pipe

4_(STM) 150_(STM) 144_(STM) 76.294 0.013 84.679 84.49 0 0

;Mcon Circular Conc. Pipe

5_(STM) 144_(STM) 140_(STM) 77.327 0.013 84.431 84.16 0 0

;Mcon Circular Conc. Pipe

8_(STM) 128_(STM) 126_(STM) 75.98 0.013 83.47 83.28 0 0

;Mcon Circular Conc. Pipe

9_(STM) 126_(STM) 124_(STM) 53.402 0.013 83.274 83.14 0 0

C1 Maj-53 OF1 101.353 0.035 87.588 87.59 0 0

;Maj RY Spill Point

C18 29_(RYCB) Maj-18_2 4.776 0.035 89.84 89.55 0 0

C18_3 Maj-15 Slope1 36.415 0.013 89.666 89.066 0 0

C18_4 Slope1 Maj-15_2 37.347 0.013 89.066 89.36 0 0

C18_5 Maj-19_2 Maj-15_2 13.813 0.013 89.527 89.36 0 0

C18_6 Maj-19_2 Maj-19 27.25 0.013 89.527 89.388 0 0

C18_8 Maj-18 Maj-18_2 5 0.013 89.547 89.51 0 0

C18_9 Maj-18_2 Maj-15_2 31.942 0.013 89.51 89.36 0 0

C19 Maj-15_2 Maj-23 11.274 0.013 89.36 89.24 0 0

C2 B2_Stor Maj-15 288.955 0.035 90.5 89.666 0 0

C20 Maj-19 Maj-20 24.9 0.013 89.388 89.169 0 0

C21 Maj-20 Maj-21 64.337 0.013 89.169 88.595 0 0

C22 Maj-22 Maj-21 13.47 0.013 88.834 88.595 0 0

C23 Maj-23 Maj-24 31.267 0.013 89.24 88.904 0 0

C24 Maj-25 Maj-24 35.922 0.013 89.152 88.904 0 0

C25 Maj-25 Maj-26 59.92 0.013 89.152 88.605 0 0

C26 Maj-27 Maj-26 40.459 0.013 88.848 88.605 0 0

;Maj RY Spill Point

C27 22_(RYCB) Maj-25 17.828 0.035 89.3 89.152 0 0

C27_1 Maj-27 Maj-60 20.292 0.013 88.848 88.618 0 0

C27_2 Maj-60 Maj-28 39.649 0.013 88.618 88.251 0 0

C28 Maj-29 Maj-28 31.279 0.013 88.595 88.251 0 0

;Maj RY Spill Point

C31 RYCB_8_(RYCB) Maj-28 19.142 0.035 88.6 88.251 0 0

C36 Maj-29 Maj-35 35.198 0.013 88.595 88.149 0 0

C37 Maj-36 Maj-35 37.341 0.013 88.408 88.149 0 0

C41 Maj-45 Maj-44 34.02 0.013 87.812 87.539 0 0

C42 Maj-45 Maj-41 33.014 0.013 87.812 87.62 0 0

C43 Maj-40 Maj-41 55.256 0.013 87.97 87.62 0 0

C44 Maj-40 Maj-39 14.403 0.013 87.97 88.071 0 0

C45 Maj-38 Maj-39 19.588 0.013 88.19 88.071 0 0

C46 Maj-36 Maj-37 37.582 0.013 88.408 87.993 0 0

C47 Maj-38 Maj-37 23.672 0.013 88.19 87.993 0 0

C48 Maj-45 Maj-46 39.529 0.013 87.812 87.407 0 0

C49 Maj-53 Maj-46 33.614 0.013 87.588 87.407 0 0

C5 58_(CB) Maj-Park 30 0.035 85.4 85 0 0

C50_1 Maj-48 Maj-48_2 5 0.013 87.78 87.744 0 0

C50_2 Maj-48_2 Maj-53 31.434 0.013 87.744 87.588 0 0

C51 Maj-53 Maj-52 33.988 0.013 87.588 87.472 0 0

C52 Maj-51 Maj-52 53.407 0.013 87.71 87.472 0 0

C53 Maj-51 Maj-50 33.561 0.013 87.71 87.425 0 0

C54 Maj-49 Maj-50 43.76 0.013 87.673 87.425 0 0

C56 Maj-21 Maj-56 22.042 0.035 88.595 88.439 0 0

;Maj RY Spill Point

C58 RYCB_2_(RYCB) Maj-46 16.507 0.035 87.58 87.407 0 0

;Maj RY Spill Point

C59 RYCB_4_(RYCB) Maj-48_2 9.706 0.035 87.8 87.744 0 0

;Major System Overland Spillway

C60 Maj-56 Maj-60 62.349 0.035 88.439 88.618 0 0

C62 1_(RYCB) Maj-50 27.046 0.035 87.813 87.425 0 0

C63 RYCB_5_(RYCB) Maj-44 10.749 0.035 87.739 87.539 0 0

C65 RYCB_6_(RYCB) Maj-35 37.112 0.035 88.329 88.149 0 0

C66 RYCB_10_(RYCB) Maj-21 47.814 0.035 88.729 88.595 0 0

C67 RYCB_11_(RYCB) Slope1 10.418 0.035 89.123 89.066 0 0

;HDPE Pipe SI

Pipe_-_(100)_(RYCB) TEE_6_(RYCB) RYCB_4_(RYCB) 43.106 0.013 86.65 86.434 0 0

;HDPE Pipe SI

Pipe_-_(110)_(RYCB) ELB_12_(RYCB) TEE_22_(RYCB) 42.796 0.013 88.3 88.086 0 0

;HDPE Pipe SI

Pipe_-_(111)_(RYCB) TEE_22_(RYCB) RYCB_9_(RYCB) 36.137 0.013 88.08 87.899 0 0

;HDPE Pipe SI

Pipe_-_(114)_(RYCB) ELB_10_(RYCB) TEE_18_(RYCB) 20.158 0.013 87.95 87.849 0 0

;HDPE Pipe SI

Pipe_-_(117)_(RYCB) ELB_14_(RYCB) TEE_24_(RYCB) 14.18 0.013 88.08 88.009 0 0

;HDPE Pipe SI

Pipe_-_(118)_(RYCB) TEE_24_(RYCB) TEE_25_(RYCB) 29.666 0.013 87.99 87.842 0 0

;HDPE Pipe SI

Pipe_-_(119)_(RYCB) ELB_13_(RYCB) TEE_23_(RYCB) 29.54 0.013 87.86 87.712 0 0

;HDPE Pipe SI

Pipe_-_(134)_(RYCB) TEE_10_(RYCB) TEE_11_(RYCB) 40.369 0.013 86.89 86.688 0 0

;HDPE Pipe SI

Pipe_-_(137)_(RYCB) TEE_7_(RYCB) TEE_8_(RYCB) 22.479 0.013 86.76 86.648 0 0

;HDPE Pipe SI

Pipe_-_(138)_(RYCB) TEE_8_(RYCB) TEE_9_(RYCB) 21.988 0.013 86.64 86.53 0 0

;HDPE Pipe SI

Pipe_-_(139)_(RYCB) ELB_3_(RYCB) TEE_2_(RYCB) 20.228 0.013 86.78 86.681 0 0

;HDPE Pipe SI

Pipe_-_(14)_(RYCB) TEE_15_(RYCB) RYCB_7_(RYCB) 4.757 0.013 87.38 87.356 0 0

;HDPE Pipe SI

Pipe_-_(140)_(RYCB) TEE_2_(RYCB) RYCB_3_(RYCB) 20.776 0.013 86.65 86.544 0 0

;HDPE Pipe SI

Pipe_-_(141)_(RYCB) ELB_11_(RYCB) TEE_19_(RYCB) 18.513 0.013 87.9 87.752 0 0

;HDPE Pipe SI

Pipe_-_(142)_(RYCB) TEE_19_(RYCB) TEE_20_(RYCB) 27.38 0.013 87.74 87.603 0 0

;HDPE Pipe SI

Pipe_-_(143)_(RYCB) TEE_20_(RYCB) TEE_21_(RYCB) 22.082 0.013 87.59 87.48 0 0

;HDPE Pipe SI

Pipe_-_(144)_(RYCB) TEE_21_(RYCB) RYCB_8_(RYCB) 33.251 0.013 87.47 87.304 0 0

;HDPE Pipe SI

Pipe_-_(15)_(RYCB) RYCB_7_(RYCB) 138_(STM) 39.009 0.013 86.79 86.595 0 0

;HDPE Pipe SI

Pipe_-_(150)_(RYCB) TEE_18_(RYCB) TEE_17_(RYCB) 21.983 0.013 87.84 87.73 0 0

;HDPE Pipe SI

Pipe_-_(151)_(RYCB) TEE_17_(RYCB) TEE_16_(RYCB) 22.116 0.013 87.69 87.579 0 0

;HDPE Pipe SI

Pipe_-_(152)_(RYCB) TEE_16_(RYCB) TEE_15_(RYCB) 36.027 0.013 87.57 87.39 0 0

;HDPE Pipe SI

Pipe_-_(153)_(RYCB) ELB_8_(RYCB) TEE_10_(RYCB) 17.189 0.013 87.072 86.9 0 0

;HDPE Pipe SI

Pipe_-_(154)_(RYCB) ELB_9_(RYCB) TEE_12_(RYCB) 38.096 0.013 87.35 87.16 0 0

;HDPE Pipe SI

Pipe_-_(155)_(RYCB) TEE_12_(RYCB) TEE_13_(RYCB) 17.927 0.013 87.15 87.06 0 0

;HDPE Pipe SI

Pipe_-_(156)_(1)_(RYCB) TEE_14_(RYCB) RYCB_7_(RYCB) 3.241 0.013 86.861 86.845 0 0

;HDPE Pipe SI

Pipe_-_(156)_(RYCB) TEE_13_(RYCB) TEE_14_(RYCB) 27.79 0.013 87 86.861 0 0

;HDPE Pipe SI

Pipe_-_(16)_(RYCB) TEE_5_(RYCB) RYCB_6_(RYCB) 3.09 0.013 86.09 86.075 0 0

;HDPE Pipe SI

Pipe_-_(161)_(RYCB) ELB_1_(RYCB) RYCB_1_(RYCB) 36.543 0.013 86.51 86.327 0 0

;HDPE Pipe SI

Pipe_-_(164)_(RYCB) TEE_23_(RYCB) RYCB_10_(RYCB) 28.561 0.013 87.7 87.557 0 0

;HDPE Pipe SI

Pipe_-_(165)_(RYCB) TEE_25_(RYCB) RYCB_11_(RYCB) 30.956 0.013 87.83 87.675 0 0

;HDPE Pipe SI

Pipe_-_(17)_(RYCB) TEE_11_(RYCB) RYCB_6_(RYCB) 5.41 0.013 86.68 86.653 0 0

;HDPE Pipe SI

Pipe_-_(19)_(RYCB) RYCB_9_(RYCB) 22_(RYCB) 31.338 0.013 87.84 87.683 0 0

;HDPE Pipe SI

Pipe_-_(25)_(RYCB) RYCB_11_(RYCB) 31_(CB) 6.05 0.013 87.65 87.62 0 0

;HDPE Pipe SI

Pipe_-_(27)_(RYCB) RYCB_3_(RYCB) 1_(RYCB) 30.6 0.013 86.48 86.327 0 0

;HDPE Pipe SI

Pipe_-_(73)_(RYCB) RYCB_8_(RYCB) 18_(CB) 9.658 0.013 87.27 87.222 0 0

;HDPE Pipe SI

Pipe_-_(87)_(RYCB) StartNullStruct2 TEE_1_(RYCB) 21.137 0.013 86.62 86.515 0 0

;HDPE Pipe SI

Pipe_-_(88)_(RYCB) TEE_1_(RYCB) RYCB_2_(RYCB) 36.065 0.013 86.51 86.33 0 0

;HDPE Pipe SI

Pipe_-_(89)_(RYCB) ELB_4_(RYCB) RYCB_3_(RYCB) 30.528 0.013 86.83 86.677 0 0

;HDPE Pipe SI

Pipe_-_(9)_(RYCB) RYCB_5_(RYCB) 11_(CB) 5.75 0.013 86.35 86.321 0 0

;HDPE Pipe SI

Pipe_-_(90)_(RYCB) StartNullStruct2 ELB_2_(RYCB) 11.016 0.013 86.62 86.565 0 0

;HDPE Pipe SI

Pipe_-_(93)_(RYCB) ELB_5_(RYCB) TEE_3_(RYCB) 39.684 0.013 86.82 86.621 0 0

;HDPE Pipe SI

Pipe_-_(94)_(RYCB) TEE_3_(RYCB) TEE_4_(RYCB) 43.993 0.013 86.55 86.33 0 0

;HDPE Pipe SI

Pipe_-_(95)_(RYCB) TEE_4_(RYCB) TEE_5_(RYCB) 43.248 0.013 86.32 86.104 0 0

;HDPE Pipe SI

Pipe_-_(96)_(RYCB) ELB_7_(RYCB) TEE_7_(RYCB) 25.116 0.013 87.1 86.82 0 0

;HDPE Pipe SI

Pipe_-_(98)_(RYCB) TEE_9_(RYCB) RYCB_5_(RYCB) 35.118 0.013 86.52 86.344 0 0

;HDPE Pipe SI

Pipe_-_(99)_(RYCB) ELB_6_(RYCB) TEE_6_(RYCB) 38.969 0.013 86.85 86.655 0 0

;Mcon Circular Conc. Pipe

STM-23_(STM) 106_(STM) 104_(STM) 97.6 0.013 83.839 83.595 0 0

;Mcon Circular Conc. Pipe

STM-24_(STM) 108_(STM) 106_(STM) 26.241 0.013 83.916 83.85 0 0

;Ipex PVC DR 35

STM-28_(STM) 110_(STM) 108_(STM) 29.106 0.013 84.236 84.114 0 0

;Mcon Circular Conc. Pipe

STM-34_(1)_(1)_(STM) 98_(STM) 2121_(STM) 39.054 0.013 81.47 81.43 0 0

;Mcon Circular Conc. Pipe

STM-34_(1)_(STM) 100_(STM) 98_(STM) 41.189 0.013 81.57 81.529 0 0

;Mcon Circular Conc. Pipe

STM-34_(STM) 102_(STM) 100_(STM) 11.833 0.013 81.641 81.627 0 0

;Mcon Circular Conc. Pipe

STM-35_(STM) 2121_(STM) 2142_(STM) 74.285 0.013 80.531 80.46 0 0

;Mcon Circular Conc. Pipe

STM-36_(STM) 2142_(STM) 2143_(STM) 23.99 0.013 80.404 80.38 0 0

;Mcon Circular Conc. Pipe

STM-37_(STM) 2143_(STM) 2144_(STM) 20.119 0.013 80.23 80.21 0 0

;Mcon Circular Conc. Pipe

STM-38_(STM) 2144_(STM) STM-111_(STM) 17.179 0.013 80.154 80.137 0 0

;HDPE Pipe SI

STM-81_(STM) 142_(STM) 140_(STM) 20.687 0.013 85.244 85.11 0 0

;HDPE Pipe SI

STM-82_(STM) StartNullStruct3 104_(STM) 37.594 0.013 84.091 83.903 0 0

;HDPE Pipe SI

STM-83_(STM) STM-251_(STM) 144_(STM) 38.405 0.013 85.609 85.225 0 0

[ORIFICES]

;;Name	From Node	To Node	Type	Offset	Qcoeff	Gated	CloseTime
CB-02	02_(CB)	106_(STM)	SIDE	85.6	0.62	NO	0
CB-03	03_(CB)	106_(STM)	SIDE	85.6	0.62	NO	0
CB-04	04_(CB)	104_(STM)	SIDE	85.53	0.62	NO	0
CB-05	05_(CB)	104_(STM)	SIDE	85.531	0.62	NO	0
CB-06	RYCB_1_(RYCB)	104_(STM)	SIDE	86.19	0.62	NO	0
CB-08	08_(CB)	112_(STM)	SIDE	85.436	0.62	NO	0
CB-09	09_(CB)	112_(STM)	SIDE	85.425	0.62	NO	0
CB-10	10_(CB)	114_(STM)	SIDE	86.17	0.62	NO	0
CB-11	11_(CB)	114_(STM)	SIDE	86.321	0.62	NO	0
CB-12	12_(CB)	120_(STM)	SIDE	85.643	0.62	NO	0
CB-13	13_(CB)	120_(STM)	SIDE	85.793	0.62	NO	0
CB-14	14_(CB)	126_(STM)	SIDE	86.012	0.62	NO	0
CB-15	15_(CB)	126_(STM)	SIDE	86.016	0.62	NO	0
CB-16	16_(CB)	128_(STM)	SIDE	86.173	0.62	NO	0
CB-17	17_(CB)	128_(STM)	SIDE	86.176	0.62	NO	0
CB-18	18_(CB)	136_(STM)	SIDE	87.222	0.62	NO	0
CB-19	19_(CB)	136_(STM)	SIDE	86.281	0.62	NO	0
CB-20	20_(CB)	140_(STM)	SIDE	86.623	0.62	NO	0
CB-21	21_(CB)	140_(STM)	SIDE	86.773	0.62	NO	0
CB-23	23_(CB)	144_(STM)	SIDE	86.923	0.62	NO	0
CB-24	24_(CB)	144_(STM)	SIDE	86.923	0.62	NO	0
CB-25	25_(CB)	146_(STM)	SIDE	86.775	0.62	NO	0
CB-26	26_(CB)	146_(STM)	SIDE	86.775	0.62	NO	0
CB-27	27_(CB)	148_(STM)	SIDE	86.775	0.62	NO	0
CB-28	28_(CB)	148_(STM)	SIDE	86.775	0.62	NO	0

CB-30 30_(CB) 150_(STM) SIDE 86.93 0.62 NO 0

CB-31 31_(CB) 150_(STM) SIDE 87.62 0.62 NO 0

;CICB

OR-02 Maj-50 02_(CB) SIDE 87.425 0.62 NO 0

;CICB

OR-03 Maj-50 03_(CB) SIDE 87.425 0.62 NO 0

;CICB

OR-04 Maj-52 04_(CB) SIDE 87.472 0.62 NO 0

;CICB

OR-05 Maj-52 05_(CB) SIDE 87.472 0.62 NO 0

OR-08 Maj-46 08_(CB) BOTTOM 87.407 0.62 NO 0

OR-09 Maj-46 09_(CB) BOTTOM 87.407 0.62 NO 0

OR-10 Maj-44 10_(CB) BOTTOM 87.539 0.62 NO 0

OR-11 Maj-44 11_(CB) BOTTOM 87.539 0.62 NO 0

OR-12 Maj-41 12_(CB) BOTTOM 87.62 0.62 NO 0

OR-13 Maj-41 13_(CB) BOTTOM 87.62 0.62 NO 0

OR-14 Maj-37 14_(CB) BOTTOM 87.993 0.62 NO 0

OR-15 Maj-37 15_(CB) BOTTOM 87.993 0.62 NO 0

OR-16 Maj-35 16_(CB) BOTTOM 88.149 0.62 NO 0

OR-17 Maj-35 17_(CB) BOTTOM 88.149 0.62 NO 0

OR-18 Maj-28 18_(CB) BOTTOM 88.251 0.62 NO 0

OR-19 Maj-28 19_(CB) BOTTOM 88.251 0.62 NO 0

OR-20 Maj-26 20_(CB) BOTTOM 88.605 0.62 NO 0

OR-21 Maj-26 21_(CB) BOTTOM 88.605 0.62 NO 0

OR-23 Maj-24 23_(CB) BOTTOM 88.904 0.62 NO 0

OR-24 Maj-24 24_(CB) BOTTOM 88.904 0.62 NO 0

OR-25 Maj-19 25_(CB) BOTTOM 89.388 0.62 NO 0

;CICB

OR-26 Maj-19 26_(CB) SIDE 89.388 0.62 NO 0

;Double CICB

OR-27 Maj-21 27_(CB) SIDE 88.595 0.62 NO 0

;Double CICB

OR-28 Maj-21 28_(CB) SIDE 88.595 0.62 NO 0

OR-30 Slope1 30_(CB) BOTTOM 89.066 0.62 NO 0

;CICB

OR-31 Slope1 31_(CB) SIDE 89.066 0.62 NO 0

RYCB-02 RYCB_2_(RYCB) 112_(STM) SIDE 86.33 0.62 NO 0

RYCB-03 1_(RYCB) 110_(STM) SIDE 86.327 0.62 NO 0

RYCB-04 RYCB_4_(RYCB) StartNullStruct3 SIDE 86.42 0.62 NO 0

RYCB-06 RYCB_6_(RYCB) 128_(STM) SIDE 86.075 0.62 NO 0

RYCB-10 RYCB_10_(RYCB) 148_(STM) SIDE 87.33 0.62 NO 0

RYCB-22 22_(RYCB) 142_(STM) SIDE 87.683 0.62 NO 0

RYCB-29 29_(RYCB) STM-251_(STM) SIDE 88.539 0.62 NO 0

[OUTLETS]

;;Name From Node To Node Offset Type QTable/Qcoeff Qexpon Gated

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- --------

B4-Out 58_(CB) 2142_(STM) 85.4 TABULAR/HEAD B4-Out NO

OL1 B2_Stor 150_(STM) 90.5 TABULAR/DEPTH B2-Out NO

[XSECTIONS]

;;Link Shape Geom1 Geom2 Geom3 Geom4 Barrels Culvert

;;---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------

10_(STM) CIRCULAR 1.35 0 0 0 1

11_(STM) CIRCULAR 1.35 0 0 0 1

12_(STM) CIRCULAR 1.35 0 0 0 1

13_(STM) CIRCULAR 1.35 0 0 0 1

14_(STM) CIRCULAR 1.65 0 0 0 1

15_(10)_(STM)	CIRCULAR	1.35	0	0	0	1
15_(11)_(STM)	CIRCULAR	1.35	0	0	0	1
15_(12)_(STM)	CIRCULAR	0.525	0	0	0	1
15_(13)_(STM)	CIRCULAR	0.6	0	0	0	1
15_(5)_(STM)	CIRCULAR	0.525	0	0	0	1
15_(9)_(STM)	CIRCULAR	1.35	0	0	0	1
4_(STM)	CIRCULAR	1.2	0	0	0	1
5_(STM)	CIRCULAR	1.2	0	0	0	1
8_(STM)	CIRCULAR	1.35	0	0	0	1
9_(STM)	CIRCULAR	1.35	0	0	0	1
C1	TRIANGULAR	0.6	3.6	0	0	1
C18	TRIANGULAR	0.6	3.6	0	0	1
C18_3	IRREGULAR	18mROWwSidewalk	0	0	0	1
C18_4	IRREGULAR	18mROWwSidewalk	0	0	0	1
C18_5	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C18_6	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C18_8	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C18_9	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C19	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C2	TRIANGULAR	0.5	3	0	0	1
C20	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C21	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C22	IRREGULAR	24mROW-Dbl-Sidewalk	0	0	0	1
C23	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C24	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C25	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C26	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C27	TRIANGULAR	0.6	3.6	0	0	1
C27_1	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1

C27_2	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C28	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C31	TRIANGULAR	0.6	3.6	0	0	1
C36	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C37	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C41	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C42	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C43	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C44	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C45	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C46	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C47	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C48	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C49	IRREGULAR	18mROW-No-Sidewalk	0	0	0	1
C5	TRIANGULAR	0.6	3.6	0	0	1
C50_1	IRREGULAR	18mROWwSidewalk	0	0	0	1
C50_2	IRREGULAR	18mROWwSidewalk	0	0	0	1
C51	IRREGULAR	18mROWwSidewalk	0	0	0	1
C52	IRREGULAR	18mROWwSidewalk	0	0	0	1
C53	IRREGULAR	18mROWwSidewalk	0	0	0	1
C54	IRREGULAR	18mROWwSidewalk	0	0	0	1
C56	TRIANGULAR	0.6	3.6	0	0	1
C58	TRIANGULAR	0.6	3.6	0	0	1
C59	TRIANGULAR	0.6	3.6	0	0	1
C60	TRIANGULAR	0.6	3.6	0	0	1
C62	TRIANGULAR	0.6	3.6	0	0	1
C63	TRIANGULAR	0.6	3.6	0	0	1
C65	TRIANGULAR	0.6	3.6	0	0	1
C66	TRIANGULAR	0.6	3.6	0	0	1

C67	TRIANGULAR	0.6	3.6	0	0	1
Pipe_-_(100)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(110)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(111)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(114)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(117)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(118)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(119)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(134)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(137)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(138)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(139)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(14)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(140)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(141)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(142)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(143)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(144)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(15)_(RYCB)	CIRCULAR	0.3	0	0	0	1
Pipe_-_(150)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(151)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(152)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(153)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(154)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(155)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(156)_(1)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(156)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(16)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(161)_(RYCB)	CIRCULAR	0.25	0	0	0	1

Pipe_-_(164)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(165)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(17)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(19)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(25)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(27)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(73)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(87)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(88)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(89)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(9)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(90)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(93)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(94)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(95)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(96)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(98)_(RYCB)	CIRCULAR	0.25	0	0	0	1
Pipe_-_(99)_(RYCB)	CIRCULAR	0.25	0	0	0	1
STM-23_(STM)	CIRCULAR	0.45	0	0	0	1
STM-24_(STM)	CIRCULAR	0.45	0	0	0	1
STM-28_(STM)	CIRCULAR	0.25	0	0	0	1
STM-34_(1)_(1)_(STM)	CIRCULAR	1.65	0	0	0	1
STM-34_(1)_(STM)	CIRCULAR	1.65	0	0	0	1
STM-34_(STM)	CIRCULAR	1.65	0	0	0	1
STM-35_(STM)	CIRCULAR	1.65	0	0	0	1
STM-36_(STM)	CIRCULAR	1.65	0	0	0	1
STM-37_(STM)	CIRCULAR	1.8	0	0	0	1
STM-38_(STM)	CIRCULAR	1.8	0	0	0	1
STM-81_(STM)	CIRCULAR	0.25	0	0	0	1

STM-82_(STM)	CIRCULAR	0.25	0	0	0	1
STM-83_(STM)	CIRCULAR	0.25	0	0	0	1
CB-02	CIRCULAR	0.083	0	0	0	
CB-03	CIRCULAR	0.102	0	0	0	
CB-04	CIRCULAR	0.094	0	0	0	
CB-05	CIRCULAR	0.102	0	0	0	
CB-06	CIRCULAR	0.152	0	0	0	
CB-08	CIRCULAR	0.102	0	0	0	
CB-09	CIRCULAR	0.083	0	0	0	
CB-10	CIRCULAR	0.127	0	0	0	
CB-11	CIRCULAR	0.083	0	0	0	
CB-12	CIRCULAR	0.127	0	0	0	
CB-13	CIRCULAR	0.108	0	0	0	
CB-14	CIRCULAR	0.083	0	0	0	
CB-15	CIRCULAR	0.102	0	0	0	
CB-16	CIRCULAR	0.083	0	0	0	
CB-17	CIRCULAR	0.102	0	0	0	
CB-18	CIRCULAR	0.094	0	0	0	
CB-19	CIRCULAR	0.127	0	0	0	
CB-20	CIRCULAR	0.127	0	0	0	
CB-21	CIRCULAR	0.108	0	0	0	
CB-23	CIRCULAR	0.127	0	0	0	
CB-24	CIRCULAR	0.094	0	0	0	
CB-25	CIRCULAR	0.108	0	0	0	
CB-26	CIRCULAR	0.108	0	0	0	
CB-27	CIRCULAR	0.178	0	0	0	
CB-28	CIRCULAR	0.178	0	0	0	
CB-30	CIRCULAR	0.127	0	0	0	
CB-31	CIRCULAR	0.102	0	0	0	

OR-02	RECT_CLOSED	0.13	0.65	0	0
OR-03	RECT_CLOSED	0.13	0.65	0	0
OR-04	RECT_CLOSED	0.13	0.65	0	0
OR-05	RECT_CLOSED	0.13	0.65	0	0
OR-08	RECT_CLOSED	0.35	0.35	0	0
OR-09	RECT_CLOSED	0.35	0.35	0	0
OR-10	RECT_CLOSED	0.35	0.35	0	0
OR-11	RECT_CLOSED	0.35	0.35	0	0
OR-12	RECT_CLOSED	0.35	0.35	0	0
OR-13	RECT_CLOSED	0.35	0.35	0	0
OR-14	RECT_CLOSED	0.35	0.35	0	0
OR-15	RECT_CLOSED	0.35	0.35	0	0
OR-16	RECT_CLOSED	0.35	0.35	0	0
OR-17	RECT_CLOSED	0.35	0.35	0	0
OR-18	RECT_CLOSED	0.35	0.35	0	0
OR-19	RECT_CLOSED	0.35	0.35	0	0
OR-20	RECT_CLOSED	0.35	0.35	0	0
OR-21	RECT_CLOSED	0.35	0.35	0	0
OR-23	RECT_CLOSED	0.35	0.35	0	0
OR-24	RECT_CLOSED	0.35	0.35	0	0
OR-25	RECT_CLOSED	0.35	0.35	0	0
OR-26	RECT_CLOSED	0.13	0.65	0	0
OR-27	RECT_CLOSED	0.13	1.3	0	0
OR-28	RECT_CLOSED	0.13	1.3	0	0
OR-30	RECT_CLOSED	0.35	0.35	0	0
OR-31	RECT_CLOSED	0.13	0.65	0	0
RYCB-02	CIRCULAR	0.127	0	0	0
RYCB-03	CIRCULAR	0.127	0	0	0
RYCB-04	CIRCULAR	0.127	0	0	0

```
RYCB-06         CIRCULAR    0.152       0       0       0
RYCB-10         CIRCULAR    0.178       0       0       0
RYCB-22         CIRCULAR    0.127       0       0       0
RYCB-29         CIRCULAR    0.127       0       0       0

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.035    0.035    0.013
X1 16.5mROW-Dbl-Sidewalk  9      2      14.5    0.0     0.0     0.0     0.0     0.0
GR 0.6     -10.9    0.15    2      0.15    4      0      4.01    0.13    8.25
GR 0       12.49    0.15    12.5    0.15    14.5    0.6     25.6
;
NC 0.035    0.035    0.013
X1 16.5mROW-No-Sidewalk  9      3.8     12.7    0.0     0.0     0.0     0.0     0.0
GR 0.6     -9.1     0.15    3.8     0.15    4      0      4.01    0.13    8.25
GR 0       12.49    0.15    12.5    0.15    12.7    0.6     25.6
;
NC 0.035    0.035    0.013
X1 16.5mROWwSidewalk  9      2      12.7    0.0     0.0     0.0     0.0     0.0
GR 0.6     -10.9    0.15    2      0.15    4      0      4.01    0.13    8.25
GR 0       12.49    0.15    12.5    0.15    12.7    0.6     25.6
;
NC 0.035    0.035    0.013
X1 18mROW-Dbl-Sidewalk  9      5.5     18      0.0     0.0     0.0     0.0     0.0
GR 0.6     -10      0.09    5.5     0.08    7.5     0      7.5     0.13    11.75
GR 0       16      0.08    16      0.09    18      0.6     29.25
;
NC 0.035    0.035    0.013
```

X1 18mROW-No-Sidewalk 7 7.5 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.08 7.5 0 7.5 0.13 11.75 0 16

GR 0.08 16 0.6 29.25

;

NC 0.035 0.035 0.013

X1 18mROWwSidewalk 8 2.75 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.09 2.75 0.08 7.5 0 7.5 0.13 11.75

GR 0 16 0.08 16 0.6 29.25

;

NC 0.035 0.035 0.013

X1 18mROWwSidewalk-Half 5 2.75 16 0.0 0.0 0.0 0.0 0.0

GR 0.6 -10 0.09 2.75 0.08 7.5 0 7.5 0.13 11.75

;

NC 0.035 0.035 0.013

X1 24mROW-Dbl-Sidewalk 9 3.6 20.4 0.0 0.0 0.0 0.0 0.0

GR 0.6 -9.3 0.15 3.6 0.15 7.5 0 7.51 0.13 12

GR 0 16.49 0.15 16.5 0.15 20.4 0.6 33.3

[LOSSES]

;;Link Kentry Kexit Kavg Flap Gate Seepage

;;---------- ---------- ---------- ---------- ---------- ----------

10_(STM) 0 0.26 0 NO 0

11_(STM) 0 0.11 0 NO 0

12_(STM) 0 1.33 0 NO 0

13_(STM) 0 0.02 0 NO 0

14_(STM) 0 0.47 0 NO 0

15_(10)_(STM) 0 0.39 0 NO 0

15_(11)_(STM) 0 0.035 0 NO 0

15_(12)_(STM) 0 0.035 0 NO 0

15_(13)_(STM)	0	1.33	0	NO	0
15_(5)_(STM)	0	0.02	0	NO	0
15_(9)_(STM)	0	0.47	0	NO	0
4_(STM)	0	0.035	0	NO	0
5_(STM)	0	1.33	0	NO	0
8_(STM)	0	0.035	0	NO	0
9_(STM)	0	0.32	0	NO	0
Pipe_-_(110)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(111)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(114)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(117)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(118)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(119)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(134)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(137)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(138)_(RYCB)	0	0.02	0	NO	0
Pipe_-_(139)_(RYCB)	0	0.08	0	NO	0
Pipe_-_(14)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(140)_(RYCB)	0	1.33	0	NO	0
Pipe_-_(141)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(142)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(143)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(144)_(RYCB)	0	0.54	0	NO	0
Pipe_-_(15)_(RYCB)	0	0.84	0	NO	0
Pipe_-_(150)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(151)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(152)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(153)_(RYCB)	0	0.035	0	NO	0
Pipe_-_(154)_(RYCB)	0	0.02	0	NO	0

Pipe_-_(155)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(156)_(1)_(RYCB) 0 0.84 0 NO 0

Pipe_-_(156)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(161)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(165)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(87)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(89)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(93)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(94)_(RYCB) 0 0.02 0 NO 0

Pipe_-_(95)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(96)_(RYCB) 0 1.33 0 NO 0

Pipe_-_(98)_(RYCB) 0 0.035 0 NO 0

Pipe_-_(99)_(RYCB) 0 0.035 0 NO 0

STM-23_(STM) 0 1.33 0 NO 0

STM-24_(STM) 0 0.08 0 NO 0

STM-28_(STM) 0 0.055 0 NO 0

STM-34_(1)_(1)_(STM) 0 1.07 0 NO 0

STM-34_(1)_(STM) 0 0.08 0 NO 0

STM-34_(STM) 0 0.54 0 NO 0

STM-35_(STM) 0 0.32 0 NO 0

STM-36_(STM) 0 0.39 0 NO 0

STM-37_(STM) 0 0.73 0 NO 0

STM-81_(STM) 0 1.33 0 NO 0

STM-82_(STM) 0 1.33 0 NO 0

STM-83_(STM) 0 1.33 0 NO 0

[CURVES]

;;Name Type X-Value Y-Value

;;---------- ---------- ---------- ----------

;100% capture of flow to this CB

100%_Capture Rating 0 0

100%_Capture 0.01 0.001

100%_Capture 0.1 1

100%_Capture 0.3 5

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

102mm-ICD Rating 0 0

102mm-ICD 0.01 0.0266

102mm-ICD 0.15 0.0278

102mm-ICD 0.3 0.0296

102mm-ICD 0.35 0.03

102mm-ICD-RLCB Rating 0 0

102mm-ICD-RLCB 0.01 0.0301

102mm-ICD-RLCB 0.15 0.0312

102mm-ICD-RLCB 0.3 0.0328

102mm-ICD-RLCB 0.35 0.0332

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

108mm-ICD Rating 0 0

108mm-ICD 0.01 0.0298

108mm-ICD 0.15 0.0312

108mm-ICD 0.3 0.0332

108mm-ICD 0.35 0.0337

108mm-ICD-RLCB Rating 0 0

108mm-ICD-RLCB 0.01 0.0338

108mm-ICD-RLCB 0.15 0.035

108mm-ICD-RLCB 0.3 0.0367

108mm-ICD-RLCB 0.35 0.0372

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

127mm-ICD Rating 0 0

127mm-ICD 0.01 0.0413

127mm-ICD 0.15 0.0432

127mm-ICD 0.3 0.0458

127mm-ICD 0.35 0.0466

127mm-ICD-RLCB Rating 0 0

127mm-ICD-RLCB 0.01 0.047

127mm-ICD-RLCB 0.15 0.048

127mm-ICD-RLCB 0.3 0.051

127mm-ICD-RLCB 0.35 0.052

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

152mm-ICD Rating 0 0

152mm-ICD 0.01 0.0591

152mm-ICD 0.15 0.0618

152mm-ICD 0.3 0.0657

152mm-ICD 0.35 0.0667

152mm-ICD-RLCB Rating 0 0

152mm-ICD-RLCB 0.01 0.067

152mm-ICD-RLCB 0.15 0.069

152mm-ICD-RLCB 0.3 0.073

152mm-ICD-RLCB 0.35 0.074

;Sx0.03

16ROW_1CB_So0.005 Rating 0 0

16ROW_1CB_So0.005 0.01 0.0003

16ROW_1CB_So0.005 0.02 0.0011

16ROW_1CB_So0.005 0.03 0.0037

16ROW_1CB_So0.005 0.04 0.0072

16ROW_1CB_So0.005 0.05 0.0132

16ROW_1CB_So0.005 0.06 0.0168

16ROW_1CB_So0.005 0.07 0.0214

16ROW_1CB_So0.005 0.08 0.0253

16ROW_1CB_So0.005 0.09 0.0286

16ROW_1CB_So0.005 0.1 0.0331

16ROW_1CB_So0.005 0.11 0.0367

16ROW_1CB_So0.005 0.12 0.0409

16ROW_1CB_So0.005 0.13 0.0446

16ROW_1CB_So0.005 0.14 0.048

16ROW_1CB_So0.005 0.15 0.049

16ROW_1CB_So0.005 0.16 0.049

16ROW_1CB_So0.005 0.17 0.049

16ROW_1CB_So0.005 0.18 0.049

16ROW_1CB_So0.005 0.19 0.049

16ROW_1CB_So0.005 0.2 0.049

16ROW_1CB_So0.005 0.21 0.049

16ROW_1CB_So0.005 0.22 0.049

16ROW_1CB_So0.005 0.23 0.049

16ROW_1CB_So0.005 0.24 0.049

16ROW_1CB_So0.005 0.25 0.049

16ROW_1CB_So0.005 0.26 0.049

16ROW_1CB_So0.005 0.27 0.049

16ROW_1CB_So0.005 0.28 0.049

16ROW_1CB_So0.005 0.29 0.049

16ROW_1CB_So0.005 0.3 0.049

16ROW_1CB_So0.005 0.31 0.049

16ROW_1CB_So0.005 0.32 0.049

16ROW_1CB_So0.005 0.33 0.049

16ROW_1CB_So0.005 0.34 0.049

16ROW_1CB_So0.005 0.35 0.049

16ROW_1CB_So0.005 0.36 0.049

16ROW_1CB_So0.005 0.37 0.049

16ROW_1CB_So0.005 0.38 0.049

16ROW_1CB_So0.005 0.39 0.049

16ROW_1CB_So0.005 0.4 0.049

;Sx0.03

16ROW_1CB_So0.01 Rating 0 0

16ROW_1CB_So0.01 0.01 0.0005

16ROW_1CB_So0.01 0.02 0.0016

16ROW_1CB_So0.01 0.03 0.0052

16ROW_1CB_So0.01 0.04 0.0101

16ROW_1CB_So0.01 0.05 0.0158

16ROW_1CB_So0.01 0.06 0.0206

16ROW_1CB_So0.01 0.07 0.0254

16ROW_1CB_So0.01 0.08 0.029

16ROW_1CB_So0.01 0.09 0.0343

16ROW_1CB_So0.01	0.1	0.0382
16ROW_1CB_So0.01	0.11	0.043
16ROW_1CB_So0.01	0.12	0.0463
16ROW_1CB_So0.01	0.13	0.049
16ROW_1CB_So0.01	0.14	0.049
16ROW_1CB_So0.01	0.15	0.049
16ROW_1CB_So0.01	0.16	0.049
16ROW_1CB_So0.01	0.17	0.049
16ROW_1CB_So0.01	0.18	0.049
16ROW_1CB_So0.01	0.19	0.049
16ROW_1CB_So0.01	0.2	0.049
16ROW_1CB_So0.01	0.21	0.049
16ROW_1CB_So0.01	0.22	0.049
16ROW_1CB_So0.01	0.23	0.049
16ROW_1CB_So0.01	0.24	0.049
16ROW_1CB_So0.01	0.25	0.049
16ROW_1CB_So0.01	0.26	0.049
16ROW_1CB_So0.01	0.27	0.049
16ROW_1CB_So0.01	0.28	0.049
16ROW_1CB_So0.01	0.29	0.049
16ROW_1CB_So0.01	0.3	0.049
16ROW_1CB_So0.01	0.31	0.049
16ROW_1CB_So0.01	0.32	0.049
16ROW_1CB_So0.01	0.33	0.049
16ROW_1CB_So0.01	0.34	0.049
16ROW_1CB_So0.01	0.35	0.049
16ROW_1CB_So0.01	0.36	0.049
16ROW_1CB_So0.01	0.37	0.049

;Sx0.03

16ROW_1CB_So0.02	Rating	0	0
16ROW_1CB_So0.02		0.01	0.0006
16ROW_1CB_So0.02		0.02	0.0019
16ROW_1CB_So0.02		0.03	0.0062
16ROW_1CB_So0.02		0.04	0.012
16ROW_1CB_So0.02		0.05	0.0154
16ROW_1CB_So0.02		0.06	0.0192
16ROW_1CB_So0.02		0.07	0.0236
16ROW_1CB_So0.02		0.08	0.0275
16ROW_1CB_So0.02		0.09	0.0316
16ROW_1CB_So0.02		0.1	0.0363
16ROW_1CB_So0.02		0.11	0.041
16ROW_1CB_So0.02		0.12	0.045
16ROW_1CB_So0.02		0.13	0.045
16ROW_1CB_So0.02		0.14	0.045
16ROW_1CB_So0.02		0.15	0.045
16ROW_1CB_So0.02		0.16	0.045
16ROW_1CB_So0.02		0.17	0.045
16ROW_1CB_So0.02		0.18	0.045
16ROW_1CB_So0.02		0.19	0.045
16ROW_1CB_So0.02		0.2	0.045
16ROW_1CB_So0.02		0.21	0.045
16ROW_1CB_So0.02		0.22	0.045
16ROW_1CB_So0.02		0.23	0.045
16ROW_1CB_So0.02		0.24	0.045
16ROW_1CB_So0.02		0.25	0.045
16ROW_1CB_So0.02		0.26	0.045
16ROW_1CB_So0.02		0.27	0.045

16ROW_1CB_So0.02 0.28 0.045

16ROW_1CB_So0.02 0.29 0.045

16ROW_1CB_So0.02 0.3 0.045

16ROW_1CB_So0.02 0.31 0.045

16ROW_1CB_So0.02 0.32 0.045

;Sx0.03

16ROW_1CB_So0.03 Rating 0 0

16ROW_1CB_So0.03 0.01 0.0005

16ROW_1CB_So0.03 0.02 0.0017

16ROW_1CB_So0.03 0.03 0.0057

16ROW_1CB_So0.03 0.04 0.011

16ROW_1CB_So0.03 0.05 0.0146

16ROW_1CB_So0.03 0.06 0.0179

16ROW_1CB_So0.03 0.07 0.0216

16ROW_1CB_So0.03 0.08 0.0256

16ROW_1CB_So0.03 0.09 0.0298

16ROW_1CB_So0.03 0.1 0.0335

16ROW_1CB_So0.03 0.11 0.038

16ROW_1CB_So0.03 0.12 0.039

16ROW_1CB_So0.03 0.13 0.039

16ROW_1CB_So0.03 0.14 0.039

16ROW_1CB_So0.03 0.15 0.039

16ROW_1CB_So0.03 0.16 0.039

16ROW_1CB_So0.03 0.17 0.039

16ROW_1CB_So0.03 0.18 0.039

16ROW_1CB_So0.03 0.19 0.039

16ROW_1CB_So0.03 0.2 0.039

16ROW_1CB_So0.03 0.21 0.039

16ROW_1CB_So0.03 0.22 0.039

16ROW_1CB_So0.03 0.23 0.039

16ROW_1CB_So0.03 0.24 0.039

16ROW_1CB_So0.03 0.25 0.039

16ROW_1CB_So0.03 0.26 0.039

16ROW_1CB_So0.03 0.27 0.039

16ROW_1CB_So0.03 0.28 0.039

16ROW_1CB_So0.03 0.29 0.039

16ROW_1CB_So0.03 0.3 0.039

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

178mm-ICD Rating 0 0

178mm-ICD 0.01 0.0811

178mm-ICD 0.15 0.0848

178mm-ICD 0.3 0.0901

178mm-ICD 0.35 0.0915

178mm-ICD-RLCB Rating 0 0

178mm-ICD-RLCB 0.01 0.092

178mm-ICD-RLCB 0.15 0.095

178mm-ICD-RLCB 0.3 0.1

178mm-ICD-RLCB 0.35 0.101

;1 Single CB on single lead pipe. Single CB is limited by 250mm Lead pipe at 1.2m head. Q=195.3 L/s

1-CB Rating 0 0

1-CB 0.05 0.1953

1-CB 1 0.1954

;1 DCB on single lead pipe. DCB is limited by 300mm Lead pipe at 1.2m head. Q=281.2 L/s

1-DCB Rating 0 0

1-DCB 0.05 0.2812

1-DCB 1 0.2813

;Sx0.03

24ROW_1CB_So0.005 Rating 0 0

24ROW_1CB_So0.005 0.01 0.0004

24ROW_1CB_So0.005 0.02 0.0012

24ROW_1CB_So0.005 0.03 0.0039

24ROW_1CB_So0.005 0.04 0.0076

24ROW_1CB_So0.005 0.05 0.0136

24ROW_1CB_So0.005 0.06 0.0174

24ROW_1CB_So0.005 0.07 0.022

24ROW_1CB_So0.005 0.08 0.0258

24ROW_1CB_So0.005 0.09 0.0296

24ROW_1CB_So0.005 0.1 0.034

24ROW_1CB_So0.005 0.11 0.0378

24ROW_1CB_So0.005 0.12 0.0418

24ROW_1CB_So0.005 0.13 0.0453

24ROW_1CB_So0.005 0.14 0.0486

24ROW_1CB_So0.005 0.15 0.049

24ROW_1CB_So0.005 0.16 0.049

24ROW_1CB_So0.005 0.17 0.049

24ROW_1CB_So0.005 0.18 0.049

24ROW_1CB_So0.005 0.19 0.049

24ROW_1CB_So0.005 0.2 0.049

24ROW_1CB_So0.005 0.21 0.049

24ROW_1CB_So0.005 0.22 0.049

24ROW_1CB_So0.005 0.23 0.049

24ROW_1CB_So0.005 0.24 0.049

24ROW_1CB_So0.005 0.25 0.049

24ROW_1CB_So0.005 0.26 0.049

24ROW_1CB_So0.005 0.27 0.049

24ROW_1CB_So0.005 0.28 0.049

24ROW_1CB_So0.005 0.29 0.049

24ROW_1CB_So0.005 0.3 0.049

24ROW_1CB_So0.005 0.31 0.049

24ROW_1CB_So0.005 0.32 0.049

24ROW_1CB_So0.005 0.33 0.049

24ROW_1CB_So0.005 0.34 0.049

24ROW_1CB_So0.005 0.35 0.049

24ROW_1CB_So0.005 0.36 0.049

24ROW_1CB_So0.005 0.37 0.049

24ROW_1CB_So0.005 0.38 0.049

24ROW_1CB_So0.005 0.39 0.049

24ROW_1CB_So0.005 0.4 0.049

;Sx0.03

24ROW_1CB_So0.01 Rating 0 0

24ROW_1CB_So0.01 0.01 0.0005

24ROW_1CB_So0.01 0.02 0.0017

24ROW_1CB_So0.01 0.03 0.0055

24ROW_1CB_So0.01 0.04 0.0107

24ROW_1CB_So0.01 0.05 0.0164

24ROW_1CB_So0.01 0.06 0.0212

24ROW_1CB_So0.01 0.07 0.0259

24ROW_1CB_So0.01 0.08 0.03

24ROW_1CB_So0.01	0.09	0.0351
24ROW_1CB_So0.01	0.1	0.0396
24ROW_1CB_So0.01	0.11	0.044
24ROW_1CB_So0.01	0.12	0.0473
24ROW_1CB_So0.01	0.13	0.049
24ROW_1CB_So0.01	0.14	0.049
24ROW_1CB_So0.01	0.15	0.049
24ROW_1CB_So0.01	0.16	0.049
24ROW_1CB_So0.01	0.17	0.049
24ROW_1CB_So0.01	0.18	0.049
24ROW_1CB_So0.01	0.19	0.049
24ROW_1CB_So0.01	0.2	0.049
24ROW_1CB_So0.01	0.21	0.049
24ROW_1CB_So0.01	0.22	0.049
24ROW_1CB_So0.01	0.23	0.049
24ROW_1CB_So0.01	0.24	0.049
24ROW_1CB_So0.01	0.25	0.049
24ROW_1CB_So0.01	0.26	0.049
24ROW_1CB_So0.01	0.27	0.049
24ROW_1CB_So0.01	0.28	0.049
24ROW_1CB_So0.01	0.29	0.049
24ROW_1CB_So0.01	0.3	0.049
24ROW_1CB_So0.01	0.31	0.049
24ROW_1CB_So0.01	0.32	0.049
24ROW_1CB_So0.01	0.33	0.049
24ROW_1CB_So0.01	0.34	0.049
24ROW_1CB_So0.01	0.35	0.049
24ROW_1CB_So0.01	0.36	0.049
24ROW_1CB_So0.01	0.37	0.049

;Sx0.03

24ROW_1CB_So0.02	Rating	0	0
24ROW_1CB_So0.02		0.01	0.0006
24ROW_1CB_So0.02		0.02	0.002
24ROW_1CB_So0.02		0.03	0.0066
24ROW_1CB_So0.02		0.04	0.0123
24ROW_1CB_So0.02		0.05	0.0158
24ROW_1CB_So0.02		0.06	0.0198
24ROW_1CB_So0.02		0.07	0.0243
24ROW_1CB_So0.02		0.08	0.0281
24ROW_1CB_So0.02		0.09	0.0325
24ROW_1CB_So0.02		0.1	0.0373
24ROW_1CB_So0.02		0.11	0.0418
24ROW_1CB_So0.02		0.12	0.045
24ROW_1CB_So0.02		0.13	0.045
24ROW_1CB_So0.02		0.14	0.045
24ROW_1CB_So0.02		0.15	0.045
24ROW_1CB_So0.02		0.16	0.045
24ROW_1CB_So0.02		0.17	0.045
24ROW_1CB_So0.02		0.18	0.045
24ROW_1CB_So0.02		0.19	0.045
24ROW_1CB_So0.02		0.2	0.045
24ROW_1CB_So0.02		0.21	0.045
24ROW_1CB_So0.02		0.22	0.045
24ROW_1CB_So0.02		0.23	0.045
24ROW_1CB_So0.02		0.24	0.045
24ROW_1CB_So0.02		0.25	0.045
24ROW_1CB_So0.02		0.26	0.045

24ROW_1CB_So0.02 0.27 0.045

24ROW_1CB_So0.02 0.28 0.045

24ROW_1CB_So0.02 0.29 0.045

24ROW_1CB_So0.02 0.3 0.045

24ROW_1CB_So0.02 0.31 0.045

24ROW_1CB_So0.02 0.32 0.045

;Sx0.03

24ROW_1CB_So0.03 Rating 0 0

24ROW_1CB_So0.03 0.01 0.0006

24ROW_1CB_So0.03 0.02 0.0018

24ROW_1CB_So0.03 0.03 0.006

24ROW_1CB_So0.03 0.04 0.0113

24ROW_1CB_So0.03 0.05 0.015

24ROW_1CB_So0.03 0.06 0.0183

24ROW_1CB_So0.03 0.07 0.0225

24ROW_1CB_So0.03 0.08 0.0264

24ROW_1CB_So0.03 0.09 0.0306

24ROW_1CB_So0.03 0.1 0.0343

24ROW_1CB_So0.03 0.11 0.0388

24ROW_1CB_So0.03 0.12 0.039

24ROW_1CB_So0.03 0.13 0.039

24ROW_1CB_So0.03 0.14 0.039

24ROW_1CB_So0.03 0.15 0.039

24ROW_1CB_So0.03 0.16 0.039

24ROW_1CB_So0.03 0.17 0.039

24ROW_1CB_So0.03 0.18 0.039

24ROW_1CB_So0.03 0.19 0.039

24ROW_1CB_So0.03 0.2 0.039

24ROW_1CB_So0.03 0.21 0.039

24ROW_1CB_So0.03 0.22 0.039

24ROW_1CB_So0.03 0.23 0.039

24ROW_1CB_So0.03 0.24 0.039

24ROW_1CB_So0.03 0.25 0.039

24ROW_1CB_So0.03 0.26 0.039

24ROW_1CB_So0.03 0.27 0.039

24ROW_1CB_So0.03 0.28 0.039

24ROW_1CB_So0.03 0.29 0.039

24ROW_1CB_So0.03 0.3 0.039

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

;Assumes 2 CB's with individual ICD's

2x102mm-ICD Rating 0 0

2x102mm-ICD 0.005 0.0532

2x102mm-ICD 0.15 0.0556

2x102mm-ICD 0.3 0.0592

2x102mm-ICD 0.35 0.06

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

;Assumes 2 CB's with individual ICD's

2x152mm-ICD Rating 0 0

2x152mm-ICD 0.005 0.1182

2x152mm-ICD 0.15 0.1236

2x152mm-ICD 0.3 0.1314

2x152mm-ICD 0.35 0.1334

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

83mm-ICD	Rating	0	0
83mm-ICD		0.01	0.0176
83mm-ICD		0.15	0.0184
83mm-ICD		0.3	0.0196
83mm-ICD		0.35	0.0199

83mm-ICD-RLCB	Rating	0	0
83mm-ICD-RLCB		0.01	0.0199
83mm-ICD-RLCB		0.15	0.0207
83mm-ICD-RLCB		0.3	0.0217
83mm-ICD-RLCB		0.35	0.022

;Plas-Tech StormTech Orifice Plate Inlet Control Device (ICD).

;Depth from top of CB

94mm-ICD	Rating	0	0
94mm-ICD		0.01	0.0226
94mm-ICD		0.15	0.0236
94mm-ICD		0.3	0.0251
94mm-ICD		0.35	0.0255

94mm-ICD-RLCB	Rating	0	0
94mm-ICD-RLCB		0.01	0.0256
94mm-ICD-RLCB		0.15	0.0265
94mm-ICD-RLCB		0.3	0.0278
94mm-ICD-RLCB		0.35	0.0282

;Block 160 - Medium Density Residential

;0.883 ha C=0.80 tc= 10 min

;5 Year Rational = 205 L/s

B1-Out Rating 0 0

B1-Out 0.01 0.205

B1-Out 0.3 0.234

;Existing UHAUL site

;3.43 ha R=0.90 tc= 12 min

;5 Year Rational (via Novatech)= 786.6 L/s

B2-Out Rating 0 0

B2-Out 0.01 0.787

B2-Out 0.3 0.897

;Block 161 - Medium Density Residential

;0.965 ha C=0.80 tc= 10 min

;5 Year Rational = 224 L/s

B3-Out Rating 0 0

B3-Out 0.01 0.224

B3-Out 0.3 0.255

;Park Lands

;1.00 ha R=0.25 tc= 10 min

;5 Year Rational (via Novatech) = 129 L/s

B4-Out Rating 0 0

B4-Out 0.01 0.1297

B4-Out 0.3 0.1479

;540 m^3 of storage assumed for site based on MArch 2020 UHAUL site Design Breif

UHAL_Onsite Storage 0 1800

```
UHAL_Onsite             0.3       1800
UHAL_Onsite             0.31      1
UHAL_Onsite             2         1


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

[TAGS]
Node      02_(CB)        CB
Node      03_(CB)        CB
Node      04_(CB)        CB
Node      05_(CB)        CB
Node      08_(CB)        CB
Node      09_(CB)        CB
Node      1_(RYCB)        RY
Node      10_(CB)        CB
Node      100_(STM)       STM
Node      102_(STM)       STM
Node      104_(STM)       STM
Node      106_(STM)       STM
Node      108_(STM)       STM
Node      11_(CB)        CB
Node      110_(STM)       STM
```

Node 112_(STM) STM

Node 114_(STM) STM

Node 12_(CB) CB

Node 120_(STM) STM

Node 122_(STM) STM

Node 124_(STM) STM

Node 126_(STM) STM

Node 128_(STM) STM

Node 13_(CB) CB

Node 136_(STM) STM

Node 138_(STM) STM

Node 14_(CB) CB

Node 140_(STM) STM

Node 142_(STM) STM

Node 144_(STM) STM

Node 146_(STM) STM

Node 148_(STM) STM

Node 15_(CB) CB

Node 150_(STM) STM

Node 16_(CB) CB

Node 17_(CB) CB

Node 18_(CB) CB

Node 19_(CB) CB

Node 20_(CB) CB

Node 21_(CB) CB

Node 2121_(STM) STM

Node 2142_(STM) STM

Node 2143_(STM) STM

Node 2144_(STM) STM

Node 22_(RYCB) RY

Node 23_(CB) CB

Node 24_(CB) CB

Node 25_(CB) CB

Node 26_(CB) CB

Node 27_(CB) CB

Node 28_(CB) CB

Node 29_(RYCB) RY

Node 30_(CB) CB

Node 31_(CB) CB

Node 58_(CB) CB

Node 98_(STM) STM

Node ELB_1_(RYCB) RY

Node ELB_10_(RYCB) RY

Node ELB_11_(RYCB) RY

Node ELB_12_(RYCB) RY

Node ELB_13_(RYCB) RY

Node ELB_14_(RYCB) RY

Node ELB_2_(RYCB) RY

Node ELB_3_(RYCB) RY

Node ELB_4_(RYCB) RY

Node ELB_5_(RYCB) RY

Node ELB_6_(RYCB) RY

Node ELB_7_(RYCB) RY

Node ELB_8_(RYCB) RY

Node ELB_9_(RYCB) RY

Node Maj-15 Maj

Node Maj-15_2 Maj

Node Maj-18_2 Maj

Node Maj-19 Maj

Node Maj-19_2 Maj

Node Maj-20 Maj

Node Maj-21 Maj

Node Maj-23 Maj

Node Maj-24 Maj

Node Maj-25 Maj

Node Maj-26 Maj

Node Maj-27 Maj

Node Maj-28 Maj

Node Maj-29 Maj

Node Maj-35 Maj

Node Maj-36 Maj

Node Maj-37 Maj

Node Maj-38 Maj

Node Maj-39 Maj

Node Maj-40 Maj

Node Maj-41 Maj

Node Maj-44 Maj

Node Maj-45 Maj

Node Maj-46 Maj

Node Maj-48_2 Maj

Node Maj-50 Maj

Node Maj-51 Maj

Node Maj-52 Maj

Node Maj-53 Maj

Node Maj-56 Maj

Node Maj-60 Maj

Node RYCB_1_(RYCB) RY

Node RYCB_10_(RYCB) RY

Node RYCB_11_(RYCB) RY

Node RYCB_2_(RYCB) RY

Node RYCB_3_(RYCB) RY

Node RYCB_4_(RYCB) RY

Node RYCB_5_(RYCB) RY

Node RYCB_6_(RYCB) RY

Node RYCB_7_(RYCB) RY

Node RYCB_8_(RYCB) RY

Node RYCB_9_(RYCB) RY

Node Slope1 Maj

Node StartNullStruct2 RY

Node StartNullStruct3 STM

Node STM-251_(STM) STM

Node TEE_1_(RYCB) RY

Node TEE_10_(RYCB) RY

Node TEE_11_(RYCB) RY

Node TEE_12_(RYCB) RY

Node TEE_13_(RYCB) RY

Node TEE_14_(RYCB) RY

Node TEE_15_(RYCB) RY

Node TEE_16_(RYCB) RY

Node TEE_17_(RYCB) RY

Node TEE_18_(RYCB) RY

Node TEE_19_(RYCB) RY

Node TEE_2_(RYCB) RY

Node TEE_20_(RYCB) RY

Node TEE_21_(RYCB) RY

Node TEE_22_(RYCB) RY

Node TEE_23_(RYCB) RY

Node TEE_24_(RYCB) RY

Node TEE_25_(RYCB) RY

Node TEE_3_(RYCB) RY

Node TEE_4_(RYCB) RY

Node TEE_5_(RYCB) RY

Node TEE_6_(RYCB) RY

Node TEE_7_(RYCB) RY

Node TEE_8_(RYCB) RY

Node TEE_9_(RYCB) RY

Node Maj-18 Maj

Node Maj-22 Maj

Node Maj-48 Maj

Node Maj-49 Maj

Node STM-111_(STM) STM

Link 10_(STM) STM

Link 11_(STM) STM

Link 12_(STM) STM

Link 13_(STM) STM

Link 14_(STM) STM

Link 15_(10)_(STM) STM

Link 15_(11)_(STM) STM

Link 15_(12)_(STM) STM

Link 15_(13)_(STM) STM

Link 15_(5)_(STM) STM

Link 15_(9)_(STM) STM

Link 4_(STM) STM

Link 5_(STM) STM

Link 8_(STM) STM

Link	9_(STM)	STM
Link	C1	Maj
Link	C18	Maj
Link	C18_3	Maj
Link	C18_4	Maj
Link	C18_5	Maj
Link	C18_6	Maj
Link	C18_8	Maj
Link	C18_9	Maj
Link	C19	Maj
Link	C2	Ditch
Link	C20	Maj
Link	C21	Maj
Link	C22	Maj
Link	C23	Maj
Link	C24	Maj
Link	C25	Maj
Link	C26	Maj
Link	C27	Maj
Link	C27_1	Maj
Link	C27_2	Maj
Link	C28	Maj
Link	C31	Maj
Link	C36	Maj
Link	C37	Maj
Link	C41	Maj
Link	C42	Maj
Link	C43	Maj
Link	C44	Maj

Link	C45	Maj
Link	C46	Maj
Link	C47	Maj
Link	C48	Maj
Link	C49	Maj
Link	C5	Maj
Link	C50_1	Maj
Link	C50_2	Maj
Link	C51	Maj
Link	C52	Maj
Link	C53	Maj
Link	C54	Maj
Link	C56	Maj
Link	C58	Maj
Link	C59	Maj
Link	C60	Maj
Link	C62	Maj
Link	C63	Maj
Link	C65	Maj
Link	C66	Maj
Link	C67	Maj
Link	Pipe_-_(100)_(RYCB)	RY
Link	Pipe_-_(110)_(RYCB)	RY
Link	Pipe_-_(111)_(RYCB)	RY
Link	Pipe_-_(114)_(RYCB)	RY
Link	Pipe_-_(117)_(RYCB)	RY
Link	Pipe_-_(118)_(RYCB)	RY
Link	Pipe_-_(119)_(RYCB)	RY
Link	Pipe_-_(134)_(RYCB)	RY

Link Pipe_-_(137)_(RYCB) RY

Link Pipe_-_(138)_(RYCB) RY

Link Pipe_-_(139)_(RYCB) RY

Link Pipe_-_(14)_(RYCB) RY

Link Pipe_-_(140)_(RYCB) RY

Link Pipe_-_(141)_(RYCB) RY

Link Pipe_-_(142)_(RYCB) RY

Link Pipe_-_(143)_(RYCB) RY

Link Pipe_-_(144)_(RYCB) RY

Link Pipe_-_(15)_(RYCB) RY

Link Pipe_-_(150)_(RYCB) RY

Link Pipe_-_(151)_(RYCB) RY

Link Pipe_-_(152)_(RYCB) RY

Link Pipe_-_(153)_(RYCB) RY

Link Pipe_-_(154)_(RYCB) RY

Link Pipe_-_(155)_(RYCB) RY

Link Pipe_-_(156)_(1)_(RYCB) RY

Link Pipe_-_(156)_(RYCB) RY

Link Pipe_-_(16)_(RYCB) RY

Link Pipe_-_(161)_(RYCB) RY

Link Pipe_-_(164)_(RYCB) RY

Link Pipe_-_(165)_(RYCB) RY

Link Pipe_-_(17)_(RYCB) RY

Link Pipe_-_(19)_(RYCB) RY

Link Pipe_-_(25)_(RYCB) RY

Link Pipe_-_(27)_(RYCB) RY

Link Pipe_-_(73)_(RYCB) RY

Link Pipe_-_(87)_(RYCB) RY

Link Pipe_-_(88)_(RYCB) RY

Link Pipe_-_(89)_(RYCB) RY

Link Pipe_-_(9)_(RYCB) RY

Link Pipe_-_(90)_(RYCB) RY

Link Pipe_-_(93)_(RYCB) RY

Link Pipe_-_(94)_(RYCB) RY

Link Pipe_-_(95)_(RYCB) RY

Link Pipe_-_(96)_(RYCB) RY

Link Pipe_-_(98)_(RYCB) RY

Link Pipe_-_(99)_(RYCB) RY

Link STM-23_(STM) STM

Link STM-24_(STM) STM

Link STM-28_(STM) STM

Link STM-34_(1)_(1)_(STM) STM

Link STM-34_(1)_(STM) STM

Link STM-34_(STM) STM

Link STM-35_(STM) STM

Link STM-36_(STM) STM

Link STM-37_(STM) STM

Link STM-38_(STM) STM

Link STM-81_(STM) STM

Link STM-82_(STM) STM

Link STM-83_(STM) STM

Link CB-02 ICD

Link CB-03 ICD

Link CB-04 ICD

Link CB-05 ICD

Link CB-06 ICD

Link CB-08 ICD

Link CB-09 ICD

Link	CB-10	ICD
Link	CB-11	ICD
Link	CB-12	ICD
Link	CB-13	ICD
Link	CB-14	ICD
Link	CB-15	ICD
Link	CB-16	ICD
Link	CB-17	ICD
Link	CB-18	ICD
Link	CB-19	ICD
Link	CB-20	ICD
Link	CB-21	ICD
Link	CB-23	ICD
Link	CB-24	ICD
Link	CB-25	ICD
Link	CB-26	ICD
Link	CB-27	ICD
Link	CB-28	ICD
Link	CB-30	ICD
Link	CB-31	ICD
Link	OR-02	Grate
Link	OR-03	Grate
Link	OR-04	Grate
Link	OR-05	Grate
Link	OR-08	Grate
Link	OR-09	Grate
Link	OR-10	Grate
Link	OR-11	Grate
Link	OR-12	Grate

Link OR-13 Grate

Link OR-14 Grate

Link OR-15 Grate

Link OR-16 Grate

Link OR-17 Grate

Link OR-18 Grate

Link OR-19 Grate

Link OR-20 Grate

Link OR-21 Grate

Link OR-23 Grate

Link OR-24 Grate

Link OR-25 Grate

Link OR-26 Grate

Link OR-27 Grate

Link OR-28 Grate

Link OR-30 Grate

Link OR-31 Grate

Link RYCB-02 ICD

Link RYCB-03 ICD

Link RYCB-04 ICD

Link RYCB-06 ICD

Link RYCB-10 ICD

Link RYCB-22 ICD

Link RYCB-29 ICD

[MAP]

DIMENSIONS 381264.26565 5033747.5339 381848.96735 5034901.0841

UNITS Meters

[COORDINATES]

;;Node X-Coord Y-Coord

;;---------- ---------- ----------

02_(CB) 381640.363 5033940.449

03_(CB) 381639.319 5033948.683

04_(CB) 381707.362 5033964.513

05_(CB) 381704.042 5033972.256

08_(CB) 381742.356 5034021.942

09_(CB) 381735.199 5034018.381

1_(RYCB) 381613.893 5033947.165

10_(CB) 381712.816 5034088.875

100_(STM) 381764.117 5033934.567

102_(STM) 381768.733 5033945.462

104_(STM) 381751.832 5033983.755

106_(STM) 381661.746 5033946.201

108_(STM) 381636.072 5033940.78

11_(CB) 381705.04 5034085.441

110_(STM) 381606.992 5033939.535

112_(STM) 381722.061 5034051.287

114_(STM) 381695.933 5034110.412

12_(CB) 381693.043 5034036.978

120_(STM) 381637.884 5034015.234

122_(STM) 381613.388 5034012.674

124_(STM) 381598.561 5034020.702

126_(STM) 381577.374 5034069.721

128_(STM) 381546.966 5034139.351

13_(CB) 381689.694 5034044.79

136_(STM) 381522.723 5034196.958

138_(STM) 381527.988 5034210.775

14_(CB)	381597.707	5034039.587
140_(STM)	381631.534	5034256.315
142_(STM)	381640.84	5034237.84
144_(STM)	381600.199	5034327.009
146_(STM)	381528.36	5034294.959
148_(STM)	381456.173	5034264.012
15_(CB)	381589.912	5034036.197
150_(STM)	381569.837	5034397.001
16_(CB)	381567.802	5034108.366
17_(CB)	381560.007	5034104.977
18_(CB)	381541.884	5034167.976
19_(CB)	381534.089	5034164.586
20_(CB)	381581.406	5034227.395
21_(CB)	381578.057	5034235.207
2121_(STM)	381797.506	5033862.116
2142_(STM)	381733.715	5033824.051
2143_(STM)	381710.028	5033827.852
2144_(STM)	381693.076	5033817.017
22_(RYCB)	381646.054	5034240.141
23_(CB)	381624.155	5034289.758
24_(CB)	381616.38	5034286.326
25_(CB)	381569.18	5034305.469
26_(CB)	381565.878	5034313.223
27_(CB)	381486.175	5034268.55
28_(CB)	381482.272	5034277.449
29_(RYCB)	381634.571	5034343.916
30_(CB)	381592.282	5034362.433
31_(CB)	381584.351	5034358.98
58_(CB)	381708.111	5033853.995

98_(STM)	381785.194	5033899.178
ELB_1_(RYCB)	381700.573	5033926.894
ELB_10_(RYCB)	381599.13	5034277.804
ELB_11_(RYCB)	381637.075	5034217.32
ELB_12_(RYCB)	381642.665	5034324.923
ELB_13_(RYCB)	381495.849	5034321.044
ELB_14_(RYCB)	381510.037	5034327.133
ELB_2_(RYCB)	381662.86	5033987.854
ELB_3_(RYCB)	381652.666	5033983.757
ELB_4_(RYCB)	381581.795	5033976.053
ELB_5_(RYCB)	381580.949	5033978.006
ELB_6_(RYCB)	381748.325	5034086.133
ELB_7_(RYCB)	381616.382	5034075.058
ELB_8_(RYCB)	381504.046	5034155.002
ELB_9_(RYCB)	381496.419	5034172.819
Maj-15	381573.401	5034393.553
Maj-15_2	381603.958	5034326.421
Maj-18_2	381633.162	5034339.357
Maj-19	381566.414	5034309.792
Maj-19_2	381591.329	5034320.826
Maj-20	381543.507	5034300.033
Maj-21	381484.13	5034275.269
Maj-23	381608.541	5034316.121
Maj-24	381621.369	5034287.607
Maj-25	381635.742	5034254.688
Maj-26	381580.14	5034232.359
Maj-27	381542.959	5034216.408
Maj-28	381537.056	5034166.524
Maj-29	381551.053	5034138.553

Maj-35	381565.153	5034106.303
Maj-36	381580.163	5034072.113
Maj-37	381594.925	5034037.553
Maj-38	381607.643	5034017.588
Maj-39	381627.215	5034016.837
Maj-40	381641.204	5034020.262
Maj-41	381691.979	5034042.056
Maj-44	381709.885	5034086.785
Maj-45	381722.3	5034055.112
Maj-46	381739.691	5034019.616
Maj-48_2	381781.911	5034001.189
Maj-50	381640.747	5033943.96
Maj-51	381672.455	5033954.954
Maj-52	381721.553	5033975.967
Maj-53	381753.038	5033988.766
Maj-56	381494.997	5034256.092
Maj-60	381528.438	5034203.663
RYCB_1_(RYCB)	381734.202	5033941.191
RYCB_10_(RYCB)	381442.319	5034298.46
RYCB_11_(RYCB)	381578.806	5034356.559
RYCB_2_(RYCB)	381725.556	5034014.74
RYCB_3_(RYCB)	381612.277	5033977.722
RYCB_4_(RYCB)	381781.005	5034010.848
RYCB_5_(RYCB)	381699.781	5034083.118
RYCB_6_(RYCB)	381529.161	5034097.261
RYCB_7_(RYCB)	381502.626	5034236.326
RYCB_8_(RYCB)	381544.063	5034177.384
RYCB_9_(RYCB)	381674.723	5034252.795
Slope1	381588.486	5034360.411

StartNullStruct2	381672.996	5033992.169
StartNullStruct3	381785.825	5033999.81
STM-251_(STM)	381634.726	5034343.823
TEE_1_(RYCB)	381692.419	5034000.507
TEE_10_(RYCB)	381510.902	5034139.24
TEE_11_(RYCB)	381526.967	5034102.206
TEE_12_(RYCB)	381481.223	5034207.753
TEE_13_(RYCB)	381474.067	5034224.19
TEE_14_(RYCB)	381499.643	5034235.058
TEE_15_(RYCB)	381507.237	5034238.213
TEE_16_(RYCB)	381540.082	5034252.461
TEE_17_(RYCB)	381560.408	5034261.179
TEE_18_(RYCB)	381580.624	5034269.812
TEE_19_(RYCB)	381620.112	5034209.907
TEE_2_(RYCB)	381633.017	5033978.954
TEE_20_(RYCB)	381594.914	5034199.197
TEE_21_(RYCB)	381574.635	5034190.459
TEE_22_(RYCB)	381660.032	5034285.809
TEE_23_(RYCB)	381468.715	5034309.368
TEE_24_(RYCB)	381523.065	5034332.731
TEE_25_(RYCB)	381550.359	5034344.355
TEE_3_(RYCB)	381565.175	5034014.419
TEE_4_(RYCB)	381547.662	5034054.776
TEE_5_(RYCB)	381530.407	5034094.432
TEE_6_(RYCB)	381764.108	5034050.504
TEE_7_(RYCB)	381626.502	5034052.072
TEE_8_(RYCB)	381647.239	5034060.747
TEE_9_(RYCB)	381667.469	5034069.361
Maj-18	381637.356	5034341.21

Maj-22 381471.715 5034270.038

Maj-48 381786.497 5034003.157

Maj-49 381597.176 5033939.913

Maj-Park 381713.84 5033832.09

OF1 381783.607 5033894.406

STM-111_(STM) 381695.19 5033799.968

B2_Stor 381428.448 5034534.885

[VERTICES]

;;Link X-Coord Y-Coord

;;---------- ---------- ----------

C1 381773.558 5033944.857

C1 381770.687 5033933.782

C2 381425.902 5034494.65

C2 381433.032 5034452.886

C2 381521.652 5034490.575

C27_1 381530.457 5034209.127

C27_2 381525.808 5034196.544

C31 381544.884 5034166.116

C58 381736.37 5034014.996

C60 381504.843 5034236.868

C60 381519.73 5034216.354

C60 381524.654 5034209.673

C63 381705.821 5034083.025

C65 381548.805 5034099.267

C67 381582.176 5034355.673

CB-06 381764.667 5033954.369

OL1 381431.504 5034494.14

OL1 381436.597 5034448.812

OL1 381519.615 5034482.426

[POLYGONS]

;;Subcatchment X-Coord Y-Coord

;;---------- ---------- ----------

A12i 381603.575 5034325.904

A12i 381599.234 5034335.868

A12i 381626.891 5034348.374

A12i 381632.397 5034351

A12i 381636.88 5034340.972

A12i 381603.575 5034325.904

A12ii 381588.225 5034361.738

A12ii 381603.575 5034325.904

A12ii 381590.101 5034319.808

A12ii 381582.52 5034337.492

A12ii 381585.089 5034338.593

A12ii 381579.688 5034351.312

A12ii 381579.992 5034357.472

A12ii 381579.342 5034357.885

A12ii 381588.225 5034361.738

A13 381530.192 5034320.178

A13 381515.153 5034313.748

A13 381509.139 5034327.791

A13 381579.342 5034357.885

A13 381579.992 5034357.472

A13 381579.648 5034351.406

A13 381585.024 5034338.57

A13 381582.52 5034337.492

A13 381580.785 5034341.808

A13	381558.955	5034332.475
A13	381530.192	5034320.178
A14	381447.103	5034284.654
A14	381440.946	5034299.476
A14	381509.139	5034327.791
A14	381512.599	5034319.721
A14	381515.151	5034313.747
A14	381493.903	5034304.663
A14	381466.674	5034293.021
A14	381447.103	5034284.654
A15i	381567.244	5034310.002
A15i	381567.244	5034310.002
A15i	381472.296	5034269.296
A15i	381462.819	5034291.373
A15i	381493.903	5034304.663
A15i	381515.153	5034313.748
A15i	381546.959	5034327.346
A15i	381557.84	5034331.998
A15i	381567.244	5034310.002
A15ii	381472.296	5034269.296
A15ii	381567.244	5034310.002
A15ii	381567.244	5034310.002
A15ii	381577.731	5034285.474
A15ii	381499.928	5034251.954
A15ii	381498.003	5034256.002
A15ii	381492.764	5034253.757
A15ii	381494.517	5034249.639
A15ii	381482.768	5034244.552
A15ii	381472.789	5034268.148

A15ii	381472.296	5034269.296
A16i	381590.176	5034319.842
A16i	381590.1	5034319.81
A16i	381568.321	5034310.464
A16i	381567.244	5034310.002
A16i	381557.84	5034331.998
A16i	381580.785	5034341.808
A16i	381590.176	5034319.842
A16ii	381567.244	5034310.002
A16ii	381568.321	5034310.464
A16ii	381590.1	5034319.81
A16ii	381590.176	5034319.842
A16ii	381600.673	5034295.291
A16ii	381577.792	5034285.449
A16ii	381569.597	5034304.499
A16ii	381567.244	5034310.002
A17ii	381603.575	5034325.904
A17ii	381634.735	5034255.086
A17ii	381634.856	5034255.039
A17ii	381625.735	5034258.586
A17ii	381621.236	5034263.563
A17ii	381617.344	5034261.852
A17ii	381610.829	5034276.619
A17ii	381611.967	5034284.565
A17ii	381606.225	5034288.349
A17ii	381602.709	5034296.167
A17ii	381600.627	5034295.272
A17ii	381590.101	5034319.808
A17ii	381603.575	5034325.904

A18i	381634.856	5034255.039
A18i	381634.735	5034255.086
A18i	381603.575	5034325.904
A18i	381636.881	5034340.972
A18i	381642.191	5034328.913
A18i	381628.738	5034322.599
A18i	381638.99	5034299.797
A18i	381644.221	5034287.878
A18i	381654.793	5034263.788
A18i	381634.856	5034255.039
A19	381642.191	5034328.913
A19	381678.308	5034247.054
A19	381664.512	5034241.664
A19	381662.063	5034247.212
A19	381656.121	5034260.762
A19	381643.608	5034289.274
A19	381633.156	5034313.091
A19	381628.751	5034322.572
A19	381642.191	5034328.913
A20i	381634.488	5034254.988
A20i	381543.015	5034215.565
A20i	381534.487	5034235.449
A20i	381614.086	5034269.236
A20i	381617.343	5034261.859
A20i	381621.236	5034263.563
A20i	381625.735	5034258.586
A20i	381634.488	5034254.988
A20ii	381543.081	5034215.412
A20ii	381634.809	5034254.918

A20ii	381631.345	5034245.978
A20ii	381631.936	5034239.319
A20ii	381635.518	5034231.203
A20ii	381551.831	5034194.996
A20ii	381543.081	5034215.412
A21	381611.967	5034284.565
A21	381610.829	5034276.619
A21	381614.086	5034269.236
A21	381570.95	5034251.169
A21	381525.154	5034231.426
A21	381514.208	5034225.655
A21	381507.271	5034235.078
A21	381499.928	5034251.954
A21	381602.709	5034296.167
A21	381606.078	5034288.284
A21	381611.967	5034284.565
A22	381498.141	5034256.061
A22	381507.271	5034235.078
A22	381520.172	5034217.553
A22	381516.384	5034212.577
A22	381502.03	5034232.083
A22	381492.764	5034253.757
A22	381498.141	5034256.061
A23	381509.221	5034177.744
A23	381495.8	5034171.963
A23	381472.748	5034224.61
A23	381467.289	5034237.916
A23	381482.787	5034244.56
A23	381494.55	5034249.652

A23	381502.03	5034232.083
A23	381509.754	5034221.839
A23	381508.667	5034221.039
A23	381500.297	5034204.233
A23	381504.385	5034189.257
A23	381509.221	5034177.744
A24i	381549.922	5034138.762
A24i	381526.351	5034193.134
A24i	381526.04	5034194.114
A24i	381525.797	5034195.112
A24i	381525.623	5034196.125
A24i	381525.518	5034197.147
A24i	381525.484	5034198.174
A24i	381525.52	5034199.201
A24i	381525.627	5034200.223
A24i	381525.803	5034201.235
A24i	381526.048	5034202.233
A24i	381526.361	5034203.212
A24i	381526.74	5034204.167
A24i	381527.183	5034205.094
A24i	381527.689	5034205.989
A24i	381528.255	5034206.846
A24i	381528.879	5034207.663
A24i	381529.557	5034208.435
A24i	381530.286	5034209.159
A24i	381531.063	5034209.832
A24i	381531.884	5034210.449
A24i	381532.746	5034211.009
A24i	381533.644	5034211.509

A24i	381534.574	5034211.946
A24i	381543.015	5034215.565
A24i	381543.081	5034215.412
A24i	381546.561	5034207.293
A24i	381551.831	5034194.996
A24i	381543.421	5034191.366
A24i	381541.924	5034190.72
A24i	381545.113	5034183.28
A24i	381543.011	5034177.3
A24i	381549.92	5034172.284
A24i	381556.16	5034157.729
A24i	381552.823	5034154.734
A24i	381558.434	5034147.596
A24i	381560.273	5034143.444
A24i	381549.922	5034138.762
A24ii	381543.015	5034215.565
A24ii	381534.574	5034211.946
A24ii	381533.644	5034211.509
A24ii	381532.746	5034211.009
A24ii	381531.884	5034210.449
A24ii	381531.063	5034209.832
A24ii	381530.286	5034209.159
A24ii	381529.557	5034208.435
A24ii	381528.879	5034207.663
A24ii	381528.255	5034206.846
A24ii	381527.689	5034205.989
A24ii	381527.183	5034205.094
A24ii	381526.74	5034204.167
A24ii	381526.361	5034203.212

A24ii	381526.048	5034202.233
A24ii	381525.803	5034201.235
A24ii	381525.627	5034200.223
A24ii	381525.52	5034199.201
A24ii	381525.484	5034198.174
A24ii	381525.518	5034197.147
A24ii	381525.623	5034196.125
A24ii	381525.797	5034195.112
A24ii	381526.04	5034194.114
A24ii	381526.351	5034193.134
A24ii	381549.922	5034138.762
A24ii	381529.865	5034130.075
A24ii	381504.385	5034189.257
A24ii	381500.297	5034204.233
A24ii	381508.667	5034221.039
A24ii	381509.633	5034221.75
A24ii	381516.384	5034212.577
A24ii	381520.078	5034217.429
A24ii	381514.208	5034225.655
A24ii	381525.154	5034231.426
A24ii	381534.487	5034235.449
A24ii	381539.469	5034223.837
A24ii	381543.015	5034215.565
A25	381635.518	5034231.203
A25	381641.599	5034217.425
A25	381544.799	5034176.002
A25	381544.745	5034176.041
A25	381543.011	5034177.3
A25	381545.108	5034183.386

A25	381541.921	5034190.773
A25	381551.831	5034194.996
A25	381631.649	5034229.445
A25	381635.518	5034231.203
A26i	381634.809	5034254.919
A26i	381643.825	5034234.546
A26i	381635.518	5034231.203
A26i	381633.932	5034234.796
A26i	381631.936	5034239.319
A26i	381631.345	5034245.978
A26i	381634.809	5034254.919
A26ii	381634.809	5034254.919
A26ii	381634.856	5034255.039
A26ii	381654.793	5034263.788
A26ii	381664.512	5034241.664
A26ii	381643.825	5034234.546
A26ii	381634.809	5034254.919
A28i	381560.238	5034143.523
A28i	381558.434	5034147.596
A28i	381552.823	5034154.734
A28i	381556.16	5034157.729
A28i	381553.216	5034164.599
A28i	381549.92	5034172.284
A28i	381544.799	5034176.002
A28i	381641.599	5034217.425
A28i	381635.518	5034231.203
A28i	381643.825	5034234.546
A28i	381664.512	5034241.664
A28i	381678.308	5034247.054

A28i	381694.037	5034211.811
A28i	381697.738	5034203.163
A28i	381699.512	5034199.142
A28i	381703.079	5034191.06
A28i	381706.466	5034182.972
A28i	381745.243	5034095.526
A28i	381731.799	5034089.596
A28i	381728.418	5034097.253
A28i	381722.864	5034094.819
A28i	381708.355	5034088.46
A28i	381699.469	5034084.388
A28i	381700.286	5034083.815
A28i	381627.001	5034053.098
A28i	381621.386	5034066.026
A28i	381616.071	5034078.235
A28i	381602.598	5034072.459
A28i	381594.759	5034069.099
A28i	381588.029	5034068.502
A28i	381579.101	5034071.768
A28i	381582.507	5034081.119
A28i	381584.397	5034085.879
A28i	381585.879	5034089.366
A28i	381583.973	5034093.75
A28i	381582.582	5034096.957
A28i	381578.962	5034105.309
A28i	381572.521	5034109.076
A28i	381574.164	5034116.309
A28i	381570.953	5034124.316
A28i	381567.791	5034132.197

A28i	381563.39	5034130.431
A28i	381562.044	5034139.444
A28i	381560.238	5034143.523
A29	381495.658	5034171.847
A29	381509.292	5034177.575
A29	381520.124	5034152.567
A29	381540.518	5034105.476
A29	381532.563	5034102.017
A29	381526.506	5034100.783
A29	381495.658	5034171.847
A3	381425.905	5034450.972
A3	381563.233	5034509.833
A3	381605.188	5034413.776
A3	381632.595	5034350.922
A3	381626.891	5034348.374
A3	381599.234	5034335.868
A3	381588.225	5034361.738
A3	381509.139	5034327.791
A3	381440.946	5034299.476
A3	381417.244	5034354.295
A3	381398.694	5034397.404
A3	381382.967	5034432.55
A3	381397.323	5034438.703
A3	381403.781	5034441.568
A3	381409.135	5034443.769
A3	381406.699	5034450.733
A3	381404.738	5034457.846
A3	381403.261	5034465.075
A3	381402.907	5034467.7

A3	381412.811	5034468.77
A3	381421.825	5034469.744
A3	381421.996	5034468.268
A3	381422.467	5034464.976
A3	381422.944	5034462.427
A3	381423.363	5034460.249
A3	381424.283	5034456.664
A3	381425.905	5034450.972
A30	381526.565	5034100.795
A30	381532.563	5034102.017
A30	381548.474	5034108.935
A30	381550.866	5034103.433
A30	381534.376	5034096.263
A30	381528.997	5034095.171
A30	381526.565	5034100.795
A31	381592.957	5033994.457
A31	381583.104	5033977.186
A31	381580.359	5033977.041
A31	381534.283	5034083.013
A31	381528.997	5034095.171
A31	381534.376	5034096.263
A31	381542.909	5034099.979
A31	381577.987	5034019.272
A31	381583.698	5034007.256
A31	381591.935	5033995.041
A31	381592.957	5033994.457
A32i	381549.922	5034138.762
A32i	381579.085	5034071.762
A32i	381558.972	5034063.02

A32i	381542.909	5034099.979
A32i	381550.866	5034103.433
A32i	381548.472	5034108.939
A32i	381540.517	5034105.478
A32i	381529.865	5034130.075
A32i	381549.922	5034138.762
A32ii	381579.085	5034071.762
A32ii	381549.948	5034138.774
A32ii	381560.273	5034143.444
A32ii	381562.044	5034139.444
A32ii	381563.39	5034130.431
A32ii	381567.791	5034132.197
A32ii	381574.164	5034116.309
A32ii	381572.521	5034109.076
A32ii	381578.962	5034105.309
A32ii	381583.973	5034093.75
A32ii	381585.829	5034089.482
A32ii	381584.397	5034085.879
A32ii	381582.507	5034081.119
A32ii	381579.085	5034071.762
A33i	381607.69	5034016.517
A33i	381607.338	5034016.66
A33i	381606.429	5034017.102
A33i	381605.552	5034017.605
A33i	381604.71	5034018.165
A33i	381603.908	5034018.781
A33i	381603.15	5034019.45
A33i	381602.438	5034020.168
A33i	381601.776	5034020.932

A33i	381601.168	5034021.74
A33i	381600.615	5034022.586
A33i	381600.12	5034023.468
A33i	381599.686	5034024.381
A33i	381579.093	5034071.743
A33i	381588.029	5034068.502
A33i	381594.759	5034069.099
A33i	381602.598	5034072.459
A33i	381621.758	5034029.049
A33i	381612.521	5034028.874
A33i	381611.043	5034024.972
A33i	381609.318	5034020.435
A33i	381607.69	5034016.517
A33ii	381579.077	5034071.756
A33ii	381599.686	5034024.381
A33ii	381600.12	5034023.468
A33ii	381600.615	5034022.586
A33ii	381601.168	5034021.74
A33ii	381601.776	5034020.932
A33ii	381602.438	5034020.168
A33ii	381603.15	5034019.45
A33ii	381603.908	5034018.781
A33ii	381604.71	5034018.165
A33ii	381605.552	5034017.605
A33ii	381606.429	5034017.102
A33ii	381607.338	5034016.66
A33ii	381607.69	5034016.517
A33ii	381605.999	5034012.447
A33ii	381593.066	5033994.395

A33ii	381591.935	5033995.041
A33ii	381583.698	5034007.256
A33ii	381577.993	5034019.275
A33ii	381558.974	5034063.016
A33ii	381579.077	5034071.756
A34i	381723.329	5034054.572
A34i	381639.998	5034018.866
A34i	381638.115	5034018.123
A34i	381636.191	5034017.492
A34i	381634.233	5034016.975
A34i	381632.249	5034016.573
A34i	381630.244	5034016.289
A34i	381628.226	5034016.123
A34i	381614.234	5034015.383
A34i	381613.223	5034015.364
A34i	381612.213	5034015.412
A34i	381611.209	5034015.529
A34i	381610.215	5034015.713
A34i	381609.235	5034015.964
A34i	381608.275	5034016.28
A34i	381607.69	5034016.517
A34i	381609.318	5034020.435
A34i	381612.521	5034028.874
A34i	381621.758	5034029.049
A34i	381630.507	5034029.725
A34i	381632.048	5034025.707
A34i	381633.576	5034026.109
A34i	381635.08	5034026.593
A34i	381636.556	5034027.159

A34i	381637.998	5034027.804
A34i	381632.965	5034039.378
A34i	381702.128	5034069.506
A34i	381705.586	5034061.921
A34i	381709.474	5034063.637
A34i	381714.153	5034058.186
A34i	381723.329	5034054.572
A34ii	381607.69	5034016.517
A34ii	381608.275	5034016.28
A34ii	381609.235	5034015.964
A34ii	381610.215	5034015.713
A34ii	381611.209	5034015.529
A34ii	381612.213	5034015.412
A34ii	381613.223	5034015.364
A34ii	381614.234	5034015.383
A34ii	381628.226	5034016.123
A34ii	381630.244	5034016.289
A34ii	381632.249	5034016.573
A34ii	381634.233	5034016.975
A34ii	381636.191	5034017.492
A34ii	381638.115	5034018.123
A34ii	381639.998	5034018.866
A34ii	381723.329	5034054.572
A34ii	381719.791	5034045.445
A34ii	381720.368	5034038.953
A34ii	381716.479	5034037.237
A34ii	381719.87	5034029.337
A34ii	381648.09	5033998.713
A34ii	381644.337	5033997.195

A34ii	381632.243	5033994.489
A34ii	381608.729	5033993.33
A34ii	381593.066	5033994.395
A34ii	381606.057	5034012.585
A34ii	381607.69	5034016.517
A39i	381723.308	5034054.581
A39i	381711.614	5034081.077
A39i	381708.355	5034088.46
A39i	381728.418	5034097.253
A39i	381731.799	5034089.596
A39i	381743.35	5034063.437
A39i	381723.308	5034054.581
A39ii	381708.355	5034088.46
A39ii	381723.308	5034054.581
A39ii	381714.153	5034058.186
A39ii	381709.474	5034063.637
A39ii	381705.477	5034061.918
A39ii	381698.78	5034077.094
A39ii	381700.697	5034083.527
A39ii	381699.469	5034084.388
A39ii	381708.355	5034088.46
A40	381627.001	5034053.098
A40	381700.286	5034083.815
A40	381700.697	5034083.527
A40	381698.831	5034077.225
A40	381702.208	5034069.573
A40	381632.99	5034039.389
A40	381627.001	5034053.098
A41	381616.019	5034078.356

A41	381637.998	5034027.804
A41	381636.454	5034027.133
A41	381635.015	5034026.57
A41	381633.544	5034026.094
A41	381632.048	5034025.707
A41	381630.471	5034029.819
A41	381621.758	5034029.049
A41	381618.854	5034035.628
A41	381616.498	5034040.564
A41	381612.427	5034050.189
A41	381602.577	5034072.506
A41	381616.019	5034078.356
A42i	381752.52	5033988.394
A42i	381723.321	5034054.551
A42i	381743.359	5034063.417
A42i	381767.382	5034009.019
A42i	381769.257	5034004.646
A42i	381782.794	5034010.445
A42i	381786.165	5034002.806
A42i	381752.52	5033988.394
A42ii	381723.329	5034054.572
A42ii	381752.52	5033988.394
A42ii	381740.112	5033983.079
A42ii	381735.054	5033995.152
A42ii	381728.327	5034010.394
A42ii	381730.178	5034016.726
A42ii	381723.331	5034021.466
A42ii	381716.47	5034037.26
A42ii	381720.368	5034038.953

A42ii	381719.776	5034045.612
A42ii	381723.329	5034054.572
A43	381658.29	5033971.559
A43	381652.974	5033984.733
A43	381650.434	5033983.765
A43	381645.443	5033997.642
A43	381655.556	5034001.733
A43	381719.905	5034029.352
A43	381723.331	5034021.466
A43	381730.257	5034016.76
A43	381728.308	5034010.436
A43	381731.729	5034002.815
A43	381668.635	5033975.791
A43	381658.29	5033971.559
A44	381587.259	5033961.173
A44	381580.359	5033977.041
A44	381583.104	5033977.186
A44	381593.066	5033994.395
A44	381608.729	5033993.33
A44	381632.243	5033994.489
A44	381644.337	5033997.195
A44	381645.441	5033997.641
A44	381650.431	5033983.764
A44	381652.974	5033984.733
A44	381658.352	5033971.585
A44	381647.327	5033967.806
A44	381635.91	5033965.77
A44	381588.359	5033961.652
A44	381587.259	5033961.173

A45i	381587.259	5033961.173
A45i	381588.359	5033961.652
A45i	381588.217	5033961.59
A45i	381588.359	5033961.652
A45i	381635.985	5033965.776
A45i	381647.327	5033967.806
A45i	381658.352	5033971.585
A45i	381664.49	5033974.096
A45i	381672.844	5033954.229
A45i	381662.673	5033950.069
A45i	381656.714	5033948.114
A45i	381650.651	5033946.512
A45i	381644.505	5033945.268
A45i	381638.296	5033944.386
A45i	381632.047	5033943.869
A45i	381607.333	5033942.562
A45i	381605.976	5033942.469
A45i	381604.627	5033942.296
A45i	381603.29	5033942.044
A45i	381601.971	5033941.712
A45i	381600.673	5033941.303
A45i	381599.403	5033940.817
A45i	381596.633	5033939.613
A45i	381587.259	5033961.173
A45ii	381596.633	5033939.613
A45ii	381599.403	5033940.817
A45ii	381600.673	5033941.303
A45ii	381601.971	5033941.712
A45ii	381603.29	5033942.044

A45ii	381604.627	5033942.296
A45ii	381605.976	5033942.469
A45ii	381607.333	5033942.562
A45ii	381632.047	5033943.869
A45ii	381638.296	5033944.386
A45ii	381644.505	5033945.268
A45ii	381650.651	5033946.512
A45ii	381656.714	5033948.114
A45ii	381662.673	5033950.069
A45ii	381672.844	5033954.229
A45ii	381676.204	5033945.164
A45ii	381662.718	5033939.873
A45ii	381652.843	5033937.109
A45ii	381646.586	5033935.831
A45ii	381639.597	5033934.819
A45ii	381632.558	5033934.232
A45ii	381607.711	5033932.918
A45ii	381602.883	5033931.977
A45ii	381600.42	5033930.904
A45ii	381596.633	5033939.613
A46i	381740.213	5033983.122
A46i	381740.056	5033982.939
A46i	381672.844	5033954.229
A46i	381672.521	5033955.1
A46i	381664.49	5033974.096
A46i	381668.606	5033975.86
A46i	381678.748	5033980.123
A46i	381731.69	5034002.773
A46i	381740.213	5033983.122

A46ii	381672.844	5033954.229
A46ii	381740.056	5033982.939
A46ii	381740.213	5033983.122
A46ii	381752.566	5033988.289
A46ii	381744.291	5033974.348
A46ii	381746.161	5033969.986
A46ii	381724.771	5033960.685
A46ii	381728.024	5033953.086
A46ii	381694.461	5033938.716
A46ii	381689.214	5033950.742
A46ii	381676.204	5033945.164
A46ii	381672.844	5033954.229
A47	381745.243	5034095.526
A47	381782.791	5034010.45
A47	381769.257	5034004.647
A47	381767.382	5034009.019
A47	381763.615	5034017.555
A47	381735.495	5034081.222
A47	381731.8	5034089.593
A47	381745.243	5034095.526
A48	381786.259	5034002.846
A48	381790.062	5033993.977
A48	381776.62	5033988.214
A48	381746.161	5033969.986
A48	381744.291	5033974.348
A48	381752.566	5033988.289
A48	381786.259	5034002.846
A49	381707.071	5033928.476
A49	381700.017	5033925.509

A49	381694.461	5033938.716
A49	381728.024	5033953.086
A49	381732.038	5033943.711
A49	381733.678	5033939.884
A49	381707.071	5033928.476
A54	381789.558	5033900.625
A54	381781.834	5033896.02
A54	381733.358	5033867.077
A54	381707.071	5033928.476
A54	381722.078	5033934.91
A54	381733.678	5033939.884
A54	381732.038	5033943.711
A54	381728.024	5033953.086
A54	381724.771	5033960.685
A54	381738.326	5033966.562
A54	381746.161	5033969.986
A54	381776.62	5033988.214
A54	381790.062	5033993.975
A54	381822.39	5033920.729
A54	381789.558	5033900.625
B1	381382.967	5034432.55
B1	381304.713	5034561.721
B1	381300.46	5034616.904
B1	381306.314	5034623.312
B1	381331.724	5034634.567
B1	381331.194	5034646.567
B1	381323.214	5034649.432
B1	381332.596	5034655.255
B1	381338.741	5034658.094

B1	381314.008	5034714.27
B1	381298.068	5034750.52
B1	381290.843	5034752.831
B1	381295.775	5034755.874
B1	381316.325	5034768.58
B1	381335.973	5034723.941
B1	381367.255	5034652.871
B1	381395.985	5034587.599
B1	381415.298	5034543.454
B1	381419.221	5034534.807
B1	381421.544	5034529.53
B1	381424.704	5034522.34
B1	381426.926	5034523.496
B1	381427.177	5034522.719
B1	381427.978	5034515.982
B1	381428.593	5034508.299
B1	381428.66	5034506.33
B1	381428.717	5034500.592
B1	381428.69	5034498.098
B1	381428.351	5034492.892
B1	381428.245	5034489.879
B1	381427.326	5034481.699
B1	381427.257	5034480.627
B1	381427.295	5034476.908
B1	381427.305	5034476.016
B1	381427.577	5034472.125
B1	381428.17	5034467.371
B1	381429.073	5034462.666
B1	381430.333	5034457.869

B1	381431.785	5034453.492
B1	381425.905	5034450.972
B1	381424.51	5034455.577
B1	381424.283	5034456.664
B1	381423.363	5034460.249
B1	381422.944	5034462.427
B1	381422.467	5034464.976
B1	381421.996	5034468.268
B1	381421.825	5034469.744
B1	381412.811	5034468.77
B1	381402.907	5034467.7
B1	381403.261	5034465.075
B1	381404.738	5034457.846
B1	381406.699	5034450.733
B1	381409.135	5034443.769
B1	381403.781	5034441.568
B1	381382.967	5034432.55
B2	381530.741	5034583.975
B2	381424.704	5034522.35
B2	381316.325	5034768.58
B2	381315.387	5034770.71
B2	381447.869	5034848.65
B2	381463.21	5034813.696
B2	381436.808	5034798.092
B2	381530.741	5034583.975
B3i	381431.785	5034453.492
B3i	381430.333	5034457.869
B3i	381429.155	5034462.326
B3i	381428.255	5034466.848

B3i	381427.638	5034471.418
B3i	381427.305	5034476.016
B3i	381427.257	5034480.627
B3i	381427.326	5034481.699
B3i	381428.245	5034489.879
B3i	381428.351	5034492.892
B3i	381428.717	5034500.592
B3i	381428.593	5034508.299
B3i	381427.978	5034515.982
B3i	381426.875	5034523.611
B3i	381530.743	5034583.97
B3i	381563.223	5034509.829
B3i	381431.785	5034453.492
B4i	381691.588	5033945.198
B4i	381699.904	5033925.461
B4i	381707.071	5033928.476
B4i	381733.358	5033867.077
B4i	381726.731	5033863.113
B4i	381649.852	5033817.212
B4i	381602.985	5033925.012
B4i	381605.53	5033926.1
B4i	381608.677	5033926.961
B4i	381632.876	5033928.241
B4i	381640.276	5033928.858
B4i	381647.625	5033929.921
B4i	381654.461	5033931.331
B4i	381664.627	5033934.177
B4i	381686.036	5033942.851
B4i	381691.588	5033945.198

B4ii	381600.42	5033930.904
B4ii	381602.883	5033931.977
B4ii	381607.711	5033932.918
B4ii	381632.558	5033934.232
B4ii	381639.597	5033934.819
B4ii	381646.586	5033935.831
B4ii	381652.843	5033937.109
B4ii	381662.718	5033939.873
B4ii	381676.204	5033945.164
B4ii	381678.395	5033939.755
B4ii	381691.563	5033945.188
B4ii	381690.549	5033944.759
B4ii	381686.036	5033942.851
B4ii	381664.627	5033934.177
B4ii	381654.461	5033931.331
B4ii	381647.625	5033929.921
B4ii	381640.276	5033928.858
B4ii	381632.876	5033928.241
B4ii	381608.677	5033926.961
B4ii	381605.53	5033926.1
B4ii	381602.985	5033925.012
B4ii	381600.42	5033930.904
B4iii	381676.204	5033945.164
B4iii	381689.214	5033950.742
B4iii	381691.563	5033945.188
B4iii	381678.395	5033939.755
B4iii	381676.204	5033945.164
C2	381447.104	5034284.654
C2	381462.819	5034291.373

C2 381482.826 5034244.577

C2 381467.309 5034237.869

C2 381447.104 5034284.654

[SYMBOLS]

;;Gage X-Coord Y-Coord

;;---------- ---------- ----------

[PROFILES]

;;Name Links

;;---------- ----------

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" Pipe_-_(141)_(RYCB) Pipe_-_(142)_(RYCB) Pipe_-_(143)_(RYCB) Pipe_-_(144)_(RYCB) C31

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" OR19 CB-21 15_(11)_(STM) 8_(STM) 9_(STM)

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" 10_(STM) 11_(STM) 12_(STM) 13_(STM) STM-23_(STM)

"Profile 001. Junction RYCB_6_(1)_(19)_(RYCB) to Junction 108_(STM)" STM-24_(STM)

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" C1_1 C1_2 C2_1 C2_2 CB-06

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" CB-43 15_(19)_(STM) 15_(20)_(STM) 15_(21)_(STM) 15_(22)_(STM)

"Profile 002. Outfall Maj-01 to Junction STM-251_(STM)" 15_(14)_(STM) 15_(15)_(STM) 15_(16)_(STM) 4_(STM) STM-83_(STM)

"Profile 003. Junction RYCB_6_(1)_(9)_(RYCB) to Junction 112_(STM)" Pipe_-_(145)_(RYCB) Pipe_-_(146)_(RYCB) Pipe_-_(147)_(RYCB) Pipe_-_(148)_(RYCB) Pipe_-_(10)_(RYCB)

"Profile 003. Junction RYCB_6_(1)_(9)_(RYCB) to Junction 112_(STM)" Pipe_-_(11)_(RYCB) RYCB-18 15_(4)_(STM) 15_(5)_(STM)

"Profile 004. Junction RYCB_6_(1)_(13)_(RYCB) to Junction 104_(STM)" C50 Pipe_-_(99)_(RYCB) Pipe_-_(100)_(RYCB) C59 C50_2

"Profile 004. Junction RYCB_6_(1)_(13)_(RYCB) to Junction 104_(STM)" C55 OR44 CB-56

"Profile 005. Junction RYCB_6_(1)_(21)_(RYCB) to Junction 144_(STM)" Pipe_-_(110)_(RYCB) Pipe_-_(111)_(RYCB) Pipe_-_(19)_(RYCB) C27 C24

"Profile 005. Junction RYCB_6_(1)_(21)_(RYCB) to Junction 144_(STM)" OR-15 CB-26

"Profile 006. Junction Maj-04 to Junction 164_(STM)" C4_1 C4_2 C5_1 C5_2 C6_2

"Profile 006. Junction Maj-04 to Junction 164_(STM)" OR4 CB-41

"Profile 007. Junction RYCB_6_(1)_(24)_(RYCB) to Junction 136_(STM)" Pipe_-_(114)_(RYCB) Pipe_-_(150)_(RYCB) Pipe_-_(151)_(RYCB) Pipe_-_(152)_(RYCB) Pipe_-_(14)_(RYCB)

"Profile 007. Junction RYCB_6_(1)_(24)_(RYCB) to Junction 136_(STM)" Pipe_-_(15)_(RYCB) 15_(10)_(STM)_2

"Profile 008. Junction RYCB_6_(1)_(31)_(RYCB) to Junction 150_(STM)" Pipe_-_(123)_(RYCB) Pipe_-_(124)_(RYCB) Pipe_-_(125)_(RYCB) Pipe_-_(23)_(RYCB) CB-35

"Profile 008. Junction RYCB_6_(1)_(31)_(RYCB) to Junction 150_(STM)" 3_(STM)

"Profile 009. Junction RYCB_6_(1)_(6)_(RYCB) to Junction 114_(STM)" Pipe_-_(96)_(RYCB) Pipe_-_(137)_(RYCB) Pipe_-_(138)_(RYCB) Pipe_-_(98)_(RYCB) Pipe_-_(9)_(RYCB)

"Profile 009. Junction RYCB_6_(1)_(6)_(RYCB) to Junction 114_(STM)" CB-11

"Profile 010. Junction Maj-34_2 to Junction 128_(STM)" C18_7 C32 OR23 CB-47 7_(STM)

"Profile 010. Junction Maj-34_2 to Junction 128_(STM)" 7_(1)_(STM)

"Profile 011. Junction Maj-19 to Junction 144_(STM)" C20 C21 OR46 CB-30 15_(12)_(STM)

"Profile 011. Junction Maj-19 to Junction 144_(STM)" 15_(13)_(STM)

"Profile 012. Junction RYCB_6_(1)_(26)_(RYCB) to Junction 150_(STM)" Pipe_-_(117)_(RYCB) Pipe_-_(118)_(RYCB) Pipe_-_(165)_(RYCB) Pipe_-_(25)_(RYCB) CB-33

"Profile 013. Junction Maj-11 to Junction 152_(STM)" C13 OR8 CB-54 1_(STM) 2_(STM)

"Profile 014. Junction RYCB_6_(1)_(36)_(RYCB) to Junction 162_(STM)" Pipe_-_(126)_(RYCB) Pipe_-_(127)_(RYCB) Pipe_-_(128)_(RYCB) Pipe_-_(74)_(RYCB) RYCB-52

"Profile 015. Junction Maj-07 to Junction 162_(STM)" C7 C8 C9 OR5 CB-39

"Profile 016. Junction RYCB_6_(1)_(2)_(1)_(RYCB) to Junction 108_(STM)" Pipe_-_(139)_(RYCB) Pipe_-_(140)_(RYCB) Pipe_-_(27)_(RYCB) RYCB-03 STM-28_(STM)

"Profile 017. Junction TEE_2_(2)_(RYCB) to Outfall 2121_(STM)" Pipe_-_(159)_(RYCB) Pipe_-_(160)_(RYCB) Pipe_-_(1)_(RYCB)_1 Pipe_-_(1)_(RYCB)_2 Pipe_-_(4)_(RYCB)

"Profile 017. Junction TEE_2_(2)_(RYCB) to Outfall 2121_(STM)" STM-34_(1)_(STM)_2

"Profile 018. Junction RYCB_6_(1)_(3)_(RYCB) to Junction 128_(STM)" Pipe_-_(93)_(RYCB) Pipe_-_(94)_(RYCB) Pipe_-_(95)_(RYCB) Pipe_-_(16)_(RYCB) RYCB-26

"Profile 019. Junction Maj-25 to Junction STM-Split" C25 OR-16 CB-23 15_(9)_(STM) 15_(10)_(STM)_1

"Profile 020. Junction Maj-15 to Junction Maj-24" C18_3 C18_4 C19 C23

"Profile 021. Junction RYCB_6_(1)_(37)_(RYCB) to Junction 152_(STM)" Pipe_-_(129)_(RYCB) Pipe_-_(130)_(RYCB) Pipe_-_(22)_(RYCB) CB-31a

"Profile 022. Junction RYCB_6_(1)_(28)_(RYCB) to Junction 162_(STM)" Pipe_-_(120)_(RYCB) Pipe_-_(121)_(RYCB) Pipe_-_(77)_(RYCB) RYCB-34

"Profile 023. Junction RYCB_6_(1)_(2)_(RYCB) to Junction 112_(STM)" Pipe_-_(87)_(RYCB) Pipe_-_(88)_(RYCB) Pipe_-_(7)_(RYCB) CB-9

"Profile 024. Junction Maj-36 to Junction 116_(STM)" C38 OR28 CB-51 15_(3)_(STM)

"Profile 025. Junction TEE_1_(1)_(RYCB) to Junction STM-Split3" Pipe_-_(157)_(RYCB) Pipe_-_(158)_(RYCB) Pipe_-_(2)_(RYCB) Pipe_-_(3)_(RYCB)

"Profile 026. Junction RYCB_6_(1)_(40)_(RYCB) to Junction STM-251_(STM)" Pipe_-_(132)_(RYCB) Pipe_-_(133)_(RYCB) Pipe_-_(24)_(RYCB) CB-31

"Profile 027. Junction Maj-25 to Junction 132_(STM)" C29 OR25 CB-45 6_(STM)

"Profile 028. Junction Maj-55 to Junction STM-Split3" C1 OR-51 CB-57 STM-34_(1)_(STM)_1

"Profile 029. Junction Maj-17 to Junction 158_(STM)" C11 OR-10 CB-37

"Profile 030. Junction RYCB_6_(1)_(25)_(RYCB) to Junction 148_(STM)" Pipe_-_(119)_(RYCB) Pipe_-_(164)_(RYCB) RYCB-10

"Profile 031. Junction Maj-51 to Junction 106_(STM)" C53 OR42 CB-3

"Profile 032. Junction TEE_1_(1)_(1)_(RYCB) to Junction 104_(STM)" Pipe_-_(161)_(RYCB) RYCB-01 CB-06

"Profile 033. Junction Maj-40 to Junction 120_(STM)" C43 OR32 CB-13-C

"Profile 034. Junction Maj-38 to Junction 122_(STM)" C45 OR34 CB-15

"Profile 035. Junction RYCB_6_(1)_(16)_(1)_(RYCB) to Junction Structure_-_(26)_(RYCB)" Pipe_-_(153)_(RYCB) Pipe_-_(134)_(RYCB) Pipe_-_(17)_(RYCB)

"Profile 036. Junction Maj-29 to Junction 128_(STM)" C36 OR27 CB-19

"Profile 037. Junction Maj-31 to Junction 130_(STM)" C34 OR21 CB-49

"Profile 038. Junction RYCB_6_(1)_(16)_(2)_(RYCB) to Junction Structure_-_(7)_(RYCB)" Pipe_-_(154)_(RYCB) Pipe_-_(155)_(RYCB) Pipe_-_(156)_(RYCB)

"Profile 039. Junction Maj-19_2 to Junction 146_(STM)" C18_6 OR-13 CB-28

"Profile 040. Junction Maj-53 to Junction 104_(STM)" C51 OR40 CB-5

"Profile 041. Junction TEE_4_(RYCB) to Junction 104_(STM)" RYCB-04 RYCB-04 STM-82_(STM)

"Profile 042. Junction RYCB_6_(1)_(13)_(RYCB) to Junction Structure_-_(17)_(RYCB)" Pipe_-_(101)_(RYCB) Pipe_-_(149)_(RYCB) Pipe_-_(103)_(RYCB)

"Profile 043. Junction Maj-36 to Junction 126_(STM)" C46 OR37 CB-17

"Profile 044. Junction Maj-21 to Junction Maj-28" C56 C60 C27_2

"Profile 045. Junction Maj-13 to Junction 35_(CB)" C16 OR-50

"Profile 046. Junction Maj-45 to Junction 9_(1)_(RYCB)" C48 OR39

"Profile 047. Junction Maj-43 to Junction 11_(2)_(RYCB)" C40 OR31

"Profile 048. Outfall Maj-18 to Junction Maj-15_2" C18_8 C18_9

"Profile 049. Junction Maj-24 to Junction 144_(STM)" OR-14 CB-25

"Profile 050. Junction Slope1 to Junction 150_(STM)" OR-11 CB-32

"Profile 051. Junction Maj-12 to Junction 156_(STM)" OR7 CB-53

"Profile 052. Junction Maj-16 to Junction 158_(STM)" OR9 CB-36

"Profile 053. Junction Maj-10 to Junction 162_(STM)" OR6 CB-38

"Profile 054. Junction Maj-06_2 to Junction 164_(STM)" OR-03 CB-40

"Profile 055. Junction Maj-03 to Junction 170_(STM)" OR-02 CB-42

"Profile 056. Junction Maj-19 to Junction 146_(STM)" OR-12 CB-27(1)

"Profile 057. Junction Maj-21 to Junction 148_(STM)" OR47 CB-29

"Profile 058. Junction Maj-50 to Junction 106_(STM)" OR43 CB-2

"Profile 059. Junction Maj-54 to Junction 104_(STM)" OR45 CB-55

"Profile 060. Junction Maj-52 to Junction 104_(STM)" OR41 CB-4

"Profile 061. Junction Maj-46 to Junction 112_(STM)" OR38 CB-8

"Profile 062. Junction Maj-44 to Junction 114_(STM)" OR30 CB-10

"Profile 063. Junction Maj-42 to Junction 118_(STM)" OR29 CB-50

"Profile 064. Junction Maj-41 to Junction 120_(STM)" OR33 CB-12-C

"Profile 065. Junction Maj-39 to Junction 122_(STM)" OR35 CB-14

"Profile 066. Junction Maj-37 to Junction 126_(STM)" OR36 CB-16

"Profile 067. Junction Maj-35 to Junction 128_(STM)" OR26 CB-18

"Profile 068. Junction Maj-30 to Junction 130_(STM)" OR20 CB-48

"Profile 069. Junction Maj-32 to Junction 132_(STM)" OR22 CB-46

"Profile 070. Junction Maj-33 to Junction 142_(STM)" OR24 CB-44

"Profile 071. Junction Maj-28 to Junction 136_(STM)" OR18 CB-20

"Profile 072. Junction Maj-26 to Junction 140_(STM)" OR-17 CB-22

"Profile 073. Junction 104_(STM) to Junction 100_(STM)" 14_(STM) STM-34_(STM)

"Profile 074. Junction RYCB_6_(1)_(20)_(RYCB) to Junction Structure_-_(29)_(RYCB)" Pipe_-_(109)_(RYCB)

"Profile 075. Junction Maj-19_2 to Junction Maj-15_2" C18_5

"Profile 076. Junction RYCB_6_(1)_(40)_(RYCB) to Junction Structure_-_(35)_(RYCB)" Pipe_-_(131)_(RYCB)

"Profile 077. Junction RYCB_6_(1)_(30)_(RYCB) to Junction Structure_-_(132)_(RYCB)" Pipe_-_(122)_(RYCB)

"Profile 078. Storage B3_Stor to Junction 164_(STM)" B3-Out

"Profile 079. Storage B2_Stor to Junction 164_(STM)" B2-Out

"Profile 080. Storage B1_Stor to Junction 164_(STM)" B1-Out

"Profile 081. Junction RYCB_6_(1)_(25)_(2)_(RYCB) to Junction RYCB_10" Pipe_-_(162)_(RYCB)

"Profile 082. Junction RYCB_6_(1)_(3)_(RYCB) to Junction TEE_3_(RYCB)" Pipe_-_(89)_(RYCB)

"Profile 083. Storage B4_Stor to Junction 106_(STM)" B4-Out

"Profile 084. Junction Maj-55 to Junction Maj-54" C57

"Profile 085. Junction 134_(STM) to Junction 132_(STM)" STM-27_(STM)

"Profile 086. Junction Maj-27 to Junction Maj-60" C27_1

"Profile 087. Junction 31_(RYCB) to Junction Maj-18_2" C18

"Profile 088. Junction Slope1 to Junction 33_(RYCB)" OR48

"Profile 089. Junction Maj-15 to Junction Maj-14" C17

"Profile 090. Junction Structure_-_(12)_(RYCB) to Junction Maj-14" C4

"Profile 091. Junction Maj-14 to Junction 31a_(RYCB)" OR49

"Profile 092. Junction Maj-13 to Junction Maj-12" C14

"Profile 093. Junction Maj-15 to Junction Maj-16" C15

"Profile 094. Junction Maj-17 to Junction Maj-10" C10

"Profile 095. Junction Maj-11 to Junction Maj-09" C12

"Profile 096. Junction 52_(RYCB) to Junction Maj-08" C6

"Profile 097. Junction Maj-07 to Junction Maj-06_2" C6_1

"Profile 098. Storage B2_Stor to Junction Maj-06" B2-Outflow

"Profile 099. Junction Maj-04 to Junction Maj-03" C3

"Profile 100. Outfall Maj-22 to Junction Maj-21" C22

"Profile 101. Outfall Maj-49 to Junction Maj-50" C54

"Profile 102. Outfall Maj-48 to Junction Maj-48_2" C50_1

"Profile 103. Junction Maj-51 to Junction Maj-52" C52

"Profile 104. Junction Maj-53 to Junction Maj-46" C49

"Profile 105. Junction TEE_6_(RYCB) to Junction Maj-46" C58

"Profile 106. Junction Maj-45 to Junction Maj-44" C41

"Profile 107. Junction Maj-43 to Junction Maj-42" C39

"Profile 108. Junction Maj-45 to Junction Maj-41" C42

"Profile 109. Junction Maj-40 to Junction Maj-39" C44

"Profile 110. Junction Maj-38 to Junction Maj-37" C47

"Profile 111. Junction Maj-36 to Junction Maj-35" C37

"Profile 112. Junction Maj-29 to Junction Maj-30" C35

"Profile 113. Junction Maj-31 to Junction Maj-32" C33

"Profile 114. Junction 24_(RYCB) to Junction 142_(STM)" RYCB-24

"Profile 115. Junction Maj-34 to Junction Maj-33" C30

"Profile 116. Junction Maj-29 to Junction Maj-28" C28

"Profile 117. Junction STM-Split to Junction Maj-60" C5

"Profile 118. Junction Structure_-_(115)_(RYCB) to Junction 20_(CB)" Pipe_-_(73)_(RYCB)

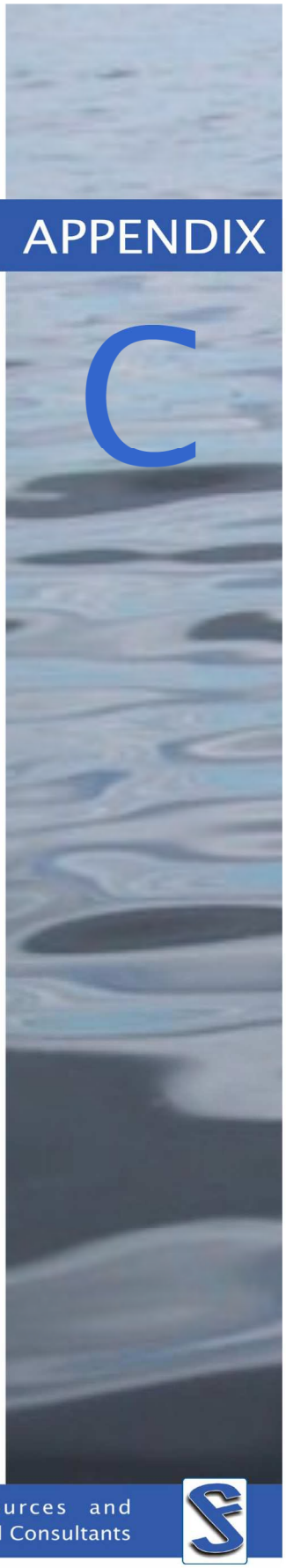
"Profile 119. Junction 144_(STM) to Junction 140_(STM)" 5_(STM)

"Profile 120. Junction 142_(STM) to Junction 140_(STM)" STM-81_(STM)

"Profile 121. Junction Maj-27 to Junction Maj-26" C26

"Profile 122. Junction Maj-34_2 to Outfall Maj-57" C18_2

"Profile 123. Outfall Maj-59 to Junction Maj-58" C2



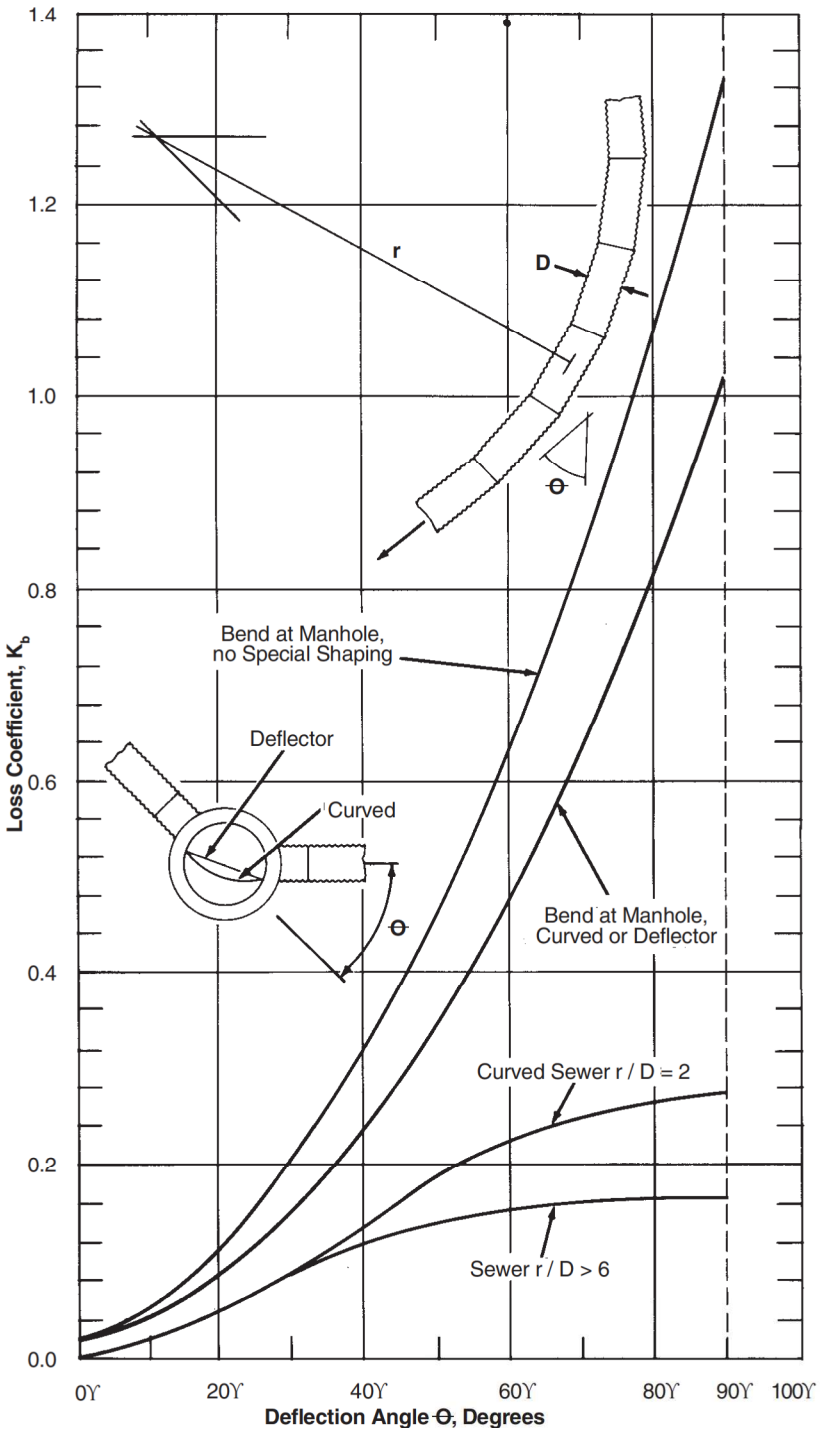
APPENDIX C

Manhole Loss Coefficient Nomograph and Table

Pipe Data and Hydraulic Simulation Results (Ultimate and Interim Conditions)

JFSA Water Resources and Environmental Consultants

MANHOLE LOSS COEFFICIENT NOMOGRAPH AND TABLE



Angle	Exit Loss
0	0.02
5	0.035
10	0.055
15	0.08
20	0.11
25	0.16
30	0.21
35	0.26
40	0.32
45	0.39
50	0.47
55	0.54
60	0.635
65	0.73
70	0.84
75	0.95
80	1.07
85	1.19
90	1.33

Figure 4.13 Sewer bend loss coefficient[16]

Table C-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	3.47	1.1	-0.180	9 01:19 AM	83.11	82.98	145	85.65	2.539			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.47	1.2	-0.090	9 01:19 AM	83.24	83.11	139	85.7	2.457			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.09	0.6	-0.160	9 01:22 AM	84.13	83.24	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	9 01:20 AM	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.060	9 01:19 AM	84.43	84.14	26	86.1	1.674			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	3.24	1.1	-0.070	9 01:18 AM	83.48	83.24	18	85.95	2.466			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.21	0.8	-0.165	9 01:20 AM	84.03	83.48	113	86.05	2.024			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.15	0.7	-0.130	9 01:19 AM	84.12	84.03	108	86.5	2.379			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.08	0.9	-0.085	9 01:12 AM	84.47	84.12	104	86.35	1.880			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.94	1.1	0.150	9 01:18 AM	84.46	83.48	9	86.1	1.636			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.85	1.1	0.170	9 01:18 AM	84.56	84.46	47	86.25	1.694			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.85	0.8	0.180	9 01:18 AM	84.66	84.56	49	86.5	1.836			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.85	1.1	0.250	9 01:18 AM	84.87	84.66	3	86.5	1.626			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.80	1.0	0.270	9 01:18 AM	85.09	84.87	56	86.7	1.610			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.16	1.1	0.380	9 01:12 AM	85.40	85.09	115	86.85	1.452			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.10	0.9	0.335	9 01:12 AM	85.49	85.40	122	87.3	1.806			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.01	0.3	0.104	9 01:15 AM	85.49	85.49	125	87.4	1.906			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.55	1.0	0.260	9 01:18 AM	85.25	85.09	65	86.7	1.454			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.48	0.7	0.260	9 01:18 AM	85.33	85.25	70	87.05	1.716			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.40	0.9	0.270	9 01:17 AM	85.63	85.33	76	87.05	1.417			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.04	0.9	0.280	9 01:13 AM	85.74	85.49	113	87.35	1.613			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.04	0.9	0.280	9 01:13 AM	85.74	85.63	92	87.45	1.713			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.27	1.0	0.580	9 01:17 AM	86.21	85.63	91	87.45	1.239			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.32	0.9	0.540	9 01:12 AM	86.45	86.21	94	87.7	1.255			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.25	1.0	0.515	9 01:19 AM	86.71	86.45	97	87	0.295			
																		97	87	0.509	78.5	13.783	86.491
																		102	87	0.509	78.5	13.783	86.491
																		96	87.2	0.709	78.5	13.783	86.491
																		101	87.2	0.709	78.5	13.783	86.491
																		95	87.4	0.909	78.5	13.783	86.491
																		100	87.45	0.959	78.5	13.783	86.491
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.88	1.0	0.550	9 01:17 AM	86.43	86.21	114	87.7	1.271			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.17	0.7	0.405	9 01:28 AM	86.49	86.43	115	87.9	1.408			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.11	0.9	0.515	9 01:28 AM	86.54	86.49	117	88.3	1.757			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.10	0.9	0.405	9 01:28 AM	86.81	86.54	118	88.2	1.392			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.67	1.0	0.900	9 01:17 AM	87.16	86.43	103	88	0.843			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.58	0.8	0.930	9 01:17 AM	87.27	87.16	106	88.4	1.131			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.58	1.0	1.060	9 01:17 AM	87.76	87.27	107	88.4	0.642			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	3.32	1.1	-0.130	12:06 PM	83.16	83.07	145	85.65	2.489			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.32	1.2	-0.060	12:06 PM	83.27	83.16	139	85.7	2.427			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.09	0.6	-0.160	12:08 PM	84.13	83.27	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	12:06 PM	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.060	12:06 PM	84.43	84.14	26	86.1	1.674			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	3.10	1.1	-0.060	12:06 PM	83.47	83.27	18	85.95	2.476			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.21	0.8	-0.165	12:04 PM	84.03	83.47	113	86.05	2.024			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.15	0.7	-0.130	12:03 PM	84.12	84.03	108	86.5	2.379			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.08	0.9	-0.095	12:02 PM	84.46	84.12	104	86.35	1.890			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.80	1.0	0.090	12:06 PM	84.40	83.47	9	86.1	1.696			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.71	1.0	0.100	12:06 PM	84.49	84.40	47	86.25	1.764			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.71	0.7	0.090	12:06 PM	84.57	84.49	49	86.5	1.926			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.71	1.0	0.150	12:06 PM	84.77	84.57	3	86.5	1.726			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.66	1.0	0.150	12:06 PM	84.97	84.77	56	86.7	1.730			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.15	1.1	0.240	11:59 AM	85.26	84.97	115	86.85	1.592			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.10	0.9	0.195	11:59 AM	85.35	85.26	122	87.3	1.946			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.01	0.2	-0.036	12:02 PM	85.35	85.35	125	87.4	2.046			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.42	0.9	0.120	12:06 PM	85.11	84.97	65	86.7	1.594			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.35	0.6	0.110	12:06 PM	85.18	85.11	70	87.05	1.866			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.28	0.9	0.110	12:03 PM	85.47	85.18	76	87.05	1.577			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.04	0.9	0.110	12:01 PM	85.57	85.35	113	87.35	1.783			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.04	0.9	0.110	12:01 PM	85.57	85.47	92	87.45	1.883			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.21	1.0	0.280	12:01 PM	85.91	85.47	91	87.45	1.539			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.32	0.9	0.220	12:01 PM	86.13	85.91	94	87.7	1.575			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.25	1.0	0.175	12:10 PM	86.37	86.13	97	87	0.635			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.82	0.9	0.200	12:05 PM	86.08	85.91	114	87.7	1.621			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.17	0.7	0.045	12:09 PM	86.13	86.08	115	87.9	1.768			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.11	0.9	0.145	12:10 PM	86.17	86.13	117	88.3	2.127			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.10	0.9	-0.005	12:09 PM	86.40	86.17	118	88.2	1.802			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.61	1.0	0.430	12:05 PM	86.69	86.08	103	88	1.313			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.52	0.8	0.460	12:05 PM	86.80	86.69	106	88.4	1.601			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.52	1.0	0.520	12:05 PM	87.22	86.80	107	88.4	1.182			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-1C: Pipe Data and Hydraulic Simulation Results for the Historical July 1, 1979 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	3.36	1.1	-0.120	01:40 AM	83.17	83.15	145	85.65	2.479			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.36	1.2	-0.080	01:40 AM	83.25	83.17	139	85.7	2.447			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.09	0.6	-0.150	01:42 AM	84.14	83.25	23	85.85	1.711			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.220	01:41 AM	84.15	84.14	28	86.1	1.954			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.050	01:40 AM	84.44	84.15	26	86.1	1.664			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	3.12	1.1	-0.080	01:40 AM	83.47	83.25	18	85.95	2.476			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.21	0.8	-0.165	01:41 AM	84.03	83.47	113	86.05	2.024			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.15	0.8	-0.130	01:40 AM	84.12	84.03	108	86.5	2.379			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.08	0.9	-0.095	01:31 AM	84.46	84.12	104	86.35	1.890			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.82	1.1	0.100	01:40 AM	84.41	83.47	9	86.1	1.686			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.73	1.0	0.110	01:40 AM	84.50	84.41	47	86.25	1.754			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.73	0.7	0.100	01:40 AM	84.58	84.50	49	86.5	1.916			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.73	1.0	0.160	01:40 AM	84.78	84.58	3	86.5	1.716			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.68	1.0	0.170	01:40 AM	84.99	84.78	56	86.7	1.710			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.15	1.1	0.250	01:30 AM	85.27	84.99	115	86.85	1.582			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.10	0.9	0.205	01:30 AM	85.36	85.27	122	87.3	1.936			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.01	0.1	-0.026	01:34 AM	85.36	85.36	125	87.4	2.036			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.43	0.9	0.130	01:40 AM	85.12	84.99	65	86.7	1.584			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.36	0.6	0.130	01:40 AM	85.20	85.12	70	87.05	1.846			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.27	0.9	0.110	01:39 AM	85.47	85.20	76	87.05	1.577			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.04	0.9	0.110	01:32 AM	85.57	85.36	113	87.35	1.783			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.04	0.9	0.110	01:32 AM	85.57	85.47	92	87.45	1.883			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.15	0.9	0.320	01:39 AM	85.95	85.47	91	87.45	1.499			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.29	0.8	0.290	01:38 AM	86.20	85.95	94	87.7	1.505			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.25	1.0	0.255	01:45 AM	86.45	86.20	97	87	0.555			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.77	0.9	0.230	01:39 AM	86.11	85.95	114	87.7	1.591			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.16	0.6	0.085	01:44 AM	86.17	86.11	115	87.9	1.728			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.10	0.8	0.185	01:44 AM	86.21	86.17	117	88.3	2.087			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.09	0.9	0.035	01:43 AM	86.44	86.21	118	88.2	1.762			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.58	1.0	0.420	01:34 AM	86.68	86.11	103	88	1.323			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.48	0.8	0.440	01:34 AM	86.78	86.68	106	88.4	1.621			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.48	0.9	0.450	01:34 AM	87.15	86.78	107	88.4	1.252			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-1D: Pipe Data and Hydraulic Simulation Results for the Historical August 4, 1988 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	3.17	1.0	-0.040	02:06 AM	83.25	83.18	145	85.65	2.399			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.18	1.1	0.010	02:06 AM	83.34	83.25	139	85.7	2.357			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.09	0.6	-0.160	02:07 AM	84.13	83.34	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	02:05 AM	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.060	02:05 AM	84.43	84.14	26	86.1	1.674			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.97	1.0	0.000	02:06 AM	83.55	83.34	18	85.95	2.396			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.21	0.8	-0.165	02:02 AM	84.03	83.55	113	86.05	2.024			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.15	0.8	-0.130	02:02 AM	84.12	84.03	108	86.5	2.379			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.08	0.9	-0.095	02:00 AM	84.46	84.12	104	86.35	1.890			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.68	1.0	0.030	02:06 AM	84.34	83.55	9	86.1	1.756			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.60	1.0	0.040	02:06 AM	84.43	84.34	47	86.25	1.824			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.60	0.7	0.030	02:06 AM	84.51	84.43	49	86.5	1.986			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.60	1.0	0.060	02:06 AM	84.68	84.51	3	86.5	1.816			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.54	1.0	0.050	02:06 AM	84.87	84.68	56	86.7	1.830			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.16	1.1	0.120	02:02 AM	85.14	84.87	115	86.85	1.712			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.10	0.9	0.075	02:08 AM	85.23	85.14	122	87.3	2.066			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.01	0.1	-0.146	02:05 AM	85.24	85.23	125	87.4	2.156			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.34	0.9	0.010	02:08 AM	85.00	84.87	65	86.7	1.704			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.25	0.6	-0.010	02:07 AM	85.06	85.00	70	87.05	1.986			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.20	0.8	-0.090	02:04 AM	85.27	85.06	76	87.05	1.777			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.04	0.9	-0.020	02:04 AM	85.44	85.23	113	87.35	1.913			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.04	0.9	-0.020	02:04 AM	85.44	85.27	92	87.45	2.013			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.14	0.9	0.080	02:03 AM	85.71	85.27	91	87.45	1.739			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.30	0.8	0.050	02:02 AM	85.96	85.71	94	87.7	1.745			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.24	0.9	-0.065	02:05 AM	86.11	85.96	97	87	0.895			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.78	0.9	-0.030	02:05 AM	85.85	85.71	114	87.7	1.851			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.14	0.5	-0.195	02:07 AM	85.89	85.85	115	87.9	2.008			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.09	0.7	-0.095	02:01 AM	85.93	85.89	117	88.3	2.367			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.09	0.8	-0.095	02:01 AM	86.31	85.93	118	88.2	1.892			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.58	1.0	0.130	02:05 AM	86.39	85.85	103	88	1.613			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.48	0.8	0.150	02:05 AM	86.49	86.39	106	88.4	1.911			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.48	0.9	0.170	02:05 AM	86.87	86.49	107	88.4	1.532			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-1E: Pipe Data and Hydraulic Simulation Results for the Historical August 8, 1996 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	2.83	0.9	-0.370	01:33 AM	82.92	82.88	145	85.65	2.729			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.83	1.0	-0.300	01:33 AM	83.03	82.92	139	85.7	2.667			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.07	0.5	-0.210	01:32 AM	84.08	83.03	23	85.85	1.771			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.02	0.1	-0.280	01:35 AM	84.09	84.08	28	86.1	2.014			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.02	0.5	-0.120	01:38 AM	84.37	84.11	26	86.1	1.734			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.68	0.9	-0.310	01:34 AM	83.24	83.03	18	85.95	2.706			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.18	0.7	-0.205	01:33 AM	83.99	83.24	113	86.05	2.064			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.12	0.6	-0.180	01:32 AM	84.07	83.99	108	86.5	2.429			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.08	0.8	-0.095	01:30 AM	84.46	84.07	104	86.35	1.890			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.46	0.9	-0.060	01:34 AM	84.25	83.24	9	86.1	1.846			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.38	0.9	-0.080	01:33 AM	84.31	84.25	47	86.25	1.944			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.39	0.6	-0.110	01:33 AM	84.37	84.31	49	86.5	2.126			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.39	0.9	-0.110	01:33 AM	84.51	84.37	3	86.5	1.986			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.35	0.9	-0.160	01:33 AM	84.64	84.51	56	86.7	2.060			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.14	1.1	0.000	01:31 AM	85.02	84.64	115	86.85	1.832			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.09	0.8	-0.075	01:30 AM	85.08	85.02	122	87.3	2.216			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.00	0.0	-0.250	00:00 AM	85.14	85.08	125	87.4	2.260			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.17	0.8	-0.260	01:32 AM	84.73	84.64	65	86.7	1.974			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.11	0.6	-0.260	01:32 AM	84.81	84.73	70	87.05	2.236			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.09	0.8	-0.320	01:31 AM	85.04	84.81	76	87.05	2.007			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.03	0.8	-0.070	01:30 AM	85.39	85.08	113	87.35	1.963			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.03	0.8	-0.070	01:30 AM	85.39	85.04	92	87.45	2.063			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.00	0.9	-0.030	01:32 AM	85.60	85.04	91	87.45	1.849			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.26	0.7	-0.140	01:26 AM	85.77	85.60	94	87.7	1.935			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.21	0.8	-0.155	01:33 AM	86.04	85.77	97	87	0.965			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.68	0.9	-0.160	01:32 AM	85.72	85.60	114	87.7	1.981			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.13	0.5	-0.265	01:31 AM	85.82	85.72	115	87.9	2.078			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.08	0.7	-0.125	01:29 AM	85.90	85.82	117	88.3	2.397			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.08	0.8	-0.105	01:27 AM	86.30	85.90	118	88.2	1.902			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.50	0.9	0.010	01:32 AM	86.27	85.72	103	88	1.733			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.41	0.7	0.020	01:30 AM	86.36	86.27	106	88.4	2.041			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.41	0.9	0.000	01:29 AM	86.70	86.36	107	88.4	1.702			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-1F: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm + 20%

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
102_(STM)	100_(STM)	81.641	81.627	1650	11.8	0.1	0.013	87.543	67.400	1.464	3.13	3.68	1.2	0.240	9 01:19 AM	83.53	83.47	145	85.65	2.119			
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.68	1.3	0.280	9 01:19 AM	83.61	83.53	139	85.7	2.087			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	87.617	0.896	0.14	0.09	0.7	-0.140	9 01:24 AM	84.15	83.61	23	85.85	1.701			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.210	9 01:22 AM	84.16	84.15	28	86.1	1.944			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.1	-0.030	9 01:21 AM	84.46	84.16	26	86.1	1.644			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	3.41	1.2	0.300	9 01:15 AM	83.85	83.61	18	85.95	2.096			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.22	0.9	-0.155	9 01:20 AM	84.04	83.85	113	86.05	2.014			
116_(STM)	114_(STM)	83.801	83.741	450	11.9	0.5	0.013	88.174	88.000	1.271	0.20	0.16	0.8	-0.120	9 01:20 AM	84.13	84.04	108	86.5	2.369			
118_(STM)	116_(STM)	84.180	83.873	375	99.6	0.3	0.013	88.362	88.174	0.881	0.10	0.09	0.9	-0.085	9 01:13 AM	84.47	84.13	104	86.35	1.880			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	3.11	1.2	0.230	9 01:18 AM	84.54	83.85	9	86.1	1.556			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	3.02	1.1	0.270	9 01:18 AM	84.66	84.54	47	86.25	1.594			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	3.02	0.8	0.280	9 01:18 AM	84.76	84.66	49	86.5	1.736			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	3.02	1.1	0.380	9 01:18 AM	85.00	84.76	3	86.5	1.496			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.97	1.1	0.430	9 01:18 AM	85.25	85.00	56	86.7	1.450			
130_(STM)	128_(STM)	84.568	83.480	450	88.3	0.2	0.013	89.045	88.631	0.848	0.13	0.16	1.2	0.550	9 01:11 AM	85.57	85.25	115	86.85	1.282			
132_(STM)	130_(STM)	84.784	84.642	375	37.4	0.4	0.013	89.181	89.045	0.979	0.11	0.10	0.9	0.515	9 01:11 AM	85.67	85.57	122	87.3	1.626			
134_(STM)	132_(STM)	85.140	84.909	250	36.0	0.7	0.013	89.169	89.181	0.977	0.05	0.03	0.6	0.294	9 01:13 AM	85.68	85.67	125	87.4	1.716			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	1.864	2.67	2.71	1.0	0.430	9 01:14 AM	85.42	85.25	65	86.7	1.284			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.64	0.7	0.450	9 01:14 AM	85.52	85.42	70	87.05	1.526			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.52	0.9	0.480	9 01:13 AM	85.84	85.52	76	87.05	1.207			
142_(STM)	132_(STM)	85.207	84.909	250	53.4	0.6	0.013	89.160	89.181	0.905	0.04	0.05	1.0	0.510	9 01:13 AM	85.97	85.67	113	87.35	1.383			
142_(STM)	140_(STM)	85.207	84.160	250	53.4	0.6	0.013	89.160	89.251	0.905	0.04	0.05	1.0	0.510	9 01:13 AM	85.97	85.84	92	87.45	1.483			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.40	1.0	0.810	9 01:13 AM	86.44	85.84	91	87.45	1.009			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.35	1.0	0.860	9 01:13 AM	86.77	86.44	94	87.7	0.935			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.27	1.1	0.875	9 01:19 AM	87.07	86.77	97	87	-0.065			
																		97	87	0.182	78.5	13.783	86.818
																		102	87	0.182	78.5	13.783	86.818
																		96	87.2	0.382	78.5	13.783	86.818
																		101	87.2	0.382	78.5	13.783	86.818
																		95	87.4	0.582	78.5	13.783	86.818
																		100	87.45	0.632	78.5	13.783	86.818
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.96	1.0	0.750	9 01:17 AM	86.63	86.44	114	87.7	1.071			
152_(STM)	150_(STM)	85.562	84.829	525	59.4	0.4	0.013	90.000	89.798	1.175	0.25	0.17	0.7	0.605	9 01:35 AM	86.69	86.63	115	87.9	1.208			
154_(STM)	152_(STM)	85.653	85.590	375	12.6	0.5	0.013	90.091	90.000	1.124	0.12	0.11	0.9	0.715	9 01:36 AM	86.74	86.69	117	88.3	1.557			
156_(STM)	154_(STM)	86.028	85.680	375	100.7	0.3	0.013	89.939	90.091	0.934	0.10	0.10	1.0	0.605	9 01:36 AM	87.01	86.74	118	88.2	1.192			
158_(STM)	150_(STM)	85.207	84.829	1050	108.0	0.4	0.013	90.066	89.798	1.866	1.62	1.74	1.1	1.090	9 01:17 AM	87.35	86.63	103	88	0.653			
160_(STM)	158_(STM)	85.289	85.217	1050	14.3	0.5	0.013	90.162	90.066	2.239	1.94	1.64	0.8	1.130	9 01:17 AM	87.47	87.35	106	88.4	0.931			
162_(STM)	160_(STM)	85.648	85.299	1050	106.3	0.3	0.013	90.303	90.162	1.806	1.56	1.64	1.1	1.240	9 01:17 AM	87.94	87.47	107	88.4	0.462			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2A: Interim Condition Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.71	0.9	-0.350	01:16	82.98	82.87	139	85.7	2.717			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.09	0.6	-0.160	01:22	84.13	82.98	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	01:20	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.060	01:19	84.43	84.14	26	86.1	1.674			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.54	0.9	-0.360	01:16	83.19	82.98	18	85.95	2.756			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.24	0.9	-0.135	01:20	84.06	83.19	113	86.05	1.994			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.22	0.8	-0.170	01:15	84.14	83.19	9	86.1	1.956			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.13	0.8	-0.190	01:14	84.20	84.14	47	86.25	2.054			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.14	0.6	-0.230	01:14	84.25	84.20	49	86.5	2.246			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.14	0.8	-0.240	01:14	84.38	84.25	3	86.5	2.116			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.10	0.8	-0.330	01:13	84.49	84.38	56	86.7	2.210			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	2.03	0.2	-0.390	01:12	84.60	84.49	65	86.7	2.104			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	1.96	0.5	-0.380	01:12	84.69	84.60	70	87.05	2.356			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	1.91	0.7	-0.410	01:11	84.95	84.69	76	87.05	2.097			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.03	0.6	-0.087	01:11	85.41	#N/A	113	87.35	1.943			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.03	0.6	-0.087	01:11	85.41	84.95	92	87.45	2.043			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	1.80	0.8	-0.140	01:11	85.49	84.95	91	87.45	1.959			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.29	0.8	-0.110	01:13	85.80	85.49	94	87.7	1.905			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.22	0.9	-0.145	01:15	86.05	85.80	97	87	0.955			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	2.178	7.84	1.44	0.2	-0.300	01:10	85.58	85.49	114	87.7	2.121			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2B: Interim Condition Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.77	1.0	-0.330	12:04	83.00	82.89	139	85.7	2.697			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.09	0.6	-0.160	12:08	84.13	83.00	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	12:06	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.050	12:06	84.44	84.14	26	86.1	1.664			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.59	0.9	-0.340	12:04	83.21	83.00	18	85.95	2.736			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.29	1.1	-0.055	12:01	84.14	83.21	113	86.05	1.914			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.23	0.8	-0.160	12:04	84.15	83.21	9	86.1	1.946			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.15	0.8	-0.190	12:03	84.20	84.15	47	86.25	2.054			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.15	0.6	-0.230	12:03	84.25	84.20	49	86.5	2.246			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.15	0.8	-0.240	12:02	84.38	84.25	3	86.5	2.116			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.11	0.8	-0.330	12:02	84.49	84.38	56	86.7	2.210			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	2.03	0.2	-0.390	12:01	84.60	84.49	65	86.7	2.104			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	1.97	0.5	-0.380	12:01	84.69	84.60	70	87.05	2.356			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	1.90	0.7	-0.410	12:01	84.95	84.69	76	87.05	2.097			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.03	0.6	-0.087	12:01	85.41	#N/A	113	87.35	1.943			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.03	0.6	-0.087	12:01	85.41	84.95	92	87.45	2.043			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	1.79	0.8	-0.140	12:00	85.49	84.95	91	87.45	1.959			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.29	0.8	-0.120	12:00	85.79	85.49	94	87.7	1.915			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.21	0.8	-0.155	12:03	86.04	85.79	97	87	0.965			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	2.178	7.84	1.43	0.2	-0.310	12:00	85.57	85.49	114	87.7	2.131			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2C: Interim Condition Pipe Data and Hydraulic Simulation Results for the Historical July 1, 1979 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.74	1.0	-0.330	01:42	83.00	82.89	139	85.7	2.697			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.09	0.6	-0.150	01:42	84.14	83.00	23	85.85	1.711			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.220	01:40	84.15	84.14	28	86.1	1.954			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.050	01:40	84.44	84.15	26	86.1	1.664			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.56	0.9	-0.350	01:42	83.20	83.00	18	85.95	2.746			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.31	1.2	-0.015	01:40	84.18	83.20	113	86.05	1.874			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.16	0.8	-0.190	01:42	84.12	83.20	9	86.1	1.976			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.08	0.8	-0.220	01:42	84.17	84.12	47	86.25	2.084			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.08	0.6	-0.260	01:42	84.22	84.17	49	86.5	2.276			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.08	0.8	-0.270	01:42	84.35	84.22	3	86.5	2.146			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.03	0.8	-0.360	01:41	84.46	84.35	56	86.7	2.240			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	1.93	0.2	-0.420	01:41	84.57	84.46	65	86.7	2.134			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	1.86	0.5	-0.410	01:41	84.66	84.57	70	87.05	2.386			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	1.77	0.7	-0.450	01:32	84.91	84.66	76	87.05	2.137			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.03	0.6	-0.087	01:40	85.41	#N/A	113	87.35	1.943			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.03	0.6	-0.087	01:40	85.41	84.91	92	87.45	2.043			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	1.66	0.7	-0.210	01:31	85.42	84.91	91	87.45	2.029			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.27	0.8	-0.140	01:30	85.77	85.42	94	87.7	1.935			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.21	0.8	-0.165	01:35	86.03	85.77	97	87	0.975			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	2.178	7.84	1.34	0.2	-0.360	01:40	85.52	85.42	114	87.7	2.181			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2D: Interim Condition Pipe Data and Hydraulic Simulation Results for the Historical August 4, 1988 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.78	1.0	-0.320	02:05	83.01	82.90	139	85.7	2.687			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.09	0.6	-0.160	02:07	84.13	83.01	23	85.85	1.721			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.230	02:05	84.14	84.13	28	86.1	1.964			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.0	-0.060	02:05	84.43	84.14	26	86.1	1.674			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.61	0.9	-0.330	02:04	83.22	83.01	18	85.95	2.726			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.32	1.2	0.005	02:00	84.20	83.22	113	86.05	1.854			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.23	0.8	-0.160	02:04	84.15	83.22	9	86.1	1.946			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.15	0.8	-0.180	02:04	84.21	84.15	47	86.25	2.044			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.16	0.6	-0.230	02:04	84.25	84.21	49	86.5	2.246			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.17	0.8	-0.240	02:03	84.38	84.25	3	86.5	2.116			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.14	0.8	-0.320	02:02	84.50	84.38	56	86.7	2.200			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	2.06	0.2	-0.390	02:02	84.60	84.50	65	86.7	2.104			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.00	0.5	-0.370	02:01	84.70	84.60	70	87.05	2.346			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	1.94	0.7	-0.400	02:01	84.96	84.70	76	87.05	2.087			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.03	0.6	-0.087	02:02	85.41	#N/A	113	87.35	1.943			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.03	0.6	-0.087	02:02	85.41	84.96	92	87.45	2.043			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	1.83	0.8	-0.120	02:00	85.51	84.96	91	87.45	1.939			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.29	0.8	-0.120	02:01	85.79	85.51	94	87.7	1.915			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.21	0.8	-0.165	02:01	86.03	85.79	97	87	0.975			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	2.178	7.84	1.49	0.2	-0.290	02:00	85.59	85.51	114	87.7	2.111			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2E: Interim Condition Pipe Data and Hydraulic Simulation Results for the Historical August 8, 1996 Storm

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	2.14	0.7	-0.530	01:32	82.80	82.70	139	85.7	2.897			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.07	0.5	-0.210	01:32	84.08	82.80	23	85.85	1.771			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.02	0.1	-0.280	01:35	84.09	84.08	28	86.1	2.014			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.02	0.5	-0.120	01:38	84.37	84.11	26	86.1	1.734			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.00	0.7	-0.530	01:32	83.02	82.80	18	85.95	2.926			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.12	0.5	-0.275	01:31	83.92	83.02	113	86.05	2.134			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	1.83	0.7	-0.320	01:33	83.99	83.02	9	86.1	2.106			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	1.75	0.7	-0.360	01:32	84.03	83.99	47	86.25	2.224			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	1.76	0.5	-0.410	01:32	84.07	84.03	49	86.5	2.426			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	1.76	0.7	-0.420	01:32	84.20	84.07	3	86.5	2.296			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	1.71	0.6	-0.500	01:31	84.32	84.20	56	86.7	2.380			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	1.65	0.1	-0.540	01:31	84.45	84.32	65	86.7	2.254			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	1.58	0.4	-0.530	01:31	84.54	84.45	70	87.05	2.506			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	1.54	0.6	-0.540	01:30	84.82	84.54	76	87.05	2.227			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.02	0.4	-0.127	01:30	85.37	#N/A	113	87.35	1.983			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.02	0.4	-0.127	01:30	85.37	84.82	92	87.45	2.083			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	1.44	0.6	-0.310	01:30	85.32	84.82	91	87.45	2.129			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.25	0.7	-0.170	01:28	85.74	85.32	94	87.7	1.965			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.19	0.8	-0.175	01:31	86.02	85.74	97	87	0.985			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	2.178	7.84	1.13	0.1	-0.470	01:30	85.41	85.32	114	87.7	2.291			

[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m

Table C-2F: Interim Condition Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm + 20%

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Time to Peak (hh:mm)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [2] (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
104_(STM)	102_(STM)	81.683	81.641	1650	41.9	0.1	0.013	87.617	67.400	1.348	2.88	3.10	1.1	-0.220	01:17	83.11	82.99	139	85.7	2.587			
106_(STM)	104_(STM)	83.839	81.983	450	97.6	0.3	0.013	87.663	67.400	0.896	0.14	0.09	0.7	-0.140	01:23	84.15	83.11	23	85.85	1.701			
108_(STM)	106_(STM)	83.916	83.850	450	26.2	0.3	0.013	87.503	87.663	0.900	0.14	0.04	0.3	-0.210	01:20	84.16	84.15	28	86.1	1.944			
110_(STM)	108_(STM)	84.236	84.114	250	29.1	0.4	0.013	87.749	87.503	0.784	0.04	0.04	1.1	-0.030	01:19	84.46	84.16	26	86.1	1.644			
112_(STM)	104_(STM)	82.204	81.983	1350	73.8	0.3	0.013	87.915	87.617	2.039	2.92	2.90	1.0	-0.230	01:16	83.32	83.11	18	85.95	2.626			
114_(STM)	112_(STM)	83.666	82.735	525	64.6	0.4	0.013	88.000	87.915	1.175	0.25	0.33	1.3	0.055	01:20	84.25	83.32	113	86.05	1.804			
120_(STM)	112_(STM)	82.964	82.735	1350	91.6	0.3	0.013	88.076	87.915	1.864	2.67	2.48	0.9	-0.060	01:16	84.25	83.32	9	86.1	1.846			
122_(STM)	120_(STM)	83.036	82.974	1350	24.6	0.3	0.013	88.231	88.076	1.872	2.68	2.39	0.9	-0.070	01:15	84.32	84.25	47	86.25	1.934			
124_(STM)	122_(STM)	83.134	83.050	1350	16.9	0.5	0.013	88.195	88.231	2.631	3.77	2.40	0.6	-0.100	01:15	84.38	84.32	49	86.5	2.116			
126_(STM)	124_(STM)	83.274	83.140	1350	53.4	0.3	0.013	88.465	88.195	1.868	2.67	2.40	0.9	-0.100	01:15	84.52	84.38	3	86.5	1.976			
128_(STM)	126_(STM)	83.470	83.280	1350	76.0	0.3	0.013	88.631	88.465	1.864	2.67	2.35	0.9	-0.180	01:14	84.64	84.52	56	86.7	2.060			
136_(STM)	128_(STM)	83.636	83.480	1350	62.5	0.3	0.013	88.646	88.631	2.393	11.63	2.27	0.2	-0.250	01:12	84.74	84.64	65	86.7	1.964			
138_(STM)	136_(STM)	83.724	83.650	1350	14.8	0.5	0.013	88.773	88.646	2.639	3.78	2.22	0.6	-0.250	01:12	84.82	84.74	70	87.05	2.226			
140_(STM)	138_(STM)	84.013	83.730	1350	113.1	0.3	0.013	89.251	88.773	1.864	2.67	2.15	0.8	-0.300	01:11	85.06	84.82	76	87.05	1.987			
142_(STM)	132_(STM)	85.244	#N/A	250	20.7	0.6	0.013	89.160	#N/A	0.975	0.05	0.04	0.8	-0.057	01:16	85.44	#N/A	113	87.35	1.913			
142_(STM)	140_(STM)	85.244	84.160	250	20.7	0.6	0.013	89.160	89.251	0.975	0.05	0.04	0.8	-0.057	01:16	85.44	85.06	92	87.45	2.013			
144_(STM)	140_(STM)	84.431	84.160	1200	77.3	0.4	0.013	89.454	89.251	2.039	2.31	2.05	0.9	-0.010	01:10	85.62	85.06	91	87.45	1.829			
146_(STM)	144_(STM)	85.305	85.030	600	78.7	0.4	0.013	89.123	89.454	1.285	0.36	0.32	0.9	-0.030	01:14	85.88	85.62	94	87.7	1.825			
148_(STM)	146_(STM)	85.665	85.390	525	78.5	0.4	0.013	88.492	89.123	1.175	0.25	0.24	0.9	-0.115	01:16	86.08	85.88	97	87	0.925			
150_(STM)	144_(STM)	84.679	85.030	1200	76.3	0.2	0.013	89.798	89.454	1.717	1.94	1.68	0.9	-0.150	01:10	85.73	85.62	114	87.7	1.971			

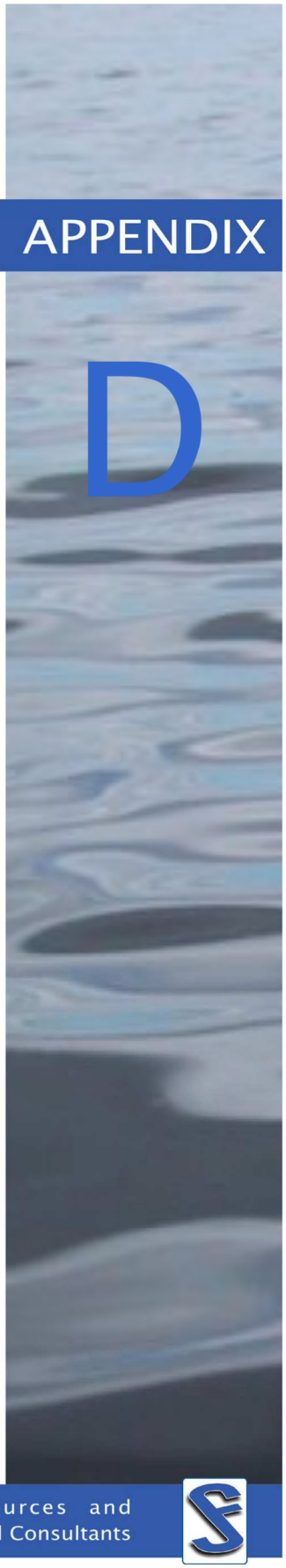
[2] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

[3] Future USF elevations estimated as 1.8 m below the upstream top of manhole elevations.

Interpolated HGL elevation

Freebaord Less than 0.3m

Freebaord Less than 0.0m



APPENDIX

D

Tables and Calculation Sheets

JFSA Water Resources and Environmental Consultants

Table D-1: Approach Flows and Captured Flows for the 100-Year Chicago Storm

Catch Basin ID	Approach Flow (m^3/s)	Captured Flow (m^3/s)
02_(CB)	0.038	0.021
03_(CB)	0.066	0.031
04_(CB)	0.055	0.027
05_(CB)	0.062	0.032
06_(CB)	0.037	0.037
08_(CB)	0.068	0.033
09_(CB)	0.033	0.022
10_(CB)	0.084	0.043
11_(CB)	0.070	0.018
12_(CB)	0.101	0.051
13_(CB)	0.078	0.036
14_(CB)	0.041	0.022
15_(CB)	0.064	0.033
16_(CB)	0.034	0.021
17_(CB)	0.064	0.033
18_(CB)	0.077	0.022
19_(CB)	0.091	0.051
20_(CB)	0.081	0.051
21_(CB)	0.077	0.035
23_(CB)	0.074	0.050
24_(CB)	0.037	0.027
25_(CB)	0.055	0.041
26_(CB)	0.056	0.041
27_(CB)	0.198	0.096
28_(CB)	0.198	0.096
30_(CB)	0.076	0.052
31_(CB)	0.059	0.028
32_(CB)	0.074	0.029
33_(CB)	0.056	0.018
34_(CB)	0.106	0.050
35_(CB)	0.087	0.050
36_(CB)	0.041	0.022
37_(CB)	0.097	0.051
40_(CB)	0.066	0.032
41_(CB)	0.092	0.051
42_(CB)	0.057	0.028
43_(CB)	0.073	0.033
44_(CB)	0.068	0.033
45_(CB)	0.024	0.021
46_(CB)	0.070	0.033
47_(CB)	0.036	0.021
48_(CB)	0.059	0.033
49_(CB)	0.060	0.027
50_(CB)	0.076	0.036
51_(CB)	0.085	0.049
52_(CB)	0.037	0.027
53_(CB)	0.083	0.051
54_(CB)	0.074	0.036
55_(CB)	0.083	0.050
57_(CB)	0.074	0.036

Table D-2: Major System Flow Depths for the 100-Year Chicago Storm

Catch Basin ID	Depth (m)
02_(CB)	0.12
03_(CB)	0.12
04_(CB)	0.12
05_(CB)	0.12
06_(CB)	0.00
08_(CB)	0.14
09_(CB)	0.14
10_(CB)	0.24
11_(CB)	0.24
12_(CB)	0.18
13_(CB)	0.18
14_(CB)	0.16
15_(CB)	0.16
16_(CB)	0.13
17_(CB)	0.13
18_(CB)	0.27
19_(CB)	0.27
20_(CB)	0.15
21_(CB)	0.15
23_(CB)	0.11
24_(CB)	0.11
25_(CB)	0.04
26_(CB)	0.04
27_(CB)	0.22
28_(CB)	0.22
30_(CB)	0.12
31_(CB)	0.12
32_(CB)	0.20
33_(CB)	0.20
34_(CB)	0.14
35_(CB)	0.14
36_(CB)	0.13
37_(CB)	0.13
40_(CB)	0.18
41_(CB)	0.18
42_(CB)	0.15
43_(CB)	0.15
44_(CB)	0.12
45_(CB)	0.12
46_(CB)	0.17
47_(CB)	0.17
48_(CB)	0.16
49_(CB)	0.16
50_(CB)	0.14
51_(CB)	0.14
52_(CB)	0.05
53_(CB)	0.16
54_(CB)	0.16
55_(CB)	0.12
57_(CB)	0.16

Note: Depth calculated as per PCSWMM model

Table D-3A: PCSWMM Subcatchment Parameters

Name	Area (ha)	Width (m)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Subarea Routing	Percent Routed (%)	Max. Infil. Rate (mm/hr)	Min. Infil. Rate (mm/hr)	Decay Constant (1/hr)	Drying Time (days)
A10	0.202	19	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A11	0.287	27	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A12i	0.194	26	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A12ii	0.090	12	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A13	0.226	30	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A14	0.319	43	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A15i	0.522	51	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A15ii	0.522	51	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A16i	0.126	53	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A16ii	0.126	50	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A17	0.091	13	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A17ii	0.093	12	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A18i	0.189	25	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A19	0.190	15	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A1i	0.157	11	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A1ii	0.202	14	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A20i	0.195	20	0.9	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A20ii	0.206	21	0.9	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A21	0.325	29	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A22	0.028	6	0.5	42.9	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A23	0.169	23	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A24i	0.110	12	0.9	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A24ii	0.237	18	0.9	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A25	0.294	29	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A26i	0.060	8	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A26ii	0.172	24	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A27i	0.088	18	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A27ii	0.181	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A28i	0.143	23	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A28ii	0.142	22	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A29	0.116	15	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A2i	0.120	10	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A2ii	0.118	10	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A3	0.154	14	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A30	0.014	8	0.5	42.9	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A31	0.187	15	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A32i	0.155	21	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A32ii	0.082	11	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A33i	0.110	7	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A33ii	0.157	21	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A34i	0.212	17	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A34ii	0.276	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A35i	0.228	20	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A35ii	0.203	17	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A36	0.294	30	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A37	0.029	6	0.5	42.9	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A38	0.239	25	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A39i	0.214	19	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A39ii	0.074	10	1.0	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A4	0.092	15	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A40	0.219	27	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A41	0.075	14	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A42i	0.171	24	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A42ii	0.083	11	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A43	0.236	29	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A44	0.199	28	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A45i	0.168	22	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A45ii	0.075	10	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A46i	0.157	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A46ii	0.136	16	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A47	0.136	15	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A48	0.205	36	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A49	0.074	13	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A50	0.066	20	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14

Table D-3A: PCSWMM Subcatchment Parameters

Name	Area (ha)	Width (m)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Subarea Routing	Percent Routed (%)	Max. Infil. Rate (mm/hr)	Min. Infil. Rate (mm/hr)	Decay Constant (1/hr)	Drying Time (days)
A51	0.186	26	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A52	0.021	9	1.2	42.9	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A53	0.182	15	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A54	0.165	21	0.5	50.0	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A5i	0.102	16	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A5ii	0.260	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A6	0.131	12	0.5	42.9	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
A7i	0.228	19	0.7	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A7ii	0.282	22	0.7	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A8i	0.220	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A8ii	0.190	22	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A9i	0.188	22	0.7	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
A9ii	0.067	9	0.7	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B1	0.883	44	0.5	85.7	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B1ii	0.123	6	0.5	85.7	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B2	3.432	279	1.0	100.0	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B3i	0.965	111	0.5	85.7	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B3ii	0.046	7	0.5	85.7	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B4i	0.947	64	0.5	28.6	0.013	0.25	1.57	4.67	PERVIOUS	100	HORTON	76.2	13.2	4.14
B4ii	0.047	6	0.5	28.6	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
B4iii	0.008	6	0.5	28.6	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
C1	0.114	21	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14
C2	0.087	15	0.5	71.4	0.013	0.25	1.57	4.67	OUTLET	100	HORTON	76.2	13.2	4.14

Table D-4A: Capacity of Grates

Water Depth H (m)	$Q_{captured}$ (L/s) OPSD 400.01 SINGLE * (L/s)	TWIN * (L/s)
0.00	0	0
0.01	1	1
0.02	2	3
0.03	4	5
0.04	7	9
0.05	11	16
0.06	16	27
0.07	20	36
0.08	36	54
0.09	48	71
0.10	61	91
0.11	73	109
0.12	86	127
0.13	99	140
0.14	109	155
0.15	120	169
0.16	129	183
0.17	136	196
0.18	145	211
0.19	150	228
0.20	156	243
0.21	161	259
0.22	167	275
0.23	172	291
0.24	176	307
0.25	181	322
0.26	186	337
0.27	189	354
0.28	194	371
0.29	199	387
0.30	202	403

* From MTO Drainage Management Manual (1997), Design Chart 4.19

Table D-4B: Capacity of Side Inlet [(1)]

Water Depth (m)	SINGLE Capacity (L/s)	TWIN Capacity (L/s)
0.00	0	0
0.01	1	2
0.02	3	6
0.03	6	12
0.04	9	18
0.05	13	26
0.06	17	34
0.07	22	44
0.08	26	52
0.09	32	64
0.10	37	74
0.11	43	86
0.12	49	98
0.13	62	124
0.14	67	134
0.15	71	142
0.16	75	150
0.17	79	158
0.18	83	166
0.19	86	172
0.20	89	178
0.21	93	186
0.22	96	192
0.23	99	198
0.24	102	204
0.25	105	210
0.26	107	214
0.27	110	220
0.28	113	226
0.29	115	230
0.30	118	236

[(1)] As per $Q_{weir} = CLH^{3/2}$ where C = 1.8, and $Q_{orifice} = CA\times(2gh)^{0.5}$ where C = 0.65 for a 13 cm high x 65 cm wide side inlet.

Table D-5: Capacity of Lead Pipes

	Release Rate (L/s) by Pipe Diameter (mm)						
Head (m)	100	150	200	250	300	375	450
0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.050	6.4	14.4	25.5	39.9	57.4	89.7	129.2
0.100	9.0	20.3	36.1	56.4	81.2	126.9	182.7
0.150	11.0	24.9	44.2	69.1	99.4	155.4	223.7
0.200	12.8	28.7	51.0	79.7	114.8	179.4	258.3
0.250	14.3	32.1	57.1	89.1	128.4	200.6	288.8
0.300	15.6	35.2	62.5	97.7	140.6	219.7	316.4
0.350	16.9	38.0	67.5	105.5	151.9	237.3	341.8
0.400	18.0	40.6	72.2	112.8	162.4	253.7	365.3
0.450	19.1	43.1	76.5	119.6	172.2	269.1	387.5
0.500	20.2	45.4	80.7	126.1	181.5	283.7	408.5
0.550	21.2	47.6	84.6	132.2	190.4	297.5	428.4
0.600	22.1	49.7	88.4	138.1	198.9	310.7	447.5
0.650	23.0	51.7	92.0	143.7	207.0	323.4	465.7
0.700	23.9	53.7	95.5	149.2	214.8	335.6	483.3
0.750	24.7	55.6	98.8	154.4	222.3	347.4	500.3
0.800	25.5	57.4	102.1	159.5	229.6	358.8	516.7
0.850	26.3	59.2	105.2	164.4	236.7	369.8	532.6
0.900	27.1	60.9	108.3	169.1	243.6	380.6	548.0
0.950	27.8	62.6	111.2	173.8	250.2	391.0	563.0
1.000	28.5	64.2	114.1	178.3	256.7	401.2	577.7
1.050	29.2	65.8	116.9	182.7	263.1	411.1	591.9
1.100	29.9	67.3	119.7	187.0	269.3	420.7	605.9
1.150	30.6	68.8	122.4	191.2	275.3	430.2	619.5
1.200	31.2	70.3	125.0	195.3	281.2	439.4	632.8
1.250	31.9	71.8	127.6	199.3	287.0	448.5	645.9
1.300	32.5	73.2	130.1	203.3	292.7	457.4	658.6
1.350	33.1	74.6	132.6	207.2	298.3	466.1	671.2
1.400	33.8	75.9	135.0	211.0	303.8	474.7	683.5
1.450	34.4	77.3	137.4	214.7	309.2	483.1	695.6
1.500	34.9	78.6	139.8	218.4	314.4	491.3	707.5
1.550	35.5	79.9	142.1	222.0	319.6	499.4	719.2
1.600	36.1	81.2	144.3	225.5	324.8	507.4	730.7

Short tube orifice coefficient = 0.82

Short tube release rate = $C\pi(Dia/1000)^2/4\times(2\times9.81\times H)^{0.5}\times1000$

Table D-6: ICD Type and Inlet Capture Results for the 2-Year Chicago Storm [1]

Catch Basin ID	Peak Flow (m^3/s)	Actual Capture (m^3/s)	Max Depth (cm)	Flow Spread (m)	% of Total Travel Lane [1]	ICD Type	Comment
02_(CB)	0.014	0.014	0.0	0.00	0%	83 mm	Low Point CICB
03_(CB)	0.024	0.024	0.0	0.00	0%	102 mm	Low Point CICB
04_(CB)	0.020	0.020	0.0	0.00	0%	94 mm	Low Point CICB
05_(CB)	0.023	0.023	0.0	0.00	0%	102 mm	Low Point CICB
06_(CB)	0.010	0.010	0.0	0.00	0%	152 mm	Low Point CICB
08_(CB)	0.025	0.025	0.0	0.00	0%	102 mm	Low Point CB
09_(CB)	0.012	0.012	0.0	0.00	0%	83 mm	Low Point CB
10_(CB)	0.031	0.031	0.0	0.00	0%	127 mm	Low Point CB
11_(CB)	0.011	0.011	0.0	0.00	0%	83 mm	Low Point CB
12_(CB)	0.037	0.037	0.0	0.00	0%	127 mm	Low Point CB
13_(CB)	0.029	0.029	0.0	0.00	0%	108 mm	Low Point CB
14_(CB)	0.015	0.015	0.0	0.00	0%	83 mm	Low Point CB
15_(CB)	0.024	0.024	0.0	0.00	0%	102 mm	Low Point CB
16_(CB)	0.012	0.012	0.0	0.00	0%	83 mm	Low Point CB
17_(CB)	0.023	0.023	0.0	0.00	0%	102 mm	Low Point CB
18_(CB)	0.016	0.012	0.0	0.00	0%	94 mm	Low Point CB
19_(CB)	0.034	0.034	0.0	0.00	0%	127 mm	Low Point CB
20_(CB)	0.030	0.030	0.0	0.00	0%	127 mm	Low Point CB
21_(CB)	0.029	0.029	0.0	0.00	0%	108 mm	Low Point CB
23_(CB)	0.028	0.028	0.0	0.00	0%	127 mm	Low Point CB
24_(CB)	0.014	0.014	0.0	0.00	0%	94 mm	Low Point CB
25_(CB)	0.019	0.019	0.0	0.00	0%	108 mm	Low Point CB
26_(CB)	0.019	0.019	0.0	0.00	0%	108 mm	Low Point CICB
27_(CB)	0.073	0.073	0.0	0.00	0%	178 mm	Double Low Point CICB
28_(CB)	0.073	0.073	0.0	0.00	0%	178 mm	Double Low Point CICB
30_(CB)	0.028	0.028	0.0	0.00	0%	127 mm	Low Point CB
31_(CB)	0.013	0.011	0.0	0.00	0%	102 mm	Low Point CICB
32_(CB)	0.028	0.019	0.0	0.00	0%	108 mm	Low Point CB
33_(CB)	0.010	0.008	0.0	0.00	0%	83 mm	Low Point CB
34_(CB)	0.039	0.039	0.0	0.00	0%	127 mm	Low Point CB
35_(CB)	0.032	0.032	0.0	0.00	0%	127 mm	Low Point CB
36_(CB)	0.015	0.015	0.0	0.00	0%	83 mm	Low Point CB
37_(CB)	0.036	0.036	0.0	0.00	0%	127 mm	Low Point CB
40_(CB)	0.024	0.024	0.0	0.00	0%	102 mm	Low Point CB
41_(CB)	0.033	0.033	0.0	0.00	0%	127 mm	Low Point CB
42_(CB)	0.021	0.021	0.0	0.00	0%	94 mm	Low Point CB
43_(CB)	0.026	0.026	0.0	0.00	0%	102 mm	Low Point CB
44_(CB)	0.025	0.025	0.0	0.00	0%	102 mm	Low Point CB
45_(CB)	0.009	0.009	0.0	0.00	0%	83 mm	Low Point CB
46_(CB)	0.026	0.026	0.0	0.00	0%	102 mm	Low Point CB
47_(CB)	0.013	0.013	0.0	0.00	0%	83 mm	Low Point CB
48_(CB)	0.021	0.021	0.0	0.00	0%	102 mm	Low Point CB
49_(CB)	0.022	0.022	0.0	0.00	0%	94 mm	Low Point CB
50_(CB)	0.028	0.028	0.0	0.00	0%	108 mm	Low Point CB
51_(CB)	0.031	0.031	0.0	0.00	0%	127 mm	Low Point CB
52_(CB)	0.014	0.014	0.0	0.00	0%	83 mm	Low Point CB
53_(CB)	0.031	0.031	0.0	0.00	0%	127 mm	Low Point CB
54_(CB)	0.027	0.027	0.0	0.00	0%	108 mm	Low Point CB
55_(CB)	0.031	0.031	0.0	0.00	0%	127 mm	Low Point CB
57_(CB)	0.027	0.027	0.0	0.00	0%	108 mm	Double Low Point CB

[1] Total travel lane width assumed to be 8.5 m (minimum road width in subdivision)

Table D-7: Ponding at Major Low Points for the 100-Year Chicago Storm & 100-Year Chicago Storm +20% [1]

Catch Basin ID	Total Depth [1]		Water Surface Elevation [1]	
	100 Year 3 Hr Chi (m)	100 Year 3 Hr Chi+20% (m)	100 Year 3 Hr Chi (m)	100 Year 3 Hr Chi+20% (m)
02_(CB)	0.12	0.16	87.55	87.59
03_(CB)	0.12	0.16	87.55	87.59
04_(CB)	0.12	0.15	87.59	87.62
05_(CB)	0.12	0.15	87.59	87.62
06_(CB)	0.00	0.00	87.49	87.49
08_(CB)	0.14	0.21	87.55	87.62
09_(CB)	0.14	0.21	87.55	87.62
10_(CB)	0.24	0.30	87.78	87.84
11_(CB)	0.24	0.30	87.78	87.84
12_(CB)	0.18	0.22	87.80	87.84
13_(CB)	0.18	0.22	87.80	87.84
14_(CB)	0.16	0.21	88.15	88.20
15_(CB)	0.16	0.21	88.15	88.20
16_(CB)	0.13	0.17	88.28	88.32
17_(CB)	0.13	0.17	88.28	88.32
18_(CB)	0.27	0.37	88.52	88.62
19_(CB)	0.27	0.37	88.52	88.62
20_(CB)	0.15	0.19	88.75	88.80
21_(CB)	0.15	0.19	88.75	88.80
23_(CB)	0.11	0.16	89.01	89.06
24_(CB)	0.11	0.16	89.01	89.06
25_(CB)	0.04	0.05	89.43	89.44
26_(CB)	0.04	0.05	89.43	89.44
27_(CB)	0.22	0.28	88.82	88.88
28_(CB)	0.22	0.28	88.82	88.88
30_(CB)	0.12	0.23	89.19	89.29
31_(CB)	0.12	0.23	89.19	89.29
32_(CB)	0.20	0.23	89.68	89.71
33_(CB)	0.20	0.23	89.68	89.71
34_(CB)	0.14	0.18	89.56	89.60
35_(CB)	0.14	0.18	89.56	89.60
36_(CB)	0.13	0.14	89.90	89.92
37_(CB)	0.13	0.14	89.90	89.92
40_(CB)	0.18	0.21	90.27	90.30
41_(CB)	0.18	0.21	90.27	90.30
42_(CB)	0.15	0.19	90.42	90.46
43_(CB)	0.15	0.19	90.42	90.46
44_(CB)	0.12	0.16	89.04	89.08
45_(CB)	0.12	0.16	89.04	89.08
46_(CB)	0.17	0.19	89.05	89.07
47_(CB)	0.17	0.19	89.05	89.07
48_(CB)	0.16	0.21	88.56	88.61
49_(CB)	0.16	0.21	88.56	88.61
50_(CB)	0.14	0.19	88.02	88.07
51_(CB)	0.14	0.19	88.02	88.07
52_(CB)	0.05	0.07	89.87	89.89
53_(CB)	0.16	0.23	89.82	89.89
54_(CB)	0.16	0.23	89.82	89.89
55_(CB)	0.12	0.17	87.37	87.42
57_(CB)	0.16	0.20	87.32	87.36

[1] As per PCSWMM models for the 100-year, 3-hour Chicago storm and the 100-year, 3-hour Chicago storm + 20%.

Table D-8: Major System Flow Depths 100-Year 3-Hour Chicago Peak Flow

Link Name	Transect	Max Velocity (m/s)	Max/Full Depth (m)	Depth x Velocity x 0.6m (m^2/s)
C1	18mROW-No-Sidewalk	0.000	0.13	0.00
C1_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C1_2	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C10	18mROWwSidewalk	0.000	0.11	0.00
C11	18mROWwSidewalk	0.000	0.12	0.00
C12	18mROW-No-Sidewalk	0.360	0.09	0.02
C13	18mROW-No-Sidewalk	0.090	0.17	0.01
C14	18mROW-No-Sidewalk	0.000	0.13	0.00
C15	18mROWwSidewalk	0.250	0.12	0.02
C16	18mROW-No-Sidewalk	0.000	0.17	0.00
C17	18mROW-No-Sidewalk	0.080	0.18	0.01
C18_2	18mROW-No-Sidewalk	0.000	0.00	0.00
C18_3	18mROWwSidewalk	0.270	0.11	0.02
C18_4	18mROWwSidewalk	0.000	0.10	0.00
C18_5	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C18_6	24mROW-Dbl-Sidewalk	0.000	0.03	0.00
C18_7	18mROW-No-Sidewalk	0.000	0.00	0.00
C18_8	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C18_9	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C19	18mROW-No-Sidewalk	0.000	0.00	0.00
C2	18mROW-No-Sidewalk	0.000	0.13	0.00
C2_1	18mROW-Dbl-Sidewalk	0.000	0.01	0.00
C2_2	18mROW-Dbl-Sidewalk	0.080	0.13	0.01
C20	24mROW-Dbl-Sidewalk	0.830	0.06	0.03
C21	24mROW-Dbl-Sidewalk	0.130	0.21	0.02
C22	24mROW-Dbl-Sidewalk	0.000	0.19	0.00
C23	18mROW-No-Sidewalk	0.000	0.09	0.00
C24	18mROW-No-Sidewalk	0.000	0.09	0.00
C25	18mROW-No-Sidewalk	0.000	0.12	0.00
C26	18mROW-No-Sidewalk	0.000	0.12	0.00
C27_1	18mROW-No-Sidewalk	0.000	0.04	0.00
C27_2	18mROW-No-Sidewalk	0.190	0.25	0.03
C28	18mROW-No-Sidewalk	0.000	0.23	0.00
C29	18mROW-No-Sidewalk	0.000	0.10	0.00
C3	18mROW-Dbl-Sidewalk	0.000	0.13	0.00
C30	18mROW-No-Sidewalk	0.000	0.10	0.00
C32	18mROW-No-Sidewalk	0.000	0.14	0.00
C33	18mROW-No-Sidewalk	0.150	0.16	0.01
C34	18mROW-No-Sidewalk	0.180	0.15	0.02
C35	18mROW-No-Sidewalk	0.000	0.13	0.00
C36	18mROW-No-Sidewalk	0.000	0.11	0.00
C37	18mROW-No-Sidewalk	0.000	0.11	0.00
C38	18mROW-No-Sidewalk	0.000	0.12	0.00
C39	18mROW-No-Sidewalk	0.000	0.12	0.00
C4_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C4_2	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C40	18mROW-No-Sidewalk	0.000	0.20	0.00
C41	18mROW-No-Sidewalk	0.000	0.20	0.00
C42	18mROW-No-Sidewalk	0.000	0.15	0.00
C43	18mROW-No-Sidewalk	0.000	0.15	0.00
C44	18mROW-No-Sidewalk	0.000	0.00	0.00
C45	18mROW-No-Sidewalk	0.000	0.00	0.00
C46	18mROW-No-Sidewalk	0.000	0.13	0.00
C47	18mROW-No-Sidewalk	0.000	0.13	0.00
C48	18mROW-No-Sidewalk	0.000	0.12	0.00

Table D-8: Major System Flow Depths 100-Year 3-Hour Chicago Peak Flow

Link Name	Transect	Max Velocity (m/s)	Max/Full Depth (m)	Depth x Velocity x 0.6m (m^2/s)
C49	18mROW-No-Sidewalk	0.090	0.12	0.01
C5_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C5_2	18mROW-Dbl-Sidewalk	0.000	0.04	0.00
C50_1	18mROWwSidewalk	0.000	0.00	0.00
C50_2	18mROWwSidewalk	0.000	0.01	0.00
C51	18mROWwSidewalk	0.050	0.11	0.00
C52	18mROWwSidewalk	0.000	0.10	0.00
C53	18mROWwSidewalk	0.000	0.10	0.00
C54	18mROWwSidewalk	0.000	0.10	0.00
C55	18mROW-No-Sidewalk	0.180	0.10	0.01
C57	18mROW-No-Sidewalk	0.000	0.10	0.00
C6_1	18mROW-Dbl-Sidewalk	0.000	0.15	0.00
C6_2	18mROW-Dbl-Sidewalk	0.200	0.18	0.02
C7	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C8	18mROW-Dbl-Sidewalk	0.000	0.05	0.00
C9	18mROWwSidewalk	0.200	0.15	0.02
	Max	**0.83**	**0.25**	**0.03**

Note: Depth and velocity calculated by PCSWMM model.

Table D-9: Major System Flow Depths 100-Year 3 Hour Chicago + 20% Peak Flow

Link Name	Transect	Max Velocity (m/s)	Max/Full Depth (m)	Depth x Velocity x 0.6m (m^2/s)
C1	18mROW-No-Sidewalk	0.000	0.17	0.00
C1_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C1_2	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C10	18mROWwSidewalk	0.000	0.12	0.00
C11	18mROWwSidewalk	0.000	0.15	0.00
C12	18mROW-No-Sidewalk	0.410	0.12	0.03
C13	18mROW-No-Sidewalk	0.110	0.25	0.02
C14	18mROW-No-Sidewalk	0.000	0.19	0.00
C15	18mROWwSidewalk	0.200	0.19	0.02
C16	18mROW-No-Sidewalk	0.000	0.19	0.00
C17	18mROW-No-Sidewalk	0.110	0.22	0.01
C18_2	18mROW-No-Sidewalk	0.000	0.00	0.00
C18_3	18mROWwSidewalk	0.170	0.22	0.02
C18_4	18mROWwSidewalk	0.000	0.19	0.00
C18_5	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C18_6	24mROW-Dbl-Sidewalk	0.000	0.04	0.00
C18_7	18mROW-No-Sidewalk	0.000	0.01	0.00
C18_8	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C18_9	24mROW-Dbl-Sidewalk	0.000	0.00	0.00
C19	18mROW-No-Sidewalk	0.000	0.00	0.00
C2	18mROW-No-Sidewalk	0.000	0.17	0.00
C2_1	18mROW-Dbl-Sidewalk	0.000	0.04	0.00
C2_2	18mROW-Dbl-Sidewalk	0.120	0.20	0.01
C20	24mROW-Dbl-Sidewalk	0.960	0.08	0.05
C21	24mROW-Dbl-Sidewalk	0.120	0.27	0.02
C22	24mROW-Dbl-Sidewalk	0.210	0.27	0.03
C23	18mROW-No-Sidewalk	0.000	0.13	0.00
C24	18mROW-No-Sidewalk	0.000	0.13	0.00
C25	18mROW-No-Sidewalk	0.000	0.16	0.00
C26	18mROW-No-Sidewalk	0.000	0.16	0.00
C27_1	18mROW-No-Sidewalk	0.000	0.04	0.00
C27_2	18mROW-No-Sidewalk	0.160	0.34	0.03
C28	18mROW-No-Sidewalk	0.070	0.33	0.01
C29	18mROW-No-Sidewalk	0.000	0.13	0.00
C3	18mROW-Dbl-Sidewalk	0.000	0.16	0.00
C30	18mROW-No-Sidewalk	0.120	0.14	0.01
C32	18mROW-No-Sidewalk	0.130	0.17	0.01
C33	18mROW-No-Sidewalk	0.220	0.19	0.03
C34	18mROW-No-Sidewalk	0.150	0.21	0.02
C35	18mROW-No-Sidewalk	0.250	0.19	0.03
C36	18mROW-No-Sidewalk	0.420	0.16	0.04
C37	18mROW-No-Sidewalk	0.000	0.14	0.00
C38	18mROW-No-Sidewalk	0.000	0.16	0.00
C39	18mROW-No-Sidewalk	0.000	0.16	0.00
C4_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C4_2	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C40	18mROW-No-Sidewalk	0.000	0.25	0.00
C41	18mROW-No-Sidewalk	0.080	0.28	0.01
C42	18mROW-No-Sidewalk	0.220	0.20	0.03
C43	18mROW-No-Sidewalk	0.020	0.18	0.00
C44	18mROW-No-Sidewalk	0.320	0.01	0.00
C45	18mROW-No-Sidewalk	0.290	0.01	0.00
C46	18mROW-No-Sidewalk	0.000	0.17	0.00
C47	18mROW-No-Sidewalk	0.060	0.18	0.01
C48	18mROW-No-Sidewalk	0.260	0.20	0.03

Table D-9: Major System Flow Depths 100-Year 3 Hour Chicago + 20% Peak Flow

Link Name	Transect	Max Velocity (m/s)	Max/Full Depth (m)	Depth x Velocity x 0.6m (m^2/s)
C49	18mROW-No-Sidewalk	0.120	0.20	0.01
C5_1	18mROW-Dbl-Sidewalk	0.000	0.00	0.00
C5_2	18mROW-Dbl-Sidewalk	0.000	0.06	0.00
C50_1	18mROWwSidewalk	0.000	0.03	0.00
C50_2	18mROWwSidewalk	0.420	0.05	0.01
C51	18mROWwSidewalk	0.110	0.14	0.01
C52	18mROWwSidewalk	0.000	0.12	0.00
C53	18mROWwSidewalk	0.000	0.14	0.00
C54	18mROWwSidewalk	0.000	0.14	0.00
C55	18mROW-No-Sidewalk	0.290	0.16	0.03
C57	18mROW-No-Sidewalk	0.000	0.14	0.00
C6_1	18mROW-Dbl-Sidewalk	0.110	0.20	0.01
C6_2	18mROW-Dbl-Sidewalk	0.200	0.24	0.03
C7	18mROW-Dbl-Sidewalk	0.600	0.05	0.02
C8	18mROW-Dbl-Sidewalk	0.210	0.07	0.01
C9	18mROWwSidewalk	0.310	0.18	0.03
	Max	**0.96**	**0.34**	**0.05**

Note: Depth and velocity calculated by PCSWMM model.

Table D-10: Rear Yard Ponding Depths for the 100-Year Chicago Storm

Catch Basin ID	Depth (m)	Catch Basin ID	Depth (cm)
1_(RYCB)	0.00	TEE_11_(RYCB)	0.00
22_(RYCB)	0.00	TEE_12_(RYCB)	0.00
29_(RYCB)	0.00	TEE_13_(RYCB)	0.00
38_(RYCB)	0.00	TEE_14_(RYCB)	0.00
39_(RYCB)	0.00	TEE_15_(RYCB)	0.00
ELB_1_(RYCB)	0.00	TEE_16_(RYCB)	0.00
ELB_10_(RYCB)	0.00	TEE_17_(RYCB)	0.00
ELB_11_(RYCB)	0.04	TEE_18_(RYCB)	0.00
ELB_12_(RYCB)	0.00	TEE_19_(RYCB)	0.03
ELB_13_(RYCB)	0.00	TEE_2_(RYCB)	0.00
ELB_14_(RYCB)	0.13	TEE_20_(RYCB)	0.02
ELB_15_(RYCB)	0.00	TEE_21_(RYCB)	0.02
ELB_16_(RYCB)	0.02	TEE_22_(RYCB)	0.00
ELB_17_(RYCB)	0.00	TEE_23_(RYCB)	0.00
ELB_18_(RYCB)	0.00	TEE_24_(RYCB)	0.20
ELB_19_(RYCB)	0.04	TEE_25_(RYCB)	0.13
ELB_2_(RYCB)	0.00	TEE_26_(RYCB)	0.03
ELB_20_(RYCB)	0.28	TEE_27_(RYCB)	0.09
ELB_21_(RYCB)	0.00	TEE_28_(RYCB)	0.00
ELB_22_(RYCB)	0.01	TEE_29_(RYCB)	0.00
ELB_23_(RYCB)	0.19	TEE_3_(RYCB)	0.00
ELB_24_(RYCB)	0.00	TEE_30_(RYCB)	0.00
ELB_25_(RYCB)	0.00	TEE_31_(RYCB)	0.00
ELB_3_(RYCB)	0.00	TEE_32_(RYCB)	0.00
ELB_4_(RYCB)	0.00	TEE_33_(RYCB)	0.00
ELB_5_(RYCB)	0.00	TEE_34_(RYCB)	0.00
ELB_6_(RYCB)	0.00	TEE_35_(RYCB)	0.01
ELB_7_(RYCB)	0.04	TEE_36_(RYCB)	0.00
ELB_8_(RYCB)	0.00	TEE_37_(RYCB)	0.00
ELB_9_(RYCB)	0.00	TEE_38_(RYCB)	0.00
RYCB_1_(RYCB)	0.00	TEE_39_(RYCB)	0.00
RYCB_10_(RYCB)	0.00	TEE_4_(RYCB)	0.00
RYCB_11_(RYCB)	0.00	TEE_40_(RYCB)	0.14
RYCB_12_(RYCB)	0.00	TEE_41_(RYCB)	0.13
RYCB_13_(RYCB)	0.00	TEE_42_(RYCB)	0.00
RYCB_14_(RYCB)	0.00	TEE_43_(RYCB)	0.00
RYCB_15_(RYCB)	0.17	TEE_43B_(RYCB)	0.00
RYCB_18_(RYCB)	0.00	TEE_44_(RYCB)	0.00
RYCB_2_(RYCB)	0.00	TEE_45_(RYCB)	0.00
RYCB_3_(RYCB)	0.00	TEE_5_(RYCB)	0.00
RYCB_4_(RYCB)	0.00	TEE_6_(RYCB)	0.00
RYCB_5_(RYCB)	0.00	TEE_7_(RYCB)	0.08
RYCB_6_(RYCB)	0.00	TEE_8_(RYCB)	0.03
RYCB_7_(RYCB)	0.00	TEE_9_(RYCB)	0.12
RYCB_8_(RYCB)	0.00		
RYCB_9_(RYCB)	0.00		
StartNullStruct2	0.00		
Structure_-_(18)_(RYCB)	0.00		
TEE_1_(RYCB)	0.01		
TEE_10_(RYCB)	0.00		

Note: Depth calculated as per PCSWMM model

Table D-11: Rational Method Calculations

Name	CB	Area (ha)	Imperv. (%)	C	Tc (mins)	Minor System Capture	Intensity (mm/hr)	Design Flow - Calculated (1) (L/s)	Design Flow - Total to CB (2) (L/s)	Design Flow - PCSWMM (3) (L/s)	Difference (2) - (3) (L/s)
A45ii	02_(CB)	0.075	71.4	0.70	10	2-Year	76.81	11	15	14	1
B4ii	02_(CB)	0.047	28.6	0.40	10	2-Year	76.81	4	15	14	1
A45i	03_(CB)	0.168	71.4	0.70	10	2-Year	76.81	25	25	24	1
A46ii	04_(CB)	0.136	71.4	0.70	10	2-Year	76.81	20	21	20	1
B4iii	04_(CB)	0.008	28.6	0.40	10	2-Year	76.81	1	21	20	1
A46i	05_(CB)	0.157	71.4	0.70	10	2-Year	76.81	23	23	23	0
A50	06_(CB)	0.066	71.4	0.70	10	2-Year	76.81	10	10	10	0
A42i	08_(CB)	0.171	71.4	0.70	10	2-Year	76.81	26	26	25	1
A42ii	09_(CB)	0.083	71.4	0.70	10	2-Year	76.81	12	12	12	0
A39i	10_(CB)	0.214	71.4	0.70	10	2-Year	76.81	32	32	31	1
A39ii	11_(CB)	0.074	71.4	0.70	10	2-Year	76.81	11	11	11	0
A34ii	12_(CB)	0.276	71.4	0.70	10	2-Year	76.81	41	41	37	4
A34i	13_(CB)	0.212	71.4	0.70	10	2-Year	76.81	32	32	29	3
A33i	14_(CB)	0.110	71.4	0.70	10	2-Year	76.81	16	16	15	1
A33ii	15_(CB)	0.157	71.4	0.70	10	2-Year	76.81	23	23	24	-1
A32ii	16_(CB)	0.082	71.4	0.70	10	2-Year	76.81	12	12	12	0
A32i	17_(CB)	0.155	71.4	0.70	10	2-Year	76.81	23	23	23	0
A24i	18_(CB)	0.110	71.4	0.70	10	2-Year	76.81	16	16	16	0
A24ii	19_(CB)	0.237	71.4	0.70	10	2-Year	76.81	35	35	34	1
A20ii	20_(CB)	0.206	71.4	0.70	10	2-Year	76.81	31	31	30	1
A20i	21_(CB)	0.195	71.4	0.70	10	2-Year	76.81	29	29	29	0
A18i	23_(CB)	0.189	71.4	0.70	10	5-Year	104.19	38	38	39	-1
A17ii	24_(CB)	0.093	71.4	0.70	10	5-Year	104.19	19	19	19	0
A16ii	25_(CB)	0.126	71.4	0.70	10	5-Year	104.19	26	26	28	-2
A16i	26_(CB)	0.126	71.4	0.70	10	5-Year	104.19	26	26	28	-2
A15ii	27_(CB)	0.522	71.4	0.70	10	5-Year	104.19	106	106	105	1
A15i	28_(CB)	0.522	71.4	0.70	10	5-Year	104.19	106	106	105	1
A12i	30_(CB)	0.194	71.4	0.70	10	5-Year	104.19	39	39	40	-1
A12ii	31_(CB)	0.090	71.4	0.70	10	5-Year	104.19	18	18	19	-1
A9i	32_(CB)	0.188	71.4	0.70	10	2-Year	76.81	28	28	28	0
A9ii	33_(CB)	0.067	71.4	0.70	10	2-Year	76.81	10	10	10	0
A7ii	34_(CB)	0.282	71.4	0.70	10	2-Year	76.81	42	42	39	3
A7i	35_(CB)	0.228	71.4	0.70	10	2-Year	76.81	34	34	32	2
A5i	36_(CB)	0.102	71.4	0.70	10	2-Year	76.81	15	15	15	0
A5ii	37_(CB)	0.260	71.4	0.70	10	2-Year	76.81	39	39	36	3
A2i	40_(CB)	0.120	71.4	0.70	10	2-Year	76.81	18	26	24	2
B3ii	40_(CB)	0.046	85.7	0.80	10	2-Year	76.81	8	26	24	2
A2ii	41_(CB)	0.118	71.4	0.70	10	2-Year	76.81	18	39	33	6
B1ii	41_(CB)	0.123	85.7	0.80	10	2-Year	76.81	21	39	33	6
A1i	42_(CB)	0.157	71.4	0.70	10	2-Year	76.81	23	23	21	2
A1ii	43_(CB)	0.202	71.4	0.70	10	2-Year	76.81	30	30	26	4
A26ii	44_(CB)	0.172	71.4	0.70	10	2-Year	76.81	26	26	25	1
A26i	45_(CB)	0.060	71.4	0.70	10	2-Year	76.81	9	9	9	0
A27ii	46_(CB)	0.181	71.4	0.70	10	2-Year	76.81	27	27	26	1
A27i	47_(CB)	0.088	71.4	0.70	10	2-Year	76.81	13	13	13	0
A28ii	48_(CB)	0.142	71.4	0.70	10	2-Year	76.81	21	21	21	0
A28i	49_(CB)	0.143	71.4	0.70	10	2-Year	76.81	21	21	22	-1
A35ii	50_(CB)	0.203	71.4	0.70	10	2-Year	76.81	30	30	28	2
A35i	51_(CB)	0.228	71.4	0.70	10	2-Year	76.81	34	34	31	3
A4	52_(CB)	0.092	71.4	0.70	10	2-Year	76.81	14	14	14	0
A8i	53_(CB)	0.220	71.4	0.70	10	2-Year	76.81	33	33	31	2
A8ii	54_(CB)	0.190	71.4	0.70	10	2-Year	76.81	28	28	27	1
A48	55_(CB)	0.205	71.4	0.70	10	2-Year	76.81	31	31	31	0
A51	57_(CB)	0.186	71.4	0.70	10	2-Year	76.81	28	28	27	1

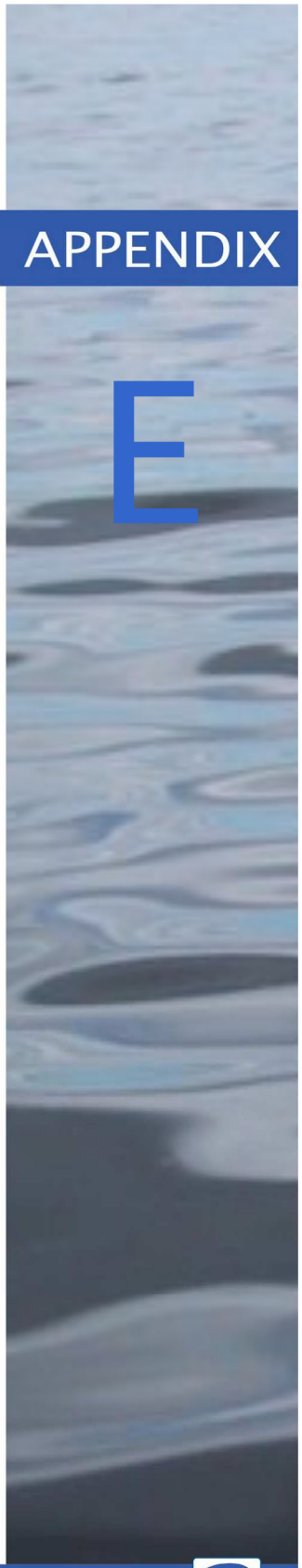
Table D-12: Time Series for Downstream Boundary Condition at STM-111

Time	Depth (m)								
	2-Yr 3-Hr Chicago	5-Yr 3-Hr Chicago	10-Yr 3-Hr Chicago	100-Yr 3-Hr Chicago	100-Yr 24-Hr SCS	100-Yr 3-Hr Chi + 20%	4-Aug-88	8-Aug-96	1-Jul-79
0:00	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57
0:05	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57
0:10	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57	80.57
0:15	80.57	80.57	80.57	80.57	80.57	80.58	80.57	80.64	80.57
0:20	80.57	80.57	80.57	80.60	80.57	80.63	80.57	80.75	80.58
0:25	80.57	80.58	80.59	80.66	80.57	80.70	80.57	80.84	80.62
0:30	80.58	80.62	80.64	80.72	80.57	80.78	80.78	80.97	80.68
0:35	80.61	80.67	80.70	80.79	80.57	80.94	81.04	80.95	80.81
0:40	80.66	80.73	80.78	80.87	80.57	81.05	81.42	80.89	81.02
0:45	80.73	80.86	80.94	80.96	80.57	81.15	81.36	80.87	81.28
0:50	80.87	81.02	81.07	81.07	80.57	81.29	81.28	80.89	81.39
0:55	81.10	81.22	81.28	81.22	80.57	81.52	81.17	81.00	81.42
1:00	81.37	81.52	81.60	81.39	80.57	81.80	81.03	81.06	81.44
1:05	81.64	81.85	81.90	81.51	80.57	82.06	80.96	81.06	81.45
1:10	81.61	81.88	81.98	81.56	80.57	82.26	80.98	81.02	81.48
1:15	81.45	81.72	81.86	81.60	80.57	82.29	81.13	81.04	81.54
1:20	81.32	81.52	81.72	81.72	80.57	82.42	81.25	81.25	81.63
1:25	81.21	81.39	81.63	81.91	80.57	82.53	81.28	81.59	81.75
1:30	81.14	81.36	81.57	82.12	80.58	82.62	81.30	81.82	81.91
1:35	81.10	81.40	81.69	82.31	80.59	82.84	81.56	81.95	82.05
1:40	81.09	81.48	81.75	82.44	80.60	82.92	81.78	81.89	82.22
1:45	81.11	81.54	81.86	82.50	80.61	83.07	81.78	81.71	82.41
1:50	81.14	81.61	81.90	82.57	80.62	83.06	81.81	81.61	82.59
1:55	81.18	81.66	81.97	82.63	80.63	83.09	81.96	81.68	82.74
2:00	81.21	81.70	81.99	82.69	80.64	83.10	82.18	81.77	82.90
2:05	81.25	81.74	82.04	82.71	80.67	83.15	82.48	81.85	83.01
2:10	81.27	81.77	82.05	82.74	80.71	83.15	82.71	81.90	83.02
2:15	81.30	81.80	82.09	82.76	80.72	83.17	82.75	81.94	83.03
2:20	81.32	81.82	82.10	82.78	80.73	83.16	82.75	81.97	83.08
2:25	81.34	81.84	82.13	82.79	80.73	83.18	82.77	81.99	83.11
2:30	81.36	81.86	82.13	82.80	80.73	83.16	82.81	82.00	83.12
2:35	81.38	81.88	82.16	82.80	80.74	83.17	82.87	82.02	83.12
2:40	81.39	81.89	82.16	82.81	80.74	83.15	82.89	82.03	83.12
2:45	81.41	81.90	82.18	82.81	80.74	83.16	82.88	82.04	83.12
2:50	81.42	81.92	82.18	82.81	80.74	83.14	82.88	82.05	83.11
2:55	81.43	81.93	82.20	82.81	80.74	83.14	82.89	82.07	83.10
3:00	81.44	81.94	82.20	82.82	80.74	83.12	82.89	82.16	83.09
3:05	81.45	81.94	82.22	82.81	80.74	83.12	82.90	82.34	83.08
3:10	81.46	81.95	82.22	82.81	80.74	83.10	82.90	82.47	83.07
3:15	81.47	81.96	82.23	82.81	80.74	83.09	82.92	82.58	83.06
3:20	81.48	81.97	82.23	82.81	80.74	83.09	82.92	82.66	83.05
3:25	81.49	81.97	82.23	82.80	80.74	83.07	82.90	82.67	83.03
3:30	81.49	81.98	82.23	82.79	80.74	83.05	82.90	82.69	83.02
3:35	81.50	81.98	82.24	82.79	80.74	83.04	82.91	82.73	83.00
3:40	81.50	81.98	82.24	82.78	80.74	83.03	82.90	82.76	82.99
3:45	81.51	81.98	82.24	82.77	80.74	83.01	82.88	82.79	82.97
3:50	81.51	81.99	82.24	82.76	80.74	82.99	82.87	82.80	82.96
3:55	81.52	81.98	82.24	82.76	80.74	82.98	82.88	82.81	82.94
4:00	81.52	81.99	82.24	82.75	80.74	82.97	82.86	82.81	82.93
4:05	81.52	81.99	82.24	82.74	80.74	82.96	82.85	82.81	82.92
4:10	81.52	81.99	82.24	82.73	80.74	82.94	82.84	82.81	82.90
4:15	81.53	81.99	82.24	82.73	80.74	82.93	82.83	82.81	82.89
4:20	81.53	81.99	82.24	82.72	80.74	82.92	82.82	82.81	82.88
4:25	81.53	81.99	82.24	82.71	80.75	82.91	82.81	82.80	82.86
4:30	81.53	81.99	82.23	82.70	80.75	82.90	82.80	82.80	82.85
4:35	81.53	81.99	82.24	82.70	80.75	82.89	82.79	82.79	82.84
4:40	81.53	81.99	82.23	82.69	80.75	82.88	82.78	82.78	82.83
4:45	81.53	81.98	82.23	82.69	80.76	82.87	82.77	82.77	82.82
4:50	81.53	81.99	82.23	82.68	80.76	82.85	82.76	82.77	82.81
4:55	81.53	81.98	82.23	82.67	80.76	82.85	82.76	82.76	82.79
5:00	81.53	81.99	82.22	82.67	80.76	82.84	82.74	82.75	82.78
5:05	81.53	81.98	82.22	82.66	80.76	82.83	82.74	82.74	82.77
5:10	81.53	81.98	82.22	82.65	80.76	82.82	82.74	82.73	82.76
5:15	81.53	81.98	82.22	82.65	80.76	82.81	82.74	82.73	82.75
5:20	81.53	81.98	82.22	82.64	80.76	82.80	82.73	82.72	82.74
5:25	81.53	81.98	82.22	82.64	80.76	82.79	82.73	82.71	82.74
5:30	81.53	81.98	82.21	82.63	80.76	82.78	82.73	82.70	82.73
5:35	81.53	81.97	82.21	82.62	80.76	82.77	82.73	82.69	82.72
5:40	81.53	81.98	82.21	82.62	80.76	82.77	82.72	82.68	82.71
5:45	81.53	81.97	82.21	82.62	80.76	82.76	82.72	82.67	82.70
5:50	81.53	81.97	82.20	82.61	80.76	82.75	82.72	82.67	82.69
5:55	81.53	81.97	82.20	82.60	80.76	82.74	82.71	82.66	82.68
6:00	81.53	81.97	82.20	82.60	80.76	82.74	82.70	82.65	82.67
6:05	81.53	81.96	82.20	82.60	80.76	82.73	82.70	82.64	82.67

6:10	81.53	81.97	82.20	82.59	80.76	82.72	82.69	82.63	82.66
6:15	81.53	81.96	82.19	82.59	80.76	82.71	82.69	82.63	82.65
6:20	81.53	81.96	82.19	82.58	80.76	82.71	82.68	82.62	82.64
6:25	81.52	81.96	82.19	82.58	80.76	82.70	82.67	82.61	82.64
6:30	81.52	81.96	82.19	82.57	80.76	82.69	82.67	82.60	82.63
6:35	81.52	81.96	82.19	82.57	80.76	82.69	82.66	82.60	82.63
6:40	81.52	81.96	82.18	82.56	80.77	82.68	82.65	82.59	82.62
6:45	81.52	81.95	82.18	82.56	80.77	82.68	82.64	82.58	82.61
6:50	81.52	81.95	82.18	82.56	80.77	82.67	82.64	82.58	82.60
6:55	81.52	81.95	82.18	82.55	80.77	82.66	82.63	82.57	82.60
7:00	81.52	81.95	82.18	82.55	80.77	82.66	82.63	82.56	82.59
7:05	81.52	81.94	82.17	82.54	80.77	82.65	82.62	82.56	82.59
7:10	81.51	81.95	82.17	82.54	80.77	82.65	82.61	82.55	82.58
7:15	81.51	81.94	82.17	82.54	80.77	82.64	82.61	82.54	82.58
7:20	81.51	81.94	82.17	82.53	80.77	82.64	82.60	82.54	82.57
7:25	81.51	81.94	82.17	82.53	80.78	82.63	82.60	82.53	82.56
7:30	81.51	81.94	82.16	82.53	80.78	82.63	82.59	82.53	82.56
7:35	81.51	81.93	82.16	82.52	80.78	82.62	82.59	82.52	82.55
7:40	81.51	81.93	82.16	82.52	80.78	82.62	82.58	82.52	82.55
7:45	81.51	81.93	82.16	82.52	80.78	82.62	82.57	82.51	82.54
7:50	81.51	81.93	82.15	82.51	80.78	82.61	82.57	82.50	82.54
7:55	81.50	81.93	82.15	82.51	80.78	82.61	82.57	82.50	82.53
8:00	81.50	81.93	82.15	82.51	80.78	82.60	82.56	82.49	82.53
8:05	81.50	81.92	82.15	82.50	80.79	82.60	82.56	82.49	82.52
8:10	81.50	81.92	82.15	82.50	80.79	82.59	82.55	82.48	82.52
8:15	81.50	81.92	82.15	82.50	80.79	82.59	82.55	82.48	82.51
8:20	81.50	81.92	82.14	82.50	80.79	82.58	82.54	82.47	82.51
8:25	81.50	81.92	82.14	82.49	80.80	82.58	82.54	82.47	82.51
8:30	81.50	81.92	82.14	82.49	80.80	82.58	82.53	82.46	82.50
8:35	81.49	81.91	82.14	82.49	80.80	82.57	82.53	82.46	82.50
8:40	81.49	81.91	82.13	82.48	80.80	82.57	82.52	82.45	82.49
8:45	81.49	81.91	82.13	82.48	80.80	82.57	82.52	82.45	82.49
8:50	81.49	81.91	82.13	82.48	80.81	82.56	82.51	82.44	82.48
8:55	81.49	81.91	82.13	82.47	80.81	82.56	82.51	82.44	82.48
9:00	81.49	81.91	82.13	82.47	80.81	82.56	82.51	82.43	82.48
9:05	81.49	81.90	82.12	82.47	80.81	82.55	82.51	82.43	82.47
9:10	81.48	81.90	82.12	82.47	80.81	82.55	82.50	82.42	82.47
9:15	81.48	81.90	82.12	82.46	80.81	82.55	82.50	82.42	82.47
9:20	81.48	81.90	82.12	82.46	80.82	82.54	82.49	82.42	82.46
9:25	81.48	81.90	82.12	82.46	80.82	82.54	82.49	82.41	82.46
9:30	81.48	81.90	82.11	82.46	80.82	82.54	82.48	82.41	82.45
9:35	81.48	81.89	82.11	82.45	80.83	82.53	82.48	82.40	82.45
9:40	81.48	81.89	82.11	82.45	80.83	82.53	82.48	82.40	82.45
9:45	81.48	81.89	82.11	82.45	80.83	82.53	82.48	82.39	82.44
9:50	81.47	81.89	82.11	82.45	80.84	82.52	82.47	82.39	82.44
9:55	81.47	81.89	82.10	82.44	80.84	82.52	82.47	82.39	82.44
10:00	81.47	81.88	82.10	82.44	80.84	82.52	82.46	82.38	82.43
10:05	81.47	81.88	82.10	82.44	80.85	82.52	82.46	82.38	82.43
10:10	81.47	81.88	82.10	82.44	80.85	82.51	82.46	82.37	82.43
10:15	81.47	81.88	82.10	82.44	80.86	82.51	82.46	82.37	82.42
10:20	81.47	81.88	82.09	82.43	80.87	82.51	82.45	82.37	82.42
10:25	81.46	81.88	82.09	82.43	80.88	82.51	82.45	82.36	82.42
10:30	81.46	81.88	82.09	82.43	80.88	82.50	82.45	82.36	82.41
10:35	81.46	81.87	82.09	82.43	80.89	82.50	82.44	82.35	82.41
10:40	81.46	81.87	82.09	82.43	80.90	82.50	82.44	82.35	82.41
10:45	81.46	81.87	82.09	82.42	80.91	82.50	82.44	82.35	82.41
10:50	81.46	81.87	82.08	82.42	80.93	82.49	82.44	82.34	82.40
10:55	81.46	81.87	82.08	82.42	80.94	82.49	82.43	82.34	82.40
11:00	81.45	81.86	82.08	82.42	80.95	82.49	82.43	82.34	82.40
11:05	81.45	81.86	82.08	82.41	80.97	82.49	82.43	82.33	82.39
11:10	81.45	81.86	82.07	82.41	80.98	82.48	82.43	82.33	82.39
11:15	81.45	81.86	82.07	82.41	81.00	82.48	82.42	82.32	82.39
11:20	81.45	81.86	82.07	82.41	81.04	82.48	82.42	82.32	82.38
11:25	81.45	81.85	82.07	82.41	81.06	82.48	82.42	82.32	82.38
11:30	81.45	81.85	82.07	82.41	81.07	82.48	82.41	82.31	82.38
11:35	81.44	81.85	82.07	82.40	81.11	82.47	82.41	82.31	82.38
11:40	81.44	81.85	82.06	82.40	81.19	82.47	82.41	82.31	82.37
11:45	81.44	81.85	82.06	82.40	81.39	82.47	82.40	82.30	82.37
11:50	81.44	81.85	82.06	82.40	81.64	82.47	82.40	82.30	82.37
11:55	81.44	81.85	82.06	82.40	81.87	82.46	82.40	82.29	82.36
12:00	81.44	81.84	82.06	82.39	82.06	82.46	82.40	82.29	82.36
12:05	81.44	81.84	82.05	82.39	82.27	82.46	82.39	82.29	82.36
12:10	81.43	81.84	82.05	82.39	82.49	82.46	82.39	82.28	82.36
12:15	81.43	81.84	82.05	82.39	82.58	82.46	82.39	82.28	82.35
12:20	81.43	81.84	82.05	82.39	82.69	82.46	82.39	82.28	82.35
12:25	81.43	81.84	82.05	82.39	82.79	82.45	82.39	82.27	82.35
12:30	81.43	81.83	82.05	82.38	82.82	82.45	82.38	82.27	82.35
12:35	81.43	81.83	82.04	82.38	82.86	82.45	82.38	82.27	82.34
12:40	81.43	81.83	82.04	82.38	82.90	82.45	82.38	82.26	82.34
12:45	81.42	81.83	82.04	82.38	82.93	82.45	82.38	82.26	82.34
12:50	81.42	81.83	82.04	82.38	82.97	82.45	82.38	82.26	82.33

12:55	81.42	81.83	82.04	82.37	82.98	82.44	82.37	82.25	82.33
13:00	81.42	81.82	82.03	82.37	82.99	82.44	82.37	82.25	82.33
13:05	81.42	81.82	82.03	82.37	82.99	82.44	82.37	82.25	82.33
13:10	81.42	81.82	82.03	82.37	83.00	82.44	82.37	82.24	82.32
13:15	81.42	81.82	82.03	82.37	82.99	82.44	82.36	82.24	82.32
13:20	81.41	81.82	82.03	82.37	83.00	82.44	82.36	82.24	82.32
13:25	81.41	81.82	82.03	82.36	82.99	82.43	82.36	82.23	82.32
13:30	81.41	81.81	82.02	82.36	82.99	82.43	82.36	82.23	82.31
13:35	81.41	81.81	82.02	82.36	82.98	82.43	82.36	82.23	82.31
13:40	81.41	81.81	82.02	82.36	82.98	82.43	82.35	82.22	82.31
13:45	81.41	81.81	82.02	82.36	82.97	82.43	82.35	82.22	82.31
13:50	81.41	81.81	82.02	82.36	82.97	82.43	82.35	82.22	82.30
13:55	81.40	81.81	82.01	82.35	82.96	82.42	82.35	82.21	82.30
14:00	81.40	81.80	82.01	82.35	82.96	82.42	82.35	82.21	82.30
14:05	81.40	81.80	82.01	82.35	82.95	82.42	82.34	82.21	82.30
14:10	81.40	81.80	82.01	82.35	82.95	82.42	82.34	82.20	82.29
14:15	81.40	81.80	82.01	82.35	82.94	82.42	82.34	82.20	82.29
14:20	81.40	81.80	82.01	82.35	82.94	82.42	82.34	82.20	82.29
14:25	81.40	81.80	82.00	82.34	82.93	82.41	82.33	82.19	82.29
14:30	81.39	81.79	82.00	82.34	82.92	82.41	82.33	82.19	82.28
14:35	81.39	81.79	82.00	82.34	82.91	82.41	82.33	82.19	82.28
14:40	81.39	81.79	82.00	82.34	82.91	82.41	82.33	82.18	82.28
14:45	81.39	81.79	82.00	82.34	82.90	82.41	82.33	82.18	82.28
14:50	81.39	81.79	82.00	82.34	82.90	82.41	82.33	82.18	82.27
14:55	81.39	81.79	81.99	82.33	82.89	82.40	82.32	82.18	82.27
15:00	81.38	81.78	81.99	82.33	82.89	82.41	82.32	82.17	82.27
15:05	81.38	81.78	81.99	82.33	82.88	82.40	82.32	82.17	82.27
15:10	81.38	81.78	81.99	82.33	82.87	82.40	82.32	82.17	82.26
15:15	81.38	81.78	81.99	82.33	82.86	82.40	82.31	82.16	82.26
15:20	81.38	81.78	81.99	82.33	82.86	82.40	82.31	82.16	82.26
15:25	81.38	81.78	81.98	82.32	82.85	82.40	82.31	82.16	82.26
15:30	81.38	81.77	81.98	82.32	82.85	82.40	82.31	82.15	82.25
15:35	81.37	81.77	81.98	82.32	82.84	82.39	82.31	82.15	82.25
15:40	81.37	81.77	81.98	82.32	82.84	82.39	82.31	82.15	82.25
15:45	81.37	81.77	81.98	82.32	82.83	82.39	82.30	82.14	82.25
15:50	81.37	81.77	81.98	82.32	82.83	82.39	82.30	82.14	82.25
15:55	81.37	81.77	81.97	82.31	82.82	82.39	82.30	82.14	82.24
16:00	81.37	81.77	81.97	82.31	82.82	82.39	82.30	82.14	82.24
16:05	81.37	81.76	81.97	82.31	82.81	82.39	82.30	82.13	82.24
16:10	81.36	81.76	81.97	82.31	82.81	82.39	82.29	82.13	82.24
16:15	81.36	81.76	81.97	82.31	82.80	82.38	82.29	82.13	82.23
16:20	81.36	81.76	81.97	82.31	82.80	82.38	82.29	82.12	82.23
16:25	81.36	81.76	81.96	82.31	82.80	82.38	82.29	82.12	82.23
16:30	81.36	81.76	81.96	82.30	82.79	82.38	82.29	82.12	82.23
16:35	81.36	81.75	81.96	82.30	82.78	82.38	82.29	82.11	82.22
16:40	81.36	81.75	81.96	82.30	82.78	82.38	82.28	82.11	82.22
16:45	81.35	81.75	81.96	82.30	82.77	82.38	82.28	82.11	82.22
16:50	81.35	81.75	81.96	82.30	82.77	82.38	82.28	82.11	82.22
16:55	81.35	81.75	81.95	82.30	82.76	82.37	82.28	82.10	82.22
17:00	81.35	81.75	81.95	82.29	82.76	82.37	82.28	82.10	82.21
17:05	81.35	81.75	81.95	82.29	82.76	82.37	82.27	82.10	82.21
17:10	81.35	81.74	81.95	82.29	82.75	82.37	82.27	82.09	82.21
17:15	81.35	81.74	81.95	82.29	82.75	82.37	82.27	82.09	82.21

17:20	81.34	81.74	81.95	82.29	82.74	82.37	82.27	82.09	82.21
17:25	81.34	81.74	81.95	82.29	82.74	82.37	82.27	82.09	82.20
17:30	81.34	81.74	81.94	82.29	82.74	82.37	82.27	82.08	82.20
17:35	81.34	81.74	81.94	82.28	82.73	82.36	82.26	82.08	82.20
17:40	81.34	81.73	81.94	82.28	82.73	82.36	82.26	82.08	82.20
17:45	81.34	81.73	81.94	82.28	82.72	82.36	82.26	82.07	82.19
17:50	81.33	81.73	81.94	82.28	82.72	82.36	82.26	82.07	82.19
17:55	81.33	81.73	81.94	82.28	82.71	82.36	82.26	82.07	82.19
18:00	81.33	81.73	81.94	82.28	82.71	82.36	82.26	82.07	82.19
18:05	81.33	81.73	81.93	82.28	82.71	82.36	82.25	82.06	82.19
18:10	81.33	81.73	81.93	82.27	82.70	82.36	82.25	82.06	82.18
18:15	81.33	81.72	81.93	82.27	82.70	82.35	82.25	82.06	82.18
18:20	81.33	81.72	81.93	82.27	82.70	82.35	82.25	82.06	82.18
18:25	81.32	81.72	81.93	82.27	82.69	82.35	82.25	82.05	82.18
18:30	81.32	81.72	81.93	82.27	82.69	82.35	82.25	82.05	82.18
18:35	81.32	81.72	81.92	82.27	82.69	82.35	82.24	82.05	82.17
18:40	81.32	81.72	81.92	82.27	82.69	82.35	82.24	82.04	82.17
18:45	81.32	81.72	81.92	82.26	82.68	82.35	82.24	82.04	82.17
18:50	81.32	81.71	81.92	82.26	82.68	82.35	82.24	82.04	82.17
18:55	81.32	81.71	81.92	82.26	82.68	82.34	82.24	82.04	82.16
19:00	81.31	81.71	81.92	82.26	82.67	82.34	82.24	82.03	82.16
19:05	81.31	81.71	81.92	82.26	82.67	82.34	82.23	82.03	82.16
19:10	81.31	81.71	81.91	82.26	82.67	82.34	82.23	82.03	82.16
19:15	81.31	81.71	81.91	82.25	82.66	82.34	82.23	82.03	82.16
19:20	81.31	81.71	81.91	82.25	82.66	82.34	82.23	82.02	82.15
19:25	81.31	81.70	81.91	82.25	82.66	82.34	82.23	82.02	82.15
19:30	81.30	81.70	81.91	82.25	82.66	82.34	82.23	82.02	82.15
19:35	81.30	81.70	81.91	82.25	82.65	82.33	82.22	82.02	82.15
19:40	81.30	81.70	81.91	82.25	82.65	82.33	82.22	82.01	82.15
19:45	81.30	81.70	81.90	82.25	82.65	82.33	82.22	82.01	82.14
19:50	81.30	81.70	81.90	82.24	82.65	82.33	82.22	82.01	82.14
19:55	81.30	81.70	81.90	82.24	82.65	82.33	82.22	82.01	82.14
20:00	81.30	81.69	81.90	82.24	82.64	82.33	82.22	82.00	82.14
20:05	81.29	81.69	81.90	82.24	82.64	82.33	82.21	82.00	82.14
20:10	81.29	81.69	81.90	82.24	82.64	82.33	82.21	82.00	82.14
20:15	81.29	81.69	81.90	82.24	82.64	82.33	82.21	82.00	82.13
20:20	81.29	81.69	81.90	82.24	82.64	82.32	82.21	81.99	82.13
20:25	81.29	81.69	81.89	82.23	82.63	82.32	82.21	81.99	82.13
20:30	81.29	81.68	81.89	82.23	82.63	82.32	82.21	81.99	82.13
20:35	81.29	81.68	81.89	82.23	82.63	82.32	82.21	81.99	82.13
20:40	81.28	81.68	81.89	82.23	82.63	82.32	82.21	81.98	82.12
20:45	81.28	81.68	81.89	82.23	82.62	82.32	82.20	81.98	82.12
20:50	81.28	81.68	81.89	82.23	82.62	82.32	82.20	81.98	82.12
20:55	81.28	81.68	81.89	82.23	82.62	82.32	82.20	81.98	82.12
21:00	81.28	81.68	81.88	82.23	82.62	82.31	82.20	81.97	82.12
21:05	81.28	81.67	81.88	82.22	82.61	82.31	82.20	81.97	82.11
21:10	81.28	81.67	81.88	82.22	82.61	82.31	82.20	81.97	82.11
21:15	81.27	81.67	81.88	82.22	82.61	82.31	82.19	81.97	82.11
21:20	81.27	81.67	81.88	82.22	82.61	82.31	82.19	81.96	82.11
21:25	81.27	81.67	81.88	82.22	82.60	82.31	82.19	81.96	82.11
21:30	81.27	81.67	81.88	82.22	82.60	82.31	82.19	81.96	82.11
21:35	81.27	81.67	81.88	82.22	82.60	82.31	82.19	81.96	82.10
21:40	81.27	81.66	81.87	82.21	82.60	82.31	82.19	81.96	82.10
21:45	81.27	81.66	81.87	82.21	82.59	82.30	82.19	81.95	82.10
21:50	81.26	81.66	81.87	82.21	82.59	82.30	82.19	81.95	82.10
21:55	81.26	81.66	81.87	82.21	82.59	82.30	82.18	81.95	82.10
22:00	81.26	81.66	81.87	82.21	82.59	82.30	82.18	81.95	82.09
22:05	81.26	81.66	81.87	82.21	82.58	82.30	82.18	81.94	82.09
22:10	81.26	81.66	81.87	82.21	82.58	82.30	82.18	81.94	82.09
22:15	81.26	81.66	81.87	82.21	82.58	82.30	82.18	81.94	82.09
22:20	81.25	81.65	81.86	82.20	82.58	82.30	82.18	81.94	82.09
22:25	81.25	81.65	81.86	82.20	82.58	82.30	82.18	81.94	82.08
22:30	81.25	81.65	81.86	82.20	82.58	82.29	82.17	81.93	82.08
22:35	81.25	81.65	81.86	82.20	82.57	82.29	82.17	81.93	82.08
22:40	81.25	81.65	81.86	82.20	82.57	82.29	82.17	81.93	82.08
22:45	81.25	81.65	81.86	82.20	82.57	82.29	82.17	81.93	82.08
22:50	81.25	81.64	81.86	82.20	82.57	82.29	82.17	81.92	82.08
22:55	81.24	81.64	81.86	82.19	82.57	82.29	82.17	81.92	82.07
23:00	81.24	81.64	81.85	82.19	82.57	82.29	82.17	81.92	82.07
23:05	81.24	81.64	81.85	82.19	82.56	82.29	82.17	81.92	82.07
23:10	81.24	81.64	81.85	82.19	82.56	82.28	82.16	81.92	82.07
23:15	81.24	81.64	81.85	82.19	82.56	82.28	82.16	81.91	82.07
23:20	81.24	81.64	81.85	82.19	82.56	82.28	82.16	81.91	82.07
23:25	81.24	81.64	81.85	82.19	82.56	82.28	82.16	81.91	82.06
23:30	81.23	81.63	81.85	82.19	82.56	82.28	82.16	81.91	82.06
23:35	81.23	81.63	81.85	82.18	82.55	82.28	82.16	81.91	82.06
23:40	81.23	81.63	81.84	82.18	82.55	82.28	82.16	81.90	82.06
23:45	81.23	81.63	81.84	82.18	82.55	82.28	82.16	81.90	82.06
23:50	81.23	81.63	81.84	82.18	82.55	82.28	82.15	81.90	82.06
23:55	81.23	81.63	81.84	82.18	82.55	82.27	82.15	81.90	82.05
0:00	81.23	81.62	81.84	82.18	82.55	82.27	82.15	81.90	82.05



APPENDIX

E

Interim Condition and EUC Pond 1 Analysis

JFSA Water Resources and Environmental Consultants

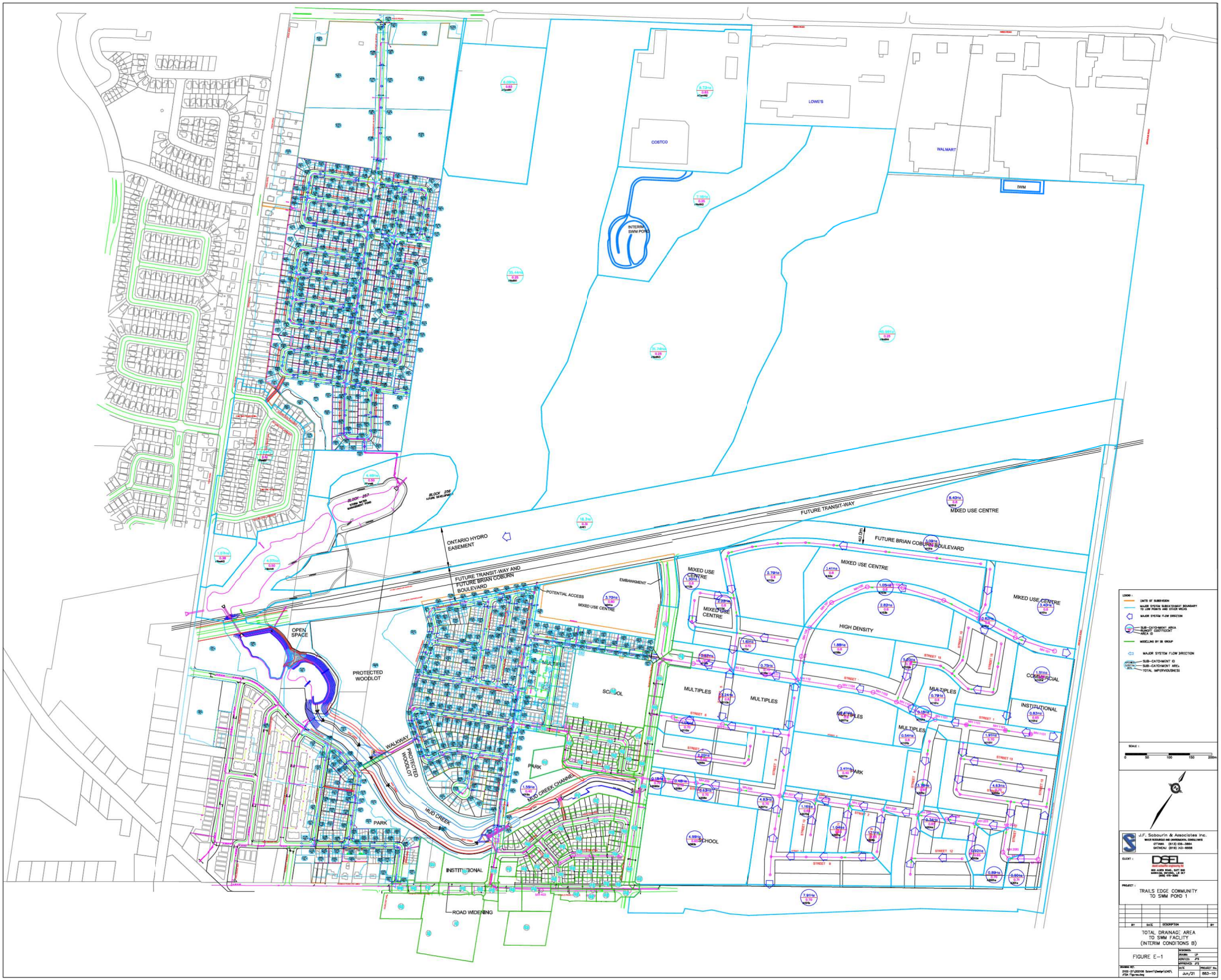

COSTCO
LOWE'S
WALMART
SWM
INTERIM SWM POND
FUTURE TRANSIT-WAY
FUTURE TRANSIT-WAY AND FUTURE BRIAN COBURN BOULEVARD
FUTURE BRIAN COBURN BOULEVARD
ONTARIO HYDRO EASEMENT
MIXED USE CENTRE
HIGH DENSITY
MULTIPLES
COMMERCIAL
INSTITUTIONAL
SCHOOL
PARK
OPEN SPACE
PROTECTED WOODLOT
WALKWAY
MUD CREEK
MUD CREEK CHANNEL
ROAD WIDENING
POTENTIAL ACCESS
EMBANKMENT
BLOCK 252
FUTURE DEVELOPMENT
BLOCK 257
LANDS TO BE CONVEYED TO THE MUNICIPALITY FOR ROAD WIDENING PURPOSES
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
STREET 10
STREET 11
STREET 12
STREET 13
STREET 14
STREET 15
STREET 16
STREET 17
STREET 18
STREET 19
STREET 20
STREET 21
STREET 22
STREET 23
STREET 24
STREET 25
STREET 26
STREET 27
STREET 28
STREET 29
STREET 30
STREET 31
STREET 32
STREET 33
STREET 34
STREET 35
STREET 36
STREET 37
STREET 38
STREET 39
STREET 40
STREET 41
STREET 42
STREET 43
STREET 44
STREET 45
STREET 46
STREET 47
STREET 48
STREET 49
STREET 50
STREET 51
STREET 52
STREET 53
STREET 54
STREET 55
STREET 56
STREET 57
STREET 58
STREET 59
STREET 60
STREET 61
STREET 62
STREET 63
STREET 64
STREET 65
STREET 66
STREET 67
STREET 68
STREET 69
STREET 70
STREET 71
STREET 72
STREET 73
STREET 74
STREET 75
STREET 76
STREET 77
STREET 78
STREET 79
STREET 80
STREET 81
STREET 82
STREET 83
STREET 84
STREET 85
STREET 86
STREET 87
STREET 88
STREET 89
STREET 90
STREET 91
STREET 92
STREET 93
STREET 94
STREET 95
STREET 96
STREET 97
STREET 98
STREET 99
STREET 100
STREET 101
STREET 102
STREET 103
STREET 104
STREET 105
STREET 106
STREET 107
STREET 108
STREET 109
STREET 110
STREET 111
STREET 112
STREET 113
STREET 114
STREET 115
STREET 116
STREET 117
STREET 118
STREET 119
STREET 120
STREET 121
STREET 122
STREET 123
STREET 124
STREET 125
STREET 126
STREET 127
STREET 128
STREET 129
STREET 130
STREET 131
STREET 132
STREET 133
STREET 134
STREET 135
STREET 136
STREET 137
STREET 138
STREET 139
STREET 140
STREET 141
STREET 142
STREET 143
STREET 144
STREET 145
STREET 146
STREET 147
STREET 148
STREET 149
STREET 150
STREET 151
STREET 152
STREET 153
STREET 154
STREET 155
STREET 156
STREET 157
STREET 158
STREET 159
STREET 160
STREET 161
STREET 162
STREET 163
STREET 164
STREET 165
STREET 166
STREET 167
STREET 168
STREET 169
STREET 170
STREET 171
STREET 172
STREET 173
STREET 174
STREET 175
STREET 176
STREET 177
STREET 178
STREET 179
STREET 180
STREET 181
STREET 182
STREET 183
STREET 184
STREET 185
STREET 186
STREET 187
STREET 188
STREET 189
STREET 190
STREET 191
STREET 192
STREET 193
STREET 194
STREET 195
STREET 196
STREET 197
STREET 198
STREET 199
STREET 200
STREET 201
STREET 202
STREET 203
STREET 204
STREET 205
STREET 206
STREET 207
STREET 208
STREET 209
STREET 210
STREET 211
STREET 212
STREET 213
STREET 214
STREET 215
STREET 216
STREET 217
STREET 218
STREET 219
STREET 220
STREET 221
STREET 222
STREET 223
STREET 224
STREET 225
STREET 226
STREET 227
STREET 228
STREET 229
STREET 230
STREET 231
STREET 232
STREET 233
STREET 234
STREET 235
STREET 236
STREET 237
STREET 238
STREET 239
STREET 240
STREET 241
STREET 242
STREET 243
STREET 244
STREET 245
STREET 246
STREET 247
STREET 248
STREET 249
STREET 250
STREET 251
STREET 252
STREET 253
STREET 254
STREET 255
STREET 256
STREET 257
STREET 258
STREET 259
STREET 260
STREET 261
STREET 262
STREET 263
STREET 264
STREET 265
STREET 266
STREET 267
STREET 268
STREET 269
STREET 270
STREET 271
STREET 272
STREET 273
STREET 274
STREET 275
STREET 276
STREET 277
STREET 278
STREET 279
STREET 280
STREET 281
STREET 282
STREET 283
STREET 284
STREET 285
STREET 286
STREET 287
STREET 288
STREET 289
STREET 290
STREET 291
STREET 292
STREET 293
STREET 294
STREET 295
STREET 296
STREET 297
STREET 298
STREET 299
STREET 300
STREET 301
STREET 302
STREET 303
STREET 304
STREET 305
STREET 306
STREET 307
STREET 308
STREET 309
STREET 310
STREET 311
STREET 312
STREET 313
STREET 314
STREET 315
STREET 316
STREET 317
STREET 318
STREET 319
STREET 320
STREET 321
STREET 322
STREET 323
STREET 324
STREET 325
STREET 326
STREET 327
STREET 328
STREET 329
STREET 330
STREET 331
STREET 332
STREET 333
STREET 334
STREET 335
STREET 336
STREET 337
STREET 338
STREET 339
STREET 340
STREET 341
STREET 342
STREET 343
STREET 344
STREET 345
STREET 346
STREET 347
STREET 348
STREET 349
STREET 350
STREET 351
STREET 352
STREET 353
STREET 354
STREET 355
STREET 356
STREET 357
STREET 358
STREET 359
STREET 360
STREET 361
STREET 362
STREET 363
STREET 364
STREET 365
STREET 366
STREET 367
STREET 368
STREET 369
STREET 370
STREET 371
STREET 372
STREET 373
STREET 374
STREET 375
STREET 376
STREET 377
STREET 378
STREET 379
STREET 380
STREET 381
STREET 382
STREET 383
STREET 384
STREET 385
STREET 386
STREET 387
STREET 388
STREET 389
STREET 390
STREET 391
STREET 392
STREET 393
STREET 394
STREET 395
STREET 396
STREET 397
STREET 398
STREET 399
STREET 400
STREET 401
STREET 402
STREET 403
STREET 404
STREET 405
STREET 406
STREET 407
STREET 408
STREET 409
STREET 410
STREET 411
STREET 412
STREET 413
STREET 414
STREET 415
STREET 416
STREET 417
STREET 418
STREET 419
STREET 420
STREET 421
STREET 422
STREET 423
STREET 424
STREET 425
STREET 426
STREET 427
STREET 428
STREET 429
STREET 430
STREET 431
STREET 432
STREET 433
STREET 434
STREET 435
STREET 436
STREET 437
STREET 438
STREET 439
STREET 440
STREET 441
STREET 442
STREET 443
STREET 444
STREET 445
STREET 446
STREET 447
STREET 448
STREET 449
STREET 450
STREET 451
STREET 452
STREET 453
STREET 454
STREET 455
STREET 456
STREET 457
STREET 458
STREET 459
STREET 460
STREET 461
STREET 462
STREET 463
STREET 464
STREET 465
STREET 466
STREET 467
STREET 468
STREET 469
STREET 470
STREET 471
STREET 472
STREET 473
STREET 474
STREET 475
STREET 476
STREET 477
STREET 478
STREET 479
STREET 480
STREET 481
STREET 482
STREET 483
STREET 484
STREET 485
STREET 486
STREET 487
STREET 488
STREET 489
STREET 490
STREET 491
STREET 492
STREET 493
STREET 494
STREET 495
STREET 496
STREET 497
STREET 498
STREET 499
STREET 500
STREET 501
STREET 502
STREET 503
STREET 504
STREET 505
STREET 506
STREET 507
STREET 508
STREET 509
STREET 510
STREET 511
STREET 512
STREET 513
STREET 514
STREET 515
STREET 516
STREET 517
STREET 518
STREET 519
STREET 520
STREET 521
STREET 522
STREET 523
STREET 524
STREET 525
STREET 526
STREET 527
STREET 528
STREET 529
STREET 530
STREET 531
STREET 532
STREET 533
STREET 534
STREET 535
STREET 536
STREET 537
STREET 538
STREET 539
STREET 540
STREET 541
STREET 542
STREET 543
STREET 544
STREET 545
STREET 546
STREET 547
STREET 548
STREET 549
STREET 550
STREET 551
STREET 552
STREET 553
STREET 554
STREET 555
STREET 556
STREET 557
STREET 558
STREET 559
STREET 560
STREET 561
STREET 562
STREET 563
STREET 564
STREET 565
STREET 566
STREET 567
STREET 568
STREET 569
STREET 570
STREET 571
STREET 572
STREET 573
STREET 574
STREET 575
STREET 576
STREET 577
STREET 578
STREET 579
STREET 580
STREET 581
STREET 582
STREET 583
STREET 584
STREET 585
STREET 586
STREET 587
STREET 588
STREET 589
STREET 590
STREET 591
STREET 592
STREET 593
STREET 594
STREET 595
STREET 596
STREET 597
STREET 598
STREET 599
STREET 600
STREET 601
STREET 602
STREET 603
STREET 604
STREET 605
STREET 606
STREET 607
STREET 608
STREET 609
STREET 610
STREET 611
STREET 612
STREET 613
STREET 614
STREET 615
STREET 616
STREET 617
STREET 618
STREET 619
STREET 620
STREET 621
STREET 622
STREET 623
STREET 624
STREET 625
STREET 626
STREET 627
STREET 628
STREET 629
STREET 630
STREET 631
STREET 632
STREET 633
STREET 634
STREET 635
STREET 636
STREET 637
STREET 638
STREET 639
STREET 640
STREET 641
STREET 642
STREET 643
STREET 644
STREET 645
STREET 646
STREET 647
STREET 648
STREET 649
STREET 650
STREET 651
STREET 652
STREET 653
STREET 654
STREET 655
STREET 656
STREET 657
STREET 658
STREET 659
STREET 660
STREET 661
STREET 662
STREET 663
STREET 664
STREET 665
STREET 666
STREET 667
STREET 668
STREET 669
STREET 670
STREET 671
STREET 672
STREET 673
STREET 674
STREET 675
STREET 676
STREET 677
STREET 678
STREET 679
STREET 680
STREET 681
STREET 682
STREET 683
STREET 684
STREET 685
STREET 686
STREET 687
STREET 688
STREET 689
STREET 690
STREET 691
STREET 692
STREET 693
STREET 694
STREET 695
STREET 696
STREET 697
STREET 698
STREET 699
STREET 700
STREET 701
STREET 702
STREET 703
STREET 704
STREET 705
STREET 706
STREET 707
STREET 708
STREET 709
STREET 710
STREET 711
STREET 712
STREET 713
STREET 714
STREET 715
STREET 716
STREET 717
STREET 718
STREET 719
STREET 720
STREET 721
STREET 722
STREET 723
STREET 724
STREET 725
STREET 726
STREET 727
STREET 728
STREET 729
STREET 730
STREET 731
STREET 732
STREET 733
STREET 734
STREET 735
STREET 736
STREET 737
STREET 738
STREET 739
STREET 740
STREET 741
STREET 742
STREET 743
STREET 744
STREET 745
STREET 746
STREET 747
STREET 748
STREET 749
STREET 750
STREET 751
STREET 752
STREET 753
STREET 754
STREET 755
STREET 756
STREET 757
STREET 758
STREET 759
STREET 760
STREET 761
STREET 762
STREET 763
STREET 764
STREET 765
STREET 766
STREET 767
STREET 768
STREET 769
STREET 770
STREET 771
STREET 772
STREET 773
STREET 774
STREET 775
STREET 776
STREET 777
STREET 778
STREET 779
STREET 780
STREET 781
STREET 782
STREET 783
STREET 784
STREET 785
STREET 786
STREET 787
STREET 788
STREET 789
STREET 790
STREET 791
STREET 792
STREET 793
STREET 794
STREET 795
STREET 796
STREET 797
STREET 798
STREET 799
STREET 800
STREET 801
STREET 802
STREET 803
STREET 804
STREET 805
STREET 806
STREET 807
STREET 808
STREET 809
STREET 810
STREET 811
STREET 812
STREET 813
STREET 814
STREET 815
STREET 816
STREET 817
STREET 818
STREET 819
STREET 820
STREET 821
STREET 822
STREET 823
STREET 824
STREET 825
STREET 826
STREET 827
STREET 828
STREET 829
STREET 830
STREET 831
STREET 832
STREET 833
STREET 834
STREET 835
STREET 836
STREET 837
STREET 838
STREET 839
STREET 840
STREET 841
STREET 842
STREET 843
STREET 844
STREET 845
STREET 846
STREET 847
STREET 848
STREET 849
STREET 850
STREET 851
STREET 852
STREET 853
STREET 854
STREET 855
STREET 856
STREET 857
STREET 858
STREET 859
STREET 860
STREET 861
STREET 862
STREET 863
STREET 864
STREET 865
STREET 866
STREET 867
STREET 868
STREET 869
STREET 870
STREET 871
STREET 872
STREET 873
STREET 874
STREET 875
STREET 876
STREET 877
STREET 878
STREET 879
STREET 880
STREET 881
STREET 882
STREET 883
STREET 884
STREET 885
STREET 886
STREET 887
STREET 888
STREET 889
STREET 890
STREET 891
STREET 892
STREET 893
STREET 894
STREET 895
STREET 896
STREET 897
STREET 898
STREET 899
STREET 900
STREET 901
STREET 902
STREET 903
STREET 904
STREET 905
STREET 906
STREET 907
STREET 908
STREET 909
STREET 910
STREET 911
STREET 912
STREET 913
STREET 914
STREET 915
STREET 916
STREET 917
STREET 918
STREET 919
STREET 920
STREET 921
STREET 922
STREET 923
STREET 924
STREET 925
STREET 926
STREET 927
STREET 928
STREET 929
STREET 930
STREET 931
STREET 932
STREET 933
STREET 934
STREET 935
STREET 936
STREET 937
STREET 938
STREET 939
STREET 940
STREET 941
STREET 942
STREET 943
STREET 944
STREET 945
STREET 946
STREET 947
STREET 948
STREET 949
STREET 950
STREET 951
STREET 952
STREET 953
STREET 954
STREET 955
STREET 956
STREET 957
STREET 958
STREET 959
STREET 960
STREET 961
STREET 962
STREET 963
STREET 964
STREET 965
STREET 966
STREET 967
STREET 968
STREET 969
STREET 970
STREET 971
STREET 972
STREET 973
STREET 974
STREET 975
STREET 976
STREET 977
STREET 978
STREET 979
STREET 980
STREET 981
STREET 982
STREET 983
STREET 984
STREET 985
STREET 986
STREET 987
STREET 988
STREET 989
STREET 990
STREET 991
STREET 992
STREET 993
STREET 994
STREET 995
STREET 996
STREET 997
STREET 998
STREET 999
STREET 1000
STREET 1001
STREET 1002
STREET 1003
STREET 1004
STREET 1005
STREET 1006
STREET 1007
STREET 1008
STREET 1009
STREET 1010
STREET 1011
STREET 1012
STREET 1013
STREET 1014
STREET 1015
STREET 1016
STREET 1017
STREET 1018
STREET 1019
STREET 1020
STREET 1021
STREET 1022
STREET 1023
STREET 1024
STREET 1025
STREET 1026
STREET 1027
STREET 1028
STREET 1029
STREET 1030
STREET 1031
STREET 1032
STREET 1033
STREET 1034
STREET 1035
STREET 1036
STREET 1037
STREET 1038
STREET 1039
STREET 1040
STREET 1041
STREET 1042
STREET 1043
STREET 1044
STREET 1045
STREET 1046
STREET 1047
STREET 1048
STREET 1049
STREET 1050
STREET 1051
STREET 1052
STREET 1053
STREET 1054
STREET 1055
STREET 1056
STREET 1057
STREET 1058
STREET 1059
STREET 1060
STREET 1061
STREET 1062
STREET 1063
STREET 1064
STREET 1065
STREET 1066
STREET 1067
STREET 1068
STREET 1069
STREET 1070
STREET 1071
STREET 1072
STREET 1073
STREET 1074
STREET 1075
STREET 1076
STREET 1077
STREET 1078
STREET 1079
STREET 1080
STREET 1081
STREET 1082
STREET 1083
STREET 1084
STREET 1085
STREET 1086
STREET 1087
STREET 1088
STREET 1089
STREET 1090
STREET 1091
STREET 1092
STREET 1093
STREET 1094
STREET 1095
STREET 1096
STREET 1097
STREET 1098
STREET 1099
STREET 1100
STREET 1101
STREET 1102
STREET 1103
STREET 1104
STREET 1105
STREET 1106
STREET 1107
STREET 1108
STREET 1109
STREET 1110
STREET 1111
STREET 1112
STREET 1113
STREET 1114
STREET 1115
STREET 1116
STREET 1117
STREET 1118
STREET 1119
STREET 1120
STREET 1121
STREET 1122
STREET 1123
STREET 1124
STREET 1125
STREET 1126
STREET 1127
STREET 1128
STREET 1129
STREET 1130
STREET 1131
STREET 1132
STREET 1133
STREET 1134
STREET 1135
STREET 1136
STREET 1137
STREET 1138
STREET 1139
STREET 1140
STREET 1141
STREET 1142
STREET 1143
STREET 1144
STREET 1145
STREET 1146
STREET 1147
STREET 1148
STREET 1149
STREET 1150
STREET 1151
STREET 1152
STREET 1153
STREET 1154
STREET 1155
STREET 1156
STREET 1157
STREET 1158
STREET 1159
STREET 1160
STREET 1161
STREET 1162
STREET 1163
STREET 1164
STREET 1165
STREET 1166
STREET 1167
STREET 1168
STREET 1169
STREET 1170
STREET 1171
STREET 1172
STREET 1173
STREET 1174
STREET 1175
STREET 1176
STREET 1177
STREET 1178
STREET 1179
STREET 1180
STREET 1181
STREET 1182
STREET 1183
STREET 1184
STREET 1185
STREET 1186
STREET 1187
STREET 1188
STREET 1189
STREET 1190
STREET 1191
STREET 1192
STREET 1193
STREET 1194
STREET 1195
STREET 1196
STREET 1197
STREET 1198
STREET 1199
STREET 1200
STREET 1201
STREET 1202
STREET 1203
STREET 1204
STREET 1205
STREET 1206
STREET 1207
STREET 1208
STREET 1209
STREET 1210
STREET 1211
STREET 1212
STREET 1213
STREET 1214
STREET 1215
STREET 1216
STREET 1217
STREET 1218
STREET 1219
STREET 1220
STREET 1221
STREET 1222
STREET 1223
STREET 1224
STREET 1225
STREET 1226
STREET 1227
STREET 1228
STREET 1229
STREET 1230
STREET 1231
STREET 1232
STREET 1233
STREET 1234
STREET 1235
STREET 1236
STREET 1237
STREET 1238
STREET 1239
STREET 1240
STREET 1241
STREET 1242
STREET 1243
STREET 1244
STREET 1245
STREET 1246
STREET 1247
STREET 1248
STREET 1249
STREET 1250
STREET 1251
STREET 1252
STREET 1253
STREET 1254
STREET 1255
STREET 1256
STREET 1257
STREET 1258
STREET 1259
STREET 1260
STREET 1261
STREET 1262
STREET 1263
STREET 1264
STREET 1265
STREET 1266
STREET 1267
STREET 1268
STREET 1269
STREET 1270
STREET 1271
STREET 1272
STREET 1273
STREET 1274
STREET 1275
STREET 1276
STREET 1277
STREET 1278
STREET 1279
STREET 1280
STREET 1281
STREET 1282
STREET 1283
STREET 1284
STREET 1285
STREET 1286
STREET 1287
STREET 1288
STREET 1289
STREET 1290
STREET 1291
STREET 1292
STREET 1293
STREET 1294
STREET 1295
STREET 1296
STREET 1297
STREET 1298
STREET 1299
STREET 1300
STREET 1301
STREET 1302
STREET 1303
STREET 1304
STREET 1305
STREET 1306
STREET 1307
STREET 1308
STREET 1309
STREET 1310
STREET 1311
STREET 1312
STREET 1313
STREET 1314
STREET 1315
STREET 1316
STREET 1317
STREET 1318
STREET 1319
STREET 1320
STREET 1321
STREET 1322
STREET 1323
STREET 1324
STREET 1325
STREET 1326
STREET 1327
STREET 1328
STREET 1329
STREET 1330
STREET 1331
STREET 1332
STREET 1333
STREET 1334
STREET 1335
STREET 1336
STREET 1337
STREET 1338
STREET 1339
STREET 1340
STREET 1341
STREET 1342
STREET 1343
STREET 1344
STREET 1345
STREET 1346
STREET 1347
STREET 1348
STREET 1349
STREET 1350
STREET 1351
STREET 1352
STREET 1353
STREET 1354
STREET 1355
STREET 1356
STREET 1357
STREET 1358
STREET 1359
STREET 1360
STREET 1361
STREET 1362
STREET 1363
STREET 1364
STREET 1365
STREET 1366
STREET 1367
STREET 1368
STREET 1369
STREET 1370
STREET 1371
STREET 1372
STREET 1373
STREET 1374
STREET 1375
STREET 1376
STREET 1377
STREET 1378
STREET 1379
STREET 1380
STREET 1381
STREET 1382
STREET 1383
STREET 1384
STREET 1385
STREET 1386
STREET 1387
STREET 1388
STREET 1389
STREET 1390
STREET 1391
STREET 1392
STREET 1393
STREET 1394
STREET 1395
STREET 1396
STREET 1397
STREET 1398
STREET 1399
STREET 1400
STREET 1401
STREET 1402
STREET 1403
STREET 1404
STREET 1405
STREET 1406
STREET 1407
STREET 1408
STREET 1409
STREET 1410
STREET 1411
STREET 1412
STREET 1413
STREET 1414
STREET 1415
STREET 1416
STREET 1417
STREET 1418
STREET 1419
STREET 1420
STREET 1421
STREET 1422
STREET 1423
STREET 1424
STREET 1425
STREET 1426
STREET 1427
STREET 1428
STREET 1429
STREET 1430
STREET 1431
STREET 1432
STREET 1433
STREET 1434
STREET 1435
STREET 1436
STREET 1437
STREET 1438
STREET 1439
STREET 1440
STREET 1441
STREET 1442
STREET 1443
STREET 1444
STREET 1445
STREET 1446
STREET 1447
STREET 1448
STREET 1449
STREET 1450
STREET 1451
STREET 1452
STREET 1453
STREET 1454
STREET 1455
STREET 1456
STREET 1457
STREET 1458
STREET 1459
STREET 1460
STREET 1461
STREET 1462
STREET 1463
STREET 1464
STREET 1465
STREET 1466
STREET 1467
STREET 1468
STREET 1469
STREET 1470
STREET 1471
STREET 1472
STREET 1473
STREET 1474
STREET 1475
STREET 1476
STREET 1477
STREET 1478
STREET 1479
STREET 1480
STREET 1481
STREET 1482
STREET 1483
STREET 1484
STREET 1485
STREET 1486
STREET 1487
STREET 1488
STREET 1489
STREET 1490
STREET 1491
STREET 1492
STREET 1493
STREET 1494
STREET 1495
STREET 1496
STREET 1497
STREET 1498
STREET 1499
STREET 1500
STREET 1501
STREET 1502
STREET 1503
STREET 1504
STREET 1505
STREET 1506
STREET 1507
STREET 1508
STREET 1509
STREET 1510
STREET 1511
STREET 1512
STREET 1513
STREET 1514
STREET 1515
STREET 1516
STREET 1517
STREET 1518
STREET 1519
STREET 1520
STREET 1521
STREET 1522
STREET 1523
STREET 1524
STREET 1525
STREET 1526
STREET 1527
STREET 1528
STREET 1529
STREET 1530
STREET 1531
STREET 1532
STREET 1533
STREET 1534
STREET 1535
STREET 1536
STREET 1537
STREET 1538
STREET 1539
STREET 1540
STREET 1541
STREET 1542
STREET 1543
STREET 1544
STREET 1545
STREET 1546
STREET 1547
STREET 1548
STREET 1549
STREET 1550
STREET 1551
STREET 1552
STREET 1553
STREET 1554
STREET 1555
STREET 1556
STREET 1557
STREET 1558
STREET 1559
STREET 1560
STREET 1561
STREET 1562
STREET 1563
STREET 1564
STREET 1565
STREET 1566
STREET 1567
STREET 1568
STREET 1569
STREET 1570
STREET 1571
STREET 1572
STREET 1573
STREET 1574
STREET 1575
STREET 1576
STREET 1577
STREET 1578
STREET 1579
STREET 1580
STREET 1581
STREET 1582
STREET 1583
STREET 1584
STREET 1585
STREET 1586
STREET 1587
STREET 1588
STREET 1589
STREET 1590
STREET 1591
STREET 1592
STREET 1593
STREET 1594
STREET 1595
STREET 1596
STREET 1597
STREET 1598
STREET 1599
STREET 1600
STREET 1601
STREET 1602
STREET 1603
STREET 1604
STREET 1605
STREET 1606
STREET 1607
STREET 1608
STREET 1609
STREET 1610
STREET 1611
STREET 1612
STREET 1613
STREET 1614
STREET 1615
STREET 1616
STREET 1617
STREET 1618
STREET 1619
STREET 1620
STREET 1621
STREET 1622
STREET 1623
STREET 1624
STREET 1625
STREET 1626
STREET 1627
STREET 1628
STREET 1629
STREET 1630
STREET 1631
STREET 1632
STREET 1633
STREET 1634
STREET 1635
STREET 1636
STREET 1637
STREET 1638
STREET 1639
STREET 1640
STREET 1641
STREET 1642
STREET 1643
STREET 1644
STREET 1645
STREET 1646
STREET 1647
STREET 1648
STREET 1649
STREET 1650
STREET 1651
STREET 1652
STREET 1653
STREET 1654
STREET 1655
STREET 1656
STREET 1657
STREET 1658
STREET 1659
STREET 1660
STREET 1661
STREET 1662
STREET 1663
STREET 1664
STREET 1665
STREET 1666
STREET 1667
STREET 1668
STREET 1669
STREET 1670
STREET 1671
STREET 1672
STREET 1673
STREET 1674
STREET 1675
STREET 1676
STREET 1677
STREET 1678
STREET 1679
STREET 1680
STREET 1681
STREET 1682
STREET 1683
STREET 1684
STREET 1685
STREET 1686
STREET 1687
STREET 1688
STREET 1689
STREET 1690
STREET 1691
STREET 1692
STREET 1693
STREET 1694
STREET 1695
STREET 1696
STREET 1697
STREET 1698
STREET 1699
STREET 1700
STREET 1701
STREET 1702
STREET 1703
STREET 1704
STREET 1705
STREET 1706
STREET 1707
STREET 1708
STREET 1709
STREET 1710
STREET 1711
STREET 1712
STREET 1713
STREET 1714
STREET 1715
STREET 1716
STREET 1717
STREET 1718
STREET 1719
STREET 1720
STREET 1721
STREET 1722
STREET 1723
STREET 1724
STREET 1725
STREET 1726
STREET 1727
STREET 1728
STREET 1729
STREET 1730
STREET 1731
STREET 1732
STREET 1733
STREET 1734
STREET 1735
STREET 1736
STREET 1737
STREET 1738
STREET 1739
STREET 1740
STREET 1741
STREET 1742
STREET 1743
STREET 1744
STREET 1745
STREET 1746
STREET 1747
STREET 1748
STREET 1749
STREET 1750
STREET 1751
STREET 1752
STREET 1753
STREET 1754
STREET 1755
STREET 1756
STREET 1757
STREET 1758
STREET 1759
STREET 1760
STREET 1761
STREET 1762
STREET 1763
STREET 1764
STREET 1765
STREET 1766
STREET 1767
STREET 1768
STREET 1769
STREET 1770
STREET 1771
STREET 1772
STREET 1773
STREET 1774
STREET 1775
STREET 1776
STREET 1777
STREET 1778
STREET 1779
STREET 1780
STREET 1781
STREET 1782
STREET 1783
STREET 1784
STREET 1785
STREET 1786
STREET 1787
STREET 1788
STREET 1789
STREET 1790
STREET 1791
STREET 1792
STREET 1793
STREET 1794
STREET 1795
STREET 1796
STREET 1797
STREET 1798
STREET 1799
STREET 1800
STREET 1801
STREET 1802
STREET 1803
STREET 1804
STREET 1805
STREET 1806
STREET 1807
STREET 1808
STREET 1809
STREET 1810
STREET 1811
STREET 1812
STREET 1813
STREET 1814
STREET 1815
STREET 1816
STREET 1817
STREET 1818
STREET 1819
STREET 1820
STREET 1821
STREET 1822
STREET 1823
STREET 1824
STREET 1825
STREET 1826
STREET 1827
STREET 1828
STREET 1829
STREET 1830
STREET 1831
STREET 1832
STREET 1833
STREET 1834
STREET 1835
STREET 1836
STREET 1837
STREET 1838
STREET 1839
STREET 1840
STREET 1841
STREET 1842
STREET 1843
STREET 1844
STREET 1845
STREET 1846
STREET 1847
STREET 1848
STREET 1849
STREET 1850
STREET 1851
STREET 1852
STREET 1853
STREET 1854
STREET 1855
STREET 1856
STREET 1857
STREET 1858
STREET 1859
STREET 1860
STREET 1861
STREET 1862
STREET 1863
STREET 1864
STREET 1865
STREET 1866
STREET 1867
STREET 1868
STREET 1869
STREET 1870
STREET 1871
STREET 1872
STREET 1873
STREET 1874
STREET 1875
STREET 1876
STREET 1877
STREET 1878
STREET 1879
STREET 1880
STREET 1881
STREET 1882
STREET 1883
STREET 1884
STREET 1885
STREET 1886
STREET 1887
STREET 1888
STREET 1889
STREET 1890
STREET 1891
STREET 1892
STREET 1893
STREET 1894
STREET 1895
STREET 1896
STREET 1897
STREET 1898
STREET 1899
STREET 1900
STREET 1901
STREET 1902
STREET 1903
STREET 1904
STREET 1905
STREET 1906
STREET 1907
STREET 1908
STREET 1909
STREET 1910
STREET 1911
STREET 1912
STREET 1913
STREET 1914
STREET 1915
STREET 1916
STREET 1917
STREET 1918
STREET 1919
STREET 1920
STREET 1921
STREET 1922
STREET 1923
STREET 1924
STREET 1925
STREET 1926
STREET 1927
STREET 1928
STREET 1929
STREET 1930
STREET 1931
STREET 1932
STREET 1933
STREET 1934
STREET 1935
STREET 1936
STREET 1937
STREET 1938
STREET 1939
STREET 1940
STREET 1941
STREET 1942
STREET 1943
STREET 1944
STREET 1945
STREET 1946
STREET 1947
STREET 1948
STREET 1949
STREET 1950
STREET 1951
STREET 1952
STREET 1953
STREET 1954
STREET 1955
STREET 1956
STREET 1957
STREET 1958
STREET 1959
STREET 1960
STREET 1961
STREET 1962
STREET 1963
STREET 1964
STREET 1965
STREET 1966
STREET 1967
STREET 1968
STREET 1969
STREET 1970
STREET 1971
STREET 1972
STREET 1973
STREET 1974
STREET 1975
STREET 1976
STREET 1977
STREET 1978
STREET 1979
STREET 1980
STREET 1981
STREET 1982
STREET 1983
STREET 1984
STREET 1985
STREET 1986
STREET 1987
STREET 1988
STREET 1989
STREET 1990
STREET 1991
STREET 1992
STREET 1993
STREET 1994
STREET 1995
STREET 1996
STREET 1997
STREET 1998
STREET 1999
STREET 2000
STREET 2001
STREET 2002
STREET 2003
STREET 2004
STREET 2005
STREET 2006
STREET 2007
STREET 2008
STREET 2009
STREET 2010
STREET 2011
STREET 2012
STREET 2013
STREET 2014
STREET 2015
STREET 2016
STREET 2017
STREET 2018
STREET 2019
STREET 2020
STREET 2021
STREET 2022
STREET 2023
STREET 2024
STREET 2025
STREET 2026
STREET 2027
STREET 2028
STREET 2029
STREET 2030
STREET 2031
STREET 2032
STREET 2033
STREET 2034
STREET 2035
STREET 2036
STREET 2037
STREET 2038
STREET 2039
STREET 2040
STREET 2041
STREET 2042
STREET 2043
STREET 2044
STREET 2045
STREET 2046
STREET 2047
STREET 2048
STREET 2049
STREET 2050
STREET 2051
STREET 2052
STREET 2053
STREET 2054
STREET 2055
STREET 2056
STREET 2057
STREET 2058
STREET 2059
STREET 2060
STREET 2061
STREET 2062
STREET 2063
STREET 2064
STREET 2065
STREET 2066
STREET 2067
STREET 2068
STREET 2069
STREET 2070
STREET 2071
STREET 2072
STREET 2073
STREET 2074
STREET 2075
STREET 2076
STREET 2077
STREET 2078
STREET 2079
STREET 2080
STREET 2081
STREET 2082
STREET 2083
STREET 2084
STREET 2085
STREET 2086
STREET 2087
STREET 2088
STREET 2089
STREET 2090
STREET 2091
STREET 2092
STREET 2093
STREET 2094
STREET 2095
STREET 2096
STREET 2097
STREET 2098
STREET 2099
STREET 2100
STREET 2101
STREET 2102
STREET 2103
STREET 2104
STREET 2105
STREET 2106
STREET 2107
STREET 2108
STREET 2109
STREET 2110
STREET 2111
STREET 2112
STREET 2113
STREET 2114
STREET 2115
STREET 2116
STREET 2117
STREET 2118
STREET 2119
STREET 2120
STREET 2121
STREET 2122
STREET 2123
STREET 2124
STREET 2125
STREET 2126
STREET 2127
STREET 2128
STREET 2129
STREET 2130
STREET 2131
STREET 2132
STREET 2133
STREET 2134
STREET 2135
STREET 2136
STREET 2137
STREET 2138
STREET 2139
STREET 2140
STREET 2141
STREET 2142
STREET 2143
STREET 2144
STREET 2145
STREET 2146
STREET 2147
STREET 2148
STREET 2149
STREET 2150
STREET 2151
STREET 2152
STREET 2153
STREET 2154
STREET 2155
STREET 2156
STREET 2157
STREET 2158
STREET 2159
STREET 2160
STREET 2161
STREET 2162
STREET 2163
STREET 2164
STREET 2165
STREET 2166
STREET 2167
STREET 2168
STREET 2169
STREET 2170
STREET 2171
STREET 2172
STREET 2173
STREET 2174
STREET 2175
STREET 2176
STREET 2177
STREET 2178
STREET 2179
STREET 2180
STREET 2181
STREET 2182
STREET 2183
STREET 2184
STREET 2185
STREET 2186
STREET 2187
STREET 2188
STREET 2189
STREET 2190
STREET 2191
STREET 2192
STREET 2193
STREET 2194
STREET 2195
STREET 2196
STREET 2197
STREET 2198
STREET 2199
STREET 2200
STREET 2201
STREET 2202
STREET 2203
STREET 2204
STREET 2205
STREET 2206
STREET 2207
STREET 2208
STREET 2209
STREET 2210
STREET 2211
STREET 2212
STREET 2213
STREET 2214
STREET 2215
STREET 2216
STREET 2217
STREET 2218
STREET 2219
STREET 2220
STREET 2221
STREET 2222
STREET 2223
STREET 2224
STREET 2225
STREET 2226
STREET 2227
STREET 2228
STREET 2229
STREET 2230
STREET 2231
STREET 2232
STREET 2233
STREET 2234
STREET 2235
STREET 2236
STREET 2237
STREET 2238
STREET 2239
STREET 2240
STREET 2241
STREET 2242
STREET 2243
STREET 2244
STREET 2245
STREET 2246
STREET 2247
STREET 2248
STREET 2249
STREET 2250
STREET 2251
STREET 2252
STREET 2253
STREET 2254
STREET 2255
STREET 2256
STREET 2257
STREET 2258
STREET 2259
STREET 2260
STREET 2261
STREET 2262
STREET 2263
STREET 2264
STREET 2265
STREET 2266
STREET 2267
STREET 2268
STREET 2269
STREET 2270
STREET 2271
STREET 2272
STREET 2273
STREET 2274
STREET 2275
STREET 2276
STREET 2277
STREET 2278
STREET 2279
STREET 2280
STREET 2281
STREET 2282
STREET 2283
STREET 2284
STREET 2285
STREET 2286
STREET 2287
STREET 2288
STREET 2289
STREET 2290
STREET 2291
STREET 2292
STREET 2293
STREET 2294
STREET 2295
STREET 2296
STREET 2297
STREET 2298
STREET 2299
STREET 2300
STREET 2301
STREET 2302
STREET 2303
STREET 2304
STREET 2305
STREET 2306
STREET 2307
STREET 2308
STREET 2309
STREET 2310
STREET 2311
STREET 2312
STREET 2313
STREET 2314
STREET 2315
STREET 2316
STREET 2317
STREET 2318
STREET 2319
STREET 2320
STREET 2321
STREET 2322
STREET 2323
STREET 2324
STREET 2325
STREET 2326
STREET 2327
STREET 2328
STREET 2329
STREET 2330
STREET 2331
STREET 2332
STREET 2333
STREET 2334
STREET 2335
STREET 2336
STREET 2337
STREET 2338
STREET 2339
STREET 2340
STREET 2341
STREET 2342
STREET 2343
STREET 2344
STREET 2345
STREET 2346
STREET 2347
STREET 2348
STREET 2349
STREET 2350
STREET 2351
STREET 2352
STREET 2353
STREET 2354
STREET 2355
STREET 2356
STREET 2357
STREET 2358
STREET 2359
STREET 2360
STREET 2361
STREET 2362
STREET 2363
STREET 2364
STREET 2365
STREET 2366
STREET 2367
STREET 2368
STREET 2369
STREET 2370
STREET 2

Table E-1: Criteria for Required Storage Volumes Under Interim B Conditions

Pond	Area (ha)	Imperviousness (%)	Storage Volume for Impervious Level [1] (m^3/ha)
N/A	N/A	35	90
SWM Pond 1	372.298	42	97.00
N/A	N/A	55	110

[1] Protection Level for Wet Pond: Normal 70% long-term S.S. removal.
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

Table E-2: Required Storage Volumes for SWM Facility Under Interim B Conditions

Pond Component	Required Volume (m^3)	Provided Volume [4] (m^3)	Volume Ratio	Provided Area [5] (m^2)	Provided Elevation (m)
Permanent Pool (PP) [1]	21221	36400	1.72	35421	Variable [7]
Quality Control [2]	14892	14892	1.00	N/A	80.684
Extended Detention [3]	33922	43988	1.30	N/A	81.650
Forebay (20% PP)	N/A	N/A	N/A	11212.4	Variable [7]
PP - Forebay	N/A	N/A	N/A	24208	Variable [7]
			Area Ratio (%) [6] =	32	

[1] Required PP volume based on Table E-1 (97.00 - 40 = 57.00 m^3/ha).
[2] Required quality control volume based on 40 m^3/ha.
[3] Required extended detention volume based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.
[4] Provided volume based on stage-storage curve and extended detention (refer to Tables E-3 and E-4).
[5] Based on grading plan provided by DSEL (refer to Figure 2).
[6] As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.
[7] Permanent pool elevations are 80.10 m in the main cell, 81.60 m in the north forebay and 81.50 m in the south forebay.

Table E-3: Extended Detention Parameters for SWM Facility Under Interim B Conditions

			Quality Orifice Parameters	
Area (C3)	24208.20	m^2	Diameter 0.400	m
Volume	36400.40	m^3		
PP Elev	80.100	m	Area 0.126	m^2
QC Elev	80.684	m	Invert 80.100	m
h (m)	0.584	m	C_o 0.62	

Notes:
- C3 is the intercept from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- h is the maximum water elevation above the orifice (m).

Table E-4: Extended Detention Drawdown Time for SWM Facility Under Interim B Conditions (Existing Controls)

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
80.100	**0.0**	**24208.2**	**0.00**				**0.000**	**PP Elev (Main)**
80.150	1219.2	24453.2	0.05	4900	8.73	0.36	0.019	
80.200	2448.4	24672.4	0.10	4642	12.38	0.52	0.038	
80.250	3687.2	24882.3	0.15	4494	15.21	0.63	0.057	
80.300	4931.9	25091.0	0.20	4414	17.61	0.73	0.075	
80.350	6196.0	25302.1	0.25	4376	19.75	0.82	0.094	
80.400	7507.8	25553.4	0.30	4484	21.71	0.90	0.112	
80.450	8742.2	25921.8	0.35	4896	23.56	0.98	0.130	
80.500	10038.4	25925.1	0.40	4292	25.19	1.05	0.147	
80.550	11335.4	25939.8	0.45	3848	26.72	1.11	0.165	
80.600	12653.7	26378.5	0.50	4341	28.33	1.18	0.181	
80.650	13983.1	26657.4	0.55	4453	29.83	1.24	0.195	
80.684	**14892.0**	**26831.1**	**0.58**	**4492**	**30.80**	**1.28**	**0.204**	**QC Elev**
80.700	15323.5	26913.6	0.60	4509	31.26	1.30	0.209	
80.750	16675.6	27152.6	0.65	4530	32.64	1.36	0.221	
80.800	18031.5	27386.6	0.70	4541	33.97	1.42	0.233	
80.850	19415.8	27631.9	0.75	4565	35.28	1.47	0.245	
80.900	20845.4	27913.0	0.80	4631	36.57	1.52	0.255	
80.950	22194.0	28324.5	0.85	4843	37.89	1.58	0.266	
81.000	23610.8	28336.7	0.90	4587	39.00	1.62	0.276	
81.050	25028.8	28361.2	0.95	4372	40.08	1.67	0.286	
81.100	26464.1	28707.0	1.00	4499	41.30	1.72	0.295	
81.150	27908.4	28942.1	1.05	4508	42.45	1.77	0.304	
81.200	29360.8	29142.3	1.10	4486	43.56	1.82	0.313	
81.250	30815.5	29338.0	1.15	4461	44.65	1.86	0.321	
81.300	32295.1	29535.6	1.20	4439	45.73	1.91	0.330	
81.350	33777.2	29736.9	1.25	4423	46.79	1.95	0.338	
81.400	35307.4	29972.4	1.30	4434	47.86	1.99	0.346	
81.450	36764.7	30324.9	1.35	4531	48.99	2.04	0.354	
81.500	**38275.7**	**35486.6**	**1.40**	**8056**	**53.13**	**2.21**	**0.361**	**PP Elev (SFore)**
81.550	40062.1	35627.9	1.45	7876	54.16	2.26	0.369	
81.600	**41866.2**	**42142.6**	**1.50**	**11956**	**59.32**	**2.47**	**0.376**	**PP Elev (NFore)**
81.650	**43987.5**	**42516.9**	**1.55**	**11812**	**60.54**	**2.52**	**0.383**	**Ext. Det.**
81.700	46121.5	42829.6	1.60	11638	61.72	2.57	0.390	
81.750	48270.9	43143.8	1.65	11476	62.89	2.62	0.397	

Table E-4: Extended Detention Drawdown Time for SWM Facility Under Interim B Conditions (Existing Controls)

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
81.800	50436.7	43457.5	1.70	11323	64.06	2.67	0.404	
81.850	52614.8	43779.8	1.75	11184	65.22	2.72	0.411	
81.900	54874.0	44141.0	1.80	11074	66.40	2.77	0.417	
81.950	57016.8	44692.9	1.85	11073	67.72	2.82	0.424	
82.000	59250.7	44700.3	1.90	10785	68.63	2.86	0.430	
82.050	61533.8	45651.1	1.95	10996	70.23	2.93	0.436	
82.100	63847.2	46277.0	2.00	11034	71.60	2.98	0.442	

Notes:
- C2 is the slope coefficient from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.

Table E-5: Stage-Storage-Outflow Curve for SWM Facility Under Interim B Conditions (Existing Controls)

			Quality Control 1		Quantity Control 1		Quantity Control 2		Quantity Control 3		Quantity Control 4			
			Vertical Orifice		Rectangular Weir		Rectangular Weir		Rectangular Weir		Rectangular Weir			
			Dia (m)	0.400	L (m)	1.000	L (m)	3.000	L (m)	1.500	L (m)	1.500		
			Area (m^2)	0.126										
			Invert (m)	80.10	C_w	1.800	C_w	1.800	C_w	1.800	C_w	1.800		
			C_o	0.62	Invert (m)	81.65	Invert (m)	82.35	Invert (m)	82.35	Invert (m)	82.35		
			Q @ D	0.154	n contr.	2	n contr.	2	n contr.	2	n contr.	2		
Elevation (m)	Active Sto. (m^3)	Demarkation Points	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Outflow (m^3/s)	Storage (ha·m)
80.100	**0**	**PP Elev (Main)**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
80.150	1219		0.050	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.122
80.200	2448		0.100	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.245
80.250	3687		0.150	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.369
80.300	4932		0.200	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.493
80.350	6196		0.250	0.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.094	0.620
80.400	7508		0.300	0.112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.751
80.450	8742		0.350	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.130	0.874
80.500	10038		0.400	0.147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.147	1.004
80.550	11335		0.450	0.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.165	1.134
80.600	12654		0.500	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.181	1.265
80.650	13983		0.550	0.195	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.195	1.398
80.684	**14892**	**QC Elev**	**0.584**	**0.204**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.204**	**1.489**
80.700	15324		0.600	0.209	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.209	1.532
80.750	16676		0.650	0.221	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.221	1.668
80.800	18032		0.700	0.233	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.233	1.803
80.850	19416		0.750	0.245	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.245	1.942
80.900	20845		0.800	0.255	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.255	2.085
80.950	22194		0.850	0.266	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.266	2.219
81.000	23611		0.900	0.276	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.276	2.361
81.050	25029		0.950	0.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.286	2.503
81.100	26464		1.000	0.295	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.295	2.646
81.150	27908		1.050	0.304	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.304	2.791
81.200	29361		1.100	0.313	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.313	2.936
81.250	30816		1.150	0.321	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.321	3.082
81.300	32295		1.200	0.330	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.330	3.230
81.350	33777		1.250	0.338	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.338	3.378
81.400	35307		1.300	0.346	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.346	3.531
81.450	36765		1.350	0.354	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	3.676
81.500	**38276**	**PP Elev (South)**	**1.400**	**0.361**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.361**	**3.828**
81.550	40062		1.450	0.369	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.369	4.006
81.600	**41866**	**PP Elev (North)**	**1.500**	**0.376**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.376**	**4.187**
81.650	**43988**	**Ext. Det.**	**1.550**	**0.383**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.383**	**4.399**

Table E-5: Stage-Storage-Outflow Curve for SWM Facility Under Interim B Conditions (Existing Controls)

			Quality Control 1		Quantity Control 1		Quantity Control 2		Quantity Control 3		Quantity Control 4			
			Vertical Orifice		Rectangular Weir		Rectangular Weir		Rectangular Weir		Rectangular Weir			
			Dia (m)	0.400	L (m)	1.000	L (m)	3.000	L (m)	1.500	L (m)	1.500		
			Area (m^2)	0.126										
			Invert (m)	80.10	C_w	1.800	C_w	1.800	C_w	1.800	C_w	1.800		
			C_o	0.62	Invert (m)	81.65	Invert (m)	82.35	Invert (m)	82.35	Invert (m)	82.35		
			Q @ D	0.154	n contr.	2	n contr.	2	n contr.	2	n contr.	2		
Elevation (m)	Active Sto. (m^3)	Demarkation Points	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Outflow (m^3/s)	Storage (ha·m)
81.700	46122		1.600	0.390	0.050	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.410	4.612
81.750	48271		1.650	0.397	0.100	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.453	4.827
81.800	50437		1.700	0.404	0.150	0.101	0.000	0.000	0.000	0.000	0.000	0.000	0.505	5.044
81.850	52615		1.750	0.411	0.200	0.155	0.000	0.000	0.000	0.000	0.000	0.000	0.565	5.261
81.900	54874		1.800	0.417	0.250	0.214	0.000	0.000	0.000	0.000	0.000	0.000	0.631	5.487
81.950	57017		1.850	0.424	0.300	0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.702	5.702
82.000	59251		1.900	0.430	0.350	0.347	0.000	0.000	0.000	0.000	0.000	0.000	0.777	5.925
82.050	61534		1.950	0.436	0.400	0.419	0.000	0.000	0.000	0.000	0.000	0.000	0.855	6.153
82.100	63847		2.000	0.442	0.450	0.494	0.000	0.000	0.000	0.000	0.000	0.000	0.937	6.385
82.150	66177		2.050	0.449	0.500	0.573	0.000	0.000	0.000	0.000	0.000	0.000	1.021	6.618
82.200	68518		2.100	0.455	0.550	0.653	0.000	0.000	0.000	0.000	0.000	0.000	1.108	6.852
82.250	70885		2.150	0.460	0.600	0.736	0.000	0.000	0.000	0.000	0.000	0.000	1.197	7.089
82.300	73266		2.200	0.466	0.650	0.821	0.000	0.000	0.000	0.000	0.000	0.000	1.287	7.327
82.350	**75666**		**2.250**	**0.472**	**0.700**	**0.907**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**1.379**	**7.567**
82.400	78151		2.300	0.478	0.750	*0.907*	0.050	0.060	0.050	0.030	0.050	0.030	1.505	7.815
82.450	80507		2.350	0.484	0.800	*0.907*	0.100	0.170	0.100	0.084	0.100	0.084	1.728	8.051
82.500	82968		2.400	0.489	0.850	*0.907*	0.150	0.311	0.150	0.154	0.150	0.154	2.014	8.297
82.550	85443		2.450	0.495	0.900	*0.907*	0.200	0.477	0.200	0.235	0.200	0.235	2.348	8.544
82.600	87947		2.500	0.500	0.950	*0.907*	0.250	0.664	0.250	0.326	0.250	0.326	2.723	8.795
82.650	90467		2.550	0.506	1.000	*0.907*	0.300	0.870	0.300	0.426	0.300	0.426	3.133	9.047
82.700	92991		2.600	0.511	1.050	*0.907*	0.350	1.092	0.350	0.533	0.350	0.533	3.575	9.299
82.750	95541		2.650	0.516	1.100	*0.907*	0.400	1.330	0.400	0.647	0.400	0.647	4.046	9.554
82.800	98121		2.700	0.521	1.150	*0.907*	0.450	1.581	0.450	0.766	0.450	0.766	4.541	9.812
82.850	100710		2.750	0.527	1.200	*0.907*	0.500	1.846	0.500	0.891	0.500	0.891	5.061	10.071
82.900	103374		2.800	0.532	1.250	*0.907*	0.550	2.122	0.550	1.021	0.550	1.021	5.601	10.337
82.950	105922		2.850	0.537	1.300	*0.907*	0.600	2.409	0.600	1.154	0.600	1.154	6.162	10.592
83.000	**108567**	**100-Year**	**2.900**	**0.542**	**1.350**	***0.907***	**0.650**	**2.707**	**0.650**	**1.292**	**0.650**	**1.292**	**6.740**	**10.857**
83.050	111257		2.950	0.547	1.400	*0.907*	0.700	3.015	0.700	1.434	0.700	1.434	7.336	11.126
83.100	113981		3.000	0.552	1.450	*0.907*	0.750	3.332	0.750	1.578	0.750	1.578	7.947	11.398
83.150	115245		3.050	0.557	1.500	*0.907*	0.800	3.658	0.800	1.726	0.800	1.726	8.573	11.525
83.200	116522		3.100	0.562	1.550	*0.907*	0.850	3.992	0.850	1.876	0.850	1.876	9.212	11.652
83.250	117806		3.150	0.566	1.600	*0.907*	0.900	4.334	0.900	2.029	0.900	2.029	9.864	11.781
83.300	119098		3.200	0.571	1.650	*0.907*	0.950	4.683	0.950	2.183	0.950	2.183	10.528	11.910

Table E-5: Stage-Storage-Outflow Curve for SWM Facility Under Interim B Conditions (Existing Controls)

			Quality Control 1		Quantity Control 1		Quantity Control 2		Quantity Control 3		Quantity Control 4			
			Vertical Orifice		Rectangular Weir		Rectangular Weir		Rectangular Weir		Rectangular Weir			
			Dia (m)	0.400	L (m)	1.000	L (m)	3.000	L (m)	1.500	L (m)	1.500		
			Area (m^2)	0.126										
			Invert (m)	80.10	C_w	1.800	C_w	1.800	C_w	1.800	C_w	1.800		
			C_o	0.62	Invert (m)	81.65	Invert (m)	82.35	Invert (m)	82.35	Invert (m)	82.35		
			Q @ D	0.154	n contr.	2	n contr.	2	n contr.	2	n contr.	2		
Elevation (m)	Active Sto. (m^3)	Demarkation Points	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Outflow (m^3/s)	Storage (ha·m)
83.350	120419		3.250	0.576	1.700	*0.907*	1.000	5.040	1.000	2.340	1.000	2.340	11.202	12.042
83.400	130762		3.300	0.581	1.750	*0.907*	1.050	5.403	1.050	2.498	1.050	2.498	11.887	13.076
83.450	133548		3.350	0.585	1.800	*0.907*	1.100	5.773	1.100	2.658	1.100	2.658	12.581	13.355
83.500	**136424**	**Top of Berm**	**3.400**	**0.590**	**1.850**	***0.907***	**1.150**	**6.149**	**1.150**	**2.819**	**1.150**	**2.819**	**13.284**	**13.642**

Notes :

- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.
- 100-Year indicates the elevation of the maximum allowable 100-year water level in the main pond cell.
- Top of Berm indicates the elevation at the top of the berm.
- Head losses for reverse grade pipe included in quality control outflow calculations.

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
To SWM Facility 1			
A101a	0.820	86	70.520
A101b	3.090	86	265.740
A101c	3.400	86	292.400
A103a	1.050	86	90.300
A103b	2.820	86	242.520
A103c	3.410	86	293.260
A108a	1.880	86	161.680
A110a	0.750	71	53.250
A112a	0.570	71	40.470
A112b	1.300	86	111.800
A112c	1.600	71	113.600
A112d	2.220	86	190.920
A112e	2.790	86	239.940
A201a	0.900	71	63.900
A202a	4.630	71	328.730
A203a	0.920	64	58.880
A204a	0.340	64	21.760
A205a	3.780	64	241.920
A206a	1.110	64	71.040
A207a	1.040	64	66.560
A208a	0.630	71	44.730
A209a	0.480	71	34.080
A1101a	0.180	86	15.480
A1101b	0.540	86	46.440
A1101c	0.790	86	67.940
A1101d	0.830	64	53.120
A1101e	1.510	64	96.640
A1101f	1.910	71	135.610
A1102a	5.200	71	369.200
A2001a	0.890	71	63.190
A2070a	1.160	64	74.240
A2071a	2.410	86	207.260
A2071b	3.410	29	98.890
A2071c	4.830	71	342.930
A2090a	0.180	71	12.780
ABLK246	2.890	64	184.960
AR114	0.110	49	5.390
AR113	0.130	49	6.370
AR112A	0.170	49	8.330
AS112A	0.140	73	10.220
AS113	0.340	73	24.820
AS112B	0.060	73	4.380
AS101	0.200	73	14.600
AS102	0.180	73	13.140
AP104	0.420	0	0.000
AS106	0.150	73	10.950
AS114	0.290	73	21.170
AS104	0.100	73	7.300
AR112B	0.090	49	4.410
AR104	0.220	49	10.780
AS3901E	0.270	86	23.220
AS3900B	0.220	86	18.920
AS54E	0.170	86	14.620
AS55AE	0.120	86	10.320

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
AS55BE	0.110	86	9.460
AS55C	0.080	86	6.880
AS56E	0.170	86	14.620
AS3901W	0.190	86	16.340
AS54W	0.110	86	9.460
AS55AW	0.096	86	8.256
AS55BW	0.096	86	8.256
AS56W	0.097	86	8.342
AEXT2A	1.516	100	151.600
AEXT2B	0.720	49	35.280
AS500C	0.310	86	26.660
AS500	0.260	86	22.360
AS307	0.250	73	18.250
AS311	0.430	73	31.390
AS312	0.350	73	25.550
AS306	0.390	73	28.470
AR301B	0.160	49	7.840
AS301	0.360	73	26.280
AS303	0.310	73	22.630
AS304	0.280	73	20.440
AR312A	0.330	49	16.170
AR312B	0.110	49	5.390
AR301A	0.150	49	7.350
AR301C	0.120	49	5.880
AR301D	0.100	49	4.900
AS314	0.170	73	12.410
AR305	0.170	49	8.330
AR402B	0.130	49	6.370
AR402A	0.130	49	6.370
AS400e	0.030	71	2.130
AS400A	0.100	71	7.100
AS400B	0.100	71	7.100
AS400C	0.120	71	8.520
AS400D	0.070	71	4.970
AS401A	0.060	71	4.260
AS401B	0.110	71	7.810
AS401C	0.290	71	20.590
AS401E	0.020	71	1.420
AS402A	0.510	71	36.210
AS402C	0.340	71	24.140
AS402G	0.110	71	7.810
AS404	0.160	70	11.200
A21	0.630	86	54.180
AS410A	0.210	86	18.060
AS410B	0.090	86	7.740
AR410A	1.830	42	76.860
AR410B	0.480	42	20.160
A402I	0.760	63	47.880
A055a	2.200	64	140.800
A101d	8.400	86	722.400
A401b	7.910	71	561.610
A560b	4.990	64	319.360
A2110a	1.040	71	73.840
A2110b	3.240	86	278.640
A039NE	0.017	75	1.275

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A039NW	0.046	74	3.404
A039SE	0.021	84	1.764
A039SW	0.023	57	1.311
A019a	1.550	29	44.950
A001N1	0.038	47	1.786
A001N2	0.047	36	1.692
A001NE	0.029	48	1.392
A001NW	0.017	47	0.799
A001R1	0.034	18	0.612
A001S1	0.057	54	3.078
A001S2	0.011	55	0.605
A001SE	0.047	62	2.914
A001SW	0.039	64	2.496
A003R1	0.040	20	0.800
A003R2	0.176	15	2.640
A004NE	0.098	66	6.468
A004NW	0.054	46	2.484
A004SW	0.024	42	1.008
A005NE	0.030	47	1.410
A005NW	0.018	50	0.900
A005SE	0.186	71	13.206
A005SW	0.130	80	10.400
A005W1	0.039	41	1.599
A006NE	0.105	71	7.455
A006NW	0.031	77	2.387
A006SE	0.142	76	10.792
A006SW	0.127	81	10.287
A007E1	0.117	74	8.658
A007E2	0.131	76	9.956
A007N1	0.063	84	5.292
A007NE	0.023	48	1.104
A007NW	0.045	62	2.790
A007R1	0.183	17	3.111
A007R2	0.036	19	0.684
A007S1	0.020	90	1.800
A007SE	0.021	52	1.092
A007SW	0.064	55	3.520
A008NE	0.039	33	1.287
A008NW	0.045	42	1.890
A008R1	0.027	19	0.513
A008R2	0.178	19	3.382
A008R3	0.153	18	2.754
A008SE	0.021	33	0.693
A008SW	0.026	42	1.092
A009E1	0.090	70	6.300
A009E2	0.039	72	2.808
A009N1	0.018	50	0.900
A009N2	0.027	48	1.296
A009N3	0.028	29	0.812
A009NE	0.054	70	3.780
A009NW	0.027	63	1.701
A009SE	0.049	84	4.116
A009SW	0.044	70	3.080
A009W1	0.086	74	6.364
A009W2	0.037	70	2.590

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A010NE	0.080	66	5.280
A010NW	0.080	71	5.680
A010S1	0.151	75	11.325
A010S2	0.151	75	11.325
A010SE	0.052	83	4.316
A010SW	0.052	75	3.900
A010W1	0.035	69	2.415
A011NE	0.076	82	6.232
A011NW	0.036	69	2.484
A011SW	0.189	77	14.553
A012NE	0.033	58	1.914
A012NW	0.055	65	3.575
A012SE	0.089	74	6.586
A012SW	0.040	80	3.200
A013N1	0.031	39	1.209
A013N2	0.029	86	2.494
A013NE	0.073	78	5.694
A013NW	0.037	78	2.886
A013S1	0.058	38	2.204
A013S2	0.062	79	4.898
A013SE	0.068	72	4.896
A013SW	0.042	74	3.108
A015N1	0.019	47	0.893
A015N2	0.010	40	0.400
A015NE	0.063	51	3.213
A015NW	0.057	70	3.990
A015S1	0.029	31	0.899
A015S2	0.007	43	0.301
A015SE	0.028	68	1.904
A015SW	0.081	74	5.994
A017NE	0.021	76	1.596
A017NW	0.168	76	12.768
A017SE	0.021	71	1.491
A017SW	0.048	73	3.504
A018DV1	0.621	74	45.954
A018NE	0.040	70	2.800
A018NW	0.045	56	2.520
A018R1	0.153	20	3.060
A018R2	0.114	21	2.394
A018R3	0.082	21	1.722
A018SE	0.021	71	1.491
A018SW	0.026	50	1.300
A019b	0.073	73	5.329
A019DV1	0.084	59	4.956
A019E1	0.040	70	2.800
A019E2	0.022	73	1.606
A019N1	0.035	69	2.415
A019N2	0.064	77	4.928
A019N3	0.027	63	1.701
A019N4	0.082	76	6.232
A019NE	0.040	85	3.400
A019NW	0.023	61	1.403
A019R1	0.198	22	4.356
A019R2	0.080	16	1.280
A019S1	0.035	77	2.695

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A019S2	0.066	70	4.620
A019S3	0.029	72	2.088
A019S4	0.083	72	5.976
A019SE	0.020	70	1.400
A019SW	0.026	50	1.300
A019W1	0.071	83	5.893
A019W2	0.065	72	4.680
A020E1	0.042	71	2.982
A020N1	0.066	52	3.432
A020N2	0.040	70	2.800
A020N3	0.049	57	2.793
A020NE	0.059	68	4.012
A020NW	0.064	67	4.288
A020S1	0.046	72	3.312
A020S2	0.022	68	1.496
A020SE	0.068	82	5.576
A020SW	0.068	75	5.100
A020W1	0.086	74	6.364
A020W2	0.047	66	3.102
A021NE	0.076	71	5.396
A021NW	0.122	67	8.174
A021SE	0.054	75	4.050
A021SW	0.073	63	4.599
A023N1	0.024	83	1.992
A023N2	0.059	73	4.307
A023NE	0.060	73	4.380
A023NW	0.032	84	2.688
A023R1	0.048	17	0.816
A023R2	0.130	18	2.340
A023R3	0.147	17	2.499
A023R4	0.116	20	2.320
A023S1	0.022	41	0.902
A023S2	0.048	46	2.208
A023SE	0.066	67	4.422
A023SW	0.026	81	2.106
A025NE	0.042	55	2.310
A025NW	0.094	55	5.170
A025SE	0.030	83	2.490
A025SW	0.020	45	0.900
A028R1	0.478	8	3.824
A029NE	0.050	66	3.300
A029NW	0.015	53	0.795
A029R1	0.129	11	1.419
A029R2	0.156	18	2.808
A029R3	0.028	23	0.644
A029R4	0.110	21	2.310
A029R5	0.211	20	4.220
A029R6	0.048	10	0.480
A029S1	0.074	42	3.108
A029S2	0.108	60	6.480
A029SE	0.155	72	11.160
A029SW	0.186	71	13.206
A031NE	0.071	62	4.402
A031NW	0.034	74	2.516
A031SE	0.061	80	4.880

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A031SW	0.027	37	0.999
A032NE	0.059	59	3.481
A032NW	0.024	29	0.696
A032R1	0.061	20	1.220
A032SE	0.054	78	4.212
A032SW	0.036	67	2.412
A034NE	0.024	71	1.704
A034NW	0.016	44	0.704
A034SE	0.021	48	1.008
A034SW	0.110	55	6.050
A039N1	0.042	88	3.696
A039N2	0.069	87	6.003
A039S1	0.021	57	1.197
A039S2	0.034	59	2.006
A040N1	0.032	81	2.592
A040N2	0.068	75	5.100
A040NE	0.082	84	6.888
A040NW	0.029	83	2.407
A040R1	0.050	19	0.950
A040R2	0.056	17	0.952
A040R3	0.076	20	1.520
A040R4	0.062	22	1.364
A040R5	0.040	13	0.520
A040S1	0.021	57	1.197
A040S2	0.035	60	2.100
A040SE	0.035	60	2.100
A040SW	0.021	57	1.197
A041a	3.700	86	318.200
A041DV1	0.631	66	41.646
A041DV2	0.018	49	0.882
A041DV3	0.048	40	1.920
A041DV4	0.144	46	6.624
A041DV5	0.129	46	5.934
A041DV6	0.070	36	2.520
A041N1	0.139	77	10.703
A041N2	0.030	73	2.190
A041NE	0.053	81	4.293
A041NW	0.044	77	3.388
A041S1	0.067	61	4.087
A041SE	0.035	60	2.100
A041SW	0.021	57	1.197
A047E1	0.015	73	1.095
A047E2	0.027	74	1.998
A047PK1	0.375	7	2.625
A047W1	0.036	22	0.792
A047W2	0.074	62	4.588
A049NE	0.039	69	2.691
A049NW	0.018	72	1.296
A049R1	0.082	16	1.312
A049R2	0.052	16	0.832
A049R3	0.116	16	1.856
A049R4	0.023	20	0.460
A049R5	0.039	22	0.858
A049SE	0.072	69	4.968
A049SW	0.045	76	3.420

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A100NE	3.234	65	210.210
A101E1	0.017	82	1.394
A101E2	0.150	57	8.550
A101E3	0.054	48	2.592
A101N1	0.151	64	9.664
A101N2	0.142	76	10.792
A101W1	0.033	64	2.112
A101W2	0.153	64	9.792
A107NW	0.087	72	6.264
A107SW	0.125	64	8.000
A140R1	0.054	22	1.188
A140R2	0.150	20	3.000
A140R3	0.125	20	2.500
A140R4	0.133	20	2.660
A140WK1	0.084	24	2.016
A170DV1	0.130	41	5.330
A170NE	0.040	70	2.800
A170NW	0.090	81	7.290
A170S1	0.038	71	2.698
A170S2	0.022	68	1.496
A170SE	0.020	70	1.400
A170SW	0.046	72	3.312
A200NE	0.035	34	1.190
A200NW	0.034	35	1.190
A200R1	0.026	13	0.338
A200R2	0.041	18	0.738
A200R3	0.049	18	0.882
A200R4	0.030	18	0.540
A250NE	0.051	67	3.417
A250NW	0.033	42	1.386
A250SE	0.071	73	5.183
A250SW	0.044	50	2.200
AChan2	2.658	100	265.800
AChan3	1.162	100	116.200
AForeS	1.859	37	68.783
ARes2	1.385	33	45.705
AWood1	0.847	7	5.929
AWood2	5.699	7	39.893
A21	0.630	86	54.180
A410F	0.520	64	33.280
AForeN	4.460	43	191.780
AMainN	4.070	43	175.010
AMainS	1.902	43	81.786
ARes1	1.212	24	29.088
AResN1	5.840	44	256.960
AResN2	1.070	26	27.820
AHE1b	18.300	14	256.200
ATW1b	3.100	7	21.700
ATW2b	6.100	7	42.700
ATW3b	5.100	86	438.600
B001N1	0.096	78	7.488
B001N2	0.090	78	7.020
B002NE	0.092	73	6.716
B002NW	0.101	77	7.777
B002R1	0.042	22	0.924

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B002R2	0.056	22	1.232
B002R3	0.092	15	1.380
B002R4	0.033	9	0.297
B002R5	0.037	22	0.814
B002SE	0.048	44	2.112
B002SW	0.128	75	9.600
B002WK1	0.019	32	0.608
B004NE	0.067	72	4.824
B004NW	0.083	70	5.810
B004PK1	0.654	29	18.966
B004R1	0.067	13	0.871
B004R2	0.062	16	0.992
B004SE	0.032	72	2.304
B004SW	0.044	68	2.992
B004WK1	0.025	50	1.250
B005N1	0.080	73	5.840
B005N2	0.043	81	3.483
B005N3	0.030	63	1.890
B005NE	0.058	71	4.118
B005NW	0.156	70	10.920
B005R1	0.059	14	0.826
B005R2	0.119	22	2.618
B005R3	0.063	20	1.260
B005R4	0.121	22	2.662
B005S1	0.080	71	5.680
B005S2	0.043	77	3.311
B005SE	0.063	71	4.473
B005SW	0.075	68	5.100
B008NE	0.049	71	3.479
B008NW	0.076	63	4.788
B008R1	0.132	22	2.904
B008SE	0.024	75	1.800
B008SW	0.106	74	7.844
B009NE	0.043	79	3.397
B009NW	0.090	73	6.570
B009PK1	0.711	29	20.619
B009R1	0.057	23	1.311
B009R2	0.128	21	2.688
B009SE	0.029	62	1.798
B009SW	0.043	74	3.182
B010N1	0.041	78	3.198
B010N2	0.048	79	3.792
B010NE	0.055	69	3.795
B010NW	0.050	68	3.400
B010R1	0.116	22	2.552
B010S1	0.052	79	4.108
B010S2	0.049	76	3.724
B010SE	0.058	71	4.118
B010SW	0.048	75	3.600
B010W1	0.021	48	1.008
B010W2	0.025	48	1.200
B011NE	0.031	55	1.705
B011NW	0.097	72	6.984
B011R1	0.074	21	1.554
B011R2	0.113	22	2.486

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B011S1	0.034	87	2.958
B011SE	0.030	53	1.590
B011SW	0.097	72	6.984
B012EX1	0.054	29	1.566
B012EX2	0.522	39	20.358
B012NE	0.082	63	5.166
B012NW	0.100	63	6.300
B012SE	0.074	63	4.662
B012SW	0.091	63	5.733
B013DV1	2.860	93	265.980
B013DV2	2.535	7	17.745
B013EX1	0.084	29	2.436
B013EX2	0.074	51	3.774
B013NE	0.080	62	4.960
B013NW	0.099	62	6.138
B015NE	0.085	63	5.355
B015NW	0.102	63	6.426
B015RE1	2.173	79	171.667
B015RE2	2.165	7	15.155
B015SE	0.049	63	3.087
B015SW	0.059	63	3.717
B016NE	0.135	68	9.180
B016NW	0.073	64	4.672
B016R1	0.065	24	1.560
B016R2	0.031	23	0.713
B016R3	0.056	11	0.616
B016R4	0.015	23	0.345
B016S1	0.061	68	4.148
B016S2	0.062	68	4.216
B016S3	0.029	61	1.769
B016SE	0.048	73	3.504
B016SW	0.052	76	3.952
B018NE	0.110	67	7.370
B018NW	0.049	72	3.528
B018R1	0.060	23	1.380
B018R2	0.044	23	1.012
B018R3	0.051	15	0.765
B018SE	0.023	48	1.104
B018SW	0.047	55	2.585
B019N1	0.070	64	4.480
B019N2	0.051	73	3.723
B019NE	0.067	70	4.690
B019NW	0.141	72	10.152
B019R1	0.045	12	0.540
B019R2	0.045	23	1.035
B019R3	0.032	22	0.704
B019R4	0.025	22	0.550
B019R5	0.052	23	1.196
B019S1	0.070	70	4.900
B019S2	0.064	73	4.672
B019SE	0.066	65	4.290
B019SW	0.074	61	4.514
B021R1	0.056	21	1.176
B021R2	0.128	23	2.944
B022N1	0.072	68	4.896

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B022N2	0.050	72	3.600
B022N3	0.056	58	3.248
B022NE	0.055	69	3.795
B022NW	0.056	66	3.696
B022S1	0.073	68	4.964
B022S2	0.050	72	3.600
B022SE	0.055	68	3.740
B022SW	0.063	67	4.221
B022W1	0.045	71	3.195
B022W2	0.023	83	1.909
B022W3	0.024	46	1.104
B024NE	0.127	70	8.890
B024NW	0.021	62	1.302
B024R1	0.109	23	2.507
B024R2	0.051	22	1.122
B024R3	0.034	24	0.816
B024SE	0.057	72	4.104
B024SW	0.049	61	2.989
B026R1	0.120	23	2.760
B028N1	0.084	68	5.712
B028N2	0.048	83	3.984
B028NE	0.062	73	4.526
B028NW	0.092	58	5.336
B028R1	0.108	22	2.376
B028R2	0.056	21	1.176
B028R3	0.139	22	3.058
B028S1	0.085	72	6.120
B028S2	0.056	67	3.752
B028SE	0.062	65	4.030
B028SW	0.184	62	11.408
B031N1	0.062	71	4.402
B031N2	0.025	56	1.400
B031N3	0.070	82	5.740
B031NE	0.077	74	5.698
B031NW	0.171	73	12.483
B031R1	0.052	13	0.676
B031R2	0.135	21	2.835
B031R3	0.062	23	1.426
B031R4	0.094	21	1.974
B031R5	0.015	23	0.345
B031S1	0.063	70	4.410
B031S2	0.032	53	1.696
B031SE	0.077	74	5.698
B031SW	0.092	58	5.336
B033NE	0.131	71	9.301
B033NW	0.034	76	2.584
B033R1	0.041	22	0.902
B033R2	0.063	21	1.323
B033R3	0.142	21	2.982
B033SE	0.105	70	7.350
B033SW	0.045	84	3.780
B036NE	0.061	70	4.270
B036NW	0.047	77	3.619
B036R1	0.126	21	2.646
B036SE	0.059	71	4.189

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B036SW	0.048	75	3.600
B036W1	0.025	48	1.200
B036W2	0.025	52	1.300
B037N1	0.045	78	3.510
B037NE	0.025	56	1.400
B037NW	0.094	73	6.862
B037R1	0.060	22	1.320
B037R2	0.113	21	2.373
B037R3	0.014	23	0.322
B037R4	0.012	25	0.300
B037SE	0.025	52	1.300
B037SW	0.095	73	6.935
B038NE	0.104	70	7.280
B038NW	0.032	78	2.496
B038SE	0.047	77	3.619
B038SW	0.047	81	3.807
B040NE	0.034	59	2.006
B040NW	0.028	58	1.624
B040R1	0.031	23	0.713
B040SE	0.129	70	9.030
B040SW	0.051	81	4.131
B041NE	0.034	59	2.006
B041NW	0.030	59	1.770
B041R1	0.031	23	0.713
B041SE	0.036	61	2.196
B041SW	0.043	74	3.182
B042N1	0.112	70	7.840
B042N2	0.044	73	3.212
B042N3	0.027	48	1.296
B042NE	0.116	72	8.352
B042NW	0.044	73	3.212
B042R1	0.090	21	1.890
B042R2	0.142	20	2.840
B042R3	0.077	16	1.232
B042S1	0.094	72	6.768
B042S2	0.094	71	6.674
B042SE	0.053	66	3.498
B042SW	0.027	48	1.296
B044NE	0.081	70	5.670
B044NW	0.082	71	5.822
B044R1	0.043	20	0.860
B044R2	0.088	22	1.936
B044SE	0.121	71	8.591
B044SW	0.053	70	3.710
B046NE	0.023	48	1.104
B046NW	0.055	63	3.465
B046R2	0.052	20	1.040
B046R3	0.080	27	2.160
B046S1	0.022	50	1.100
B046SE	0.038	79	3.002
B046SW	0.119	73	8.687
B047NE	0.112	71	7.952
B047NW	0.026	50	1.300
B047R1	0.125	22	2.750
B047R2	0.060	21	1.260

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B047R3	0.053	23	1.219
B047R4	0.014	18	0.252
B047R5	0.048	21	1.008
B047R6	0.065	20	1.300
B047SE	0.111	73	8.103
B047SW	0.055	69	3.795
B048N1	0.027	48	1.296
B048NE	0.075	75	5.625
B048NW	0.064	70	4.480
B048R1	0.062	21	1.302
B048R2	0.082	20	1.640
B048R3	0.138	16	2.208
B048SE	0.076	79	6.004
B048SW	0.065	68	4.420
B048W1	0.032	47	1.504
B048W2	0.036	83	2.988
B048W3	0.024	50	1.200
B050N1	0.088	72	6.336
B050N2	0.033	52	1.716
B050NE	0.065	75	4.875
B050NW	0.070	64	4.480
B050R1	0.128	21	2.688
B050R2	0.068	22	1.496
B050R3	0.103	22	2.266
B050S1	0.087	72	6.264
B050S2	0.039	85	3.315
B050S3	0.023	61	1.403
B050SE	0.057	68	3.876
B050SW	0.153	72	11.016
B055N1	0.030	47	1.410
B055NE	0.096	69	6.624
B055NW	0.046	72	3.312
B055R1	0.118	21	2.478
B055SE	0.093	72	6.696
B055SW	0.048	71	3.408
B056NE	0.029	48	1.392
B056NW	0.028	61	1.708
B056SE	0.025	48	1.200
B056SW	0.025	64	1.600
B058NE	0.039	72	2.808
B058NW	0.046	72	3.312
B058R1	0.117	21	2.457
B058R2	0.102	22	2.244
B058SE	0.021	62	1.302
B058SW	0.031	61	1.891
B180N1	0.060	68	4.080
B180N2	0.060	68	4.080
B180N3	0.038	46	1.748
B180NE	0.065	71	4.615
B180NW	0.067	70	4.690
B180R1	0.117	23	2.691
B180R2	0.075	23	1.725
B180SE	0.050	72	3.600
B180SW	0.047	73	3.431
B410NE	0.025	56	1.400

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
B410NW	0.037	78	2.886
B590NE	0.103	74	7.622
B590NW	0.105	76	7.980
B590R1	0.067	22	1.474
B590R2	0.172	22	3.784
B590R3	0.120	21	2.520
B590R4	0.080	10	0.800
B590SE	0.108	69	7.452
B590SW	0.071	73	5.183
C001R1	0.084	9	0.756
C001R2	0.705	9	6.345
C002R1	0.200	11	2.200
C003R1	0.155	5	0.775
C004R1	0.381	6	2.286
C005R1	0.297	9	2.673
C006R1	0.319	9	2.871
C007R1	0.342	6	2.052
C008R1	0.385	7	2.695
C009R1	0.460	9	4.140
C010R1	0.334	10	3.340
C011R1	0.130	13	1.690
C012R1	0.092	13	1.196
C012WK1	0.028	66	1.848
C013PK1	0.428	29	12.412
C013R1	0.295	39	11.505
C013R2	0.151	40	6.040
NCOM2	8.720	90	784.800
NNAT1	21.420	7	149.940
NNAT2	7.160	7	50.120
NNAT3	31.740	7	222.180
NNAT4	45.990	7	321.930
To SWM Facility 1 (BMR Phase 1 Interim)			
A11	0.063	69.915	4.370
A12	0.155	50.168	7.751
A13	0.148	41.86	6.179
A14	0.423	70.28	29.714
A15	0.096	70.28	6.747
A17	0.242	61.404	14.854
A18	0.166	52.344	8.710
A19	0.035	69.048	2.430
A20	0.250	62.8	15.713
A21	0.480	55.324	26.528
A22	0.028	28.571	0.811
A23	0.227	60.987	13.838
A24	0.223	61.111	13.609
A25	0.239	56.478	13.493
A29	0.184	60.326	11.118
A30	0.014	50	0.705
A31	0.289	61.938	17.894
A32	0.162	61.875	10.005
A33	0.159	62.581	9.932
A34	0.090	59.756	5.402
A35	0.225	63.556	14.326
A41	0.297	57.229	17.008
A42	0.238	58.242	13.867

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A43	0.347	58.205	20.185
A44	0.288	61.716	17.774
A45	0.195	60.112	11.722
A46	0.209	63.587	13.258
A47	0.145	56.757	8.213
A54	0.816	7	5.714
A9	3.038	7	21.265
B1	1.681	7	11.764
B2	3.432	100	343.220
B3	1.007	86	86.611
B4	1.002	7	7.014
C2	0.069	67.606	4.651
S6	0.044	25	1.098
S7	0.049	25	1.215
S8	0.083	25	2.080
S9	2.319	7	16.230
To SWM Facility 3			
A043R1	0.226	8	1.808
A043R2	0.017	18	0.306
A043R3	0.076	32	2.432
A043R4	0.078	32	2.496
A043SE	0.064	64	4.096
A043SW	0.048	64	3.072
A044R1	0.173	12	2.076
A045N1	0.049	71	3.479
A045N2	0.081	77	6.237
A045NE	0.251	69	17.319
A045NW	0.043	84	3.612
A045S1	0.048	73	3.504
A045S2	0.081	78	6.318
A045SE	0.118	61	7.198
A045SW	0.043	86	3.698
A046NE	0.058	69	4.002
A046R1	0.170	21	3.570
A046R2	0.145	12	1.740
A046R3	0.280	14	3.920
A046SE	0.095	76	7.220
A046SW	0.039	77	3.003
A047NE	0.009	78	0.702
A047NW	0.025	76	1.900
A047R1	0.144	17	2.448
A047R2	0.098	16	1.568
A047SE	0.040	73	2.920
A047SW	0.115	66	7.590
A101NE	0.073	73	5.329
A101NW	0.046	64	2.944
A101S1	0.107	64	6.848
A101S2	0.113	63	7.119
A101SE	0.084	70	5.880
A101SW	0.076	64	4.864
A102R1	0.087	32	2.784
A410F	0.520	64	33.280
A460NE	0.059	61	3.599
A460NW	0.090	57	5.130
A460PK1	0.355	7	2.485

Table E-6: Drainage Area to SWM Facility (Interim B Conditions)

Segment ID [1]	Area (ha)	Imperviousness (%)	Area x Imp.
A460R1	0.071	20	1.420
A460R2	0.057	19	1.083
A460R3	0.030	23	0.690
A460SE	0.041	85	3.485
AR410C	0.550	64	35.200
AS410C	0.110	86	9.460
AS410D	0.080	86	6.880
AS410E	0.100	86	8.600
Total	**377.561**	**42**	**15965.636**

[1] Refer to Figure 2

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 15965.636 / 377.561 = 42 %

Table E-7: Summary of Total Drainage Area (Interim B Conditions)

Land Use [1]	Area (ha)	Imperviousness (%)	Area x Imp.
To SWM Facility 1	372.298	42	15710.322
To SWM Facility 3	5.263	49	255.314
Total	377.561	42	15965.636

[1] Refer to Figure 2

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 15965.636 / 377.561 = 42 %

Table E-8: Target Release Rates for SWM Facility [1]

Event	Pre-Development Release Rate ($m^3/s/ha$)	Target Release Rate (m^3/s)
2-Year, 24-Hour SCS	1.600	1.000
5-Year, 24-Hour SCS	2.900	2.300
10-Year, 24-Hour SCS	3.900	3.800
25-Year, 24-Hour SCS	5.500	5.600
50-Year, 24-Hour SCS	6.600	6.700
100-Year, 24-Hour SCS	7.800	8.000

[1] As per the April 2008 "*East Urban Community Pond No. 1 Design Brief*" by Stantec.

CALCULATION SHEET E-1: EXISTING CONTROLS (INTERIM B CONDITIONS)

Quality Control 1			Quantity Control 1			Quantity Control 2			Quantity Control 3			Quantity Control 4		
Vertical Circular Orifice			Rectangular Weir			Rectangular Weir			Rectangular Weir			Rectangular Weir		
Diameter	(m)	0.400	L	(m)	1.000	L	(m)	3.000	L	(m)	1.500	L	(m)	1.500
A_o	(m^2)	0.126												
invert	(m)	80.10	C_w		1.80	C_w		1.80	C_w		1.80	C_w		1.80
C_o		0.62	Crest Elev.	(m)	81.65	Crest Elev.	(m)	82.35	Crest Elev.	(m)	82.35	Crest Elev.	(m)	82.35
			n		2	n		2	n		2	n		2
Max Water Level	(m)	83.009	Max Water Level	(m)	83.009	Max Water Level	(m)	83.009	Max Water Level	(m)	83.009	Max Water Level	(m)	83.009
Head of Water	(m)	2.909	Head of Water	(m)	1.359	Head of Water	(m)	0.659	Head of Water	(m)	0.659	Head of Water	(m)	0.659
Q_0	(m^3/s)	0.568	Q_w	(m^3/s)	2.077	Q_w	(m^3/s)	2.762	Q_w	(m^3/s)	1.317	Q_w	(m^3/s)	1.317
Orifice Equation:			Weir Equation:			Weir Equation:			Weir Equation:			Weir Equation:		
$Q_o = C_o A_o (2gh)^{0.5}$			$Qw = C_w(L-0.1nh)h^{1.5}$			$Qw = C_w(L-0.1nh)h^{1.5}$			$Qw = C_w(L-0.1nh)h^{1.5}$			$Qw = C_w(L-0.1nh)h^{1.5}$		
Not including outlet pipe losses														
Q_o *is the orifice flow*			*Qw is the weir flow*			*Qw is the weir flow*			*Qw is the weir flow*			*Qw is the weir flow*		
C_o *is the orifice coefficient*			*Cw is the weir coefficient*			*Cw is the weir coefficient*			*Cw is the weir coefficient*			*Cw is the weir coefficient*		
A_o *is the orifice flow area*			*L is the weir length*			*L is the weir length*			*L is the weir length*			*L is the weir length*		
g is the gravitational constant			*h is the weir height*			*h is the weir height*			*h is the weir height*			*h is the weir height*		
h is the head of water			*n is the # of side contractions*			*n is the # of side contractions*			*n is the # of side contractions*			*n is the # of side contractions*		

CALCULATION SHEET E-2: FOREBAY SIZING FOR SWM FACILITY

Trails Edge Subdivision
SWM Facility 1 - Interim B Conditions
City of Ottawa
Calculation of North Forebay Size

© DSEL

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	3.47		149 m / 43 m
Q_p =	0.383	m^3/s	(at elevation 81.65 m)
V_s =	0.0003	m/s	

L_{min} = 66.52 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:00min)
- V_f = desired final velocity

Input:

Q =	5.579	m^3/s
d =	2.51	m
Vf =	0.5	m/s

L_{min} = 35.55 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	66.52 m	
Length of Forebay Provided	**149.00 m**	(at elevation 81.6 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:05min)
- W_{avg} = average width of forebay

Input:

Q =	5.579	m^3/s	
d =	2.51	m	
W_{avg} =	40	m	(36 m bottom, 43 m permanent pool)

V = 0.06 m/s < 0.15 m/s

CALCULATION SHEET E-3: FOREBAY SIZING FOR SWM FACILITY

Trails Edge Subdivision
SWM Facility 1 - Interim B Conditions
City of Ottawa
Calculation of South Forebay Size

© DSEL

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	3.18		143 m / 45 m
Q_p =	0.383	m^3/s	(at elevation 81.65 m)
V_s =	0.0003	m/s	

L_{min} = 63.71 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:10min)
- V_f = desired final velocity

Input:

Q =	15.601	m^3/s
d =	2.08	m
Vf =	0.5	m/s

L_{min} = 120.30 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	120.30 m	
Length of Forebay Provided	**143.00 m**	(at elevation 81.5 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:10min)
- W_{avg} = average width of forebay

Input:

Q =	15.601	m^3/s	
d =	2.08	m	
W_{avg} =	38	m	(31 m bottom, 45 m permanent pool)

V = 0.20 m/s > 0.15 m/s

Appendix D
Sanitary Sewer Design Sheets and Sanitary Calculations

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION						COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE					
STREET	FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL (FULL) (m/s)	VEL (ACT.) (m/s)
North West Sanitary Trunk																									
Trunk 1	1007A	1008A			0.00	0			2.58	2.58					1.57	2.58	2.58	0.85	2.42	58.00	200.00	0.65	26.44	0.09	0.84	0.52
COMMERCIAL	1008A	1009A			0.00	0				2.58					1.57	0.00	2.58	0.85	2.42	86.50	250.00	0.25	29.73	0.08	0.61	0.37
COMMERCIAL	1009A	1010A			0.00	0			1.29	3.87					2.35	1.29	3.87	1.28	3.63	86.50	250.00	0.25	29.73	0.12	0.61	0.41
COMMERCIAL					0.00	0			0.22	4.09						0.22	4.09								
COMMERCIAL	1010A	1011A			0.00	0			1.63	5.72					3.48	1.63	5.72	1.89	5.37	39.50	300.00	0.20	43.25	0.12	0.61	0.00
COMMERCIAL	1011A	1012A			0.00	0			0.99	6.71					4.08	0.99	6.71	2.21	6.29	99.50	375.00	0.15	67.91	0.09	0.61	0.38
COMMERCIAL	1012A	1013A			0.00	0			1.41	8.12					4.93	1.41	8.12	2.68	7.61	117.00	375.00	0.15	67.91	0.11	0.61	0.40
COMMERCIAL	1013A	1014A			0.00	0			1.41	9.53					5.79	1.41	9.53	3.14	8.93	112.00	375.00	0.15	67.91	0.13	0.61	0.41
COMMERCIAL	1014A	1022A			0.00	0			1.54	11.07					6.73	1.54	11.07	3.65	10.38	83.50	375.00	0.15	67.91	0.15	0.61	0.44
COMMERCIAL	1022A	1023A			0.00	0			7.02	18.09					10.99	7.02	18.09	5.97	16.96	96.50	375.00	0.15	67.91	0.25	0.61	0.51
	1023A	1024A	0.65	66	0.65	66	3.63	0.78		18.09					10.99	0.65	18.74	6.18	17.95	81.00	450.00	0.12	98.76	0.18	0.62	0.47
	1024A	1025A	0.20	21	0.85	87	3.61	1.02		18.09					10.99	0.20	18.94	6.25	18.26	79.00	450.00	0.12	98.76	0.18	0.62	0.47
	1025A	1026A	0.13	14	0.98	101	3.59	1.18		18.09					10.99	0.13	19.07	6.29	18.46	51.00	450.00	0.12	98.76	0.19	0.62	0.48
	1026A	1027A	0.20	21	1.18	122	3.58	1.42		18.09					10.99	0.20	19.27	6.36	18.77	74.00	450.00	0.12	98.76	0.19	0.62	0.48
	1027A	1028A			1.18	122				18.09					10.99	0.00	19.27	6.36	17.35	11.00	450.00	0.12	98.76	0.18	0.62	0.47
	1028A	1029A	0.40	41	1.58	163	3.54	1.87		18.09					10.99	0.40	19.67	6.49	19.35	100.00	450.00	0.12	98.76	0.20	0.62	0.48
	1029A	1037A	0.60	61	2.18	224	3.50	2.54		18.09					10.99	0.60	20.27	6.69	20.22	94.00	450.00	0.12	98.76	0.20	0.62	0.48
	1037A	1040A	3.30	334	5.48	558	3.36	6.08		18.09					10.99	3.30	23.57	7.78	24.85	79.00	450.00	0.12	98.76	0.25	0.62	0.51
	1040A	1049A	1.45	147	6.93	705	3.31	7.56		18.09					10.99	1.45	25.02	8.26	26.81	79.00	450.00	0.12	98.76	0.27	0.62	0.52
	1049A	1058A	4.50	455	11.43	1160	3.21	12.07		18.09					10.99	4.50	29.52	9.74	32.80	81.50	450.00	0.12	98.76	0.33	0.62	0.56
PARK	1058A	1059A	5.80	586	17.23	1746	3.10	17.54		18.09			1.27	1.27	11.20	7.07	36.59	12.07	40.81	120.50	450.00	0.12	98.76	0.41	0.62	0.59
	1059A	1090A	0.70	71	17.93	1817	3.09	18.20		18.09				1.27	11.20	0.70	37.29	12.31	41.71	123.00	450.00	0.12	98.76	0.42	0.62	0.59
PARK, EXT FUT			4.30	620	22.23	2437			5.27	23.36			0.56	1.83		10.13	47.42									
	1090A	1095A	12.65	1278	34.88	3715	2.89	34.79		23.36				1.83	14.49	12.65	60.07	19.82	69.10	75.00	450.00	0.15	110.42	0.63	0.69	0.73
Contribution from Trunk 2, MH 1094A-1095A					10.74	1478				0.00				4.64			15.38									
	1095A	1096A	0.50	51	46.12	5244	2.78	47.24		23.36				6.47	15.24	0.50	75.95	25.06	87.54	79.00	525.00	0.12	148.98	0.59	0.69	0.72
	1096A	1107A	2.26	229	48.38	5473	2.77	49.13		23.36				6.47	15.24	2.26	78.21	25.81	90.18	86.50	525.00	0.10	136.00	0.66	0.63	0.67
	1107A	1108A	4.24	429	52.62	5902	2.74	52.41		23.36				6.47	15.24	4.24	82.45	27.21	94.86	87.00	525.00	0.42	278.71	0.34	1.29	1.16
PARK	1108A	1132A	0.06	8	52.68	5910	2.74	52.48		23.36			1.16	7.63	15.43	1.22	83.67	27.61	95.52	31.50	525.00	0.10	136.00	0.70	0.63	0.68
CONTRIBUTION FROM EXTERNAL			0.96	144	53.64	6054	2.73	53.56	4.42	27.78				7.63		5.38	89.05									
			0.95	137	54.59	6191				27.78				7.63		0.95	90.00									
	1132A	1133A	9.80	990	64.39	7181	2.68	62.37		27.78				7.63	18.11	9.80	99.80	32.93	113.41	15.50	600.00	0.10	194.17	0.58	0.69	0.72
	1133A	1A (B.O.)			64.39	7181	2.68	62.37		27.78				7.63	18.11	0.00	99.80	32.93	113.41	15.50	600.00	0.10	194.17	0.58	0.69	0.72
To MH 1A By Others																										
Trunk 2																										
PARK	1203A	1204A	0.40	58	0.40	58				0.00			4.64	4.64	0.75	5.04	5.04	1.66	2.41	81.00	300.00	0.65	77.96	0.03	1.10	0.48
	1204A	1205A	0.89	129	1.29	187	3.53	2.14		0.00				4.64	0.75	0.89	5.93	1.96	4.85	111.00	300.00	0.20	43.25	0.11	0.61	0.40
	1205A	1206A	0.83	120	2.12	307	3.46	3.44		0.00				4.64	0.75	0.83	6.76	2.23	6.42	74.00	300.00	0.20	43.25	0.15	0.61	0.44
	1206A	1207A	1.03	149	3.15	456	3.40	5.02		0.00				4.64	0.75	1.03	7.79	2.57	8.34	75.00	300.00	0.20	43.25	0.19	0.61	0.47
	1207A	1208A			3.15	456				0.00				4.64	0.75	0.00	7.79	2.57	3.32	100.50	300.00	0.20	43.25	0.08	0.61	0.37

LICENSED PROFESSIONAL ENGINEER
K. MITIC
100122349
OCT. 18, 2019
PROVINCE OF ONTARIO

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.108	Harmon Correction Factor =	0.800		
Average Daily Flow =	280	l/p/day		Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	35000	L/ha/da	0.405	Extraneous Flow =	0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.405	Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00			Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.50	if ICI >20%	1.00	if ICI <20%			
Mixed Use	35000.00	L/ha/da					
Institutional =	0.405	l/s/Ha					

Designed: R.B	PROJECT: Orleans EUC MUC		
Checked: K.M	LOCATION: City of Ottawa		
Dwg. Reference:	File Ref: 14-733	Date: October, 2019	Sheet No. 1 of 2

Copy of 733_SAN_Oct1819_Opt1_final.xlsx

D1

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: BMR
Date Prepared: 10/4/2019
Date Revised: 6/8/2021
Input By: Dan Coffey
Reviewed By: Sam Bahia
Drawing Reference: 118224-GP AND 118224-SAN

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- CALCULATED ANNUAL CELL OUTPUT
- CALCULATED RARE CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION				DEMAND																		DESIGN CAPACITY							
				RESIDENTIAL FLOW											INDUSTRIAL / COMMERICAL / INSTITUIONAL FLOW						EXTRANOUS FLOW AREA METHOD		TOTAL DESIGN FLOW	PROPOSED SEWER PIPE SIZING / DESIGN							
STREET	AREA	FROM MH	TO MH	SINGLES	SEMIS/ TOWNS	APARTS	PARK AREA (ha)	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW Q(q) (L/s)	PEAKED DESIGN POP FLOW Q(p) (L/s)	PEAKED ANNUAL/RARE POP FLOW Q(AR - Res) (L/s)	RESIDENTIAL DRAINAGE AREA (ha.)	CUMULATIVE RES DRAINAGE AREA (ha.)	COMMERICAL / INSTITUTIONAL AREA (ha.)	CUMULATIVE COMMERICAL / INSTITUTIONAL AREA (ha.)	AVG DESIGN COMMERICAL / INSTIUTIONAL FLOW Q (ci) (L/s)	COMMERICAL / INSTITUTIONAL PEAK FACTOR	CUMULATIVE ICI DRAINAGE AREA (ha.)	PEAKED DESIGN ICI FLOW Q (CI) (L/s)	CUMULATIVE EXTRANOUS DRAINAGE AREA (ha.)	DESIGN EXTRAN. FLOW Q(e) (L/s)	TOTAL DESIGN FLOW Q(D) (L/s)	LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
Street 9	A1	169	165					0.000	0.000	4.00	0.00	0.00	0.00	1.570	1.570	0.000	0.000	0.00	1.00	0.000	0.00	1.570	0.52	0.52	123.7	250 PVC	0.254	0.013	0.25	31.0	0.61	1.7%
	A2, A3	165	163			168		0.353	0.353	4.00	1.14	3.66	1.96	1.160	2.730	0.000	0.000	0.00	1.00	0.000	0.00	2.730	0.90	4.56	72.5	250 PVC	0.254	0.013	0.25	31.0	0.61	14.7%
	A4	163	161		14			0.038	0.391	4.00	1.27	4.05	2.17	0.470	3.200	0.000	0.000	0.00	1.00	0.000	0.00	3.200	1.06	5.11	102.9	250 PVC	0.254	0.013	0.25	31.0	0.61	16.5%
	A5	161	159		4			0.011	0.401	4.00	1.30	4.16	2.23	0.150	3.350	0.000	0.000	0.00	1.00	0.000	0.00	3.350	1.11	5.27	14.1	250 PVC	0.254	0.013	0.50	43.9	0.87	12.0%
	A6	159	151		28			0.076	0.477	3.98	1.55	4.93	2.64	0.150	3.500	0.000	0.000	0.00	1.00	0.000	0.00	3.500	1.16	6.08	112.1	250 PVC	0.254	0.013	0.25	31.0	0.61	19.6%
Street 2	A7	157	155		27			0.073	0.073	4.00	0.24	0.76	0.41	0.760	0.760	0.000	0.000	0.00	1.00	0.000	0.00	0.760	0.25	1.01	102.8	200 PVC	0.203	0.013	0.35	20.2	0.62	5.0%
	A8	155	153		4			0.011	0.084	4.00	0.27	0.87	0.47	0.170	0.930	0.000	0.000	0.00	1.00	0.000	0.00	0.930	0.31	1.17	13.8	200 PVC	0.203	0.013	0.50	24.2	0.75	4.9%
	A9	153	151		10			0.027	0.111	4.00	0.36	1.15	0.62	0.340	1.270	0.000	0.000	0.00	1.00	0.000	0.00	1.270	0.42	1.57	62.5	200 PVC	0.203	0.013	0.35	20.2	0.62	7.7%
Street 2	A10	151	145		8			0.022	0.609	3.93	1.97	6.21	3.32	0.330	5.100	0.000	0.000	0.00	1.00	0.000	0.00	5.100	1.68	7.89	76.3	250 PVC	0.254	0.013	0.25	31.0	0.61	25.4%
Chemin de Jargeau Road	A12	147	145		14			0.038	0.038	4.00	0.12	0.39	0.21	0.450	0.450	0.000	0.000	0.00	1.00	0.000	0.00	0.450	0.15	0.54	98.1	250 PVC	0.254	0.013	0.25	31.0	0.61	1.7%
	A11	147	EX		25			0.068	0.068	4.00	0.22	0.70	0.38	0.780	0.780	0.000	0.000	0.00	1.00	0.000	0.00	0.780	0.26	0.96	64.5	200 PVC	0.203	0.013	0.65	27.6	0.85	3.5%
Voie de Cerulean Way	A13	145	141		9			0.024	0.671	3.90	2.18	6.80	3.64	0.330	5.880	0.000	0.000	0.00	1.00	0.000	0.00	5.880	1.94	8.74	77.3	300 PVC	0.305	0.013	0.20	45.1	0.62	19.4%
	A14	143	141		2			0.005	0.005	4.00	0.02	0.06	0.03	0.080	0.080	0.000	0.000	0.00	1.00	0.000	0.00	0.080	0.03	0.08	16.6	200 PVC	0.203	0.013	1.20	37.5	1.16	0.2%
Lumen Place	A15	141	139	20				0.068	0.745	3.88	2.41	7.49	4.01	0.800	6.760	0.000	0.000	0.00	1.00	0.000	0.00	6.760	2.23	9.72	113.9	300 PVC	0.305	0.013	0.20	45.1	0.62	21.5%
	A16	139	137	2				0.007	0.752	3.88	2.44	7.55	4.05	0.180	6.940	0.000	0.000	0.00	1.00	0.000	0.00	6.940	2.29	9.84	14.6	300 PVC	0.305	0.013	0.50	71.3	0.98	13.8%
	A18	137	129	6				0.020	0.772	3.87	2.50	7.75	4.15	0.270	7.210	0.000	0.000	0.00	1.00	0.000	0.00	7.210	2.38	10.12	62.8	300 PVC	0.305	0.013	0.20	45.1	0.62	22.4%
Voie de Cerulean Way	A18	143	133		6			0.016	0.016	4.00	0.05	0.17	0.09	0.290	0.290	0.000	0.000	0.00	1.00	0.000	0.00	0.290	0.10	0.26	56..5	200 PVC	0.203	0.013	0.65	27.6	0.85	1.0%
Street 5	A19	135	133	3				0.010	0.010	4.00	0.03	0.11	0.06	0.150	0.150	0.000	0.000	0.00	1.00	0.000	0.00	0.150	0.05	0.16	27.7	200 PVC	0.203	0.013	0.65	27.6	0.85	0.6%
Street 5	A20	133	131	7				0.024	0.050	4.00	0.16	0.52	0.28	0.280	0.720	0.000	0.000	0.00	1.00	0.000	0.00	0.720	0.24	0.76	40.4	200 PVC	0.203	0.013	0.35	20.2	0.62	3.7%
	A21	131	129	14				0.048	0.098	4.00	0.32	1.01	0.54	0.560	0.560	0.000	0.000	0.00	1.00	0.000	0.00	0.560	0.18	1.20	84.3	200 PVC	0.203	0.013	0.35	20.2	0.62	5.9%
Lumen Place	A22	129	127	6				0.020	0.890	3.83	2.88	8.84	4.74	0.330	8.100	0.000	0.000	0.00	1.00	0.000	0.00	8.100	2.67	11.52	73.0	300 PVC	0.305	0.013	0.20	45.1	0.62	25.5%
	A23	127	125	10				0.034	0.924	3.82	3.00	9.16	4.91	0.440	8.540	0.000	0.000	0.00	1.00	0.000	0.00	8.540	2.82	11.98	56.6	300 PVC	0.305	0.013	0.20	45.1	0.62	26.5%
	A24	125	123	2				0.007	0.931	3.82	3.02	9.22	4.94	0.120	8.660	0.000	0.000	0.00	1.00	0.000	0.00	8.660	2.86	12.08	11.2	300 PVC	0.305	0.013	0.50	71.3	0.98	16.9%
	A25	123	121	3				0.010	0.941	3.82	3.05	9.31	4.99	0.150	8.810	0.000	0.000	0.00	1.00	0.000	0.00	8.810	2.91	12.22	23.6	300 PVC	0.305	0.013	0.20	45.1	0.62	27.1%
	A26	121	113	15				0.051	0.992	3.80	3.22	9.78	5.24	0.620	9.430	0.000	0.000	0.00	1.00	0.000	0.00	9.430	3.11	12.89	96.7	300 PVC	0.305	0.013	0.20	45.1	0.62	28.6%
Voie de Persimmon Way	A27	119	117	17				0.058	0.058	4.00	0.19	0.60	0.32	0.710	0.710	0.000	0.000	0.00	1.00	0.000	0.00	0.710	0.23	0.83	103.0	200 PVC	0.203	0.013	0.35	20.2	0.62	4.1%
	A28	117	115	2				0.007	0.065	4.00	0.21	0.67	0.36	0.160	0.870	0.000	0.000	0.00	1.00	0.000	0.00	0.870	0.29	0.96	14.0	200 PVC	0.203	0.013	0.50	24.2	0.75	4.0%
	A29	115	113	7				0.024	0.088	4.00	0.29	0.92	0.49	0.330	1.200	0.000	0.000	0.00	1.00	0.000	0.00	1.200	0.40	1.31	63.2	200 PVC	0.203	0.013	0.35	20.2	0.62	6.5%
Voie de Persimmon Way	A30	113	105	6				0.020	1.101	3.77	3.57	10.77	5.77	0.290	10.920	0.000	0.000	0.00	1.00	0.000	0.00	10.920	3.60	14.37	72.3	300 PVC	0.305	0.013	0.20	45.1	0.62	31.9%
TO TRUNK SANITARY SEWER																																	
Street 8	FUTURE	CAP2	101	113				0.384	0.384	4.00	1.25	3.98	2.13	3.470	3.470	0.000	0.000	0.00	1.00	0.000	0.00	3.470	1.15	5.13	40.4	200 PVC	0.203	0.013	0.35	20.2	0.62	25.3%
	A31	101	103	8				0.027	0.411	4.00	1.33	4.27	2.29	0.500	3.970	0.000	0.000	0.00	1.00	0.000	0.00	3.970	1.31	5.58	12.5	200 PVC	0.203	0.013	0.50	24.2	0.75	23.0%
	A32	103	105	5				0.017	0.428	4.00	1.39	4.44	2.38	0.270	4.240	0.000	0.000	0.00	1.00	0.000	0.00	4.240	1.40	5.84	46.9	200 PVC	0.203	0.013	0.35	20.2	0.62	28.9%
TO TRUNK SANITARY SEWER																																	
Rue de Beaugency Street	A34	105	107	12				0.041	1.570	3.67	5.09	14.92	7.99	0.500	0.500		0.000	0.00	1.00	0.000	0.00	0.500	0.17	15.09	98.4	300 PVC	0.305	0.013	0.20	45.1	0.62	33.4%
	A35	107	109	2				0.007	1.577	3.66	5.11	14.98	8.02	0.120	0.620	0.000	0.000	0.00	1.00	0.000	0.00	0.620	0.20	15.18	28.3	300 PVC	0.305	0.013	0.20	45.1	0.62	33.7%
	A36, A37	109	111	4			1.000	0.017	1.594	3.66	5.17	15.13	8.10	0.210	0.830	0.000	0.000	0.00	1.00	0.000	0.00	0.830	0.27	15.40	26.6	300 PVC	0.305	0.013	0.20	45.1	0.62	34.1%
	-	111	205	0				0.000	1.594	3.66	5.17	15.13	8.10	0.000	0.830	0.000	0.000	0.00	1.00	0.000	0.00	0.830	0.27	15.40	1.8	300 PVC	0.305	0.013	0.50	71.3	0.98	21.6%
TRUNK SANITARY SEWER																																	
Rue de Beaugency Street	FUTURE, A33	CAP1	201				6.470	5.473	5.473	2.77	17.74	39.30	21.06	48.380	48.380	40.860	40.860	13.24	1.50	40.860	19.86	89.240	29.45	88.62	36.6	525 CONC	0.533	0.013	0.35	265.4	1.19	33.4%
	-	201	203					0.000	7.002	3.11	22.69	56.40	30.21	0.500	48.880	0.000	40.860	13.24	1.50	40.860	19.86	89.740	29.61	105.87	96.7	525 CONC	0.533	0.013	0.10	141.9	0.63	74.6%
	-	203	205					0.000	8.596	3.02	27.86	67.30	36.05	0.120	49.000	0.000	40.860	13.24	1.50	40.860	19.86	89.860	29.65	116.81	29.2	525 CONC	0.533	0.013	0.10	141.9	0.63	82.3%
	-	205	1A					0.000	8.596	3.02	27.86	67.30	36.05	1.000	50.830	0.000	40.860	13.24	1.50	40.860	19.86	91.690	30.26	117.42	27.7	525 CONC	0.533	0.013	0.10	141.9	0.63	82.8%
TOTALS				264	151	168	7.470		8.604																								

DEMAND EQUATION

Design Parameters:

1. Q(D), Q(A), Q(R) = Q(p) + Q(fd) + Q(ici) + Q(e)
2. Q(p) = (P x q x M x K / 86,400)
3. q Avg capita flow (L/per/day)= 280 L/per/day (design); 200 L/per/day (annual and rare)
4. M = Harmon Formula (maximum of 4.0)
5. K = 0.8 (design); 0.6 (annual and rare)
6. Park flow is considered equivalent to a single unit / ha
   Park Demand = 1 Single Unit Equivalent / Park ha
7. Foundation Drains 0.45 L/s/unit
8. Q(ici) = ICI Area x ICI Flow x ICI Peak
9. Q(e) = 0.33 L/sec/ha (design); 0.30 L/sec/ha (annual); 0.55 L/sec/ha (rare)

Definitions:

Q(D) = Peak Design Flow (L/sec) Q(A) = Peak Annual Flow (L/sec) Q(R) = Peak Rare Flow (L/sec)
Q(e) = Extraneous Flow (L/sec)
Q(p) = Population Flow (L/sec)

K = Harmon Correction Factor	Singles	Semis/Towns	Apts (2-BR)
P = Residential Population	3.4	2.7	2.1
Typ Service Diameter (mm)		135	
Typ Service Length (m)	15	15	
I/I Pipe Rate (L/mm dia/m/hr) =	0.007		

Q(fd) = Foundation Flow (L/sec)
Q(ici) = Industrial / Commercial / Institutional Flow (L/sec)

Institutional / Commercial / Industrial		Industrial	Commercial / Institutional	
	Design =	35000	28000	L/gHa/d
	Annual / Rare =	10000	17000	L/gHa/d
ICI Peak *	Design = Std ICI -->	1.0	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)
	Annual / Rare =	1.0		

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)
Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

NOTES
External Flows to be determined as part of detailed design process. Futher coordination with DSEL required.

FOREST VALLEY TRUNK AND ORLEANS CUMBERLAND COLLECTOR CAPACITY ANALYSIS

634-00465

Prepared by:

Stantec Consulting Ltd.
400-1505 Laperriere Avenue
Ottawa ON K1Z 7T1

Prepared for:

City of Ottawa
111 Lisgar Street
4th Floor
Ottawa, ON K1P 1J1

October 2003

Stantec

Distribution:
City of Ottawa **2** copies
Stantec, **2** copies

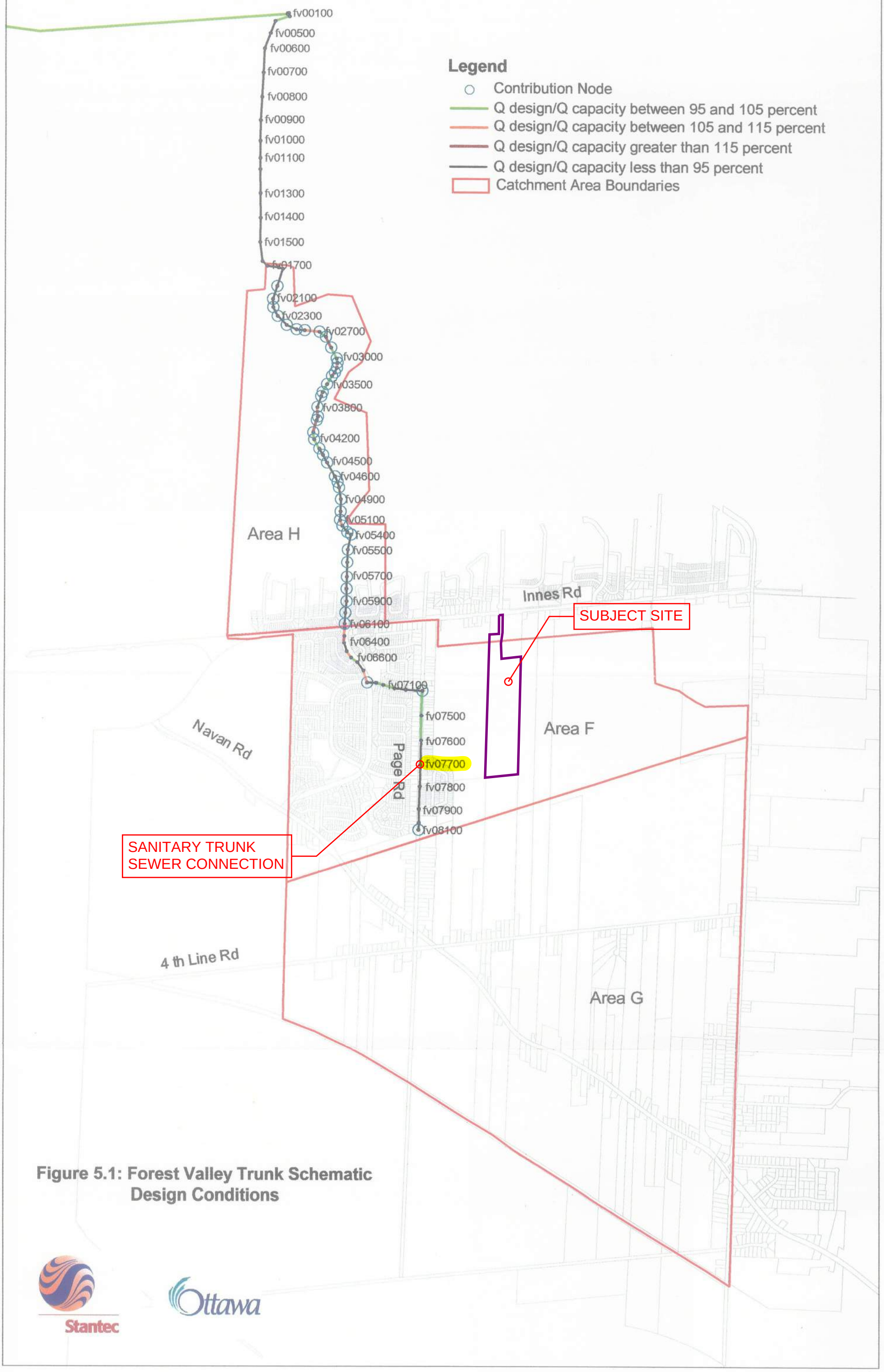


Figure 5.1: Forest Valley Trunk Schematic Design Conditions

Stantec

Ottawa

david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613)836-0856
Fax (613) 836-7183
www.DSEL.ca

DESIGN BRIEF

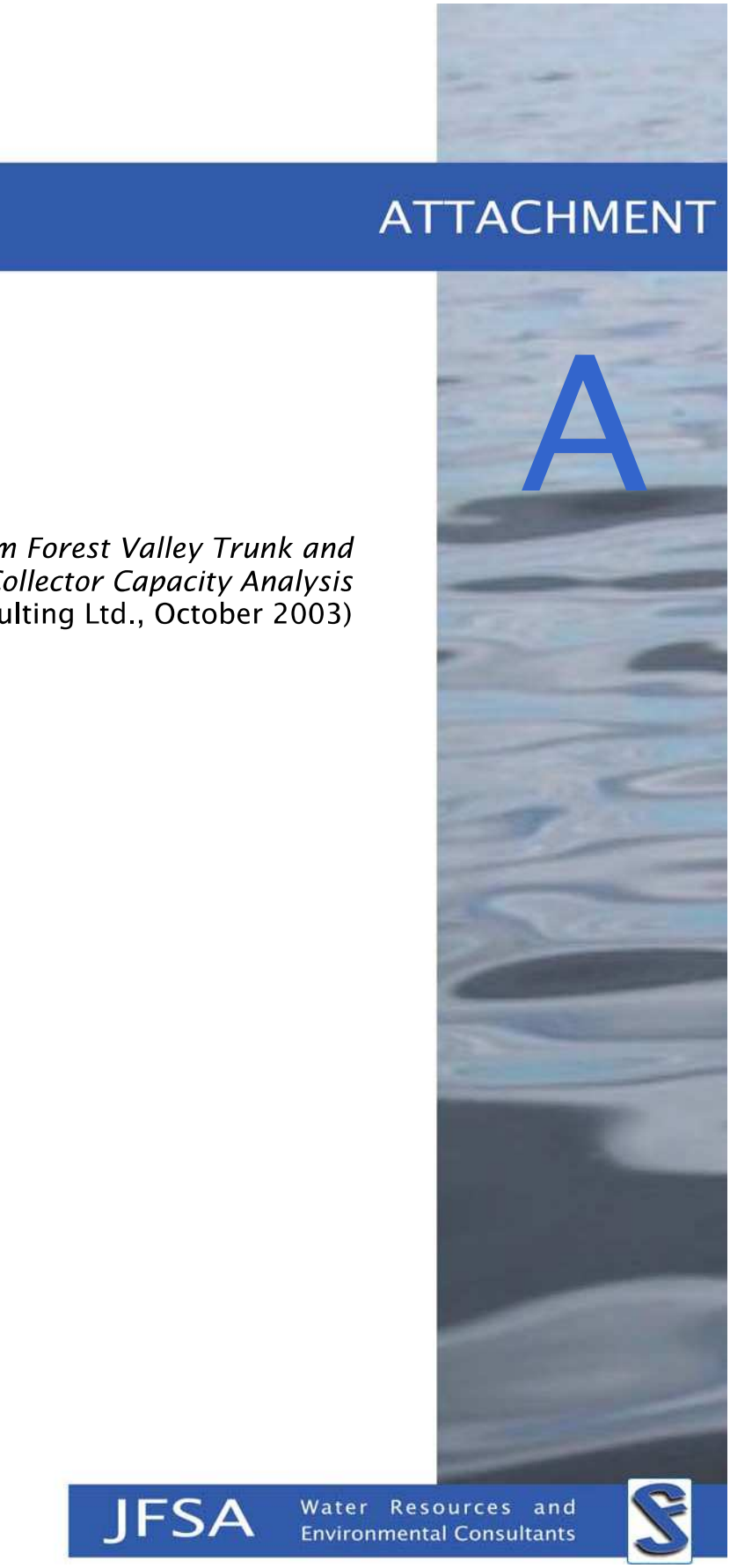
FOR

CAIVAN (ORLEANS VILLAGE) LIMITED
3490 INNES ROAD

CITY OF OTTAWA

PROJECT NO.: 15-881

MAY 2018 – VER 2
© DSEL



ATTACHMENT

A

Excerpts from Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis
(Stantec Consulting Ltd., October 2003)

JFSA Water Resources and Environmental Consultants

TABLE 5-1
Summary of FVT Wasterwater Flows and HGL

LEGEND
- Catchment Node
- Q/Qcap between 95% and105%
- Q/Qcap between 105% and115%
- Q/Qcap greater than 115%
- Q/Qcap greater than 95% and HGL is above basement elevation (OG-3.3m)

USMH	DSMH	LENGTH	USINV	USOBV	GROUND	USF Elev. (3.3m below OG)	Qcap Manning's (L/s)	Design				Monitored (300Lpcd, 0.50L/s/ha, K=0.60)				Monitored & Design			
								HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)
fv05100	fv05000	3,608	78.8	79.7	84.0	80.7	924	79.7	0.00	793	86%	79.7	0.00	661	71%	79.7	0.00	820	89%
fv05200	fv05100	3,646	78.9	79.8	84.3	81.0	731	79.8	0.01	793	109%	79.8	0.00	660	90%	79.8	0.02	819	112%
fv05300	fv05200	3,698	79.1	80.0	84.7	81.4	924	80.0	0.00	793	86%	80.0	0.00	660	71%	80.0	0.00	819	89%
fv05400	fv05300	3,724	79.1	80.0	85.5	82.2	822	80.0	0.00	792	96%	80.0	0.00	659	80%	80.0	0.00	819	100%
fv05500	fv05400	3,821	79.4	80.3	86.9	83.6	924	80.3	0.00	783	85%	80.3	0.00	649	70%	80.3	0.00	807	87%
fv05600	fv05500	3,898	79.6	80.5	87.9	84.6	844	80.5	0.00	783	93%	80.5	0.00	648	77%	80.5	0.00	807	96%
fv05700	fv05600	3,989	79.8	80.7	89.1	85.8	962	80.7	0.00	783	81%	80.7	0.00	648	67%	80.7	0.00	806	84%
fv05800	fv05700	4,063	80.0	80.9	89.0	85.7	864	80.9	0.00	773	89%	80.9	0.00	636	74%	80.9	0.00	794	92%
fv05900	fv05800	4,140	80.2	81.1	88.6	85.3	885	81.1	0.00	773	87%	81.1	0.00	636	72%	81.1	0.00	794	90%
fv06000	fv05900	4,210	80.3	81.2	88.6	85.3	885	81.2	0.00	773	87%	81.2	0.00	636	72%	81.2	0.00	793	90%
fv06100	fv06000	4,280	80.5	81.4	88.9	85.6	822	81.4	0.00	772	94%	81.4	0.00	636	77%	81.4	0.00	793	96%
fv06200	fv06100	4,306	80.5	81.4	88.8	85.5	864	81.4	0.00	772	89%	81.4	0.00	635	74%	81.4	0.00	793	92%
fv06300	fv06200	4,354	80.6	81.5	88.6	85.3	731	81.5	0.01	772	106%	81.5	0.00	635	87%	81.5	0.01	793	109%
fv06400	fv06300	4,397	80.6	81.5	88.5	85.2	653	81.6	0.02	772	118%	81.5	0.00	635	97%	81.6	0.02	793	121%
fv06500	fv06400	4,448	80.8	81.7	88.2	84.9	1016	81.7	0.00	772	76%	81.7	0.00	635	63%	81.7	0.00	793	78%
fv06600	fv06500	4,495	80.8	81.8	88.1	84.8	731	81.8	0.01	772	106%	81.8	0.00	635	87%	81.8	0.01	793	109%
fv06700	fv06600	4,544	80.9	81.8	87.8	84.5	778	81.8	0.00	772	99%	81.8	0.00	635	82%	81.9	0.02	793	102%
fv06800	fv06700	4,609	81.1	82.0	87.7	84.4	885	82.0	0.00	772	87%	82.0	0.00	635	72%	82.0	0.00	793	90%
fv06900	fv06800	4,688	81.2	82.1	87.0	83.7	706	82.1	0.02	772	109%	82.1	0.00	635	90%	82.2	0.03	793	112%
fv07000	fv06900	4,744	81.3	82.3	87.3	84.0	800	82.3	0.00	714	89%	82.3	0.00	561	70%	82.3	0.00	714	89%
fv07100	fv07000	4,791	81.4	82.4	87.6	84.3	680	82.4	0.01	714	105%	82.4	0.00	561	83%	82.4	0.01	714	105%
fv07200	fv07100	4,863	81.6	82.5	87.5	84.2	731	82.5	0.00	714	98%	82.5	0.00	561	77%	82.5	0.00	714	98%
fv07300	fv07200	4,934	81.8	82.7	87.8	84.5	1016	82.7	0.00	714	70%	82.7	0.00	561	55%	82.7	0.00	714	70%
fv07400	fv07300	5,037	81.9	82.9	88.0	84.7	1790	82.9	0.00	714	40%	82.9	0.00	561	31%	82.9	0.00	714	40%
fv07500	fv07400	5,189	82.224	83.138	87.8	84.5	706	83.1	0.00	533	76%	83.1	0.00	458	65%	83.1	0.00	533	76%
fv07600	fv07500	5,342	82.450	83.364	87.7	84.4	731	83.4	0.00	533	73%	83.4	0.00	458	63%	83.4	0.00	533	73%
fv07700	fv07600	5,495	82.608	83.522	87.8	84.5	597	83.5	0.00	533	89%	83.5	0.00	458	77%	83.5	0.00	533	89%
fv07800	fv07700	5,627	82.751	83.665	87.6	84.3	626	83.7	0.00	533	85%	83.7	0.00	458	73%	83.7	0.00	533	85%
fv07900	fv07800	5,766	82.877	83.791	87.1	83.8	1790	83.8	0.00	533	30%	83.8	0.00	458	26%	83.8	0.00	533	30%
fv08000	fv07900	5,852	82.965	83.879	86.4	83.1	1790	83.9	0.00	533	30%	83.9	0.00	458	26%	83.9	0.00	533	30%
fv08100	fv08000	5,897	83.011	83.925	86.0	82.7	597	83.9	0.00	533	89%	83.9	0.00	458	77%	83.9	0.00	533	89%

ATTACHMENT

B

XPSWMM Model Schematic

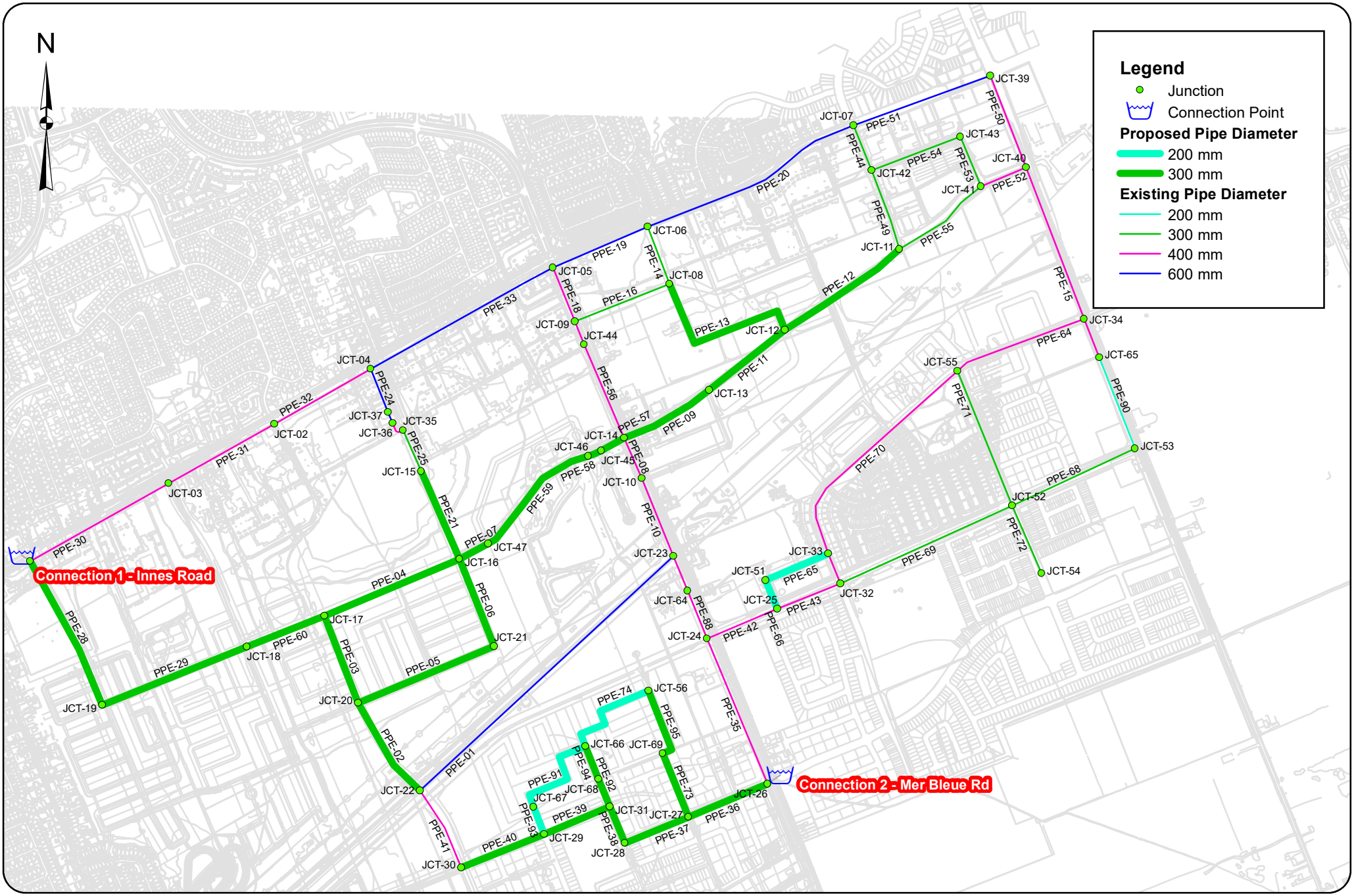
Pipe Data and Hydraulic Simulation Results

JFSA Water Resources and Environmental Consultants

Table B-2: Pipe Data and Hydraulic Simulation Results for the Sanitary Trunk Sewer (Monitored & Design Scenario, 165.2 L/s Redirected from fv07400 to fv07700)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover [2] (m)	Compare to 2003 HGL Results (m)	
																		U/S HGL [3] (m)	Difference (m)
fv08100	fv08000	83.011	82.965	900	45.0	0.1	0.013	86.000	86.400	0.900	0.572	0.533	0.9	-0.166	83.745	83.705	2.255	83.9	-0.155
fv08000	fv07900	82.965	82.877	900	86.0	0.1	0.013	86.400	87.100	0.900	0.572	0.533	0.9	-0.160	83.705	83.631	2.695	83.9	-0.195
fv07900	fv07800	82.877	82.751	900	139.0	0.1	0.013	87.100	87.600	0.854	0.543	0.533	1.0	-0.146	83.631	83.515	3.469	83.8	-0.169
fv07800	fv07700	82.751	82.608	900	132.0	0.1	0.013	87.600	87.800	0.944	0.600	0.533	0.9	-0.136	83.515	83.410	4.085	83.7	-0.185
fv07700	fv07600	82.608	82.450	900	153.0	0.1	0.013	87.800	87.700	0.900	0.572	0.698	1.2	-0.098	83.410	83.194	4.390	83.5	-0.090
fv07600	fv07500	82.450	82.224	900	153.0	0.2	0.013	87.700	87.800	1.102	0.701	0.698	1.0	-0.156	83.194	82.968	4.506	83.4	-0.206
fv07500	fv07400	82.224	81.900	900	152.0	0.2	0.013	87.800	88.000	1.304	0.830	0.698	0.8	-0.156	82.968	82.637	4.832	83.1	-0.132
fv07400	fv07300	81.900	81.800	900	103.0	0.1	0.013	88.000	87.800	0.900	0.572	0.714	1.2	-0.163	82.637	82.442	5.363	82.9	-0.263
fv07300	fv07200	81.800	81.600	900	71.0	0.3	0.013	87.800	87.500	1.506	0.958	0.714	0.7	-0.258	82.442	82.306	5.358	82.7	-0.258
fv07200	fv07100	81.600	81.400	900	72.0	0.3	0.013	87.500	87.600	1.506	0.958	0.714	0.7	-0.194	82.306	82.201	5.194	82.5	-0.194
fv07100	fv07000	81.400	81.300	900	47.0	0.2	0.013	87.600	87.300	1.304	0.830	0.714	0.9	-0.099	82.201	82.133	5.399	82.4	-0.199
fv07000	fv06900	81.300	81.200	900	56.0	0.2	0.013	87.300	87.000	1.207	0.768	0.714	0.9	-0.067	82.133	81.994	5.167	82.3	-0.167
fv06900	fv06800	81.200	81.100	900	79.0	0.1	0.013	87.000	87.700	0.986	0.627	0.793	1.3	-0.106	81.994	81.834	5.006	82.2	-0.206
fv06800	fv06700	81.100	80.900	900	65.0	0.3	0.013	87.700	87.800	1.584	1.008	0.793	0.8	-0.166	81.834	81.713	5.866	82.0	-0.166
fv06700	fv06600	80.900	80.800	900	49.0	0.2	0.013	87.800	88.100	1.273	0.810	0.793	1.0	-0.087	81.713	81.621	6.087	81.9	-0.187
fv06600	fv06500	80.800	80.800	900	47.0	0.0	0.013	88.100	88.200	0.090	0.060	0.793	13.2	-0.079	81.621	81.515	6.479	81.8	-0.179
fv06500	fv06400	80.800	80.600	900	51.0	0.4	0.013	88.200	88.500	1.777	1.131	0.793	0.7	-0.185	81.515	81.422	6.685	81.7	-0.185
fv06400	fv06300	80.600	80.600	900	43.0	0.0	0.013	88.500	88.600	0.090	0.060	0.793	13.2	-0.078	81.422	81.335	7.078	81.6	-0.178
fv06300	fv06200	80.600	80.500	900	48.0	0.2	0.013	88.600	88.800	1.304	0.830	0.793	1.0	-0.165	81.335	81.241	7.265	81.5	-0.165
fv06200	fv06100	80.500	80.500	900	26.0	0.0	0.013	88.800	88.900	0.090	0.060	0.793	13.2	-0.159	81.241	81.174	7.559	81.4	-0.159
fv06100	fv06000	80.500	80.300	900	70.0	0.3	0.013	88.900	88.600	1.520	0.970	0.793	0.8	-0.226	81.174	81.023	7.726	81.4	-0.226
fv06000	fv05900	80.300	80.200	900	70.0	0.1	0.013	88.600	88.600	1.080	0.680	0.793	1.2	-0.177	81.023	80.858	7.577	81.2	-0.177
fv05900	fv05800	80.200	80.000	900	77.0	0.3	0.013	88.600	89.000	1.450	0.920	0.794	0.9	-0.242	80.858	80.669	7.742	81.1	-0.242
fv05800	fv05700	80.000	79.800	900	74.0	0.3	0.013	89.000	89.100	1.480	0.940	0.794	0.8	-0.231	80.669	80.500	8.331	80.9	-0.231
fv05700	fv05600	79.800	79.600	900	91.0	0.2	0.013	89.100	87.900	1.330	0.850	0.806	0.9	-0.200	80.500	80.296	8.600	80.7	-0.200
fv05600	fv05500	79.600	79.400	900	77.0	0.3	0.013	87.900	86.900	1.450	0.920	0.807	0.9	-0.204	80.296	80.126	7.604	80.5	-0.204
fv05500	fv05400	79.400	79.100	900	97.0	0.3	0.013	86.900	85.500	1.580	1.010	0.807	0.8	-0.174	80.126	79.840	6.774	80.3	-0.174
fv05400	fv05300	79.100	79.100	900	26.0	0.0	0.013	85.500	84.700	0.090	0.060	0.819	13.7	-0.160	79.840	79.744	5.660	80.0	-0.160
fv05300	fv05200	79.100	78.900	900	52.0	0.4	0.013	84.700	84.300	1.760	1.120	0.819	0.7	-0.256	79.744	79.615	4.956	80.0	-0.256
fv05200	fv05100	78.900	78.800	900	38.0	0.3	0.013	84.300	84.000	1.460	0.930	0.819	0.9	-0.185	79.615	79.513	4.685	79.8	-0.185
fv05100	fv05000	78.800	78.700	900	53.0	0.2	0.013	84.000	84.400	1.240	0.790	0.820	1.0	-0.187	79.513	79.383	4.487	79.7	-0.187
fv05000	fv04900	78.700	78.500	900	76.0	0.3	0.013	84.400	84.800	1.460	0.930	0.820	0.9	-0.217	79.383	79.198	5.017	79.6	-0.217
fv04900	fv04800	78.500	78.300	900	74.0	0.3	0.013	84.800	84.300	1.480	0.940	0.822	0.9	-0.202	79.198	79.033	5.602	79.4	-0.202
fv04800	fv04700	78.300	78.200	900	36.0	0.3	0.013	84.300	84.300	1.500	0.950	0.822	0.9	-0.167	79.033	78.956	5.267	79.2	-0.167
fv04700	fv04600	78.200	78.100	900	38.0	0.3	0.013	84.300	84.400	1.460	0.930	0.822	0.9	-0.144	78.956	78.882	5.344	79.1	-0.144
fv04600	fv04500	78.100	77.900	900	81.0	0.3	0.013	84.400	84.800	1.410	0.900	0.823	0.9	-0.118	78.882	78.735	5.518	79.0	-0.118
fv04500	fv04400	77.900	77.800	900	48.0	0.2	0.013	84.800	84.400	1.300	0.830	0.823	1.0	-0.065	78.735	78.648	6.065	78.8	-0.065
fv04400	fv04300	77.800	77.700	900	41.0	0.2	0.013	84.400	84.000	1.410	0.890	0.828	0.9	-0.052	78.648	78.572	5.752	78.7	-0.052
fv04300	fv04200	77.700	77.500	900	55.0	0.4	0.013	84.000	84.500	1.720	1.090	0.883	0.8	-0.028	78.572	78.443	5.428	78.6	-0.028
fv04200	fv04100	77.500	77.400	900	43.0	0.2	0.013	84.500	84.600	1.370	0.870	0.883	1.0	0.043	78.443	78.329	6.057	78.4	0.043
fv04100	fv04000	77.400	77.300	900	79.0	0.1	0.013	84.600	84.100	1.010	0.640	0.884	1.4	0.029	78.329	78.140	6.271	78.4	-0.071
fv04000	fv03900	77.300	77.200	900	21.0	0.5	0.013	84.100	83.900	1.960	1.250	0.889	0.7	-0.060	78.140	78.088	5.960	78.2	-0.060
fv03900	fv03800	77.200	77.100	900	61.0	0.2	0.013	83.900	83.600	1.150	0.730	0.889	1.2	-0.012	78.088	77.934	5.812	78.2	-0.112
fv03800	fv03700	77.100	76.900	900	71.0	0.3	0.013	83.600	83.600	1.510	0.960	0.891	0.9	-0.066	77.934	77.781	5.666	78.0	-0.066
fv03700	fv03600	76.900	76.900	900	27.0	0.0	0.013	83.600	83.700	0.090	0.060	0.892	14.9	-0.019	77.781	77.709	5.819	77.9	-0.119
fv03600	fv03500	76.900	76.800	900	55.0	0.2	0.013	83.700	84.000	1.210	0.770	0.893	1.2	-0.091	77.709	77.583	5.991	77.9	-0.191
fv03500	fv03400	76.800	76.600	900	59.0	0.3	0.013	84.000	83.800	1.660	1.050	0.895	0.9	-0.117	77.583	77.458	6.417	77.7	-0.117

Appendix E
Water Demand Calculations and Hydraulic Modeling



GeoAdvice Engineering Inc.

Project: **Hydraulic Capacity and Modeling Analysis East Urban Community Mixed-Use Centre Development**
Client: **David Schaeffer Engineering Ltd.**
Date: **July 2018**
Created by: **AM**
Reviewed by: **WdS**

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.

0 400 800
Meters

Site Layout and Connection Points

Figure 1.1
B5

Boundary Conditions for BMR Lands

Date Provided September-19

Scenario	Demand	
	L/min	L/s
Average Daily Demand	306.06	5.101
Maximum Daily Demand	765.06	12.751
Peak Hour	1683.18	28.053
Fire Flow Demand #1	10020	167
Fire Flow Demand #2	13020	217
Fire Flow Demand #3	15000	250

# of connections 2

Location:



Results:

Connection 1 - Jargeau Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.9	61.0
Peak Hour	127.0	55.4
Max Day plus Fire 1	122.5	49.1
Max Day plus Fire 3	116.5	40.5

[1] Ground Elevation = 88.0 m

Max Day Plus Fire 2 = 118.9, 43.9

Connection 2 - Beaugency Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.9	61.0
Peak Hour	127.0	55.4
Max Day plus Fire 1	120.9	46.8
Max Day plus Fire 3	113.2	35.9

[1] Ground Elevation = 88.0 m

Max Day Plus Fire 2 = 116.3, 40.2

Connection 3 - Innes Rd (Optional)

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.9	56.4
Peak Hour	127.0	50.9
Max Day plus Fire 1	127.1	51.0
Max Day plus Fire 3	126.0	49.5

[1] Ground Elevation = 91.2 m

Max Day Plus Fire 2 = 126.4, 50.1

Notes:

1. Please interpolate to estimate HGL elevations at fire flow demand 2.

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.

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons (3610 Innes Road)
Date: 6/24/2021
Input By: BCS
Reviewed By: BHB

Legend

Building Description: Lots 24 to 59 - Single Family
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	3297			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**6,594**	
	F	**Base fire flow without reductions**				**27,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**22,950**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**13,770**
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**60%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**37,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**617**
				or	USGPM	9,775
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	8.5
		Required Volume of Fire Flow (m^3)			m^3	18870

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons (3610 Innes Road)
Date: 6/24/2021
Input By: BCS
Reviewed By: BHB

Legend

Building Description: Block 114 to 120
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	4500			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**9,000**	
	F	**Base fire flow without reductions**				**31,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**26,350**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**14,493**
		East Side	10.1 - 20 m		15%	
		South Side	20.1 - 30 m		10%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**55%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**41,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**683**
				or	USGPM	10,832
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	9.5
		Required Volume of Fire Flow (m^3)			m^3	23370

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons (3610 Innes Road)
Date: 6/24/2021
Input By: BCS
Reviewed By: BHB

Legend

Building Description: Lots 20 to 23, 146 to 151 - Single Family (contiguous block basis)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1570			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**3,140**	
	F	**Base fire flow without reductions**				**18,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**15,300**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**6,120**
		East Side	10.1 - 20 m		15%	
		South Side	> 45.1m		0%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**40%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**21,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**350**
				or	USGPM	5,548
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	4.5
		Required Volume of Fire Flow (m^3)			m^3	5670

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons (3610 Innes Road)
Date: 6/24/2021
Input By: BCS
Reviewed By: BHB

Legend

Building Description: Lots 1 to 11, 91 to 97 - Single Family (contiguous block basis)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	2826			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**5,652**	
	F	**Base fire flow without reductions**				**25,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**21,250**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**8,500**
		East Side	20.1 - 30 m		10%	
		South Side	20.1 - 30 m		10%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**40%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**30,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**500**
				or	USGPM	7,926
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	7
		Required Volume of Fire Flow (m^3)			m^3	12600

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118224
Project Name: The Commons (3610 Innes Road)
Date: 6/24/2021
Input By: BCS
Reviewed By: BHB

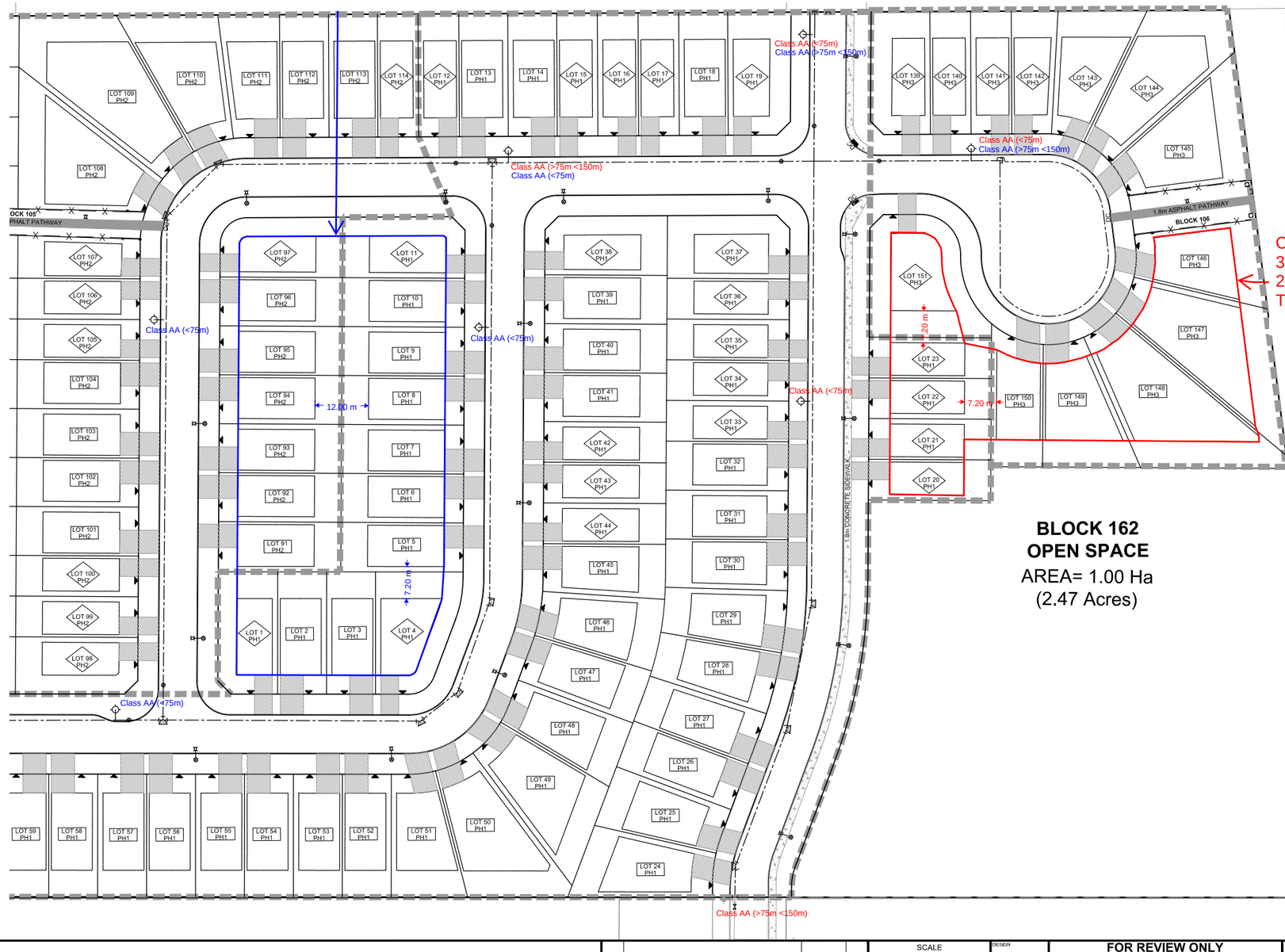
Legend

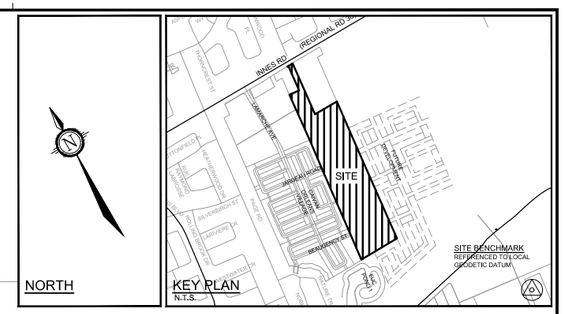
Building Description: Block 102 - Townhouse Block (contiguous block basis)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	875			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**1,750**	
	F	**Base fire flow without reductions**				**14,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,900**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**7,735**
		East Side	30.1- 45 m		5%	
		South Side	20.1 - 30 m		10%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**65%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**20,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**333**
				or	USGPM	5,284
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	4.5
		Required Volume of Fire Flow (m^3)			m^3	5400

FIGURE E4

Contiguous Block 2 - Required Fire Flow = 30000 L/min
4 Class AA - (<75m) Hydrants = 22800 L/min
2 Class AA - (>75m <150m) Hydrants = 7600 L/min
Total Contribution to Required Fire Flow = 30400 L/min





NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY

SCALE 1:500

1:500
0 5 10 15 20

DESIGN BR
CHECKED BCS
DRAWN BR
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

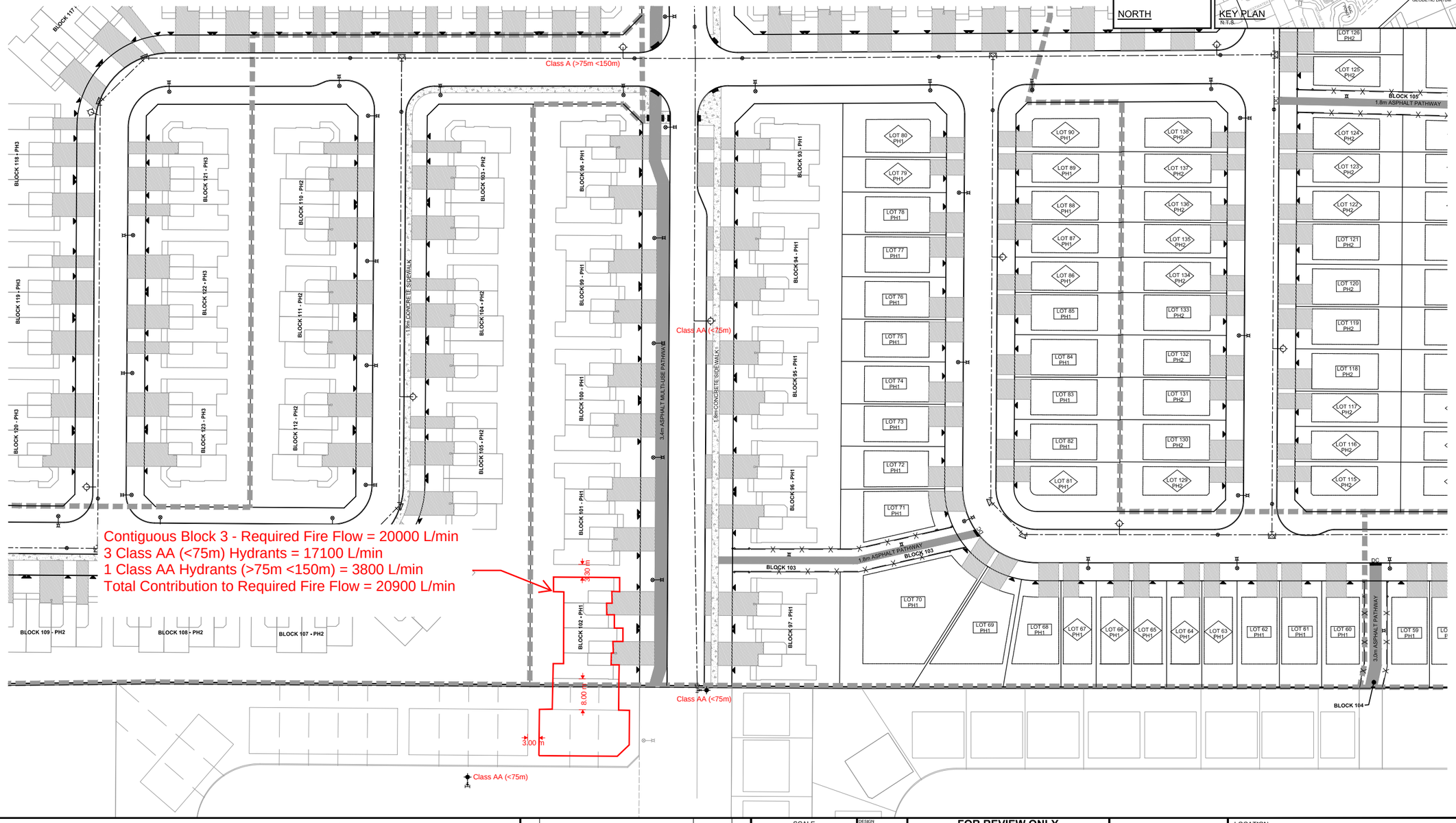
LOCATION
CITY OF OTTAWA
THE COMMONS

DRAWING NAME

PROJECT No. 118224-00
REV REV # 1
DRAWING No.

C:\temp\AcPublish_18536\118224-FUS.dwg, 118224-CUP1, Jun 29, 2021 - 8:51am, bneed

FIGURE E5



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PRELIMINARY

No.	REVISION	DATE	BY

SCALE 1:500

1:500
0 5 10 15 20

DESIGN BR
CHECKED BCS
DRAWN BR
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
THE COMMONS

DRAWING NAME

PROJECT No. 118224-00
REV REV # 1
DRAWING No.

C:\temp\AcPublish_16536\118224-FUS.dwg, 118224-CUP2, Jun 29, 2021 - 8:51am, bread

1. Background

On behalf of the City of Ottawa, the National Research Council of Canada (NRC) evaluated the City's hydrant spacing guidelines in relation to Required Fire Flow (RFF) as calculated using the Fire Underwriters Survey (FUS) methodology. This work lead to the development of a procedure to be used to establish the appropriate sizing of, and hydrant spacing on, dead-end watermains. This procedure may also be used as an optional watermain network design method to optimize watermain sizing based on RFF and standard hydrant spacing.

The procedure is partially based on the NFPA 1: Fire Code (NFPA1) and the City of Ottawa existing hydrant classification practice (refer to **Attachment A** at the end of this appendix for relevant excerpts of the Fire Code).

2. Rationale for Guideline

Given a Required Fire Flow (RFF) for a certain asset/structure/building, proper planning must ensure that there is a sufficient number of hydrants at sufficient proximities to actually provide the RFF. Both the capacity of the hydrants and their proximity to the asset/structure/building must be considered. Pressure losses (due to friction) in firehoses are proportional to the firehose length. Therefore, the actual fire flow delivered by the nozzle at the end of a very long firehose will be less compared to a short firehose connected to the same hydrant. Table 1 provides conservative values for hydrant fire flow capacity adjusted for firehose length.

3. Hydrant Capacity Requirement

For the purposes of this guidelines, the aggregate fire flow capacity of all contributing fire hydrants within 150 m of a building/asset/structure[1], measured in accordance with Table 1, shall be not less than the RFF.

4. Standard Practice

For the vast majority of developments, hydrant spacing as indicated in Section 4.5, Table 4.9, Ottawa Design Guidelines – Water Distribution, are sufficient to meet the RFF. This has been verified by evaluating approved development plans representing a

[1] Although NFPA 1 considers hydrant contribution at distances of up to 1000ft (305 m), Ottawa Fire Services (OFS) would need two pumpers to deliver flow from such a distance (one pumper midway – acting as a booster). Moreover, OFS cautioned that some redundancy is advisable to account for accessibility limitations in emergency situations, wind effects, etc. Therefore 150 m was considered as the maximum contributing distance

range of land uses and configurations. However, in some instances involving dead-end watermains, standard spacing requirements may not be sufficient to meet RFF.

Standard design practice involves systematic checking of design fire flows at every node in hydraulic models of proposed water distribution systems. Normally the entire design fire flow is applied to each node in succession. Nodes are typically at water main junctions rather than actual hydrant locations. This significantly simplifies the design process and the current software packages that are normally used for this purpose have been developed based on this practice. The "point load assumption" produces a conservative design.

Table 1. Maximum flow to be considered from a given hydrant

Hydrant Class	Distance to asset/structure/building (m)[a]	Contribution to required fire flow (L/min)[b]
AA	≤ 75	5,700
	> 75 and ≤ 150	3,800
A	≤ 75	3,800
	> 75 and ≤ 150	2,850
B	≤ 75	1,900
	> 75 and ≤ 150	1,500
C	≤ 75	800
	> 75 and ≤ 150	800

[a] Distance of contributing hydrant from the structure, measured in accordance with NFPA 1 (Appendix A).

[b] Maximum flow contribution to be considered for a given asset/structure/building, at a residual pressure of 20 psi, measured at the location of the main, at ground level.

4. Intended Application of Guideline

The intent of this procedure is to:

- Determine the appropriate sizing of dead end watermains and associated hydrant requirements.
- Provide an optional approach to local watermain network sizing that will assist the designer in determining the minimum pipe sizing needed to meet RFF.

The procedure permits the designer to: (a) reconcile available hydrant flow with computed RFFs, and (b) allow the distribution of RFFs along multiple hydrants, rather

than consider RFF to be a point flow. The application of this protocol may result in reduced watermain diameters compared to those determined based on a traditional design approach. Caution is required in the application of the procedure to ensure that the transmission function of any watermains identified in a Master Servicing Study is not compromised. Normally, watermains 300mm in diameter and larger that are identified in such studies would not be considered for resizing.

5. Application Procedure

5.1 Rated hydrants

The procedure described here would apply to an existing watermain network with existing hydrants (i.e., re-development or infill in existing neighborhoods):

- Identify critical zones within the (re)development area, e.g., high RFF, dead ends, small diameter watermains, low C factor, and/or high geographic elevation zones.
- For the critical zones use Table 1 to examine if there are sufficient hydrants to deliver the RFF (following procedure described in 5.3).
- If hydrant capacity is insufficient, then consider either:
    - adding hydrants as appropriate;
    - determine if the existing hydrants can be upgraded to higher rating; or
    - upgrade existing watermains.

5.2 Un-rated hydrants

There are currently about 24,800 hydrants in the City of Ottawa, of which about 78% are rated. Of the rated hydrants, 96% are AA (Blue), 3% are A (Green). Many of the un-rated hydrants are located in old parts of the City, often installed on water mains with minimum diameter of 6" (150 mm), and would be likely to have a low rating.

Based on a review of hydrants that have been installed as part of recent urban development, approximately 99% of those which were rated are rated AA, and only 1% are rated A.

5.2.1 Un-rated Existing Hydrants

In cases where fire flow is to be evaluated in areas with an established water distribution network and with existing fire hydrants (i.e., re-development or infill in existing neighborhoods), all un-rated hydrants should be tested and rated in accordance with NFPA standard 291. The procedure described in Section 5.1 can then be followed to complete the design.

5.2.2 Planned hydrants

Planned hydrants cannot be tested for rating because they have not been installed yet. Moreover, the rating of a hydrant is an intrinsic property of the hydrant and can therefore not be directly evaluated by simulation. Based on the statistics cited previously, it can be assumed for design purposes that all planned hydrants are AA. However, there could be a situation where the proposed network might not have sufficient capacity to supply 5,700 L/min to a AA-rated hydrant in a specific area. Hydraulic analysis is required to confirm that the distribution network is capable of providing the hydrants with the fire flows in Table 1.

5.3 Hydrant Placement and Watermain Size Optimization

Ottawa design guidelines for watermain sizing and hydrant placement (Section 4) stipulate that the RFF be added to the average hourly rate of a peak day demand. This fire flow is added to hydraulic nodes in the vicinity of the planned development, while ensuring that the residual pressure is at least 140 kPa (measured at the location of the main, at ground level).[2] The following procedure is used to optimize watermain sizing and hydrant placement based on the RFF.

- Place hydrants throughout the development area according to the current Ottawa design guidelines.
- Size water mains and locate hydrants according to standard design procedures. Assume all hydrants are AA-rated.
- Identify the most critical zones in the development area, e.g. highest required fire flows, dead ends, longest distances between junctions, and/or highest elevation. Within these critical zones identify critical structures, i.e. those with highest RFF or greatest distance from proposed hydrant locations. Identify the closest hydrants to these buildings.
- For each critical structure, distribute the RFF according to Table 1 (i.e., assign a flow of 5,700 L/min to all hydrants with a distance of less or equal to 75 m from the test property and 3,800 L/min to all hydrants with a distance of more than 75 m but less or equal to 150 m from the test property) These hydrants are to be represented as hydrant-nodes in the network model, where the hydrant lateral would connect to the proposed water main.

---

[2] At the time when this protocol was proposed, the City of Ottawa had in effect Technical Bulletin ISDTB 2014-02, whereby RFF may be capped at 10,000 L/min for single detached dwellings (with a minimum 10 m separation between the backs of adjacent units and for side-by-side town and row houses that comply with the OBC Div. B, subsection 3.1.10 requirement (compartments of no more than 600 m^2 area).

- For each critical structure, run a single fire flow simulation ensuring that the RFF is provided by hydrants within 150 m distance from the test property, with a minimum residual pressure of 140 kPa.
- If the required residual pressure cannot be achieved, consider either re-sizing of pipes, and/or re-spacing of hydrants.

The above procedure is optional except for dead-end watermains servicing cul-de-sacs because (a) based on standard spacing requirements, there would often be insufficient fire flow provided and (b) the watermain would otherwise could be sized larger than necessary and lead to excessive water age and on-going flushing requirements.

Irrespective of the above, if the RFF is equal to or less than 10,000 L/min, then:

- where the distance between two adjacent hydraulic nodes is greater than the inter-hydrant spacing allowed in the guideline, a hydraulic node should be added halfway between the two nodes, and proceed with fire flow simulations to verify watermain sizing, ensuring that the simulation considers RFF at the new hydraulic node.

Attachment A—Excerpts from NFPA 1 Fire Code (2015 Edition)

18.5 Fire Hydrants.

18.5.1 Fire Hydrant Locations and Distribution. Fire hydrants shall be provided in accordance with Section 18.5 for all new buildings, or buildings relocated into the jurisdiction unless otherwise permitted by 18.5.1.1 or 18.5.1.2.

18.5.1.4* The distances specified in Section 18.5 shall be measured along fire department access roads in accordance with 18.2.3.

18.5.1.5 Where fire department access roads are provided with median dividers incapable of being crossed by fire apparatus, or where fire department access roads have traffic counts of more than 30,000 vehicles per day, hydrants shall be placed on both sides of the fire department access road on an alternating basis, and the distances specified by Section 18.5 shall be measured independently of the hydrants on the opposite side of the fire department access road.

18.5.1.6 Fire hydrants shall be located not more than 12 ft (3.7 m) from the fire department access road.

18.5.2 Detached One- and Two-Family Dwellings. Fire hydrants shall be provided for detached one- and two-family dwellings in accordance with both of the following:

(1) The maximum distance to a fire hydrant from the closest point on the building shall not exceed 600 ft (183 m).

(2) The maximum distance between fire hydrants shall not exceed 800 ft (244 m).

18.5.3 Buildings Other than Detached One- and Two-Family Dwellings. Fire hydrants shall be provided for buildings other than detached one- and two-family dwellings in accordance with both of the following:

(1) The maximum distance to a fire hydrant from the closest point on the building shall not exceed 400 ft (122 m).

(2) The maximum distance between fire hydrants shall not exceed 500 ft (152 m).

18.5.4 Minimum Number of Fire Hydrants for Fire Flow.

18.5.4.1 The minimum number of fire hydrants needed to deliver the required fire flow for new buildings in accordance with Section 18.4 shall be determined in accordance with Section 18.5.4.

18.5.4.2 The aggregate fire flow capacity of all fire hydrants within 1000 ft (305 m) of the building, measured in accordance with 18.5.1.4 and 18.5.1.5, shall be not less than the required fire flow determined in accordance with Section 18.4.

18.5.4.3* The maximum fire flow capacity for which a fire hydrant shall be credited shall be as specified by Table 18.5.4.3. Capacities exceeding the values specified in Table 18.5.4.3 shall be permitted when local fire department operations have the ability to accommodate such values as determined by the fire department.

Table 18.5.4.3 Maximum fire flow hydrant capacity

Distance to buildings[a]		Maximum capacity[b]	
(ft)	(m)	(gpm)	(L/min)
≤ 250	≤ 76	1500	5678
> 250 and ≤ 500	> 76 and ≤ 152	1000	3785
> 500 and ≤ 1000	> 152 and ≤ 305	750	2839

[a] Measured in accordance with 18.5.1.4 and 18.5.1.5.

[b] Minimum 20 psi (139.9 kPa) residual pressure.

18.5.4.4 Fire hydrants required by **18.5.2** and **18.5.3** shall be included in the minimum number of fire hydrants for fire flow required by **18.5.4**.

The City of Ottawa design guidelines on hydrant classification conform to the NFPA Standard #291, which recommends the following:

5.1 Classification of Hydrants. Hydrants should be classified in accordance with their rated capacities [at 20 psi (1.4 bar) residual pressure or other designated value as follows:

(1) Class AA — Rated capacity of 1500 gpm (5700L/min) or greater

(2) Class A — Rated capacity of 1000–1499 gpm (3800– 5699 L/min)

(3) Class B — Rated capacity of 500–999 gpm (1900–3799 L/min)

(4) Class C — Rated capacity of less than 500 gpm (1900 L/min)

Novatech Project #: 118224
Project Name: 3610 Innes Road (Former BMR Lands)
Date: 10/04/2019
Date Revised: 3/4/2020

Engineers, Planners & Landscape Architects

OVERALL WATER DEMAND

RESIDENTIAL					BASIC DAY DEMAND	MAX. DAY DEMAND	PEAK HOUR DEMAND
NUMBER OF UNITS				POP'N			
SINGLE DWELLING	ROW TOWNHOME	MULTI-RESIDENTIAL	PARK	(pers)	(L/s) RES.	(L/s) RES.	(L/s) RES.
179	109	168	1	1259	5.10	12.75	28.05

ASSUMPTIONS:

RESIDENTIAL POPULATION	- Single Dwelling	3.4	people/unit
	- Semi-Detached	2.7	people/unit
	- Row Townhome	2.7	people/unit
	- Multi-Residential	2.1	people/unit
	- Park demands, equivalent to Single Dwelling		
BASIC DAY DEMAND:	- Residential	350	L / c / d
MAXIMUM DAY DEMAND:	- Residential	2.50	* basic day
PEAK HOUR DEMAND:	- Residential	2.20	* maximum day

FIRE FLOW DEMAND:	- Low Density Residential	10,000	L/min. =	167	L/s
	- Typ. Row Town Blocks	13,000	L/min. =	217	L/s
	- Stacked Row Town Blocks	15,000	L/min. =	250	L/s

Novatech Project #: 118224
Project Name: 3610 Innes Road (Former BMR Lands)
Date: 10/04/2019
Date Revised: 3/4/2020

NOVATECH
Engineers, Planners & Landscape Architects

JUNCTION DEMAND

JUNCTION ID	RESIDENTIAL					BASIC DAY DEMAND	MAX. DAY DEMAND	PEAK HOUR DEMAND	FIRE FLOW DEMAND
	NUMBER OF UNITS				POP'N				
	SINGLE DWELLING	ROW TOWNHOME	MULTI-RESIDENTIAL	PARK	(pers)	(L/s)	(L/s)	(L/s)	(L/s)
1			84		176	0.71	1.79	3.93	167
2			84		176	0.71	1.79	3.93	167
3	8	12			60	0.24	0.60	1.33	167
4	6	14			58	0.24	0.59	1.30	167
5	6	13			56	0.22	0.56	1.24	167
6	8	14			65	0.26	0.66	1.45	167
7		25			68	0.27	0.68	1.50	167
8	3	17			56	0.23	0.57	1.25	167
9	13				44	0.18	0.45	0.98	167
10	10	10			61	0.25	0.62	1.36	167
11	15				51	0.21	0.52	1.14	167
12	15	4			62	0.25	0.63	1.38	167
13	14				48	0.19	0.48	1.06	167
14	15				51	0.21	0.52	1.14	167
15	14				48	0.19	0.48	1.06	167
16	17				58	0.23	0.59	1.29	167
17	10			1	37	0.15	0.38	0.83	167
18	13				44	0.18	0.45	0.98	167
19	12				41	0.17	0.41	0.91	167
20					0	0.00	0.00	0.00	167
21					0	0.00	0.00	0.00	167
22					0	0.00	0.00	0.00	167
23					0	0.00	0.00	0.00	167
24					0	0.00	0.00	0.00	167
25					0	0.00	0.00	0.00	167
TOTAL	**179**	**109**	**168**	**1**	**1,259**	**5.10**	**12.75**	**28.05**	

ASSUMPTIONS:

RESIDENTIAL POPULATION DENSITY:
- Single Dwelling — 3.4 people/unit
- Semi-Detached — 2.7 people/unit
- Row Townhome — 2.7 people/unit
- Multi-Residential — 2.1 people/unit
- Park demands, equivalent to Single Dwelling

BASIC DAY DEMAND:
- Residential — 350 L / c / d

MAXIMUM DAY DEMAND:
- Residential — 2.50 * basic day

PEAK HOUR DEMAND:
- Residential — 2.20 * maximum day

FIRE FLOW DEMAND:
- Low Density Residential — 10,000 L/min. = 167 L/s
- Typ. Row Town Blocks — 13,000 L/min. = 217 L/s
- Stacked Row Town Blocks — 15,000 L/min. = 250 L/s

Novatech Project #: 118224
Project Name: 3610 Innes Road (Former BMR Lands)
Date: 10/04/2019
Date Revised: 3/4/2020

NOVATECH
Engineers, Planners & Landscape Architects

MAX PRESSURES DURING BSDY CONDITIONS

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)
1	90.90	0.71	131.30	40.40	57
2	90.50	0.71	131.30	40.79	58
3	90.30	0.24	131.30	40.99	58
4	90.00	0.24	131.30	41.29	59
5	90.20	0.22	131.30	41.09	58
6	89.70	0.26	131.30	41.59	59
7	88.40	0.27	131.30	42.90	61
8	89.30	0.23	131.30	42.00	60
9	88.60	0.18	131.30	42.69	61
10	89.20	0.25	131.30	42.09	60
11	88.60	0.21	131.30	42.69	61
12	88.90	0.25	131.30	42.39	60
13	88.20	0.19	131.30	43.10	61
14	88.10	0.21	131.30	43.20	61
15	88.00	0.19	131.30	43.30	62
16	87.80	0.23	131.30	43.50	62
17	87.70	0.15	131.30	43.60	62
18	87.50	0.18	131.30	43.80	62
19	87.40	0.17	131.30	43.90	62
20	89.70	0.00	131.30	41.60	59
21	88.10	0.00	131.30	43.19	61
22	87.60	0.00	131.30	43.70	62
23	87.90	0.00	131.30	43.40	62
24	88.00	0.00	131.30	43.30	62
25	91.00	0.00	131.30	40.30	57

Novatech Project #: 118224
Project Name: 3610 Innes Road (Former BMR Lands)
Date: 10/04/2019
Date Revised: 3/4/2020

NOVATECH
Engineers, Planners & Landscape Architects

MIN PRESSURES DURING PKHR CONDITIONS

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)
1	90.90	3.91	130.08	39.18	56
2	90.50	3.91	130.06	39.56	56
3	90.30	1.32	130.06	39.76	57
4	90.00	1.32	130.06	40.06	57
5	90.20	1.21	130.06	39.86	57
6	89.70	1.43	130.06	40.36	57
7	88.40	1.49	130.08	41.68	59
8	89.30	1.27	130.07	40.77	58
9	88.60	0.99	130.06	41.46	59
10	89.20	1.38	130.06	40.86	58
11	88.60	1.16	130.06	41.46	59
12	88.90	1.38	130.06	41.16	59
13	88.20	1.05	130.07	41.87	60
14	88.10	1.16	130.07	41.97	60
15	88.00	1.05	130.07	42.07	60
16	87.80	1.27	130.08	42.28	60
17	87.70	0.83	130.18	42.48	60
18	87.50	0.98	130.10	42.60	61
19	87.40	0.94	130.10	42.70	61
20	89.70	0.00	130.07	40.37	57
21	88.10	0.00	130.06	41.96	60
22	87.60	0.00	130.10	42.50	60
23	87.90	0.00	130.22	42.32	60
24	88.00	0.00	130.09	42.09	60
25	91.00	0.00	130.24	39.24	56

Novatech Project #: 118224
Project Name: 3610 Innes Road (Former BMR Lands)
Date: 10/04/2019
Date Revised: 3/4/2020

NOVATECH
Engineers, Planners & Landscape Architects

AVAILABLE FLOW AT 20psi DURING MXDY+FF CONDITIONS

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)	FIRE FLOW DEMAND (L/s)	FIRE FLOW DEMAND (L/min)	AVAILABLE FLOW (L/min)
1	90.90	1.78	130.98	40.08	57	167	10,000	13,734
2	90.50	1.78	130.97	40.48	58	167	10,000	13,722
3	90.30	0.60	130.97	40.68	58	167	10,000	14,778
4	90.00	0.60	130.97	40.98	58	167	10,000	13,650
5	90.20	0.55	130.97	40.78	58	167	10,000	13,434
6	89.70	0.65	130.97	41.28	59	167	10,000	17,046
7	88.40	0.68	130.98	42.58	61	167	10,000	34,560
8	89.30	0.58	130.98	41.68	59	167	10,000	28,722
9	88.60	0.45	130.97	42.38	60	167	10,000	14,550
10	89.20	0.63	130.97	41.78	59	167	10,000	17,904
11	88.60	0.53	130.97	42.38	60	167	10,000	16,320
12	88.90	0.63	130.97	42.08	60	167	10,000	14,508
13	88.20	0.48	130.97	42.78	61	167	10,000	15,936
14	88.10	0.53	130.97	42.88	61	167	10,000	14,028
15	88.00	0.48	130.97	42.98	61	167	10,000	14,070
16	87.80	0.58	130.98	43.18	61	167	10,000	16,644
17	87.70	0.38	131.00	43.30	62	167	10,000	23,574
18	87.50	0.45	130.98	43.49	62	167	10,000	19,398
19	87.40	0.43	130.98	43.59	62	167	10,000	12,390
20	89.70	0.00	130.98	41.28	59	167	10,000	25,728
21	88.10	0.00	130.97	42.88	61	167	10,000	12,012
22	87.60	0.00	130.98	43.39	62	167	10,000	17,238

Appendix F
Geotechnical Investigation (soft copy)

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Geotechnical Investigation

Proposed Residential Development
3604-3646 Innes Road
Ottawa, Ontario

Prepared For

Glenview Homes (Innes) Ltd.

April 2, 2020

Report: PG4026-2 Revision 2

Table of Contents

Page

1.0 Introduction 1

2.0 Proposed Development 1

3.0 Method of Investigation
3.1 Field Investigation 2
3.2 Field Survey 3
3.3 Laboratory Testing 4
3.4 Analytical Testing 4

4.0 Observations
4.1 Surface Conditions 5
4.2 Surface Profile 5
4.3 Groundwater 7

5.0 Discussion
5.1 Geotechnical Assessment 8
5.2 Site Grading and Preparation 8
5.3 Foundation Design 11
5.4 Design for Earthquakes 12
5.5 Basement Slab/Slab on Grade Construction 13
5.6 Pavement Structure 13

6.0 Design and Construction Precautions
6.1 Foundation Drainage and Backfill 16
6.2 Protection Against Frost Action 16
6.3 Excavation Side Slopes 16
6.4 Pipe Bedding and Backfill 17
6.5 Groundwater Control 18
6.6 Winter Construction 18
6.7 Corrosion Potential and Sulphate 19
6.8 Landscaping Considerations 19

7.0 Recommendations 21

8.0 Statement of Limitations 22

Appendices

Appendix 1 Soil Profile and Test Data Sheets
Boreholes by Others
Symbols and Terms
Atterberg Limits Testing Results
Grain Size Testing Results

Appendix 2 Figure 1 - Key Plan
Drawing PG4026-1 - Test Hole Location Plan
Drawing PG4026-2 - Permissible Grade Raise Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by Glenview Homes (Innes) Ltd. to conduct a geotechnical investigation for the proposed residential development to be located at 3604, 3636 and 3646 Innes Road, in the City of Ottawa, Ontario (Refer to Figure 1 - Key Plan in Appendix 2).

The objectives of the current geotechnical review were:

- ❑ to determine the subsurface soil and groundwater conditions based on the soils information.
- ❑ to provide geotechnical recommendations pertaining to design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. The report contains the geotechnical findings and recommendations pertaining to the design and construction of the subject development as understood at the time of writing this report.

2.0 Proposed Development

Specific details of the proposed development were not available at the time of writing this report. However it is understood that the proposed development will consist of townhouse units and residential single unit dwellings. It is also anticipated that the development will include associated car parking areas, residential driveways, access lanes and landscaped areas. It is further understood that the site will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

The field program for the current investigation was conducted between December 5 and December 7, 2018. At that time, a total of 10 (ten) boreholes (BH) were advanced to a maximum depth of 6.7 m. Previous field investigations were completed by Paterson between September 2014 and August 2017. During that time, a total of 6 test holes, consisting of boreholes and test pits were extended to a maximum depth of 7.1 m.

Previous geotechnical investigations were also completed by others within the area of the subject site. The results of the previous investigations by others are discussed in the current report. The locations of the test holes are shown on Drawing PG4026-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were completed using a track mounted auger drill rig operated by a two person crew. The test pits were completed using a hydraulic shovel. All fieldwork was conducted under the full-time supervision of Paterson personnel from our geotechnical division under the direction of a senior engineer. The testing procedure consisted of augering to the required depths and at the selected locations sampling the overburden.

Two (2) investigations were completed by others for environmental purposes for the subject site. The field work was conducted in 2013 and 2016. A total of 34 test holes were completed during the course of the investigations by others. The test holes were advanced to a maximum depth of 7.0 m below existing ground surface.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using a 50 mm diameter split spoon sampler. Soil samples were also recovered along the sidewalls of the test pits by hand during excavation.

All soil samples were visually inspected and initially classified on site. The split spoon samples were placed in sealed plastic bags. All samples were transported to our laboratory for examination and classification. The depths at which the split spoon, auger and grab samples were recovered from the test holes are shown as SS, AU and G, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing was carried out at regular depth intervals in cohesive soils using a field vane apparatus.

Overburden thickness was evaluated during the course of the site investigations by dynamic cone penetration testing (DCPT) at several borehole locations. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

The subsurface conditions observed at the borehole and test pit locations were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets and Borehole Logs by Others in Appendix 1.

Groundwater

Flexible standpipes were installed in all boreholes to monitor the groundwater levels subsequent to the completion of the sampling program. Groundwater infiltration levels were noted at the time of excavation at the test pit locations.

3.2 Field Survey

The borehole locations were determined by Paterson personnel taking into consideration the presence of underground and aboveground services. The location and ground surface elevation at each borehole location were provided by J.D. Barnes Limited. It is understood that the elevations are referenced to a geodetic datum. The test hole locations and ground surface elevations at the test hole locations are presented on Drawing PG4026-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the subject site were visually examined in our laboratory to review the results of the field logging. A total of two (2) Atterberg limit tests were completed on selected silty clay samples. Grain size distribution (hydrometer) testing was also completed on two (2) soil samples and one (1) soil sample was submitted for shrinkage testing. The results are presented in Subsection 4.2 of our current report and in Appendix 1.

3.4 Analytical Testing

One (1) soil sample was submitted to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was analyzed to determine the concentration of sulphate and chloride, the resistivity and the pH of the sample. The results are discussed in Subsection 6.7 and shown in Appendix 1.

4.0 Observations

4.1 Surface Conditions

The north portion of the subject site is currently occupied by commercial buildings with associated paved/gravel surfaced areas used for parking and storage units. The gravel surfacing extends approximately 400 m south of Innes Road, and is relatively flat and at grade with Innes Road. The ground surface along the north portion of the site is relatively flat and at grade with Innes Road. The ground surface south of the gravel surfaced area consists of grass covered, undeveloped land with occasional trees, and slopes gradually down toward the south. The site is bordered to the north by Innes Road and to the east, south and west by undeveloped land. Additional commercial properties border the subject site to the east and west along Innes Road.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the borehole locations consisted of a layer of topsoil, followed by a very stiff to stiff brown silty clay crust. A stiff to firm grey silty clay deposit was encountered below the aforementioned layers. A glacial till deposit was encountered below the grey silty clay at some borehole locations. The fine matrix of the glacial till was observed to consist of grey silty clay with sand and gravel, with occasional cobbles and boulders. Practical refusal to augering was encountered at BH 2-18, BH 3-18 and BH 5-18 at depths of 3.8 to 5.6 m. Practical refusal to DCPT was encountered at a depth of 10.4 m at BH 7. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the soil profiles encountered at each test hole location.

Atterberg Limits Results

The results of the Atterberg Limit tests conducted within the silty clay are presented below in Table 1 - Summary of Atterberg Limits Results and are presented in Appendix 1.

Table 1 - Summary of Atterberg Limits Results				
Sample	**Liquid Limit %**	**Plastic Limit %**	**Plasticity Index %**	**Classification**
BH1-18 SS2	67	29	38	CH
BH10-18 SS3	72	29	43	CH
TP 1 G2	66	21	45	CH
TP 1 G3	71	24	47	CH
TP 2 G2	78	25	53	CH
TP 3 G2	69	25	44	CH
TP 4 G2	77	25	52	CH
TP 5 G3	70	24	46	CH

The results of the shrinkage testing of BH5 SS3 resulted in a shrinkage limit of 19% with a shrinkage ratio of 1.71.

Hydrometer Testing

Two (2) soil samples were submitted for hydrometer testing. The results are summarized in Table 2 and presented on the Grain Size Distribution sheets in Appendix 1.

Table 2 - Summary of Hydrometer Tests				
Sample	**Gravel %**	**Sand %**	**Fines Content**	
			Silt %	**Clay %**
BH4-18 SS3	0	0.6	29.9	69.5
BH6-18 SS3	0	0.5	23	76.5

Bedrock

Based on available geological mapping, the local bedrock consists of limestone and shale of the Bobcaygeon and Lindsay formations with an anticipated overburden thickness of 0 to 25 m.

4.3 Groundwater

The groundwater levels were measured in the borehole locations on December 14, 2018, and are presented in the Soil Profile and Test Data sheets in Appendix 1.

Table 3 - Summary of Groundwater Level Readings

Test Hole Number	Ground Elevation (m)	Groundwater Levels (m)		Recording Date
		Depth	Elevation	
BH1-18	89.02	1.84	87.18	December 14, 2018
BH2-18	88.81	1.19	87.62	December 14, 2018
BH3-18	88.43	0.95	87.48	December 14, 2018
BH4-18	88.26	1.07	87.19	December 14, 2018
BH5-18	87.47	1.29	86.18	December 14, 2018
BH6-18	87.61	Damaged	n/a	December 14, 2018
BH7-18	86.93	1.02	85.91	December 14, 2018
BH8-18	87.51	Damaged	n/a	December 14, 2018
BH9-18	86.95	0.65	86.3	December 14, 2018
BH10-18	86.69	Frozen	n/a	December 14, 2018

Note: The ground surface elevations at the borehole locations were provided by JD Barnes Limited.

It is important to note that groundwater level readings could be influenced by surface water infiltrating the backfilled borehole, which can lead to higher than typical groundwater levels. The long-term groundwater level can also be estimated based on moisture levels and colouring of the recovered soil samples. Based on these observations at the borehole locations, the long-term groundwater level is expected at a 3 to 4 m depth.

It should be noted that groundwater levels are subject to seasonal fluctuations, therefore groundwater levels could differ at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered adequate for the proposed development. It is expected that buildings can be founded by conventional style shallow foundations placed on undisturbed, stiff to firm silty clay, glacial till or a clean, surface sounded bedrock bearing surface.

Due to the presence of the silty clay deposit, the subject site will be subject to permissible grade raise recommendations.

The above and other consideration are discussed in the following paragraphs.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

Due to the presence of shallow bedrock, some bedrock removal may be required to construct footings and municipal services.

Bedrock Removal

Based on the bedrock encountered in the area, line drilling in conjunction with hoe-ramming or controlled blasting may be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming alone.

Prior to considering blasting operations, the blasting effects on the existing services, buildings and other structures should be addressed. A pre-blast or pre-construction survey of the existing structures located in proximity to the blasting operations should be completed prior to commencing site activities. The extent of the survey should be determined by the blasting consultant and should be sufficient to respond to any inquiries/claims related to the blasting operations.

As a general guideline, peak particle velocities (measured at the structures) should not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures.

The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is also an experienced blasting consultant.

Excavation side slopes in sound bedrock can be excavated almost vertical side walls. A minimum 1 m horizontal ledge, should remain between the overburden excavation and the bedrock surface. The ledge will provide an area to allow for potential sloughing or a stable base for the overburden shoring system.

Vibration Considerations

Construction operations are the cause of vibrations, and possibly sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain, as much as possible, a cooperative environment with the residents.

The following construction equipments could be the source of vibrations: hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the source of detrimental vibrations on the nearby buildings and structures. Therefore, all vibrations are recommended to be limited.

Two parameters are used to determine the permissible vibrations, namely, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). The guidelines are for current construction standards. Considering that these guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended be completed to minimize the risks of claims during or following the construction of the proposed building.

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 material. 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 buildings should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If excavated stiff brown silty clay, free of organics and deleterious materials, is to be used to build up the subgrade level for areas to be paved, the silty clay, under dry conditions, should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

Decommissioning of Standpipe Piezometers

Upon the completion of groundwater level monitoring program, the flexible standpipe piezometers shall be properly decommissioned by licensed and experienced contractor as per Ontario Regulation 903 to protect the water quality of existing and future standpipes and the shared groundwater resources.

As per Ontario Regulation 903, abandonment barrier (sealant) material must be placed continuously from the bottom of the standpipe piezometer upward to approximately 2 m below the ground surface. The abandonment barrier material must be compatible with the quality of the water found in the standpipe piezometer, stable in the presence of any contaminants, and should not contain any materials that may impair the integrity of the abandonment barrier, including soil or drill cuttings. The abandonment barrier should be placed in a manner that does not prevent the placement of clean, washed sand or gravel adjacent to water producing zones or bedrock fractures to minimize the loss of abandonment barrier material. However, the abandonment barrier must be placed in a manner that prevents any movement of water, natural gas, contaminants or other material between subsurface formations (which include aquifers) or between a subsurface formation and the top of abandonment barrier material. After or during the placement of the abandonment barrier, the casing or screen must be removed, if reasonably possible.

During the removal of the screen, the bottom of the screen must be immersed in the rising accumulation of the abandonment barrier until the required level is reached.

To prevent inadvertent or unauthorized access, the standpipe piezometer and the standpipe piezometer opening must be sealed up to the ground surface by placing 50 mm or 150 mm bentonite chips, pellets, granules or powder in accordance with the manufacturer's specifications, and cover the bentonite with soil cover or other material that is keeping with the immediately adjacent material.

5.3 Foundation Design

Bearing Resistance Values

Strip footings, up to 2 m wide, and pad footings, up to 4 m wide, founded on an undisturbed, stiff silty clay can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**.

Footings placed on a glacial till or engineered fill bearing surface can be designed using a bearing resistance value at SLS of **150 kPa** and at ULS of **225 kPa**.

A geotechnical resistance factor of 0.5 was incorporated into the abovenoted bearing resistance values at ULS.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, have been removed, in the dry, prior to the placement of concrete for footings.

Footings bearing on an undisturbed soil bearing surface and designed using the bearing resistance values provided herein will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Footings placed on a clean, surface sounded bedrock surface can be designed using a factored bearing resistance value at ULS of **1,000 kPa**, incorporating a geotechnical resistance factor of 0.5.

A clean, surface-sounded bedrock bearing surface should be free of loose materials, and have no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

Footings bearing on surface sounded bedrock and designed using the above mentioned bearing resistance values will be subjected to negligible post-construction total and differential settlements.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to an undisturbed soil bearing surface above the groundwater table when a plane extending horizontally and vertically from the bottom edge of the footing at a minimum of 1.5H:1V passes through in situ soil of the same or higher capacity as the bearing medium soil.

Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending horizontally and vertically from the bottom edge of the footing at a minimum of 1H:6V passes through in situ soil of the same or higher capacity as the bearing medium soil. A lateral support zone of 1.5H:1V is recommended for a weathered bedrock bearing medium.

Permissible Grade Raise Recommendations

Permissible grade raise restriction areas are also required due to the silty clay deposit. Refer to Drawing PG4026-2 - Permissible Grade Raise Plan in Appendix 2 for further details.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C** for foundations to be constructed within the north portion of the subject site and a **Class D** for foundations within the south portion of the subject site. The soils underlying the proposed shallow foundations are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

5.5 Basement Slab

With the removal of all topsoil and fill, containing deleterious or organic materials, the native soil or existing granular fill approved by the geotechnical consultant at the time of excavation will be considered to be an acceptable subgrade surface on which to commence backfilling for basement floor slab or slab on grade construction. Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

It is recommended that the upper 200 mm of sub-floor fill for basement slabs consist of 19 mm clear crushed stone. The upper 300 mm of sub-floor fill below slabs on grade should consist of OPSS Granular A crushed stone. All backfill materials within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of car only parking areas, local roadways and roadways on which bus traffic is anticipated.

Table 6 - Recommended Pavement Structure - Car Only Parking Areas/Driveways

Thickness (mm)	Material Description
50	**Wear Course** - Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Table 7 - Recommended Pavement Structure - 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
400	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Table 8 - Recommended Pavement Structure - Collector Roads with Bus Traffic	
Thickness (mm)	**Material Description**
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Upper Binder Course** - Superpave 19.0 Asphaltic Concrete
50	**Lower Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
550	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing its load carrying capacity.

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone and placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material should otherwise be used for this purpose.

6.2 Protection Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

Exterior footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of heated structures and require additional protection, such as soil cover of 2.1 m or an equivalent combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should be either cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located within the grey silty clay or bedrock, the thickness of the bedding material should be increased to a minimum of 300 mm. The material should be placed in maximum 225 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extent at least to the spring line of the pipe.

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 225 mm thick lifts and compacted to a minimum of 95% of its SPMDD.

It should generally be possible to re-use the moist (not wet) brown silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches. The seals should be at least 1.5 m long and should extend from trench wall to trench wall. Generally, the seals should extend from the frost line and fully penetrate the bedding, subbedding and cover material. The barriers should consist of relatively dry and compactable brown silty clay placed in maximum 225 mm thick loose layers and compacted to a minimum of 95% of the material's SPMDD. The clay seals should be placed at the site boundaries and at strategic locations at no more than 60 m intervals in the service trenches.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium. It is anticipated that groundwater infiltration into the excavations should be low and controllable using conventional open sumps.

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes, being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

The subsurface conditions at this site mostly consist of frost susceptible materials. In presence of water and freezing conditions ice could form within the soil mass. Heaving and settlement upon thawing could occur. Precautions should be taken if winter construction is considered for this project.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be constructed in a manner that will avoid the introduction of frozen materials into the trenches. As well, pavement construction is difficult during winter. The subgrade consists of frost susceptible soils which will experience total and differential frost heaving as the work takes place. In addition, the introduction of frost, snow or ice into the pavement materials, which is difficult to avoid, could adversely affect the performance of the pavement structure. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The results of the chloride content, pH and resistively indicate the presence of a moderate to aggressive environment for exposed ferrous metals at this site.

6.8 Landscaping Considerations

Tree Planting Restrictions

Paterson completed a soils review of the site to determine applicable tree planting setbacks, in accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines) for trees planted within a public right-of-way (ROW). Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. Sieve analysis testing was also completed on selected soil samples. The results of our testing are presented in Tables 1 and 2 in Subsection 4.2 and in Appendix 1.

Based on the results of our review, a high sensitivity clay soil was encountered between anticipated underside of footing elevations and 3.5 m below anticipated finished grade as per City Guidelines. Based on our Atterberg Limits test results, the modified plasticity limit generally exceeds 40%. The following tree planting setbacks are recommended for these high sensitivity areas.

Large trees (mature height over 14 m) can be planted within this area provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space). Tree planting setback limits is 7.5 m for small (mature tree height up to 7.5 m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the following conditions are met:

- ❏ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.
- ❏ A small tree must be provided with a minimum of 25 m^3 of available soil volume while a medium tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.
- ❏ The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect.
- ❏ The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).
- ❏ Grading surround the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

Aboveground Swimming Pools, Hot Tubs, Decks and Additions

The in-situ soils are considered to be acceptable for in-ground swimming pools. Above ground swimming pools must be placed at least 5 m away from the residence foundation and neighbouring foundations. Otherwise, pool construction is considered routine, and can be constructed in accordance with the manufacturer`s requirements.

Additional grading around the hot tub should not exceed permissible grade raises. Otherwise, hot tub construction is considered routine, and can be constructed in accordance with the manufacturer's specifications.

Additional grading around proposed deck or addition should not exceed permissible grade raises. Otherwise, standard construction practices are considered acceptable.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that a materials testing and observation services program including the following aspects be performed by the geotechnical consultant.

- ❑ Review of the final grading plan from a geotechnical perspective, once available.
- ❑ 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 request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test hole locations, we request 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 our 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 Glenview Homes (Innes) Ltd. or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.







Faisal I. Abou-Seido, P.Eng.

David J. Gilbert, P.Eng

Report Distribution:

- ❏ Glenview Properties Inc. (3 copies)
- ❏ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

BOREHOLES BY OTHERS

SYMBOLS AND TERMS

ATTERBERG LIMITS RESULTS

HYDROMETER TESTING RESULTS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

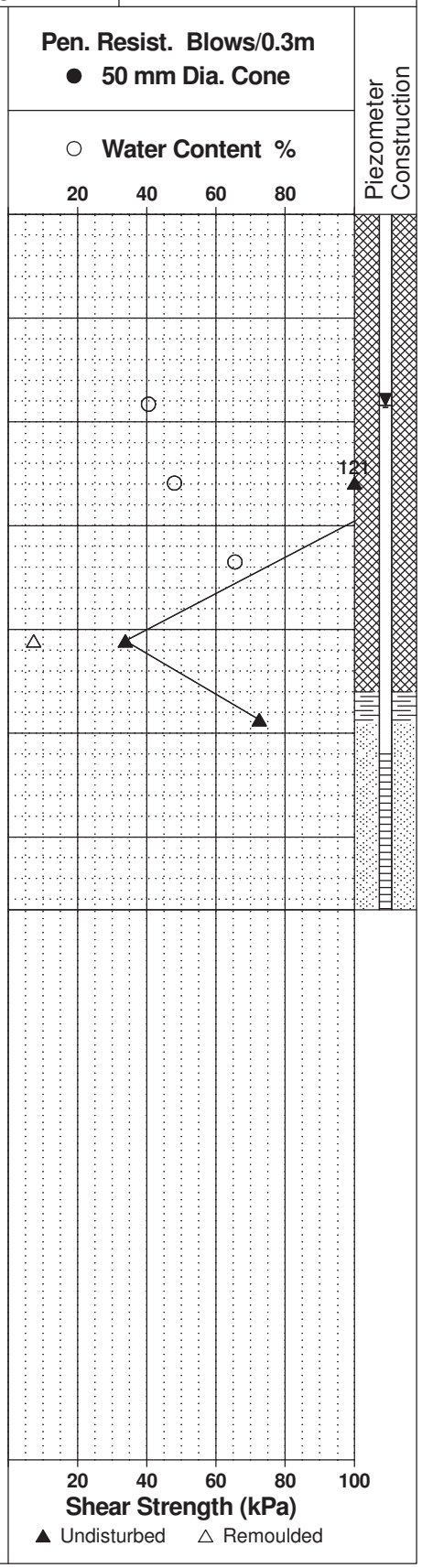
FILE NO. PG4026

REMARKS

HOLE NO. BH 1-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	89.02
FILL: Brown silty clay with sand and gravel, trace crushed stone		AU	1				
0.30							
		SS	2	50	8	1	88.02
		SS	3	92	10	2	87.02
Very stiff to stiff, brown **SILTY CLAY**		SS	4	92	P		
		SS	5	92	2	3	86.02
- firm to stiff and grey by 3.4m depth						4	85.02
4.72							
		SS	6	67	P	5	84.02
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders		SS	7	33	20		
		SS	8	46	8	6	83.02
6.70							
End of Borehole							
(GWL @ 1.84m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

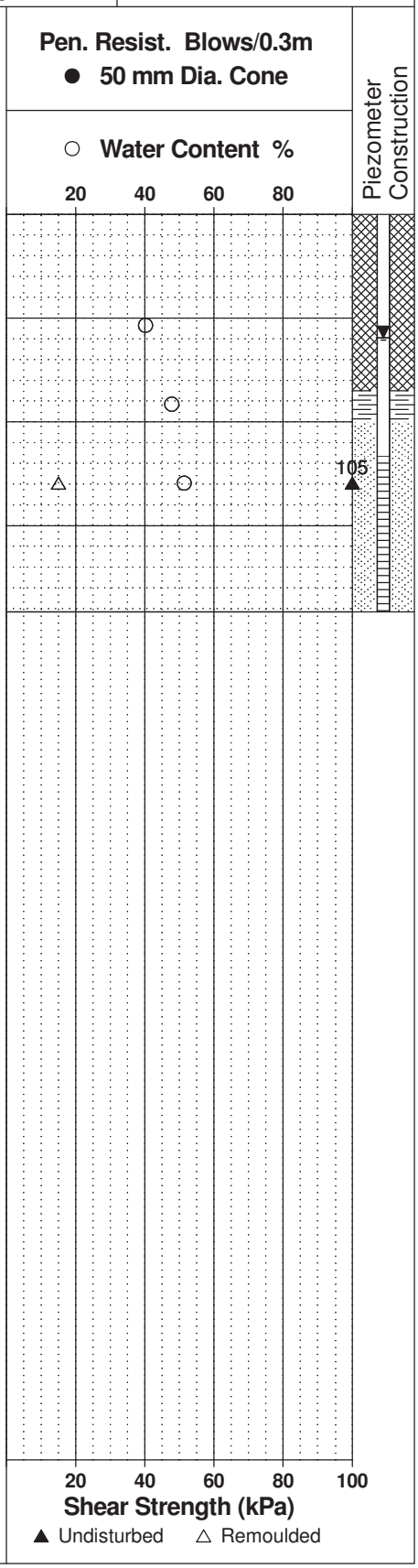
FILE NO. PG4026

REMARKS

HOLE NO. BH 2-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.81
TOPSOIL 0.20		AU	1				
		SS	3	92	7	1	87.81
Very stiff, brown **SILTY CLAY**		SS	2	75	9		
						2	86.81
- grey by 2.7m depth		SS	4	100	P		
2.92						3	85.81
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders		SS	5	50	10		
3.83		SS	6	27	50+		
End of Borehole							
Practical refusal to augering at 3.83m depth							
(GWL @ 1.19m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

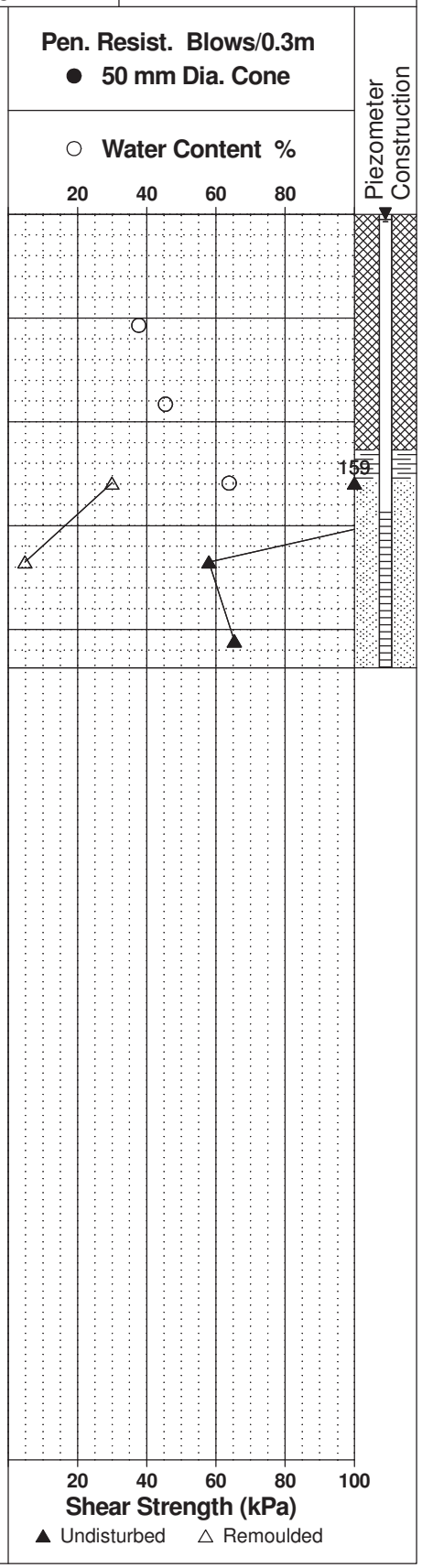
FILE NO. PG4026

REMARKS

HOLE NO. BH 3-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.43
TOPSOIL 0.13		AU	1				
		SS	2	79	9	1	87.43
Very stiff to stiff, brown **SILTY CLAY**		SS	3	96	7	2	86.43
		SS	4	96	P		
- grey by 2.8m depth						3	85.43
3.50							
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders						4	84.43
4.37							
End of Borehole							
Practical refusal to augering at 4.37m depth							
(GWL @ 0.05m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

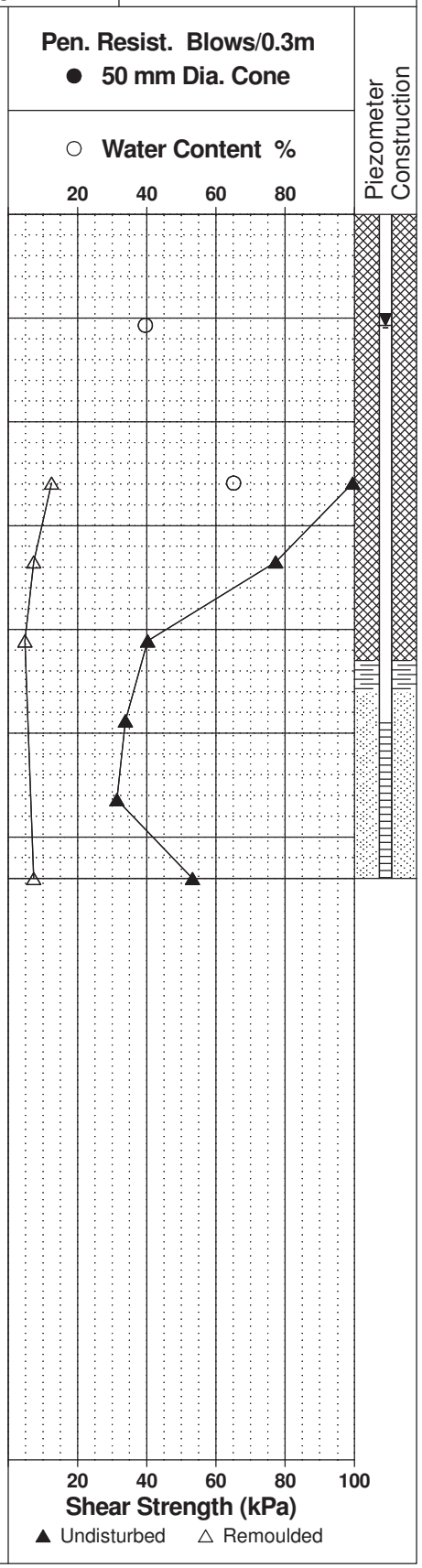
FILE NO. PG4026

REMARKS

HOLE NO. BH 4-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.26
TOPSOIL 0.30		AU	1				
		SS	2	83	10	1	87.26
		SS	3	88	6	2	86.26
Very stiff to stiff, brown **SILTY CLAY**		SS	4	83	P	3	85.26
- firm to stiff and grey by 3.7m depth						4	84.26
						5	83.26
6.40						6	82.26
End of Borehole							
(GWL @ 1.07m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

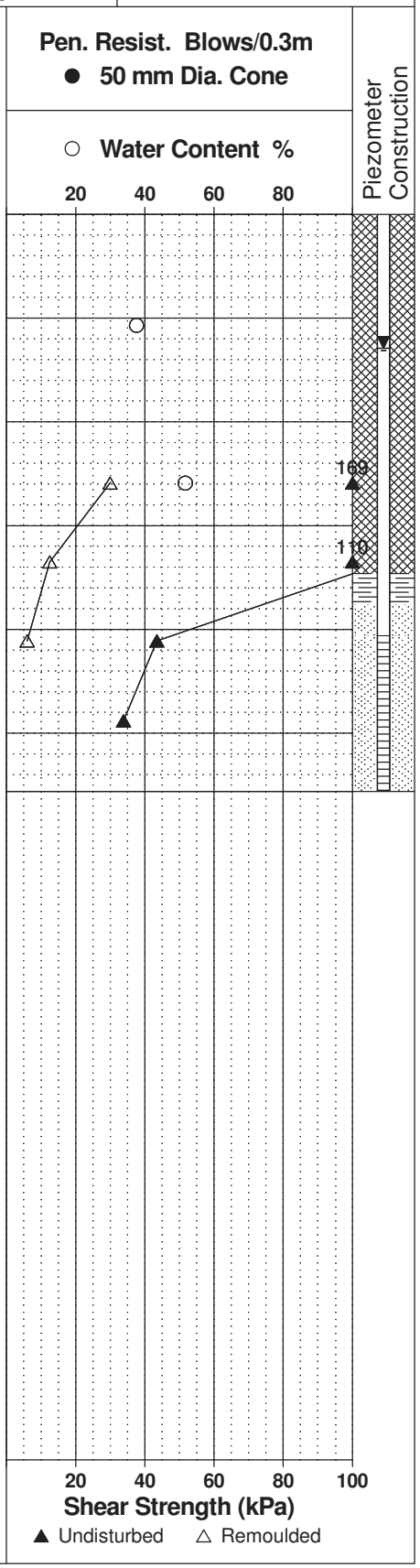
FILE NO. PG4026

REMARKS

HOLE NO. BH 5-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	87.47
TOPSOIL 0.25		AU	1				
		SS	2	88	13	1	86.47
		SS	3	96	11	2	85.47
Very stiff to stiff, brown **SILTY CLAY**		SS	4	96	P	3	84.47
- firm and grey by 3.7m depth						4	83.47
5.51		SS	5	86	50+	5	82.47
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders 5.56							
End of Borehole							
Practical refusal to augering at 5.56m depth							
(GWL @ 1.29m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

FILE NO. PG4026

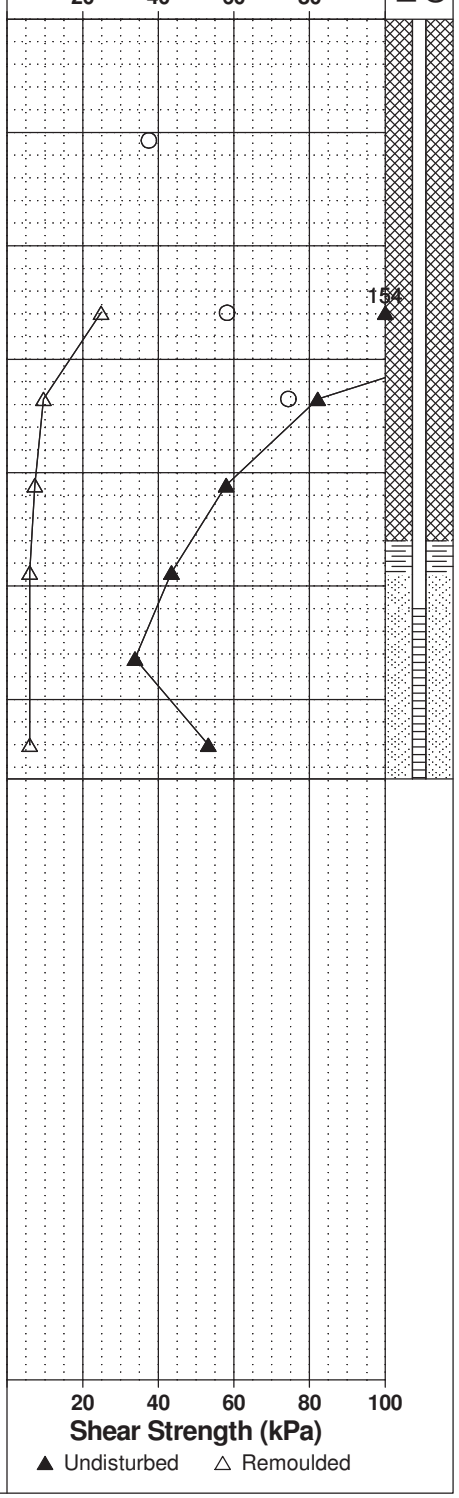
REMARKS

HOLE NO. BH 6-18

BORINGS BY CME 55 Power Auger **DATE** December 6, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	87.61
Brown **SILTY CLAY,** some organics trace topsoil		AU	1				
0.25							
		SS	2	79	11	1	86.61
		SS	3	92	6	2	85.61
Very stiff to stiff, brown **SILTY CLAY**		SS	4	96	P	3	84.61
- stiff to firm and grey by 3.7m depth						4	83.61
						5	82.61
						6	81.61
		SS	5	100	P		
6.70							
End of Borehole							
(Piezometer blocked at 0.43m depth - Dec. 14, 2018)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %



Piezometer Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

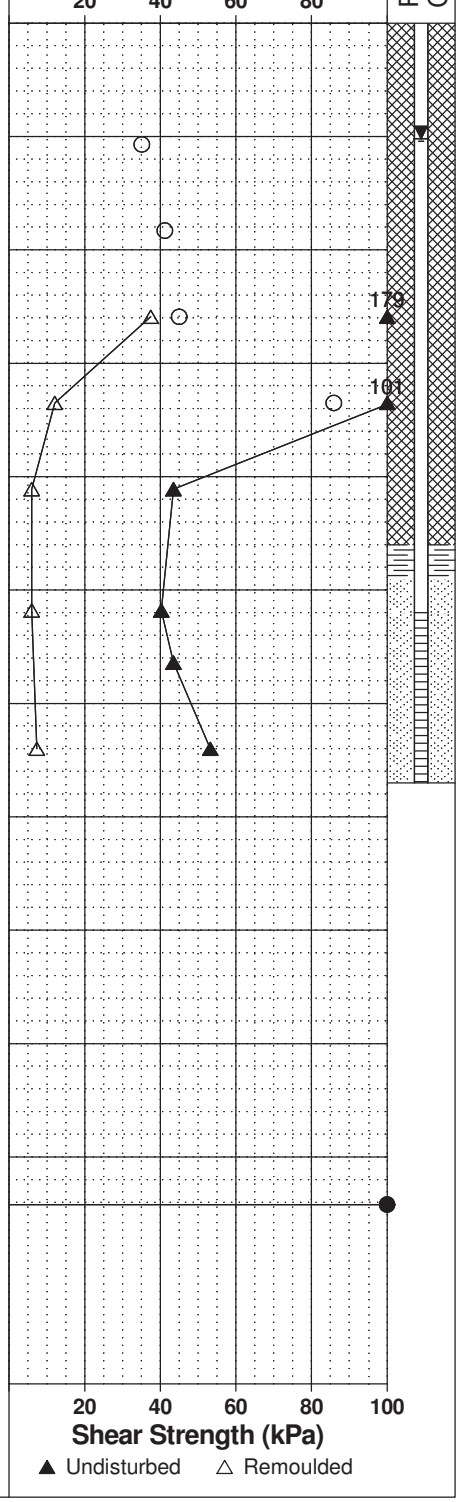
FILE NO. PG4026

REMARKS

HOLE NO. BH 7-18

BORINGS BY CME 55 Power Auger **DATE** December 6, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	86.93
TOPSOIL 0.15		AU	1				
		SS	2	79	13	1	85.93
		SS	3	92	9	2	84.93
Very stiff to stiff, brown **SILTY CLAY**		SS	4	88	P	3	83.93
- firm to stiff and grey by 3.4m depth						4	82.93
						5	81.93
		SS	5	100	P	6	80.93
6.70							
Dynamic Cone Penetration Test commenced at 6.70m depth. Cone pushed to 10.4m depth.						7	79.93
						8	78.93
						9	77.93
						10	76.93
10.42							
End of Borehole							
Practical DCPT refusal at 10.42m depth							
(GWL @ 1.02m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

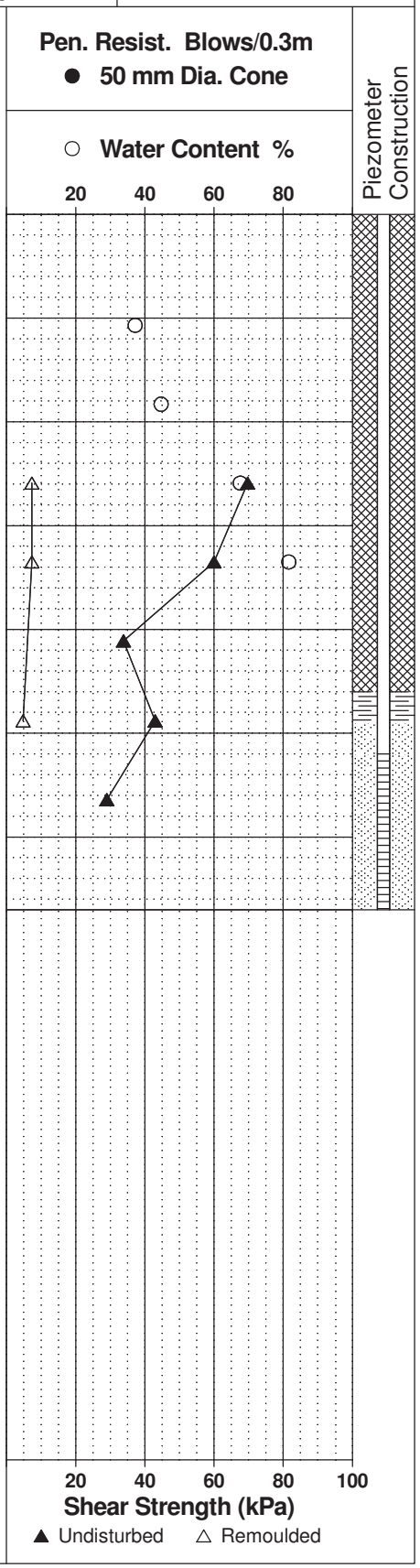
FILE NO. PG4026

REMARKS

HOLE NO. BH 8-18

BORINGS BY CME 55 Power Auger **DATE** December 6, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	87.51
TOPSOIL 0.15		AU	1				
		SS	2	67	10	1	86.51
		SS	3	96	6	2	85.51
Very stiff to stiff, brown **SILTY CLAY**		SS	4	62	P	3	84.51
- firm and grey by 3.8m depth						4	83.51
						5	82.51
		SS	5	100	P	6	81.51
6.70							
End of Borehole							
(Piezometer blocked at 0.48m depth - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

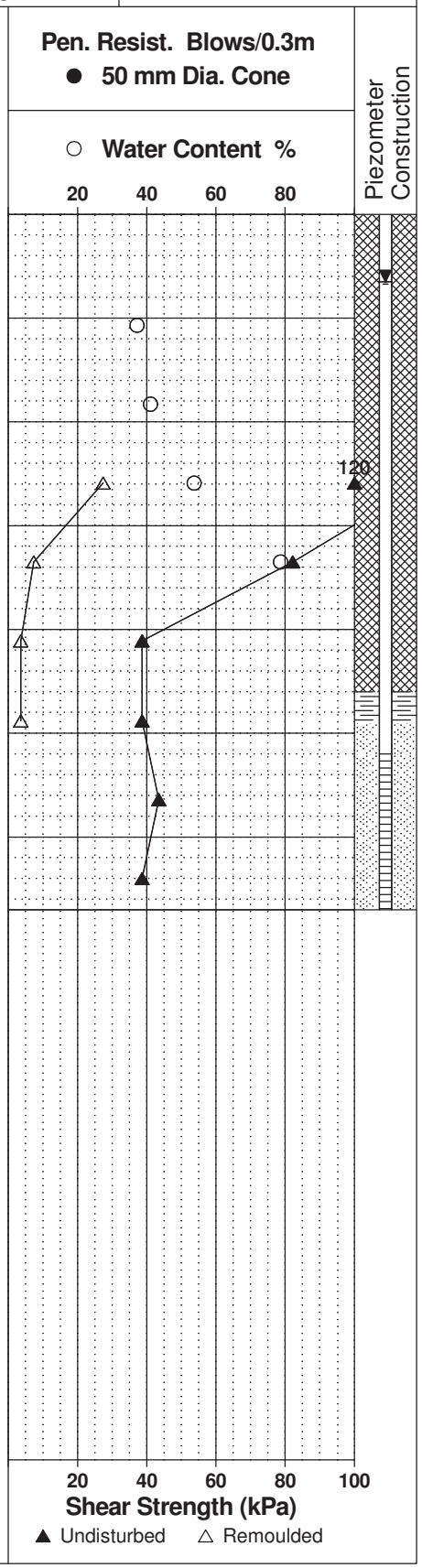
FILE NO. PG4026

REMARKS

HOLE NO. BH 9-18

BORINGS BY CME 55 Power Auger **DATE** December 7, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	86.95
TOPSOIL 0.15		AU	1				
		SS	2	62	10	1	85.95
		SS	3	92	8	2	84.95
Very stiff to stiff, brown **SILTY CLAY**		SS	4	88	P	3	83.95
- firm and grey by 3.7m depth						4	82.95
						5	81.95
						6	80.95
		SS	5	46	P		
6.70							
End of Borehole							
(GWL @ 0.65m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes LimiteD

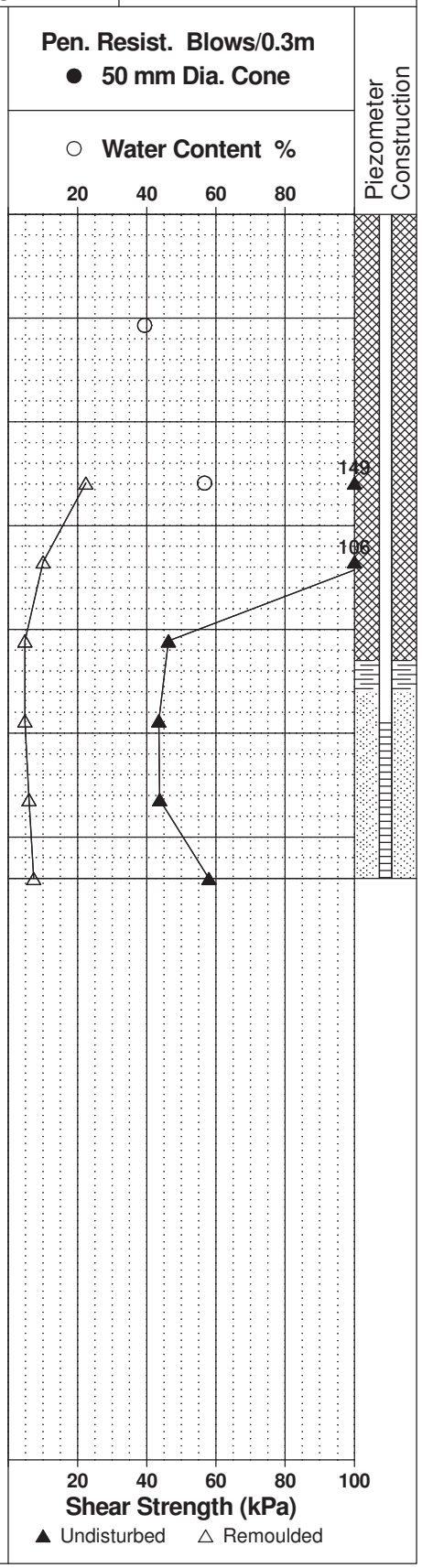
FILE NO. PG4026

REMARKS

HOLE NO. BH10-18

BORINGS BY CME 55 Power Auger **DATE** December 7, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	86.69
Brown **SILTY CLAY,** trace sand, organics and topsoil 0.15		AU	1				
		SS	2	88	10	1	85.69
		SS	3	96	7	2	84.69
Very stiff to stiff, brown **SILTY CLAY**		SS	4	96	P	3	83.69
- firm to stiff and grey by 3.7m depth						4	82.69
						5	81.69
6.40						6	80.69
End of Borehole							
(Piezometer frozen at 0.5m depth - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

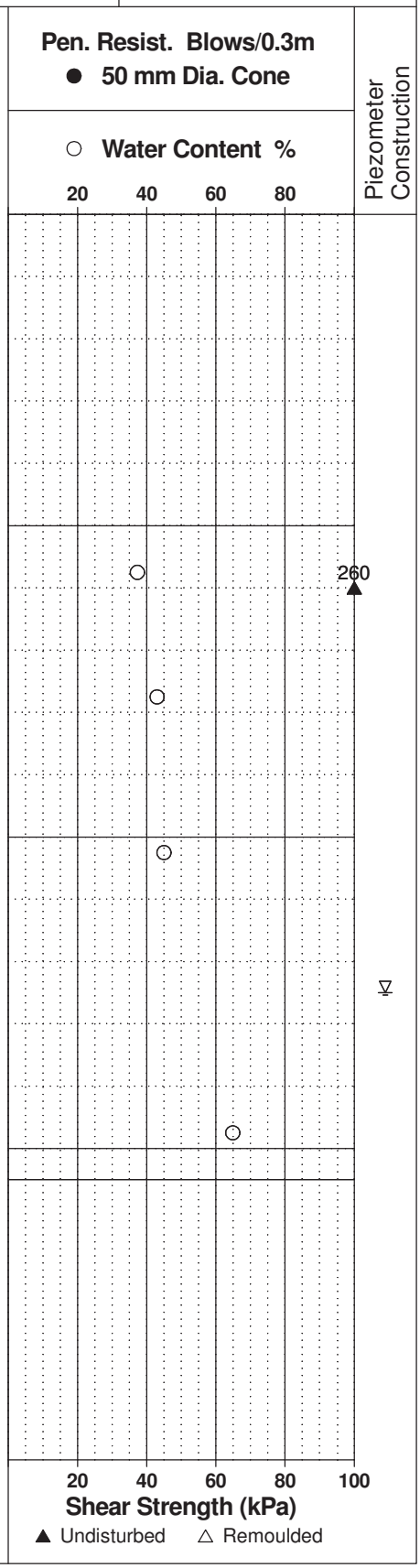
REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL 0.10						0	
Hard to stiff, brown **SILTY CLAY**		G	1			1	
		G	2				
		G	3			2	
2.50							
Stiff to firm, grey-brown **SILTY CLAY**		G	4			3	
3.10							
End of Test Pit							
(GWL @ 2.5m depth based on field observations)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

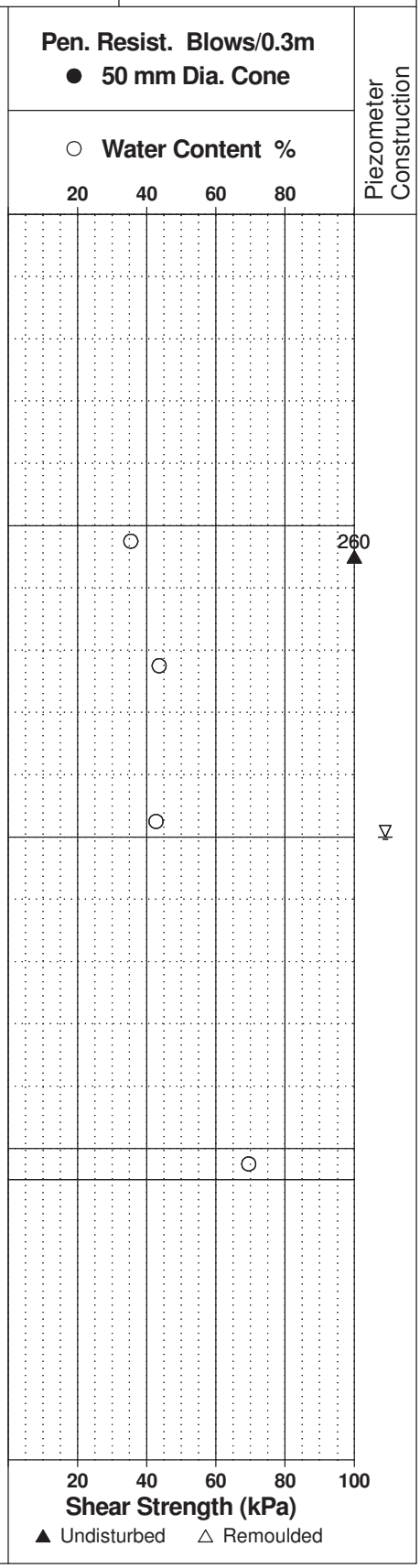
REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.15						0			
Hard to stiff, brown **SILTY CLAY**		G	1			1			
		G	2						
		G	3			2			
2.75									
Stiff to firm, grey **SILTY CLAY**						3			
3.10		G	4						
End of Test Pit									
(GWL @ 2.0m depth based on field observations)									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
TOPSOIL 0.10							
		G	1			1	
Hard to stiff, brown **SILTY CLAY**		G	2				
		G	3			2	
2.90							
Stiff to firm, grey **SILTY CLAY**		G	4			3	
3.30							
End of Test Pit							
(GWL @ 2.6m depth based on field observations)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

260

20 40 60 80 100

Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Piezometer Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.15						0			
Hard to stiff, brown **SILTY CLAY**		G	1			1		260	
		G	2						
		G	3			2			
2.80									
Stiff to firm, grey-brown **SILTY CLAY** 3.00		G	4			3			
End of Test Pit									
(GWL @ 2.0m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0			
TOPSOIL 0.15									
Hard to stiff, brown **SILTY CLAY**		G	1			1		○ 260	
		G	2					○	
		G	3			2		○	
3.00						3			
Stiff to firm, grey **SILTY CLAY**		G	4					○	
3.20 End of Test Pit									
(GWL @ 2.8 depth based on field observations)									

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

RAPPORT DE FORAGE : **F-01**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5191369842 °O
Y = 45.4458564224 °N
Élévation surface : 90.69 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR *ÉLÉVATION* (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS ODEUR F	ODEUR M	ODEUR P	VISUEL D	VISUEL S	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	PUITS D'OBSERVATION DIAGRAMME	PUITS D'OBSERVATION DESCRIPTION	REMARQUES
		Surface du terrain.															
0.10 *90.59*		Asphalte.															
		Remblai : Gravier sableux sec.							CF	82	11 6 6 11	F-01 (0.30-0.40)	HP F1-F4 HAP BTEX Métaux (R153)				
0.50 *90.19*		Sol naturel : Gravier sableux.										F-01 (0.40-0.50)					
												F-01 (0.50-0.91)					
1.06 *89.63*		Fin du forage à 1.06 m de profondeur.							CF	33	15 R/1.06						Refus à 1.06 m sur bloc ou roc.

RAPPORT DE FORAGE : **F-02**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5189257577 °O
Y = 45.445930007 °N
Élévation surface : 90.64 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
0.10 *90.54*		Asphalte.												
		Remblai : Gravier sableux brun gris sec.												
0.45						CF	41	3 11 9 6	F-02 (0.30-0.45)					
0.5 — 0.55 *90.09*		Sol naturel : Sable silteux noir.							F-02 (0.45-0.55)	HP F1-F4 HAP Métaux (R153)				0.5
0.75 *89.89*		Sol naturel : Sable silteux brun sec.							F-02 (0.55-0.75)	HP F1-F4 HAP BTEX				
		Sol naturel : Sable graveleux.							F-02 (0.75-0.91)					
1.0						CF	66	3 6 R/1.21	F-02 (0.91-1.02)					1.0
1.21 *89.43*		Fin du forage à 1.21 m de profondeur.							F-02 (1.02-1.12)					Refus à 1.21 m sur bloc ou roc.
1.5														1.5
2.0														2.0
2.5														2.5
3.0														3.0
3.5														3.5
4.0														4.0

RAPPORT DE FORAGE : **F-03**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5196137735 °O
Y = 45.4456012321 °N
Élévation surface : 90.39 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE		OBSERVATIONS				ÉCHANTILLONS						PUITS D'OBSERVATION		
	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR (F M P)	VISUEL (D S)	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.												
0.10 *90.29*		Asphalte.												
0.30 *90.09*		Remblai : Gravier sableux sec.												
0.50 *89.89*		Sol naturel : Sable graveleux gris.				CF	49	12 5 5 3	F-03 (0.30-0.50)	HP F1-F4 HAP BTEX Métaux (R153)				
		Sol naturel : Sable silteux avec trace de gravier.							F-03 (0.50-0.91)	HP F1-F4 HAP BTEX Métaux (R153)				
0.91 *89.48*		Sol naturel : Sable silteux.				CF	33		F-03 (0.91-1.01)					
									F-03 (1.01-1.11)	HP F1-F4 HAP BTEX Métaux (R153)				
1.52 *88.87*		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **F-04**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5201167458 °O
Y = 45.4451939281 °N
Élévation surface : 89.29 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR F	ODEUR M	ODEUR P	VISUEL D	VISUEL S	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.															
89.29		Remblai : Sable graveleux gris et blanc.							CF	74	85 55 30 18	F-04 (0.00-0.20)					
0.20																	
89.09		Remblai : Gravier sableux saturé										F-04 (0.20-0.61)					
0.61																	
88.68		Sol naturel : Argile silteuse brune grise.							CF	90	1 1 2 6	F-04 (0.61-1.22)	HP F1-F4 HAP BTEX				
1.22																	
88.07		Fin du forage à 1.22 m de profondeur.															Refus à 1.22 m sur bloc ou roc.

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE FORAGE : **F-05**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5198284892 °O
Y = 45.4453512328 °N
Élévation surface : 89.21 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE	DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	ODEUR (F M P)	VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.												
89.21 / 0.20		Remblai : Sable et gravier sec				CF	66	58 69 21 18	F-05 (0.00-0.20)					
89.01 / 0.61		Sol naturel : Gravier noir et saturé avec un peu de sable.							F-05 (0.20-0.61)					
88.60 / 1.83		Sol naturel : Argile silteuse brune-beige et humide.				CF	100	1 1 5 6	F-05 (0.61-1.22)					
						CF	100		F-05 (1.22-1.32)	HP F1-F4 HAP BTEX Métaux (R153)				
									F-05 (1.32-1.83)					
87.38 / 2.10		Sol naturel : Argile silteuse grise humide.				CF	82	3 8 22 8	F-05 (1.83-2.10)					
87.11 / 2.34		Sol naturel : Gravier sableux gris.							F-05 (2.10-2.34)					
86.87	Roc atteint	Fin du forage à 2.34 m de profondeur.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE FORAGE : **F-06**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5200570318 °O
Y = 45.4477309683 °N
Élévation surface : 89.22 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR *ÉLÉVATION* (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.22		Remblai : Sable graveleux gris-brun et sec.				CF	100	1 3 4 7	F-06 (0.00-0.61)	HP F1-F4 HAP BTEX				
0.61														
88.61		Sol naturel : Argile silteuse grise.				CF	100	1 4 4 6	F-06 (0.61-1.22)					
						CF	49	56 36 19 10	F-06 (1.22-1.83)					
87.70														
1.83		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **F-07**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5199577902 °O
Y = 45.4476971365 °N
Élévation surface : 89.47 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR *ÉLÉVATION* (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.47		Remblai : Sable graveleux gris-blanc et sec.				CF	57	110 54 13 11	F-07 (0.00-0.50)					
0.50														
0.60		Remblai : Sable graveleux gris-blanc et humide.							F-07 (0.50-0.61)					
88.87		Sol naturel : Argile silteuse.				CF	90	1 3 4 6	F-07 (0.61-1.22)	HP F1-F4 HAP BTEX				
						CF			F-07 (1.22-1.83)					
87.95														
1.83		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **F-08**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5196453839 °O
Y = 45.4472729549 °N
Élévation surface : 89.2 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage :

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE		OBSERVATIONS				ÉCHANTILLONS						PUITS D'OBSERVATION		
	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL		TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
				F	M	P	D	S									
		Surface du terrain.															
0.10 / *89.10*		Remblai : Argile graveleuse.							CF	41	2 11 8 22						
		Remblai : Sable graveleux gris.											HP F1-F4 HAP BTEX				
0.61 / *88.59*		Fin du forage à 0.61 m de profondeur.															Refus à 0.61 m sur bloc ou roc.

RAPPORT DE FORAGE : **F-09**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5190143537 °O
Y = 45.4460829513 °N
Élévation surface : 89.71 m *()*
Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage :

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.71		Remblai : Sable et gravier. Gris blanc sec devenant humide.				CF	74	64 66 24 16		HP F1-F4 HAP BTEX	DUP7			
0.61														
89.10		Sol naturel : Argile silteuse avec un peu de sable humide.				CF	25	1 2 3 4						
						CF	100	2 3 3 5						
88.19														
1.83		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **PO-01**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5189110706 °O
Y = 45.446095328 °N
Élévation surface : 89.99 m *()*
Élévation margelle : 89.99 m *()*

Entrepreneur forage : Marathon Drilling Co. Ltd.
Type de foreuse : CME 75
Équipement de forage : Tarière tige pleine /
Diamètre du forage : 200 mm
Fluide forage : Aucun
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

▽ Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE	DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	ODEUR (F M P)	VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.												
89.99		Remblai : Sable graveleux gris avec trace d'oxydation.				CF	57	60 55 35 22	PO-01 (0.00-0.61)					
0.61														
89.38		Sol naturel : Argile silteuse brune.				CF	90	2 6 8 6	PO-01 (0.61-0.86)	HP F1-F4 HAP BTEX Métaux (R153)				
0.86														
89.13		Sol naturel : Sable silteux humide.							PO-01 (0.86-1.22)					
1.22														
88.77		Sol naturel : Argile silteuse grise et humide.				CF	100	2 2 4 6	PO-01 (1.22-1.83)					
1.83														
87.91		Fin du forage à 2.08 m de profondeur.												

Margelle
Bentonite
Tube PVC
Sable
CRÉPINE
CPV
Diam. : 30 mm
Ouv. : 0.25 mm
Long. : 1.52 m
EAU
Prof. : 0.48 m
Élév. : 89.46 m
Date : 2013-07-08
Bouchon

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE TRANCHÉE : **TE-01**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5199533185 °O
Y = 45.4457572743 °N
Élévation surface : 89.57 m *()*
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée
Type de foreuse : Rétrocaveuse
Équipement de forage : Manuelle /
Diamètre du forage :
Fluide forage :
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR *ÉLÉVATION* (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.57		Remblai : Gravier sableux avec trace de silt. Gris et humide.				TR			TE-01 (0.00-0.30)					
0.30 *89.27*		Remblai : Silt sableux brun avec trace de matière résiduelle (bois brûlé).		M	D				TE-01 (0.30-0.60)	HP F1-F4 HAP BTEX Métaux (R153)				
0.60 *88.97*		*Infiltration d'eau à 0.6 m.* Sol naturel : Silt argileux gris humide.							TE-01 (0.60-1.00)					
1.00 *88.57*		Sol naturel : Silt sableux graveleux avec trace d'argile. Gris humide.							TE-01 (1.00-3.50)					
3.50 *86.07*	Roc atteint	*Infiltration d'eau.* Fin de la tranchée												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE TRANCHÉE : **TE-02**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5205637155 °O
Y = 45.4458202359 °N
Élévation surface : 89.59 m *()*
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée
Type de foreuse : Rétrocaveuse
Équipement de forage : Manuelle /
Diamètre du forage :
Fluide forage :
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE	DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	ODEUR (F M P)	VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.												
89.59		Remblai : Matière résiduelle (55%) (brique, bois, bois brûlé et plastique) et silt sableux avec trace de matière organique. Brun humide.				TR			TE-02 (0.00-0.35)	HP F1-F4 HAP BTEX Métaux (R153)				
0.35 / 89.24		Sol naturel : Silt avec un peu de sable et trace de matière organique.							TE-02 (0.35-1.00)	HP F1-F4 HAP BTEX Métaux (R153)				
1.00 / 88.59		Sol naturel : Silt argileux avec traces de gravier brun-beige.							TE-02 (1.00-1.45)	HP F1-F4 HAP BTEX Métaux (R153)				
1.45 / 88.14		Sol naturel : Silt argileux gris avec traces de gravier.							TE-02 (1.45-3.30)					
3.30 / 86.29	Roc atteint	*Infiltration d'eau.* Fin de la tranchée												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE TRANCHÉE : **TE-03**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5206801071 °O
Y = 45.4461519033 °N
Élévation surface : 88.98 m *()*
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée
Type de foreuse : Rétrocaveuse
Équipement de forage : Manuelle /
Diamètre du forage :
Fluide forage :
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
88.98		Remblai : Gravier sableux gris saturé. *Eau à la surface.*				TR			TE-03 (0.00-0.30)					
0.30 *88.68*		Sol naturel : Silt argileux gris humide.							TE-03 (0.30-1.00)	HP F1-F4 HAP	DUP8			
1.00 *87.98*		Sol naturel : Silt avec un peu d'argile gris humide.							TE-03 (1.00-2.60)					
2.60 *86.38*	Roc atteint	Fin de la tranchée												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE TRANCHÉE : **TE-04**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5202005926 °O
Y = 45.4465543177 °N
Élévation surface : 90.77 m *()*
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée
Type de foreuse : Rétrocaveuse
Équipement de forage : Manuelle /
Diamètre du forage :
Fluide forage :
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau Phase libre

ANALYSES CHIMIQUES
BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes
HAC Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR *ÉLÉVATION* (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
90.77		Remblai : Sable graveleux avec trace de matière organique. Brun sec.				TR			TE-04 (0.00-1.00)					
1.00 *89.77*		Remblai : Silt argileux avec trace de matière organique. Brun noir humide.							TE-04 (1.00-2.30)	HP F1-F4 HAP Métaux (R153)				
2.30 *88.47*		Sol naturel : Silt avec un peu d'argile gris humide.							TE-04 (2.30-3.20)					
3.20 *87.57*		*Infiltration d'eau*												
		Fin de la tranchée												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE TRANCHÉE : **TE-05**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**
Site : **Site # 38 Orléans**
Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : X = 75.5204743629 °O
Y = 45.4472004843 °N
Élévation surface : 92.43 m *()*
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée
Type de foreuse : Rétrocaveuse
Équipement de forage : Manuelle /
Diamètre du forage :
Fluide forage :
Équip. d'échantillonnage : Carottier fendu

ODEUR
F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL
D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON
CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau ▼ Phase libre

ANALYSES CHIMIQUES

BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE		OBSERVATIONS				ÉCHANTILLONS						PUITS D'OBSERVATION		
	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR F M P	VISUEL D S		TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.													
92.43															
0.15		Terre végétale et un peu de matière résiduelle (20%) (brique).					TR								
92.28		Remblai : Silt sableux graveleux avec trace de matière résiduelle (bois) brun.								TE-05 (0.15-2.30)	HP F1-F4 HAP				
2.30															
90.13		Remblai : Silt argileux avec trace de matière organique brun noir.								TE-05 (2.30-3.00)					
										TE-05 (3.00-3.60)					
3.60															
88.83		Fin de la tranchée													

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

BOREHOLE DRILLING RECORD : **BH16-1**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **1/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032601 mE
Y = 459357 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

Water Level ▽ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatil Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.30		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	66		BH16-1 1A					
		CLAYEY SILT brown, moist, stiff	H - 0, I - 0						BH16-1 1B	Metals and Inorganics				
1.52		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100		BH16-1 2A	Metals and Inorganics				
2.53		**GRAVEL** with sand and some silty clay, grey-brown, wet, soft	H - 0, I - 0						BH16-1 2B	Metals and Inorganics				
2.89		*Refusal at 2.89 m below ground surface on assumed bedrock*												
		End of borehole at 2.89 m.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-2**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **1/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032622 mE
Y = 459337 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
Phenol. C.	Phenolic Compounds	PH F1-F4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
VOC	Volatil Organic Compounds (MAH & CAH)	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans	HWR	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH *ELEVATION* (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F M P	VISUAL D S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL DIAGRAM	MONITORING WELL DESCRIPTION	REMARKS
		Ground surface.												
0.30		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	50		BH16-2 1A					
		CLAYEY SILT brown, moist, stiff	H - 20, I - 0						BH16-2 1B	Metals and Inorganics				
			H - 0, I - 0			MC	83		BH16-2 2A	Metals and Inorganics				
2.44		*with some sand* *Refusal at 2.44 m below ground surface on assumed bedrock*	H - 0, I - 0						BH16-2 2B	Metals and Inorganics				
		End of borehole at 2.44 m.												

BOREHOLE DRILLING RECORD : **BH/MW16-3**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5011286 mE, Y = 472354 mN
Surface Elevation: 87.23 m *(Relative)*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: Air
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatil Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
87.23		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	73		BH/MW16-3 1A					
0.43 / 86.80		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0						BH/MW16-3 1B	Metals and Inorganics			Bentonite	
1.52 / 85.71		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100		BH/MW16-3 2A	Metals and Inorganics			Slotted PVC pipe	
			H - 0, I - 0						BH/MW16-3 2B				Sand	
3.05 / 3.12 / 84.11		**GRAVEL** with sand , brown, wet **BEDROCK**	H - 0, I - 0			MC	5		BH/MW16-3 3	Metals and Inorganics			SCREEN Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m WATER Depth: 2.13 m Elev.: m Date: 6/7/2016	
4.57 / 82.66		End of borehole at 4.57 m.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-4**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **1/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032619 mE
Y = 459397 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

Water Level ▽ Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
Phenol. C.	Phenolic Compounds	PH F1-F4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
VOC	Volatil Organic Compounds (MAH & CAH)	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans	HWR	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH *ELEVATION* (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F	ODOUR M	ODOUR P	VISUAL D	VISUAL S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
		Ground surface.															
0.43		**FILL** sand and gravel, brown, dry	H - 0, I - 0						MC	71		BH16-4 1A					
0.5		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0									BH16-4 1B	Metals and Inorganics PHCs F2-F4				
1.0																	
1.5			H - 0, I - 0						MC	86		BH16-4 2A					
2.0																	
2.28																	
2.5		**SILTY CLAY** grey-brown, moist, stiff *becoming wet and soft*	H - 0, I - 0									BH16-4 2B	Metals and Inorganics	BH16-4-102B			
3.0		*Refusal at 3.05 m below ground surface on assumed bedrock*															
3.05		End of borehole at 3.05 m.															
3.5																	
4.0																	
4.5																	
5.0																	

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH/MW16-5**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032607 mE, Y = 459421 mN
Surface Elevation: 87.47 m *(Relative)*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: Air
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatil Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
87.47 0.23		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	76		BH/MW16-5 1A					
87.24		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0						BH/MW16-5 1B	Metals and Inorganics PHCs F2-F4	BH16-5-101B		Bentonite	
1.52 *85.95*		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 30			MC	83		BH/MW16-5 2A				Sand	
		becoming wet and soft											Slotted PVC pipe	
3.05 *84.42*		**BEDROCK**	H - 0, I - 35						BH/MW16-5 2B	Metals and Inorganics PH F_1-F_4 BTEX PAH			SCREEN Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m WATER Depth: 2.27 m Elev.: m Date: 6/7/2016	
4.57 *82.90*		End of borehole at 4.57 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-6**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **1/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032622 mE
Y = 459430 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

Water Level ▽ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.23		**FILL** Sand and gravel, brown, dry	H - 15, I - 2			MC	46		BH16-6 1A					
		CLAYEY SILT brown, moist, stiff	H - 0, I - 0						BH16-6 1B	Metals and Inorganics PH F_1-F_4 BTEX				
2.90			H - 0, I - 0			MC	100		BH16-6 2A					
3.05		**SILTY CLAY** grey-brown, moist, stiff *Refusal at 3.05 m below ground surface on assumed bedrock*	H - 0, I - 0						BH16-6 2B	Metals and Inorganics				
		End of borehole at 3.05 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-7**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **1/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032572 mE
Y = 459424 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

Water Level ▽ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.20		**TOP SOIL**				MC	85							
		CLAYEY SILT brown or grey-brown, moist, stiff	H - 10, I - 0						BH16-7 1	Metals and Inorganics PAH PH F_1-F_4 BTEX				
			H - 0, I - 0			MC	100		BH16-7 2A					
2.44														
		SILTY CLAY with some sand, grey-brown, moist, stiff *becoming wet and soft*	H - 0, I - 0						BH16-7 2B	Metals and Inorganics				
3.05														
		SANDY GRAVEL with some silty clay grey-brown, wet, soft	H - 0, I - 0			MC	26		BH16-7 3					
4.11		*Refusal at 4.11 m below ground surface on assumed bedrock*												
		End of borehole at 4.11 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH/MW16-8**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032569 mE, Y = 459449 mN
Surface Elevation: 86.84 m *(Relative)*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: Air
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
86.84 0.20		**TOP SOIL**				MC	100							
86.64		**CLAYEY SILT** brown or grey-brown, moist, stiff	H - 10, I - 0						BH/MW16-81	Metals and Inorganics PAH PH F_1-F_4 BTEX			Bentonite	
			H - 10, I - 0			MC	100		BH/MW16-82A				Sand	
2.44 *84.40*		**SILTY CLAY** grey-brown, moist, stiff	H - 5, I - 0						BH/MW16-82B	Metals and Inorganics			Slotted PVC pipe	
3.05 *83.79*		**SANDY GRAVEL** with trace to some silty clay grey-brown, wet, soft	H - 0, I - 0			MC	100		BH/MW16-83A				SCREEN Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m WATER Depth: 1.45 m Elev.: m Date: 6/7/2016	
			H - 15, I - 0						BH/MW16-83B					
4.11 *82.73*		End of borehole at 4.11 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-9**

Prepared by: **Kathryn Maton** Date (Start): **2/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032512 mE
Y = 459382 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR (F M P)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.17		**TOP SOIL**												
0.5		**CLAYEY SILT** brown or grey-brown, moist, stiff	H - 0, I - 0			MC	91		BH16-9 1	Metals and Inorganics				
1.0														
1.52														
1.5		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100		BH16-9 2A					
2.0														
2.5		*becoming wet*												
3.0			H - 0, I - 0						BH16-9 2B	Metals and Inorganics				
3.5			H - 0, I - 0			MC	100		BH16-9 3A					
4.0		*-with some sand and some gravel* *-becoming grey*	H - 0, I - 0						BH16-9 3B					
4.57														
4.5		**SANDY GRAVEL** with some silty clay grey-brown, wet	H - 0, I - 0			MC	53		BH16-9 4	Metals and Inorganics				
5.0														
5.5														
6.0														
6.5			H - 0, I - 0			MC	60		BH16-9 5					
7.01														
7.0		*Refusal at 7.01 m below ground surface on assumed bedrock*												
7.5		End of borehole at 7.01 m.												
8.0														
8.5														
9.0														
9.5														
10.0														

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-10**

Prepared by: **Kathryn Maton** Date (Start): **2/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032473 mE
Y = 459402 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatil Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR (F M P)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.23		**TOP SOIL**				MC	80							
		CLAYEY SILT brown or grey-brown, moist, stiff	H - 0, I - 0						BH16-10 1	Metals and Inorganics				
			H - 0, I - 0			MC	100		BH16-10 2A					
2.61		**SILTY CLAY** grey-brown, wet, soft	H - 0, I - 0						BH16-10 2B	Metals and Inorganics				
			H - 0, I - 0			MC	100		BH16-10 3A					
			H - 0, I - 0						BH16-10 3B					
			H - 0, I - 0			MC	100		BH16-10 4A	Metals and Inorganics				
6.10														
6.40		**SANDY GRAVEL** with some silty clay grey-brown, wet, soft *Refusal at 6.40 m below ground surface on assumed bedrock*	H - 0, I - 0						BH16-10 4B					
		End of borehole at 6.40 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-11**

Prepared by: **Kathryn Maton** Date (Start): **2/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032342 mE
Y = 459432 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
Phenol. C.	Phenolic Compounds	PH F1-F4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
VOC	Volatil Organic Compounds (MAH & CAH)	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans	HWR	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH *ELEVATION* (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F M P	VISUAL D S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
		Ground surface.												
0.20		**TOP SOIL**				MC	86							
		CLAYEY SILT brown or grey-brown, moist, stiff	H - 0, I - 0						BH16-11 1					
1.52		**SILTY CLAY** grey-brown, wet to very wet, soft to very soft	H - 0, I - 0			MC	100		BH16-11 2A	Metals and Inorganics				
		becoming wet	H - 0, I - 0						BH16-11 2B					
			H - 0, I - 0			MC	100		BH16-11 3A					
		becoming grey and unweathered	H - 0, I - 0						BH16-11 3B	Metals and Inorganics				
			H - 0, I - 0			MC	100		BH16-11 4A					
			H - 0, I - 0						BH16-11 4B					
6.10		*Refusal at 6.10 m below ground surface on assumed bedrock*												
		End of borehole at 6.10 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-12**

Prepared by: **Kathryn Maton** Date (Start): **2/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032334 mE
Y = 459386 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

Water Level ▽ Free Phase ▼

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.15		**TOP SOIL**	H - 0, I - 0			MC	76		BH16-12 1					
		CLAYEY SILT brown or grey-brown, moist, stiff												
1.52		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100		BH16-12 2A	Metals and Inorganics				
		becoming wet and soft	H - 0, I - 0						BH16-12 2B					
		becoming grey, very soft and unweathered	H - 0, I - 0			MC	100		BH16-12 3A					
			H - 0, I - 0						BH16-12 3B	Metals and Inorganics				
			H - 0, I - 0			MC	100		BH16-12 4A					
6.25		*with some sand*												
		Refusal at 6.25 m below ground surface on assumed bedrock	H - 0, I - 0						BH16-12 4B					
		End of borehole at 6.25 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-13**

Prepared by: **Kathryn Maton** Date (Start): **2/6/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032385 mE
Y = 459515 mN
Surface Elevation: m *()*
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: None
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons
MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50} Petroleum Hydrocarbons C_{10}-C_{50}
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leacheate Tests (Haz. Waste Reg.)

DEPTH *ELEVATION* (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.18		**TOP SOIL**	H - 0, I - 0			MC	73							
		CLAYEY SILT brown or grey-brown, moist, stiff												
1.52		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100			Metals and Inorganics	BH16-13-102A			
		becoming wet												
		becoming wet to very wet	H - 0, I - 0											
		becoming grey and unweathered	H - 0, I - 0			MC	100							
			H - 0, I - 0							Metals and Inorganics				
			H - 0, I - 0			MC	50							
5.18		*Refusal at 5.18 m below ground surface on assumed bedrock*												
		End of borehole at 5.18 m.												

TEST PIT RECORD : **TP16-1**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032612 mE
Y = 459421 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS
I - Isobutylene
H - Hexane

SAMPLE TYPE
TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY: LITHOGRAPHY	GEOLOGY / LITHOGRAPHY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	OBSERVATIONS: ODOUR (F M P D S)	OBSERVATIONS: VISUAL (F M P D S)	SAMPLES: SAMPLE TYPE	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, dry	H - 0, I - 0			TR	TP16-1 SA1				
1.01		**CLAYEY SILT** brown, moist	H - 0, I - 0			TR	TP16-1 SA2				
1.34		End of test pit at 1.34 m.									

0.5
1.0
1.5
2.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

TEST PIT RECORD : **TP16-2**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032619 mE
Y = 459408 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY: LITHOGRAPHY	GEOLOGY / LITHOGRAPHY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	OBSERVATIONS: ODOUR (F M P D S)	OBSERVATIONS: VISUAL (F M P D S)	SAMPLES: SAMPLE TYPE	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, dry									
			H - 0, I - 0			TR	TP16-2 SA1				
0.76		**CLAYEY SILT** brown, moist									
0.99		End of test pit at 0.99 m.									
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

TEST PIT RECORD : **TP16-3**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032631 mE
Y = 459412 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY	DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	ODOUR (F M P)	VISUAL (D S)	SAMPLES: SAMPLE TYPE	NUMBER	ANALYSIS	DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, moist to wet									
			H - 0, I - 0			TR	TP16-3 SA1				
0.5											0.5
0.91											
		CLAYEY SILT brown, wet	H - 0, I - 0			TR	TP16-3 SA2				
1.0											1.0
1.5											1.5
1.52		End of test pit at 1.52 m.									
2.0											2.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

TEST PIT RECORD : **TP16-4**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032626 mE
Y = 459424 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY: LITHOGRAPHY	GEOLOGY / LITHOGRAPHY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	OBSERVATIONS: ODOUR (F M P)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, moist to wet	H - 0, I - 0			TR	TP16-4 SA1				
0.81		**CLAYEY SILT** brown, wet	H - 0, I - 0			TR	TP16-4 SA2				
1.27		End of test pit at 0.76 m.									

0.5
1.0
1.5
2.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

TEST PIT RECORD : **TP16-5**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032559 mE
Y = 459440 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY: LITHOGRAPHY	GEOLOGY / LITHOGRAPHY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	OBSERVATIONS: ODOUR (F M P)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	WATER ARRIVAL	REMARKS
0.00		**TOP SOIL**									
0.20		**CLAYEY SILT** brown or grey-brown, moist									
0.5											
1.0			H - 0, I - 0			TR	TP16-5 SA1	EC			
1.14		End of test pit at 1.14 m.									
1.5											
2.0											

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

TEST PIT RECORD : **TP16-6**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032988 mE
Y = 459317 mN
Surface Elevation: m *()*

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity
MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C_{10}-C_{50}	Petroleum Hydrocarbons C_{10}-C_{50}
PH F_1-F_4	Petroleum Hydrocarbons F1-F4 (C_{10}-C_{50})
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY	DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	ODOUR (F M P)	VISUAL (D S)	SAMPLES: SAMPLE TYPE	NUMBER	ANALYSIS	DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**TOP SOIL**									
0.61											
0.68		**FILL** Sand and Silt and some organic material, brown, dry *Test pit terminated over assumed bedrock at 0.68 metres below ground surface*	H - 0, I - 0			TR	TP16-6 SA1	PH F_1-F_4 BTEX			
		End of test pit at 0.68 m.									

0.5
1.0
1.5
2.0

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

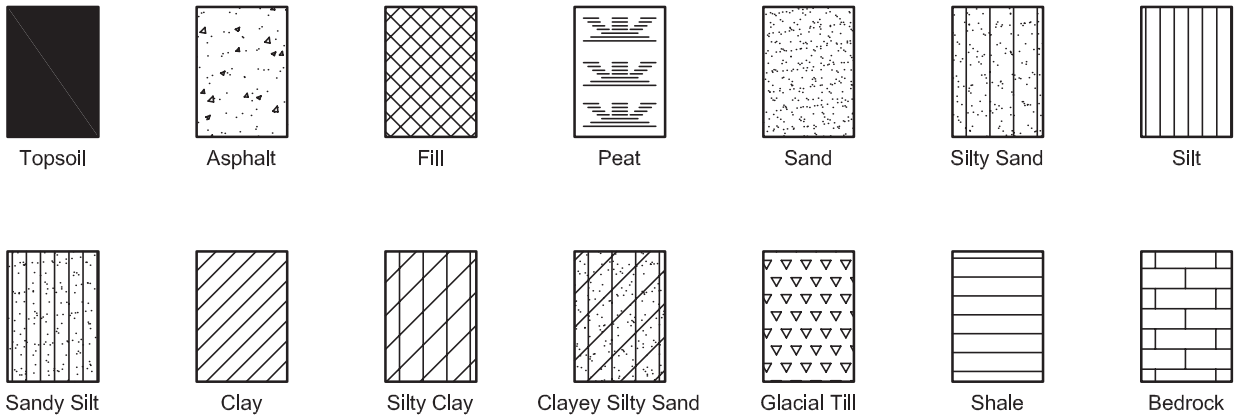
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

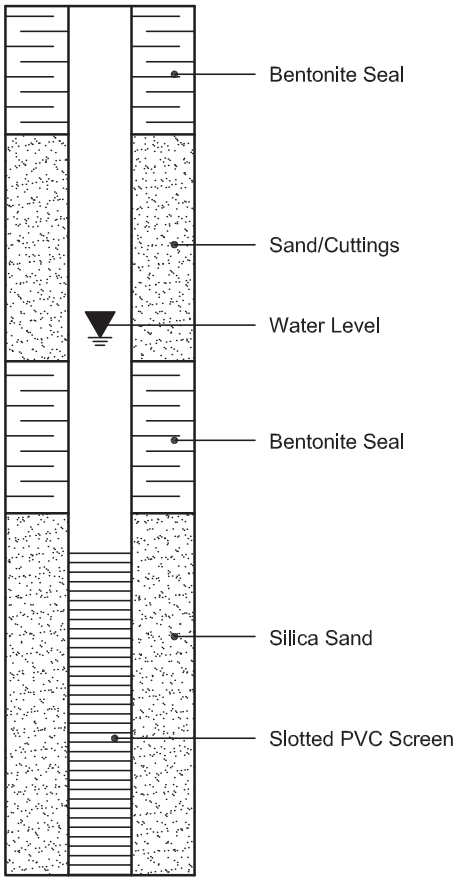
SYMBOLS AND TERMS (continued)

STRATA PLOT

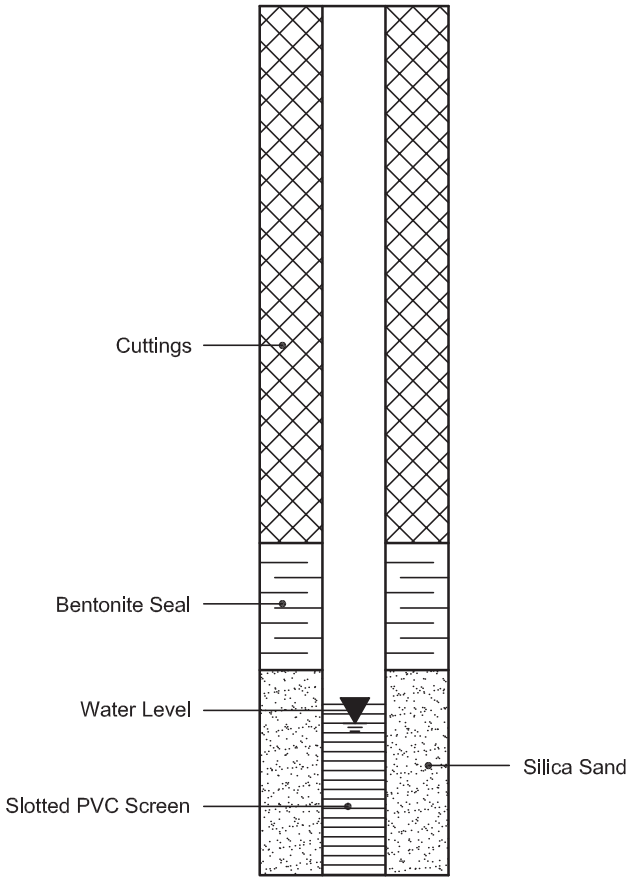


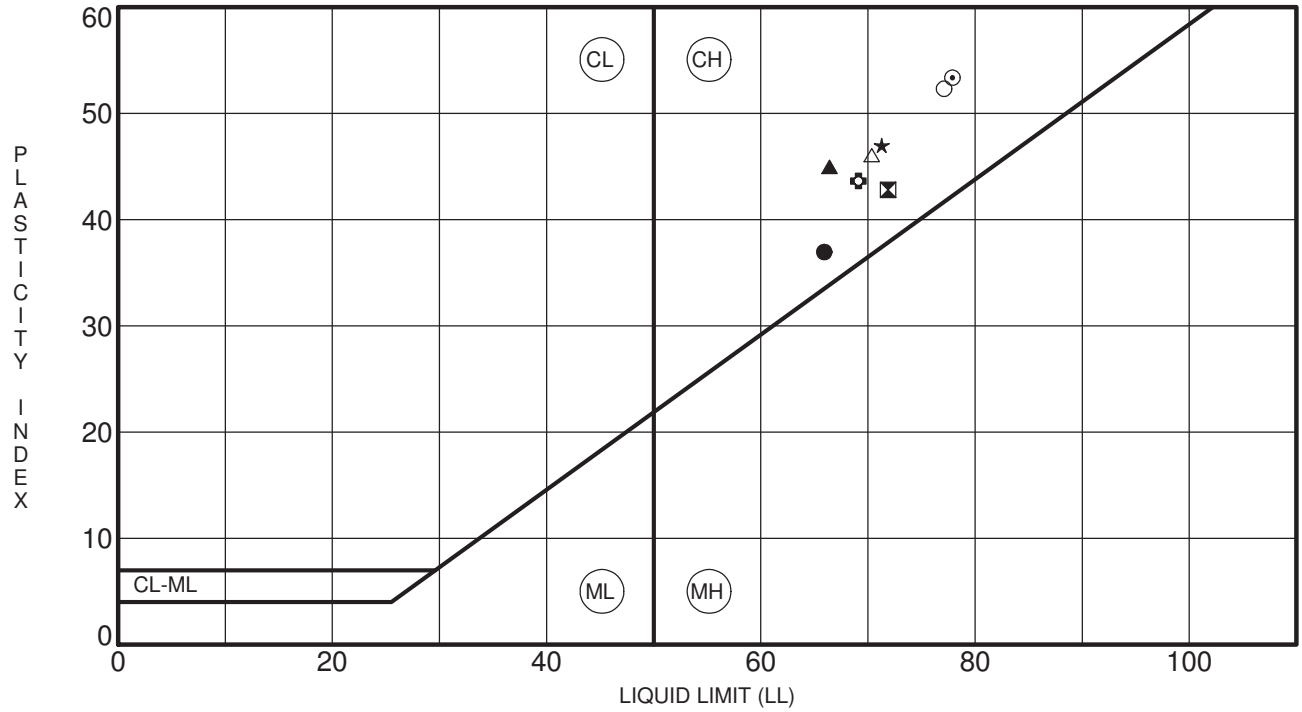
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION





Specimen Identification			LL	PL	PI	Fines	Classification
●	**BH 1-18**	**SS 2**	**66**	**29**	**37**		**CH - Inorganic clays of high plasticity**
⊠	**BH10-18**	**SS 3**	**72**	**29**	**43**		**CH - Inorganic clays of high plasticity**
▲	**TP 1**	**G2**	**66**	**21**	**45**		**CH - Inorganic clays of high plasticity**
★	**TP 1**	**G3**	**71**	**24**	**47**		**CH - Inorganic clays of high plasticity**
⊙	**TP 2**	**G2**	**78**	**25**	**53**		**CH - Inorganic clays of high plasticity**
✿	**TP 3**	**G2**	**69**	**25**	**44**		**CH - Inorganic clays of high plasticity**
○	**TP 4**	**G2**	**77**	**25**	**52**		**CH - Inorganic clays of high plasticity**
△	**TP 5**	**G3**	**70**	**24**	**46**		**CH - Inorganic clays of high plasticity**

CLIENT **Glenview Homes (Innes) Limited** FILE NO. **PG4026**

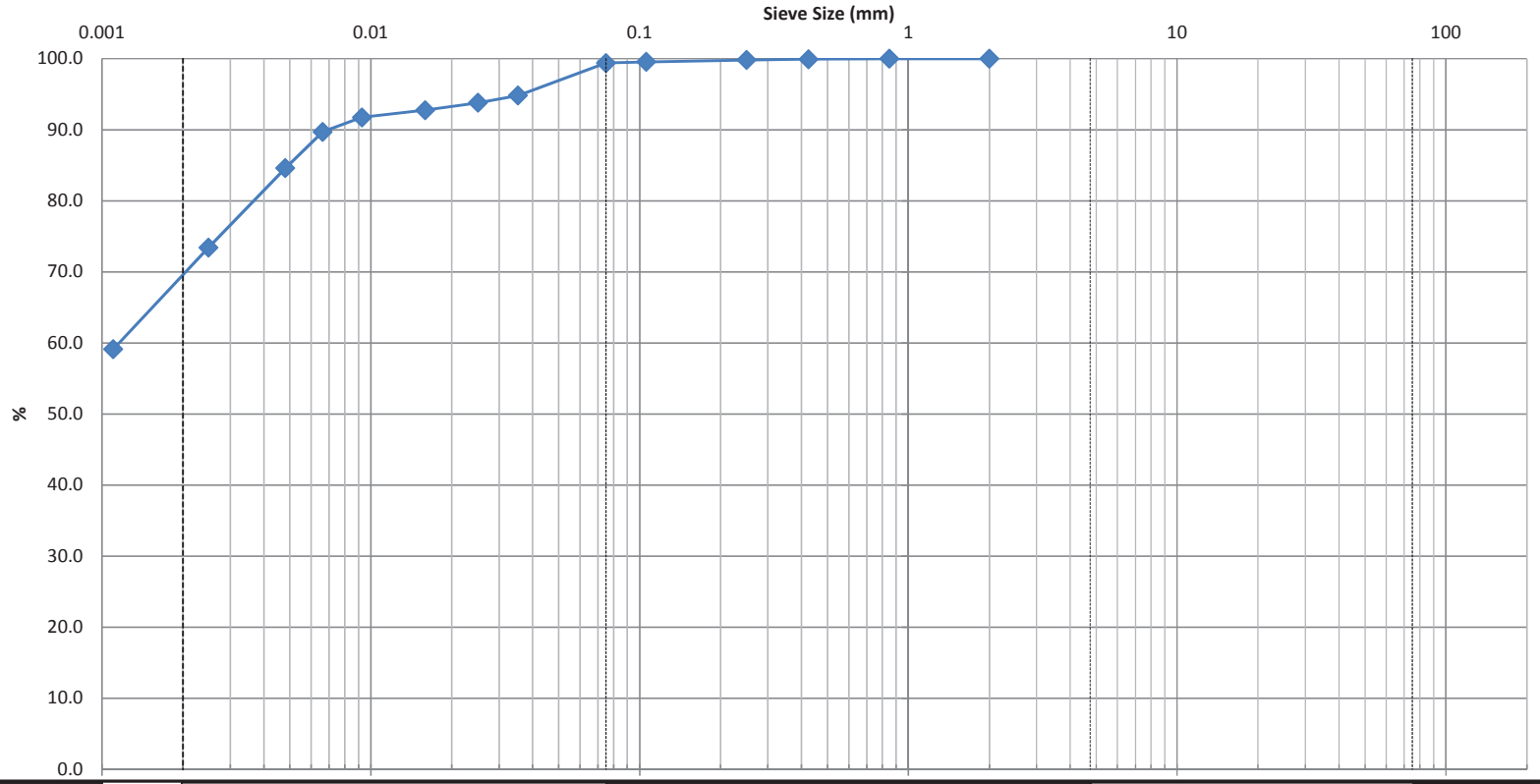
PROJECT **Supplemental Geotechnical Investigation - 3604-3646 Innes Road** DATE **1 Aug 17**

patersongroup Consulting Engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

ATTERBERG LIMITS' RESULTS

patersongroup
consulting engineers

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO:	PG4026
CONTRACT NO.:		BH OR TP No.:	BH4-18 - SS3	LAB NO:	06542
PROJECT:	3604-3636 Innes Road			DATE RECEIVED:	7-Dec-18
				DATE TESTED:	12-Dec-18
DATE SAMPLED:	5-Dec-18			DATE REPORTED:	17-Dec-18
SAMPLED BY:	N. Giamberardino			TESTED BY:	D. Bertrand



	Clay	Silt	Sand			Gravel		Cobble
			Fine	Medium	Coarse	Fine	Coarse	

Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						32.5					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					0.0	0.6		29.9		69.5	

Comments	

patersongroup
consulting engineers

HYDROMETER
LS-702 ASTM-422

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO.:	PG4026
PROJECT:	3604-3636 Innes Road	BH OR TP No.:	BH4-18 - SS3	DATE SAMPLED:	05-Dec-18
LAB No. :	06542	TESTED BY:	D. Bertrand	DATE RECEIVED:	07-Dec-18
SAMPLED BY:	N. Giamberardino	DATE REPT'D:	17-Dec-18	DATE TESTED:	12-Dec-18

SAMPLE INFORMATION

SAMPLE MASS	102.5	50.00	
SPECIFIC GRAVITY (Gs)	2.700	REMARKS	
HYGROSCOPIC MOISTURE	Tare No.		
TARE Wt.	50.00	ACTUAL Wt.	
AIR DRY (Wa)	150.00	100.00	
OVEN DRY (Wo)	147.00	97.00	
F=(Wo/Wa)	0.970		
INITIAL Wt. (Ma)	50.00		
Wt. CORRECTED	48.50		
Wt. AFTER WASH BACK SIEVE	0.3		
SOLUTION CONCENTRATION	40 g / L		

GRAIN SIZE ANALYSIS

SIEVE DIAMETER (mm)	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
63.0			
53.0			
37.5			
26.5			
19.0			
16.0			
13.2			
9.5			
4.75			
2.0	**0.0**	0.0	100.0
Pan	**102.5**		
0.850	**0.00**	0.0	100.0
0.425	**0.04**	0.1	99.9
0.250	**0.10**	0.2	99.8
0.106	**0.23**	0.5	99.5
0.075	**0.30**	0.6	99.4
Pan	**0.30**		
SIEVE CHECK 0.0	MAX = 0.3%		

HYDROMETER DATA

ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (°C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	8:38	52.5	6.0	23.0	0.0353	94.8	94.8
2	8:39	52.0	6.0	23.0	0.0251	93.8	93.8
5	8:42	51.5	6.0	23.0	0.0160	92.8	92.8
15	8:52	51.0	6.0	23.0	0.0093	91.7	91.7
30	9:07	50.0	6.0	23.0	0.0066	89.7	89.7
60	9:37	47.5	6.0	23.0	0.0048	84.6	84.6
250	12:47	42.0	6.0	23.0	0.0025	73.4	73.4
1440	8:37	35.0	6.0	23.0	0.0011	59.1	59.1

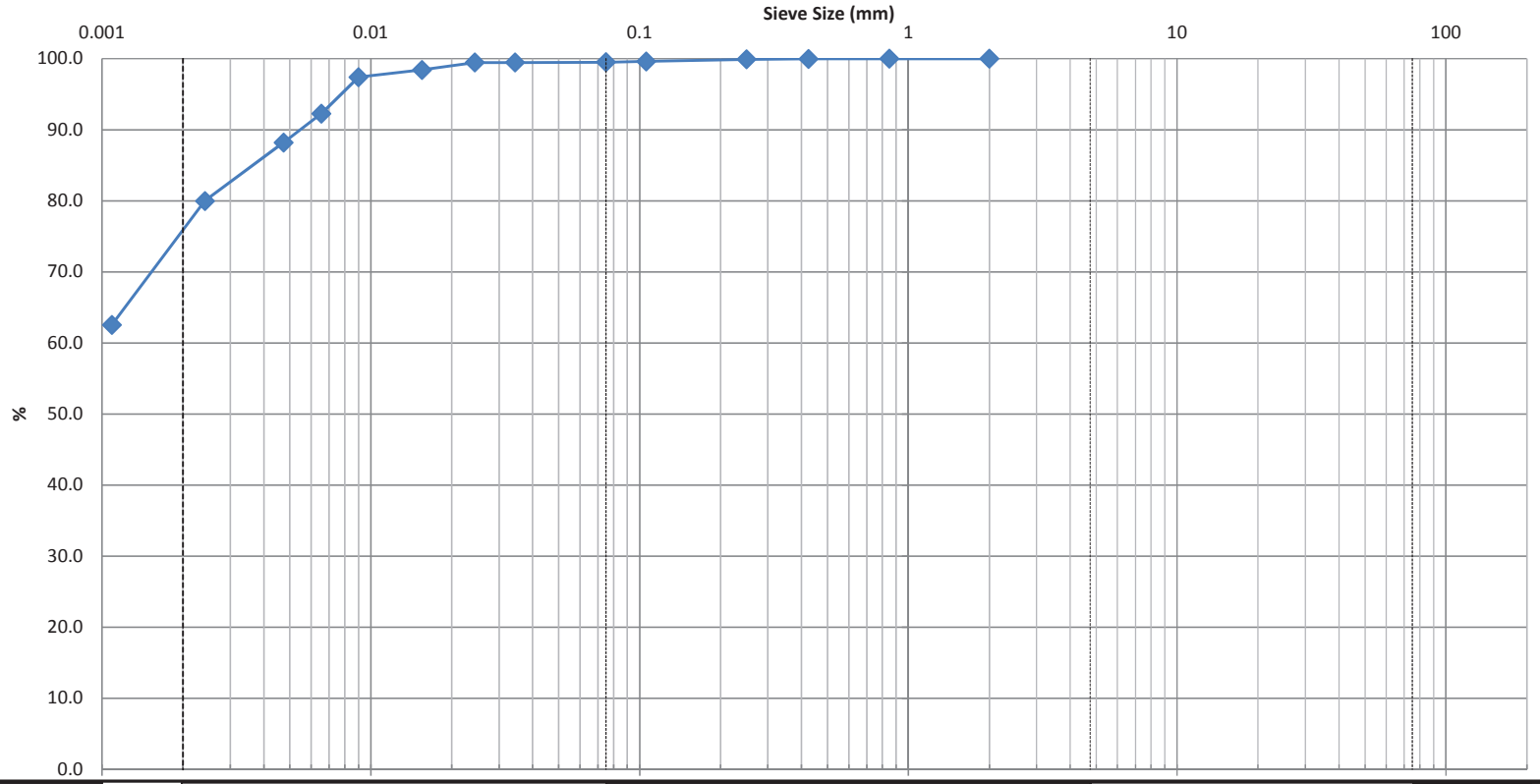
COMMENTS

Moisture Content = 32.5%

REVIEWED BY:	Curtis Beadow	APPROVED BY:	Joe Forsyth, P. Eng.

patersongroup
consulting engineers

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO:	PG4026
CONTRACT NO.:		BH OR TP No.:	BH6-18 - SS3	LAB NO:	06543
PROJECT:	3604-3636 Innes Road			DATE RECEIVED:	7-Dec-18
				DATE TESTED:	12-Dec-18
DATE SAMPLED:	5-Dec-18			DATE REPORTED:	17-Dec-18
SAMPLED BY:	N. Giamberardino			TESTED BY:	D. Bertrand



	Clay	Silt	Sand			Gravel		Cobble
			Fine	Medium	Coarse	Fine	Coarse	

Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						30.1					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					0.0	0.5		23.0		76.5	

Comments	

patersongroup
consulting engineers

HYDROMETER
LS-702 ASTM-422

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO.:	PG4026
PROJECT:	3604-3636 Innes Road	BH OR TP No.:	BH6-18 - SS3	DATE SAMPLED:	05-Dec-18
LAB No. :	06543	TESTED BY:	D. Bertrand	DATE RECEIVED:	07-Dec-18
SAMPLED BY:	N. Giamberardino	DATE REPT'D:	17-Dec-18	DATE TESTED:	12-Dec-18

SAMPLE INFORMATION

SAMPLE MASS	109.3	50.10	
SPECIFIC GRAVITY (Gs)	2.700	REMARKS	
HYGROSCOPIC MOISTURE	Tare No.		
TARE Wt.	50.00	ACTUAL Wt.	
AIR DRY (Wa)	150.00	100.00	
OVEN DRY (Wo)	146.25	96.25	
F=(Wo/Wa)	0.963		
INITIAL Wt. (Ma)	50.10		
Wt. CORRECTED	48.22		
Wt. AFTER WASH BACK SIEVE	0.26		
SOLUTION CONCENTRATION	40 g / L		

GRAIN SIZE ANALYSIS

SIEVE DIAMETER (mm)	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
63.0			
53.0			
37.5			
26.5			
19.0			
16.0			
13.2			
9.5			
4.75			
2.0	**0.0**	0.0	100.0
Pan	**109.3**		
0.850	**0.00**	0.0	100.0
0.425	**0.02**	0.0	100.0
0.250	**0.05**	0.1	99.9
0.106	**0.19**	0.4	99.6
0.075	**0.25**	0.5	99.5
Pan	**0.26**		
SIEVE CHECK 0.0	MAX = 0.3%		

HYDROMETER DATA

ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (°C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	8:51	54.5	6.0	23.0	0.0344	99.5	99.5
2	8:52	54.5	6.0	23.0	0.0244	99.5	99.5
5	8:55	54.0	6.0	23.0	0.0155	98.4	98.4
15	9:05	53.5	6.0	23.0	0.0090	97.4	97.4
30	9:20	51.0	6.0	23.0	0.0065	92.3	92.3
60	9:50	49.0	6.0	23.0	0.0047	88.2	88.2
250	13:00	45.0	6.0	23.0	0.0024	80.0	80.0
1440	8:50	36.5	6.0	23.0	0.0011	62.5	62.5

COMMENTS

Moisture Content = 30.1%

REVIEWED BY:	Curtis Beadow	APPROVED BY:	Joe Forsyth, P. Eng.

APPENDIX 2

FIGURE 1 - KEY PLAN

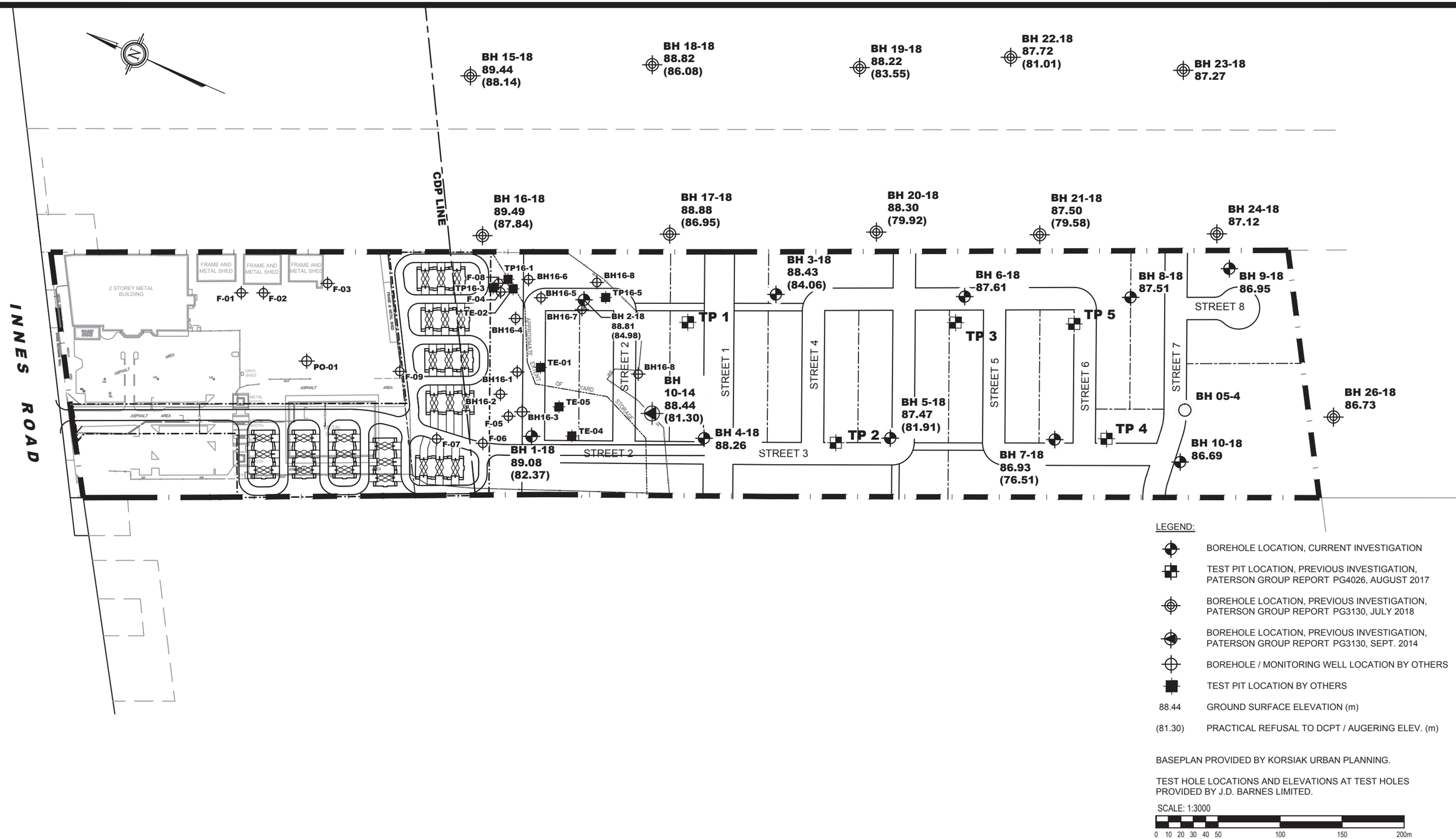
DRAWING PG4026-1 - TEST HOLE LOCATION PLAN

DRAWING PG4026-2 - PERMISSIBLE GRADE RAISE PLAN



FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION
- TEST PIT LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG4026, AUGUST 2017
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, JULY 2018
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, SEPT. 2014
- BOREHOLE / MONITORING WELL LOCATION BY OTHERS
- TEST PIT LOCATION BY OTHERS
- 88.44 GROUND SURFACE ELEVATION (m)
- (81.30) PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

BASEPLAN PROVIDED BY KORSIAK URBAN PLANNING.

TEST HOLE LOCATIONS AND ELEVATIONS AT TEST HOLES PROVIDED BY J.D. BARNES LIMITED.

SCALE: 1:3000

0 10 20 30 40 50 100 150 200m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
3	UPDATED CONCEPTUAL PLAN	09/08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG

GLENVIEW HOMES (INNES) LTD.

SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
3604-3646 INNES ROAD

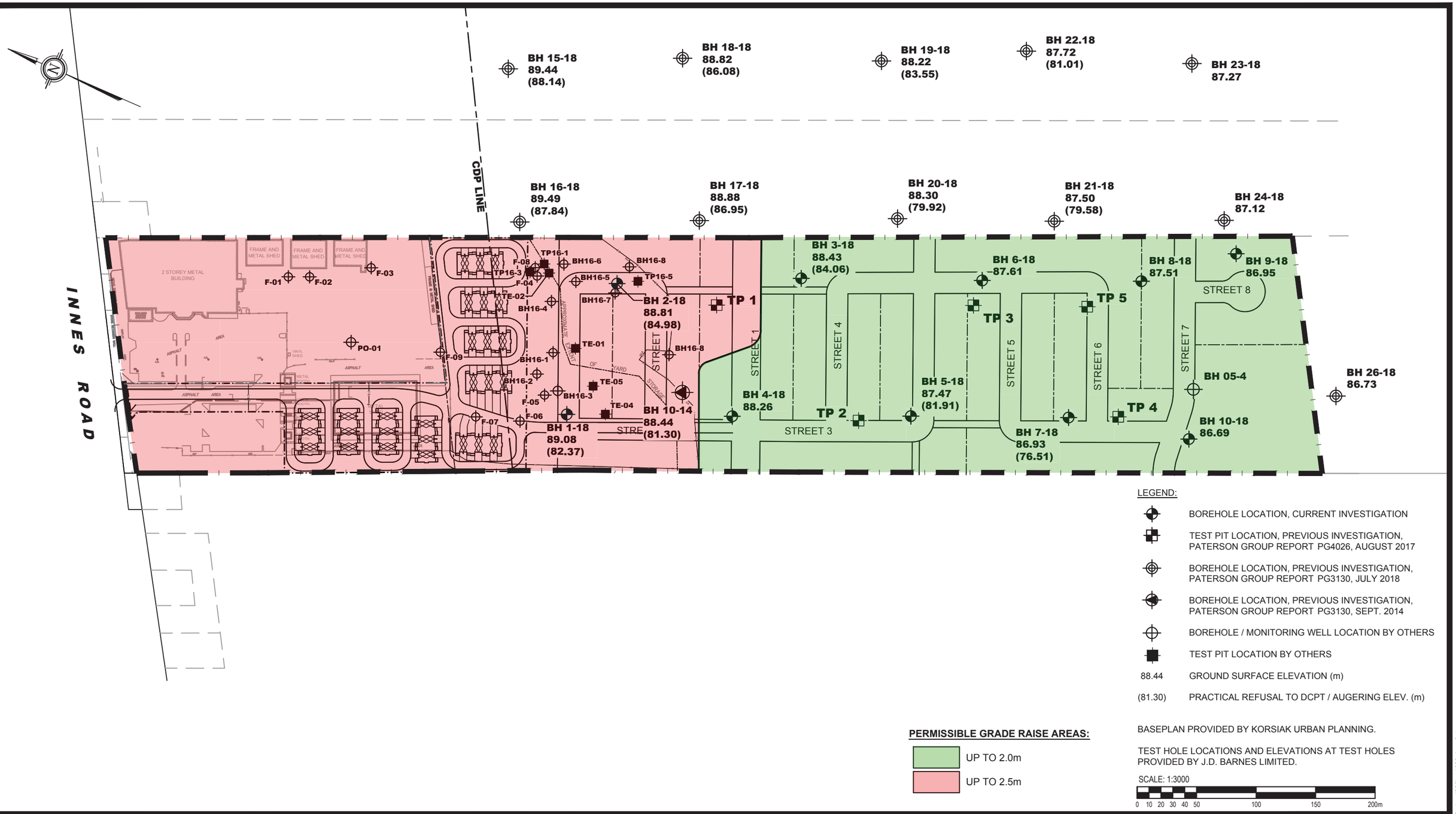
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:3000	Date: 08/2017
Drawn by: RCG	Report No.: PG4026-1
Checked by: NZ	Dwg. No.: PG4026-1
Approved by: DJG	Revision No.: 3

p:\autocad drawings\geotechnical\pg4026\xlpg4026\pg4026-1-rev2.dwg



LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION
- TEST PIT LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG4026, AUGUST 2017
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, JULY 2018
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, SEPT. 2014
- BOREHOLE / MONITORING WELL LOCATION BY OTHERS
- TEST PIT LOCATION BY OTHERS
- 88.44 GROUND SURFACE ELEVATION (m)
- (81.30) PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

PERMISSIBLE GRADE RAISE AREAS:

- UP TO 2.0m
- UP TO 2.5m

BASEPLAN PROVIDED BY KORSIAK URBAN PLANNING.

TEST HOLE LOCATIONS AND ELEVATIONS AT TEST HOLES PROVIDED BY J.D. BARNES LIMITED.

SCALE: 1:3000

0 10 20 30 40 50 100 150 200m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
3	UPDATED CONCEPTUAL PLAN	08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG

GLENVIEW HOMES (INNES) LTD.

SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
3604-3646 INNES ROAD

OTTAWA, ONTARIO

Title:

PERMISSIBLE GRADE RAISE PLAN

Scale: 1:3000	**Date:** 02/2019
Drawn by: RCG	**Report No.:** PG4026-1
Checked by: NC	**Dwg. No.:** PG4026-2
Approved by: DJG	**Revision No.:** 3

p:\autocad drawings\geotechnical\pg4026xx\pg4026-1-rev2.dwg

patersongroup **memorandum**

consulting engineers

re: **Geotechnical Review - Lightweight Fill Requirements**
Proposed Residential Development
3604-3646 Innes Road - Ottawa

to: Glenview Homes (Innes) Ltd.- **Ms. Jillian Normand** - JNormand@glenview.ca

date: February 18, 2021

file: PG4026-MEMO.02

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a review of the preliminary grading at the proposed development with respect to lightweight fill requirements. The following memorandum should be read in conjunction with Paterson Report PG4026-2 Revision 2 dated April 2, 2020.

Geotechnical Review

Paterson reviewed the following drawing prepared by Novatech for the aforementioned commercial development:

- ❏ Macro Grading, Erosion and Sediment Control Plan - Project Number 118224-00 - Drawing Number 118224-GR - Revision 2 dated April 3, 2020

Based on our review of the preliminary grading plan, it is anticipated that grading at the proposed roadways and residential dwellings will be considered acceptable and in compliance with our permissible grade raise recommendations. As such, it is anticipated that lightweight fill will not be required at the subject site.

Upon request, Paterson will provide a summary of design details for the proposed development on a lot by lot basis once grading at the proposed development has been finalized.

We trust that the current submission meets your immediate requirements.

Best Regards,

Paterson Group Inc.



Kevin A. Pickard, EIT





David J. Gilbert, P.Eng.

Paterson Group Inc

Head Office and Laboratory
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

Northern Office and Laboratory
63 Gibson Street
North Bay - Ontario - P1B 8Z4
Tel: (705) 472-5331 Fax: (705) 472-2334

St. Lawrence Office
993 Princess Street - Suite 100
Kingston - Ontario - K7L 1H3
Tel: (613) 542-7381

Appendix G
Draft Conditions

File: D07-16-19-0027

MENU OF CONDITIONS
FOR DRAFT APPROVAL
GLENVIEW HOME (INNES) LIMITED
SUBDIVISION, 3610 INNES ROAD

DRAFT APPROVED 26/05/2021

INDEX

General 2
Landowners Agreement 4
Zoning 4
Roadway Modifications 5
Highways/Roads 5
Public Transit 7
Geotechnical 8
Pathways, Sidewalks, Walkways, Fencing, and Noise Barriers 11
Landscaping/Streetscaping 12
Tree Conservation 14
Urban Design 14
Parks 15
Environmental Constraints 22
Record of Site Condition / Contaminated Soil 25
Schools 25
Archaeology 25
Stormwater Management 25
Sanitary Services 28
Water Services 29
Serviced Lands 30
Utilities 31
Fire Services 36
Noise Attenuation 36
Land Transfers 38
Blasting 38
Development Charges By-law 39
Survey Requirements 40
Closing Conditions 41

The City of Ottawa's conditions applying to the draft approval of Glenview Homes (Innes) Limited's Subdivision (File No. D07-16-19-0027), 3610 Innes Road, are as follows:

1.	This approval applies to the draft plan certified by J.D.Barnes Ontario Land Surveyor, dated MONTH, DAY, YEAR, showing 151 Residential Lots, 9 streets, 10 residential blocks, 4 pathway blocks, 1 open space block, # 30cm reserves and # temporary turning circles. This approval applies to the approved conceptual plans and reports in support of the draft plan as follows (list plans, reports and studies associated with the draft approval): 1) Conceptual Site Servicing and Stormwater Management Report, prepared by Novatech, dated April 3, 2020 2) Addendum to Conceptual Site Servicing and Stormwater Management Report, prepared by Novatech, dated November 27, 2020 3) Geotechnical Investigation, Report: PG4026-2 Revision 2, prepared by Paterson Group, dated April 2, 2020 4) Traffic Impact Assessment, Ref: R-2018-155, prepared by Novatech, dated April 15, 2020 5) Stage 1 & 2 Archaeological Assessment for 3604-3646 Innes Road, Report Number: 1788059, prepared by Golder Associates, dated January 12, 2018 6) EIS – Species at Risk and Mitigation Measures – Updated prepared by Muncaster Environmental Planning Inc. dated October 13, 2020 7) Phase One Environmental Site Assessment Update, Part of Report No. 161-06382-00, prepared by WSP, dated June 27, 2016 8) Phase Two Environmental Site Assessment Update and Remediation, Report No. 161-06382-00, prepared by WSP, dated November 28, 2016 9) Planning Rationale & Integrated Environmental Review Statement, Ref: R-2019-173, prepared by Novatech, dated October 4, 2019 Subject to the conditions below, these plans and reports may require updating and/or additional details prior to final approval.	
	The Owner agrees, by entering into a Subdivision Agreement, to satisfy all terms, conditions and obligations, financial and otherwise, of the City of Ottawa, at the Owner's sole expense, all to the satisfaction of the City.	**Clearing Agency**[i]
	General	
2.	Prior to the issuance of a Commence Work Notification, the Owner shall obtain such permits as may be required from Municipal or Provincial	**OTTAWA Planning**

	authorities and shall file copies thereof with the General Manager, Planning, Infrastructure and Economic Development Department.	
3.	Prior to commencing construction, the Owner shall enter into a subdivision agreement with the City. The subdivision agreement shall, among other matters, require that the Owner post securities in a format approved by the City Solicitor, in an amount of 100% of the estimated cost of all works, save and except non-municipal buildings. The aforementioned security for site works shall be for works on both private and public property and shall include, but not be limited to, lot grading and drainage, landscaping and driveways, roads and road works, road drainage, underground infrastructure and services (storm, sanitary, watermains), streetlights, stormwater management works and park works. The amount secured by the City shall be determined by the General Manager, Planning, Infrastructure and Economic Development Department, based on current City tender costs, which costs shall be reviewed and adjusted annually. Securities for on-site works may be at a reduced rate subject to the approval of the General Manager, Planning, Infrastructure and Economic Development Department. Engineering, Inspection and Review fees will be collected based on the estimated cost of the works (+HST) and a park review and inspection fee will be based on 4% (+HST) of the total value of the park works as noted herein and in accordance with the City's Fees By-law for planning applications (By-law No. 2018-24 or as amended).	**OTTAWA Planning**
4.	The Owner acknowledges and agrees that any residential blocks for street-oriented dwelling units on the final Plan shall be configured to ensure that there will be no more than 25 units per block.	**OTTAWA Planning**
5.	The Owner acknowledges and agrees that any person who, prior to the draft plan approval, entered into a purchase and sale agreement with respect to lots or blocks created by this Subdivision, shall be permitted to withdraw from such agreement without penalty and with full refund of any deposit paid, up until the acknowledgement noted above has been executed. The Owner agrees to provide to the General Manager, Planning, Infrastructure and Economic Development Department an acknowledgement from those purchasers who signed a purchase and sale agreement before this Subdivision was draft approved, that the Subdivision had not received draft approval by the City. The Owner agrees that the purchase and sale agreements signed prior to draft approval shall be amended to contain a clause to notify purchasers of this fact, and to	**OTTAWA Legal**

	include any special warning clauses, such as but not limited to Noise Warnings and easements.	
6.	All prospective purchasers shall of affected lots be informed through a clause in the agreements of purchase and sale of the presence of lightweight fill on the lands, and that the presence of such lightweight fill may result in specific restrictions on landscaping, pools, additions, decks and fencing	**OTTAWA Legal**
7.	The Owner, or his agents, shall not commence or permit the commencement of any site related works until such time as a pre-construction meeting has been held with Planning, Infrastructure and Economic Development Department staff and until the City issues a Commence Work Notification.	**OTTAWA Planning**
	Landowners Agreement	
8.	The City will require each owner to demonstrate that it has executed the Funding Agreement and any applicable Cost Sharing Agreement, or the other owners consent to the owner proceeding in advance of the Cost Sharing Agreement being executed, as a condition of approval for all draft plan of subdivision and condominium, site plan and severance applications in the secondary plan area. A development condition shall require notification from the Administrator of the EUC Phase 3 Area Landowners Group that the owner is party to the relevant agreement(s) and has paid their share of any costs pursuant to the agreement(s) prior to registration.	**OTTAWA Planning LG**
	Zoning	
9.	The Owner agrees that prior to registration of the Plan of Subdivision, the Owner shall ensure that the proposed Plan of Subdivision shall conform with a Zoning By-law approved under the requirements of the *Planning Act*, with all possibility of appeal to the Ontario Municipal Board exhausted.	**OTTAWA Planning**
10.	The Owner undertakes and agrees that prior to the registration of the Plan of Subdivision, the Owner shall deliver to the City a certificate executed by an Ontario Land Surveyor showing that the area and frontage of all lots and blocks within the Subdivision are in accordance with the applicable Zoning By-law.	**OTTAWA Planning**
11.	The Owner acknowledges and agrees that in those situations where both interior side yard setbacks of a dwelling lot are less than 1.2 metres and are obstructed by permitted projections, a shared access easement shall be registered on the titles to the affected lot and one of the abutting lots in order to provide clear and unobstructed access within the side yard.	**OTTAWA Planning**

	Roadway Modifications	
12.	The Owner shall pay all expenses associated with all works related to roadway modifications and shall provide financial security in the amount of 100% of the cost of implementing the required works.	**OTTAWA Planning**
13.	The Owner agrees to provide a Development Information Form and Geometric Plan indicating: a) Road Signage and Pavement Marking for the subdivision; b) Intersection control measure at new internal intersections; and c) location of depressed curbs and TWSIs; prior to the earlier of registration of the Agreement or early servicing. Such form and plan shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning Transpo Plg**
14.	Where traffic calming is identified, the Owner acknowledges and agrees to implement traffic calming measures on roads within the limits of their subdivision to limit vehicular speed and improve pedestrian safety. The Owner further acknowledges and agrees that the detailed design for new roads will include the recommendation(s) from the required supporting transportation studies. The Owner agrees that traffic calming measures shall reference best management practices from the Canadian Guide to Neighbourhood Traffic Calming, published by the Transportation Association of Canada, and/or Ontario Traffic Manual. These measures may include either vertical or horizontal features (such measures shall not interfere with stormwater management and overland flow routing), including but not limited to: • intersection or mid block narrowings, chicanes, medians; • speed humps, speed tables, raised intersections, raised pedestrian crossings; • road surface alterations (for example, use of pavers or other alternate materials, provided these are consistent with the City's Official Plan polices related to Design Priority Areas); • pavement markings/signage; and • temporary/seasonal installations such as flexi posts or removable bollards.	**OTTAWA Planning**
	Highways/Roads	
15.	The Owner acknowledges and agrees that all supporting transportation studies and design of all roads and intersections shall be to the satisfaction	**OTTAWA Planning**

	of the General Manager, Planning, Infrastructure and Economic Development Department.	
16.	The Owner shall retain a licensed or registered professional with expertise in the field of transportation planning and/or traffic operations to prepare a Transportation Impact Assessment. The study shall comply with the City of Ottawa's Transportation Impact Assessment Guidelines. The Owner agrees to revise the Draft Plan in accordance with the recommendations of the study to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
17.	The Owner shall provide temporary turn-arounds for all streets terminating at the edge of any phase of development, prior to registration of the Plan, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. The Owner agrees that it will convey to the City at no cost any temporary easements that may be required in order to establish the temporary turn-arounds. Turning circle(s) may include a 0.3-metre reserve along the perimeter of any temporary turning circle(s), to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. For any portion of the temporary turn-around easements that do not form part of the permanent road allowance, the easements shall be released at the expense of the Owner when the easements are no longer required by the City.	**OTTAWA Planning**
18.	Any dead ends and/or open spaces of road allowances created by this plan of subdivision may be terminated in 0.3 metre reserves. The Owner shall place 0.3 metre reserves on the following locations: • *dead ends of Streets 1, 5 and 7*	**OTTAWA Planning Legal**
19.	The Owner shall provide the following site triangles on the final plan at all of the following occurrences of intersections of public roads within the limits of the plan of subdivision: Public lanes to local lanes: 3m x 3m Local road to local road: 3m x 3m Local road to collector road: 5m x 5m Collector road to collector road: 5m x 5m Collector road to arterial road: 5m x 5m Arterial road to arterial road: 5m x 5m	**OTTAWA Planning Legal**
20.	The Owner agrees to provide a construction traffic management plan for the subdivision prior to the earlier of registration of the Agreement or early servicing. Such plan shall, at a minimum, ensure that contractors respect the peak traffic periods to ensure construction does not impact residents' daily commute; and that Innes Road is regularly cleaned and kept free of	**OTTAWA Planning**

	construction mud and debris to ensure commuters and cyclists are not affected by stones, dirt, debris and dust. Such plan shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	
21.	The Owner acknowledges that should the plan be registered in one phase; the registration shall include: • • *All Blocks*	**OTTAWA Planning**
22.	All streets shall be named to the satisfaction of the Director of Building Code Services and in accordance with the Municipal Addressing By-law or the Private Roadways By-law as applicable.	**OTTAWA Planning BCS**
23.	The Owner acknowledges that the construction of buildings may be restricted on certain lots and/or blocks until such time as road connections are made so that snowplow turning and garbage collection can be implemented.	**OTTAWA Planning**
24.	The Owner acknowledges that the ongoing East Urban Community Mixed-use Centre Community Design Plan study (CDP) proposes a multi-use pathway facilities along future 24-metre wide collector roads extending west through the subdivision (Street 1). The Owner further agrees to design and build such facilities within Street 1 to City standards should the need be identified in the approved CDP.	**OTTAWA Planning**
25.	The Owner acknowledges and agrees that, where feasible, the driveways leading to multiple attached dwelling blocks fronting along a public road, shall be paired. The pairing of driveways shall be shown on all detailed drawings submitted for review and approval and shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
	Public Transit	
26.	The Owner shall design and construct, at its expense, Street 1, which has/have been identified as transit service routes, to Transportation Association of Canada standards, including right-of-way width, horizontal and vertical geometry. The Owner shall design and construct, at its expense, the determined locations for transit passenger standing areas and shelter pads, to the specifications of the General Manager, Planning, Infrastructure and Economic Development Department. Specific bus stop locations will be identified during the creation of the composite utility plan. All of the above shall be to the specifications and satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning Transit**

27.	The Owner shall, prior to registration, design and construct a temporary turn-around for designated-transit Street 1 at the limit of the subdivision over Block 159as required, or on the abutting east lands owned by others, to accommodate interim transit routes, all to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department and the Assistant General Manager, Transit Services Operations.	**OTTAWA Transit**
28.	The Owner shall ensure that the staging of the Subdivision, including the construction of dwellings, roadways, walkways, and paved passenger standing areas, or shelter pads, shall occur in a sequence that permits the operation of an efficient, high quality transit service at all stages of development.	**OTTAWA Transit**
29.	The Owner shall orient dwellings and vehicular accesses in the vicinity of bus stops in such a manner as to avoid traffic conflicts and visual intrusion. Prior to the earlier of early servicing or registration, the Owner shall submit plans to Planning, Infrastructure and Economic Development Department for approval indicating the orientation of all dwellings and private accesses in the vicinity of all bus stop locations.	**OTTAWA Planning Transit**
30.	The Owner shall inform all prospective purchasers, through a clause in all agreements of Purchase and Sale and indicate on all plans used for marketing purposes, those streets identified for potential transit services, the location of the bus stops, paved passenger standing areas, or shelters pads and shelters, any of which may be located in front of or adjacent to the purchaser's lot at any time.	**OTTAWA Transit**
31.	The Owner agrees to implement a Transit Service Strategy in accordance with the Official Plan. The Owner, together with the City, will determine the method and means by which the developments, as well as adjacent areas, can be efficiently and effectively serviced by transit. The Owner shall enter into an agreement with the Transit Services Branch, prior to the registration of the subdivision, to outline the provision of interim bus service. Said agreement shall include, but not be limited to, the following: establishment of routes and stops and levels of service and provision and maintenance of stops and turnarounds. The agreement may include: funding and cost-sharing arrangements and timing and triggers for the transfer of responsibility to City.	**OTTAWA Transit**
	Geotechnical	
32.	Where special soils conditions exist, the Owner covenants and agrees that the following clause shall be incorporated into all agreements of purchase and sale for Lot, and included in the municipal covenant agreement against the title:	**OTTAWA Planning**

	"The Owner acknowledges that special soils conditions exist on this lot which will require: (a) a geotechnical engineer licensed in the Province of Ontario to approve any proposal or design for a swimming pool installation or other proposal requiring an additional building permit on this lot prior to applying for a pool enclosure permit or installing the pool; and (b) the Owner to submit a copy of the geotechnical engineer's or geoscientists report to the General Manager, Planning, Infrastructure and Economic Development Department at the time of the application for the pool enclosure or additional building permit. The Owner also acknowledges that said ~~e~~ngineer or geoscientist will be required to certify that the construction has been completed in accordance with his/her recommendation and that a copy of the certification or report will be submitted to the General Manager, Planning, Infrastructure and Economic Development Department.	
33.	The Owner shall submit a geotechnical report prepared in accordance with the City's approved Geotechnical Investigation and Reporting Guidelines and/or Slope Stability Guidelines for Development Applications by a geotechnical engineer or geoscientist, licensed in the Province of Ontario, containing detailed information on applicable geotechnical matters and recommendations to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development which include, but are not limited to: 1. existing sub-surface soils, groundwater conditions; 2. slope stability (including an assessment during seismic loading) and erosion protection, in addition to any building construction requirements adjacent to unstable slope; 3. clearly indicate orientation of any cross-sections used in slope stability analysis and location of center of the slip circle; 4. grade raise restrictions on the site and, if appropriate, the impacts this will have on the slope stability; 5. design and construction of underground services to the building, including differential settlement near any buildings or structures; 6. design and construction of roadway, fire routes and parking lots; 7. design and construction of retaining walls and/or slope protection; 8. design and construction of engineered fill; 9. design and construction of building foundations; 10. site dewatering; 11. tree planting; 12. any restrictions to landscaping, in particular type and size of trees and the proximity of these to structures/buildings; 13. the construction for future infrastructure and buildings;	**OTTAWA Planning**

	14. design and construction of swimming pools, hot tubs, decks, and additions; 15. design and construction of park blocks for its intended uses; and 16. in areas of sensitive marine clay soils:	
34.	a) The Owner agrees to any restrictions to landscaping, in particular the type and size of trees and the proximity of these to structures/buildings due to the presence of sensitive marine clay soils, as per the City's Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines. b) The Owner agrees to provide the following tests, data, and information prior to zoning approval , in order to determine the sensitivity of the clay soils and how it will impact street tree planting and potentially front yard setbacks: i. Shear Vane analysis including remolded values per ASTM D2573. ii. Atterberg Limit testing per ASTM D4318; with the following data clearly identified, Natural water content (W), Plastic Limit (PL), Plasticity Index (PI), Liquidity Index (LI), and Activity (A). iii. Shrinkage Limit testing per ASTM D4943 with Shrinkage Limit (SL). iv. A separate section within the geotechnical report on sensitive marine clay soils, which will include a signed letter and corresponding map that confirms the locations of low, medium sensitivity (generally <40% plasticity) or high sensitivity clay soils (generally >40% plasticity), as determined by the above tests and data. v. The report identifies that foundation walls are to be reinforced at least nominally, with a minimum of two upper and two lower 15M (rebar size) bars in the foundation wall. c) In locations where all six conditions in the Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines cannot be met (e.g. if soils are generally >40% plasticity) the 2005 Clay Soils Policy will apply, meaning only small, low-water demand trees can be planted at a minimum separation distance of 7.5m from a building foundation. In these cases, the Zoning By-law will be used to ensure sufficient front yard setbacks to accommodate street trees in the right-of-way. For example, if street trees are planted in the right-of-way at a distance of 2m from the front lot line, then the minimum front yard setback would be 5.5m (7.5m – 2m).	**OTTAWA Planning**
35.	In areas of sensitive marine clay soils, the Owner agrees that, prior to registration, to prepare an information package for homeowners regarding tree planting and watering, in accordance with the supporting geotechnical	**OTTAWA Forestry**

	report. This information must be approved by Forestry Services prior to circulation to homeowners.	
	Pathways, Sidewalks, Walkways, Fencing, and Noise Barriers	
36.	The Owner acknowledges and agrees that all pathways, sidewalks, walkways, fencing, and noise barriers are to be designed and constructed in accordance with City specifications, at no cost to the City, and to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
37.	The Owner shall construct a 1.8-metre asphalt pathway within each of Blocks 163 to 166, or asphalt widths that match with abutting developments inclusive, as well as 1.5 metre heavy-duty black vinyl-coated chain link fencing to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. Wood post-and-rail fencing to City standards shall be installed along the abutting residential lot lines extending from the end of the chain link fencing at a point in line with the front wall of the adjacent dwellings to the road allowance, all to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
38.	The Owner agrees to design and construct, at no cost to the City, sidewalks in accordance with City Specifications in the following locations: • Street 1 – MUP on north side and sidewalk on south side • Street 9 – sidewalk both sides from Innes Road to Street 2 (up to Block 159) • Street 9 – sidewalk on west and south sides from Street 2 to Street 2 • Street 2 – sidewalk on west side from Street 9 to Street 1 • Street 7 – sidewalk on south side	**OTTAWA Planning**
39.	The Owner agrees to connect all new pathways, sidewalks, walkways to the existing pathways, sidewalks, walkways located at the following locations: • Street 1 at Jargeau Road • Street 9 at Innes Road • Block 165 to existing path	**OTTAWA Planning**
40.	a) The Owner agrees to design and construct 1.5 metre black vinyl-coated chain link fences in accordance with the Fence By-law at the following locations: • Along the south and east boundary of the Park Block 162 where the park abuts residential lots All chain link fencing that separate public lands and residential lots and blocks shall have a maximum opening (the diamond shape area) of no	**OTTAWA Planning Parks**

	greater than 37 mm in order to comply with the applicable part of the "Pool Enclosure By-Law". b) The Owner agrees that any vinyl-coated chain link fence required to be installed with the exception of parks fencing shall be located a minimum of 0.15 metres inside the property line of the park. Refer to Parks condition X for details.	
41.	a) The Owner agrees to design and erect, at no cost to the City, noise attenuation barriers in accordance with City Specifications at the locations to be specified in the Noise Study required to be submitted to the satisfaction and approval of the General Manager, Planning, Infrastructure and Economic Development Department. b) The Owner agrees that any noise attenuation barrier required to be installed under this Agreement, shall be located a minimum of 0.30 metres inside the property line of the private property, and the location of the fence shall be verified by an Ontario Land Surveyor, prior to the release of securities for the noise attenuation barrier.	**OTTAWA Planning**
42.	The Owner shall insert a clause in each agreement of purchase and sale and shall be registered as a notice on title in respect of all lands which fences have been constructed stating that: "Purchasers are advised that they must maintain all fences in good repair, including those as constructed by *Glenview Homes (Innes) Limited* along the boundary of this land, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. The Purchaser agrees to include this clause in any future purchase and sale agreements".	**OTTAWA Planning**
	Landscaping/Streetscaping	
43.	The Owner agrees, prior to registration to have a landscape plan(s) for the plan of subdivision prepared by a Landscape Architect, in accordance with the recommendations contained in the geotechnical report(s), the Tree Conservation Report, and/or the Environmental Impact Statement (if appropriate). The landscape plan(s) shall include detailed planting locations, plant lists which include species, plant form and sizes, details of planting methods, pathway widths and materials, access points, fencing requirements and fencing materials, other landscape features and gateway features where required.	**OTTAWA Planning Forestry**

	The Owner agrees to implement the approved landscape plan(s) and bear all costs and responsibility for the preparation and implementation of the plan(s). The Owner agrees that where sensitive marine clay soils are present, and the geotechnical report has satisfied the applicable conditions of the Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines, confirmation of adequate soil volumes in accordance with the subject guidelines shall be provided by a Landscape Architect prior to zoning approval. All of the aforementioned are to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	
44.	The Owner agrees that for all single detached and semi-detached lots, a minimum of 1 tree per interior lot and 2 trees per exterior side yard lots (i.e. corner lots) shall be provided on the landscape plan(s). In areas of low/medium plasticity sensitive marine clay soils, the following exceptions in accordance with the Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines will apply in order to maximize the number of medium size trees: a) Where abutting properties form a continuous greenspace between driveways, one medium size tree will be planted instead of two small size trees, provided the minimum soil volume can be achieved. In these cases only, for the purposes of determining the minimum number of trees to be planted, one medium size tree that replaces two small trees will be counted as two trees. b) The medium size tree should be planted as close as possible to the middle of this continuous greenspace (in the right-of-way) to maximize available soil volume. c) On larger lots with sufficient soil volume for a medium size tree, one medium size tree will be planted on each lot (or each side of a corner lot), even if the abutting properties form a continuous greenspace between driveways. d) If trees need to be replaced, Forestry staff reserve the right to plant appropriate size trees at one tree per lot. Along park frontages, the Landscape Plan shall locate trees at a 6-8 metre on-centre separation distance along the full extent of the road right-of-way abutting any park block(s). Should specific site constraints prevent the required allocation of trees, the remaining number of required trees shall be provided within any proposed park(s), open space or environmental blocks, non-residential road right-of-way frontages, stormwater management facility(s), or other suitable	**OTTAWA Planning Forestry**

	alternative locations, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	
45.	In areas of sensitive marine clay soils where the six conditions of the Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines have been met, the following shall be provided: a) The landscape plan shall include a note indicating that is has been developed as per the geotechnical report(s) (date, author), the letter (date, author), and Map (date, title), to the satisfaction of the General Manager, Planning Infrastructure and Economic Development. b) At the time of tree planting, in addition to providing an F1 inspection form, the Landscape Architect will provide a signed letter indicating that trees have been planted with appropriate soil volume in accordance with the approved Landscape Plan, to the satisfaction of the General Manager, Planning Infrastructure and Economic Development.	**OTTAWA Planning**
46.	Prior to registration or Commence Work Notification of the Composite Utility Plan, the Owner agrees to have a landscape plan for the draft plan of subdivision prepared by a Landscape Architect. The landscape plan shall include detailed planting location and species list, pathway width and materials, access points, fencing requirements and fencing materials and shall be approved by the General Manager, Planning, Infrastructure and Economic Development Department prior to subdivision registration	**OTTAWA Planning and Forestry Services**
47.	The Owner agrees to implement the approved landscape plan to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning and Forestry Services**
	Tree Conservation	
48.	The Owner acknowledges and agrees to abide by the Urban Tree Conservation By-law, 2009-200, and that any trees to be removed from the site shall be in accordance with an approved Tree Permit to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
49.	The Owner agrees to maintain the tree protection measures until construction is complete and/or the City has provided written permission to remove them.	**OTTAWA Planning**
	Urban Design	
	The Owner acknowledges and agrees to use best efforts during the siting of dwellings on the lots and/or blocks to ensure that the designs of all	**OTTAWA Planning**

	dwellings and streetscapes have regard to the design principles and are consistent with the guidelines contained within all applicable City of Ottawa urban design guidelines, including the Council-approved *Building Better and Smarter Suburbs* initiatives. In particular, the flanking exterior side façades of dwellings on corner lots should feature elevations that address the street.	
	Parks	
50.	In accordance with the Planning Act and the City of Ottawa Parkland Dedication By-law, the Owner shall: (select one) a) convey Blocks 162 to the City for parkland purposes; and/ or b) provide cash-in-lieu of parkland on the subject lands within Ward 2 such value of the land to be determined by the City's Realty Services Branch. The Applicant shall bear the cost of any appraisal costs incurred by the City. All to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department.	**OTTAWA Parks**
51.	The Owner covenants and agrees that Block 162 will be conveyed to the City, at no cost, as dedicated parkland. The size and configuration of the park block on the Final Plan shall be to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department. The Owner covenants and agrees that the parkland dedication requirement has been calculated at a rate of one hectare per 300 units (residential >18units/ha), but for apartments, as defined by the zoning by-law this parkland conveyance will not exceed a maximum of 10% of the land area of the site being developed. Based on the estimated number of 302 units for this subdivision, there is a parkland dedication requirement of 1.007 hectares, as shown in the calculation below: **Parkland Dedication Required** Residential Units: 302 **Total:** | Calculation | Parkland Required (ha) Unit Sub-Totals: 302 | **302** | 1 / 300 | 1.007 **Parkland REQUIRED Total *(ha)*: 1.007** **Parkland Dedicated:** Block 162 1.002 **Parkland DEDICATED Total *(ha)*: 1.002** **Parkland Under-Dedication *(ha)*: 0.005** In the event that the number of units change, the required parkland dedication will also change.	**OTTAWA Parks**

52.	The Owner acknowledges and agrees that Blocks 160 and 161 have been identified as future residential development. Once the land use and densities have been determined for Blocks 160 and 161, additional parkland dedication will be required. It is expected that when the said blocks are developed, appropriate parkland dedication will be determined and calculated at the required rate noted above in condition 54. Land conveyance or cash-in-lieu of parkland will be determined through future development applications for said blocks, all to the satisfaction of the General Manager, Recreation, Cultural and Facility Services. The Owner acknowledges and agrees if cash-in-lieu of parkland is determined sufficient through development of Blocks 160 and 161, such value of the land will be determined by the City's Realty Service Branch. The Owner shall be responsible for any appraisal costs incurred by the City, all to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department.	**OTTAWA RC&FS**
53.	The Owner and the General Manager of Recreation, Culture and Facility Services may, if it is mutually beneficial to both parties, enter into an agreement whereby the Owner will provide funding (+HST) to the City for the design and the construction of the park block(s). The City will proceed to design and construction of the park as per the typical city-build park process as described in the Parks Development Manual. The timing of the park construction will be at the discretion of the City. The expected cost of the park(s) works to be paid to the city will be based on the rate per hectare and indexing rate utilized for the park development by the City at the time of registration of the phase of development, which includes the park block(s) plus a 5% administrative fee for City forces to execute the project. The funding for park works will be paid to the city at the time of registration for the phase of development, which includes the park block. All standard subdivision conditions associated with the park, including, but not limited to: fencing, fill and rough grading, tree removal and services stubbed to within 2.0 m inside the park block(s) will remain a subdivision cost to be covered by the Owner separate from the park funding.	**OTTAWA Parks**
54.	The Owner acknowledges and agrees to design and construct the parkland, identified as Block 162, in accordance with City specifications and standards. The Owner further agrees to provide design plans and documents as detailed in the Park Development Manual 2nd edition 2017 (and as amended) for the park(s). The plans and documents will detail the designs, costs and amenities to be provided in each park. The expected cost of the design, construction, review and inspection of these parks will be in accordance with the rate per hectare and indexing rate utilized for park development by the City at the time of registration of each phase of development.	**OTTAWA Parks**

	The design plans and documents as well as the final budget for design, construction, review and inspection shall be subject to approval by the City, all to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department.	
55.	All Owner obligations associated with the Park Block(s) must be completed to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department within two years of registration. If the Park Block(s) is not tendered and under construction within two years of registration, the Owner agrees that the park development budget shall be based on the park development rate per hectare in effect at the time of the commencement of the park construction and that the Owner is required to pay the applicable Park Development rate for the current year that the park is to be built and those funds will be added to the park budget for construction	**OTTAWA Parks**
56.	The Owner acknowledges and agrees that no stormwater management facilities, encumbrances such as retaining walls, utility lines or easements of any kind shall be located on, or in front of, dedicated park blocks without the written approval of the General Manager, Recreation, Cultural and Facility Services Department.	**OTTAWA Parks**
57.	The Owner acknowledges and agrees that any encumbrances which are not solely for the benefit of the park, such as retaining walls, utility lines or easements of any kind on lands, or portion thereof encumbering the design and function of future Park Block 162 must be approved by the General Manager of Recreation, Culture and Facility Services Department, and will not form part of the *Planning Act* parkland dedication requirements. .	**OTTAWA Parks**
58.	The Owner agrees the park block(s) must be fully developable for its intended use based on a geotechnical report. If any constraints to development of the park block(s) are found the measures necessary to mitigate the constraints and to provide a subgrade suitable for the intended park(s) uses as identified in the Facility Fit Plan, or if a Facility Fit Plan has not yet been prepared for intended park uses as identified by Parks planning staff, will be undertaken by the Owner. The Owner is solely responsible for the costs of any necessary mitigation measures in addition to the Park Budget. All of the aforementioned are to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department.	**OTTAWA Parks**
59.	Once a Facility Fit Plan is submitted and approved by the General Manager, Recreation, Cultural and Facility Services, and after tree protection fencing has been installed accordingly, both as approved by the	**OTTAWA Parks**

	General Manager, Recreation, Cultural and Facility Services Department, the Owner may remove vegetation, trees and topsoil from the park(s) to facilitate rough grading of the area. The Owner agrees that the Owner may stockpile the topsoil either on or off the park(s). If the removal of the native topsoil is required, the Owner agrees to provide replacement topsoil at a sufficient depth and quality for the park(s) as per City Standards for park topsoil. All work shall proceed in accordance with the applicable By-laws and all at the sole cost of the Owner.	
60.	The City acknowledges and agrees that the Owner may use the Park(s) outside of the protected park areas for the stockpiling of materials or staging as needed. The Owner agrees to conduct the stockpiling of soils in accordance with the excess soils regulation, as amended, at the time of construction. The Owner agrees contaminated soils shall not be stockpiled on future park areas. The Owner agrees to provide to the City documentation of the source and quality of the soils temporarily stored on the future park areas. The Owner acknowledges and agrees that in the event that the Owner chooses to use the parkland for stockpiling or staging, once this use of the parkland is completed, all materials will be removed from the parkland and a geotechnical report by a qualified and licensed engineer or geoscientist will be submitted. The geotechnical report shall confirm that the subgrade is suitable for its intended use and that no contaminants have been deposited on the parkland. The geotechnical report must indicate the level of soil compaction on the site and conform to City Standards, to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department. The Owner agrees that any remediation required to the parkland as result of the owners use/or disturbance of the parkland will be at the Owner's expense and will be in addition to the estimated park budget calculated at the per hectare rate as indexed and such remediation work shall be completed to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department.	**OTTAWA Parks**
61.	The Owner further agrees to prepare and submit upon registration, for approval all park plans and documents required as noted in the Park Development Manual 2017 based on the approved Facility Fit Plan, all to the satisfaction of the General Manager, Recreation, Cultural and Facility Services Department	**OTTAWA Parks**
62.	The Owner agrees to filling and rough grade the park block in accordance with the following:	**OTTAWA Planning Parks**

	Any fill imported to the future park block must be conducted in accordance with the excess soils regulation, as amended, at the time of construction. Documentation of the source and quality of the fill to be imported must be approved by a Qualified Person. Soils must be tested to the minimum parameter list as specified in the excess soils regulation. Importation of soils with no chemical testing will not be permitted. Additional testing may be required by the Qualified Persons as defined in the regulation. Copies of all records related to all soils imported to the future park areas must be provided to the City. It is the responsibility of the Owner to fill and rough grade the park where necessary, with clean earth borrow, compacted and leveled within the park block accordingly, to provide for positive surface drainage as per the City Standards for Park Fill and rough grading as per the approved subdivision grading plan. All at the expense of the Owner. All works and fill materials are to be approved by the General Manager, Planning, Infrastructure and Economic Development Department prior to being placed on site.	
63.	It is the responsibility of the Owner to undertake final grading of the park block as per the park working drawings /grading and drainage plan. This final grading will be covered by the park budget to a maximum of 10% of the park construction cost. Additional grading beyond 10% of park construction cost will be at the Owner's expense. All works and design drawings are subject to the approval of the General Manager, Recreation, Cultural and Facility Services Department and the General Manager, Planning, Infrastructure and Economic Development Department. Unless otherwise specified the Owner shall provide the following services and utilities to all Park Blocks: a) A 300mm diameter storm sewer and CB/MH at 2m inside the park property line. b) A 50mm diameter water line complete with standpost at 2m inside the park property line. A city standard park water vault chamber, standard detail W31.1 latest version, must also be installed as part of parks water works. The park water vault will be funded from the park budget. Co-ordination of all park water works including water vault and meter installation is an Owner responsibility. c) 150mm diameter sanitary sewer and MH at 2m inside the park property line. d) A 120/240 volt, 200 amperes single phase hydro service at 2m inside the park property line. The Owner is responsible for making all arrangements and coordinating the connection of the new hydro (electrical) service, including costs and inspections, with the respective hydro (electricity) agencies. The Owner is also	**OTTAWA Planning Parks**

	responsible to ensure the park electricity service(s) is included on the approved CUP drawings.	
64.	The Owner shall install fencing of uniform appearance and quality, with a minimum height of 1.5m along the common boundary of all residential lots and other lots which abut Park Blocks. Fences shall be installed 0.15m on the park property side of the common property line, and the location of the fence shall be verified by an Ontario Land Surveyor. All fences must adhere to the City's fence By-law 2003-462. Fence materials will be of commercial grade and consist of 6-gauge black vinyl coated chain link material and black powder coated schedule 40 pipe rails and posts or an approved alternative. The fencing shall meet the Pool Enclosure By-law specifications.	**OTTAWA Parks**
65.	No access from private property to passive public property will be allowed. The Owner shall place the following clause in each Agreement of Purchase and Sale and shall be registered as a notice on title in respect of all Lots and Blocks: "The Transferee for himself, his heirs, executors, administers, successors and assigns acknowledge being advised that gates accessing public property are not permitted in the fences."	**OTTAWA Parks**
66.	The Owner shall include a clause in each Agreement of Purchase and Sale and shall be registered as a notice on title in respect of all Lots and Blocks which shall provide notification to all purchasers of lands within the Subdivision that parkland within this subdivision and/or already existing in the vicinity of the subdivision may have (select as appropriate): a) active hard surface and soft surface recreational facilities b) active lighted sports fields and other lit amenities c) recreation and leisure facilities d) potential community centre e) library f) day care g) other potential public buildings/facilities.	**OTTAWA Parks**
67.	The Owner acknowledges and agrees that, if the approved park concept design contains amenities proposed by the Owner that exceed the standard park design and construction budget, and if securities are not retained by the City for these items, the City shall not be responsible for these items in the event that the City must complete the park.	**OTTAWA Parks**
68.	The Owner acknowledges and agrees that, following registration of this agreement, all park blocks will be transferred to the City. Notwithstanding said transfer, the Owner acknowledges and agrees that, prior to the assumption of the park by the City, the owner will retain all liability for the	**OTTAWA Parks**

	transferred blocks and that said transfer will in no way exonerate the Owner from its responsibility to design and construct the park pursuant to the terms of this agreement.	
69.	The Owner acknowledges and agrees that where multiple parks are to be developed within a Community Design Plan (CDP) area or draft plan of subdivision with multiple land-owners, the land-owners will enter into a cost sharing agreement to cover the cost of the development of the parks as per the direction of OPA 159. No approvals will be given on a plan of subdivision until a cost sharing agreement regarding the development of parkland within the development area has been entered into and submitted to the City. All to the satisfaction of the General Manager, Recreation, Cultural and Facility Services and the General Manager, Planning, Infrastructure and Economic Development.	**OTTAWA Planning Parks**
70.	The Owner acknowledges and agrees to erect on the park block(s) at a location selected by the General Manager, Recreation, Cultural and Facility Services a professionally painted sign indicating: Future Parkland No Dumping No Removal of soils or Vegetation All at the expense of the Owner	**OTTAWA Parks**
71.	Upon registration of the subdivision and transfer of ownership of the park block to the city, the Owner agrees to provide: • a certificate of insurance that names the City of Ottawa as Additional Insured, and • a letter of credit which covers the full amount of the park construction cost to ensure the work is completed, the Owner will hereby be granted consent to enter at no cost to complete the work. All is to the satisfaction of the General Manager of Recreation Culture and Facility Services.	**OTTAWA Parks**
72.	It is the responsibility of the Owner to remove all vegetation from the park block that has not been identified for retention. The tree removal within the park block will occur at same time as tree removal for the entire subdivision as identified in the tree removal permit which is submitted by the Owner and approved by the City. The Owner is solely responsible for the costs of any necessary tree removals occurring at this time.	**OTTAWA RC&FS**
73.	The Owner acknowledges and agrees that no work within the ROW in front of, or around, any boundary of the park will be a park cost. All ROW work	**OTTAWA Parks**

	including, tree planting, topsoil and sod, and all hard surface work will be at the Owners' expense. Where a park plaza or landscape feature extends into the ROW as a continual element of the park development, this work may be considered park work at the discretion of the General Manager, Recreation, Cultural and Facility Services.	
74.	The Owner acknowledges and agrees to install a three-rail post-and-rail wood fence to City standards along the limit of development separating Park Block 162 from the stormwater management pond to the south.	**OTTAWA RC&FS**
	Environmental Constraints	
75.	The Owner shall prepare an Integrated Environmental Review and/or an Environmental Impact Statement, in accordance with the policies of the Official Plan, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning CA**
76.	The Owner agrees that prior to registration, early servicing, or other works that would alter the vegetative characteristics of the site, the Owner shall have the environmental impact statement updated as necessary to reflect the final plan as approved, and to address any changes to the anticipated impacts and recommended mitigation measures that may be required as a result of changes to the draft plan, changes in the regulatory context with respect to species at risk, or changes in the known environmental context of the site. This update shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
77.	The Owner acknowledges and agrees that the construction of the subdivision shall be in accordance with the recommendations of BMR Lands, South Side of Innes Road, EIS – Species at Risk and Mitigation Measures – Updated prepared by Muncaster Environmental Planning Inc. dated October 13, 2020: • To protect breeding birds, as required no additional tree or shrub removal should occur between April 15th and August 15th, unless a breeding bird survey conducted by a qualified biologist within five days of the woody vegetation removal identifies no active nests in the trees or shrubs; • Although not anticipated, any trees and shrubs to be retained are to be protected with sturdy orange construction fencing at least 1.2 metres in height installed from the tree trunk a minimum distance of ten times the retained tree diameter. Signs, notices or posters are not to be attached to any tree. No grading, heavy machinery traffic, stockpiling of material, machinery maintenance and refueling or	**OTTAWA Planning CA**

other activities that may cause soil compaction to occur within five metres of the critical root zone of the trees to be retained and protected. The root system, trunk or branches of the trees to be retained are to be protected and not damaged. If any roots of trees to be retained are exposed during site alterations, the roots shall be immediately reburied with soil or covered with filter cloth, burlap or woodchips and kept moist until the roots can be buried permanently. A covering of plastic should be used to retain moisture during an extended period when watering may not be possible. Any roots that must be cut are to be cut cleanly to facilitate healing and as far from the tree as possible. Exhaust fumes from all equipment during construction will not be directed towards the retained trees. All of the supports and bracing for the protective fencing should be placed outside of the protected area and should be installed in such a way as to minimize root damage. Also, since the desired effect of the barrier is to prevent construction traffic from entering the critical root zone, the barrier should be kept in place until all site servicing and house construction has been completed;

- As indicated above, plantings of native vegetation as part of the urban residential subdivision on a lot-by-lot basis are recommended to provide natural environment and aesthetic features. Potential native species to plant include nannyberry, elderberry and dogwood shrubs along with sugar maple, red maple, basswood, balsam fir, white cedar, bur oak, red oak and white spruce trees. Sourcing native species from local seed sources is strongly recommended to ensure adaptability and longevity. Only locally appropriate native species are to be used for landscaping adjacent to natural features or buffer zones;
- To protect any trees immediately adjacent to the site, no excavations or other activities that may impact the critical root zone of these adjacent trees should be undertaken within the critical root zones. The critical root zones are identified as ten times the diameter of the tree to be protected. To be conservative, no excavations, filling, stockpiling, or other major site disturbances should occur within four metres of the property line. The park proposed for the southwest portion of the site (see Figure 2) will provide extensive protection for any remaining trees adjacent to the site in this area;
- The extent of exposed soils is to be kept to a minimum at all times. Re-vegetation of exposed, non-developed areas with native species is to be achieved as soon as possible;
- The objective with respect to erosion and sediment controls will be to ensure that the surface water runoff leaving the site is not degraded with respect to water quantity or quality. Erosion and sediment control will focus on best management practices;

	• Where groundwater must be removed, the groundwater will be pumped into a proper filter mechanism such as a sediment trap or filter bag prior to release to the environment; • Seepage barriers such as silt fencing, straw bale check dams and other sediment and erosion control measures will be installed as required to OPSD requirements in any temporary drainage ditches and around disturbed areas during construction and stockpiles of fine material. These control measures must be properly maintained to maximize their function during construction. An Erosion and Sediment Control Plan will be prepared during the detailed engineering analysis; • The contractors and other on-site workers are to be aware of potential Species at Risk in the vicinity of the site including butternut, and on appropriate measures to reduce human-wildlife conflict during the work. Appendix 1 of the City of Ottawa's Protocol for Wildlife Protection during Construction (August 2015) describes these species. The project biologist for this project is Bernie Muncaster (613-748-3753). Any Species at Risk sightings are to be immediately reported to the project biologist and the Ministry of Environment, Conservation and Parks and activities modified to avoid impacts until further direction by the Ministry; • As recommended in City of Ottawa (2015) prior to beginning work each day, wildlife is to be checked for by conducting a thorough visual inspection of the workspace and immediate surroundings. See Section 2.5 of City of Ottawa (2015) for additional recommendations on construction site management with respect to wildlife. Any turtles, snakes, or other sensitive wildlife in the work areas are to be relocated to the south. Animals should be moved only far enough to ensure their immediate safety. See Appendix 1 and the links in Section 4 of City of Ottawa (2015) for suggestions on how to effectively relocate turtles and snakes; • To discourage wildlife from entering the work areas during construction, the site should be kept clear of food wastes and other garbage, and proper drainage provided to avoid accumulation of standing water, which could attract amphibians, birds, and other wildlife to the work areas; • Municipal by-laws and provincial regulations for noise will be followed and utilities will be located as required in the vicinity of the site prior to construction; and, • Waste will be managed in accordance with provincial regulations. The contractor will have a spill kit on-hand at all times in case of spills or other accidents.	
78.	The Owner agrees to abide by all appropriate regulations associated with Provincial and Federal statutes for the protection of wildlife, including migratory birds and species at risk.	**OTTAWA Planning**

	Record of Site Condition / Contaminated Soil	
79.	The Owner shall be required to submit to the General Manager, Planning, Infrastructure and Economic Development Department and Chief Building Official, a Record of Site Condition (RSC) completed in accordance with the O.Reg. 153/04, and acknowledged by the Ministry of Environment. The RSC shall confirm that all or part of the site will be suitable for the proposed use in accordance with O.Reg. 153/04.	**OTTAWA Planning BCS**
	Schools	
80.	The Owner acknowledges and agrees to inform prospective purchasers that school accommodation pressures exist in the Ottawa-Carleton District School Board schools designated to serve this development which pressures are currently being addressed by the utilization of portable classrooms and/or directing students to schools outside their community.	**OCDSB**
	Archaeology	
81.	Where the Owner is required to undertake an archaeological assessment: i. The Owner acknowledges having been required to retain a licensed consultant archaeologist to undertake an archaeological assessment of the entire property, including 1:10,000 scale mapping, "Archaeological Site Record" and report(s); ii. The Owner agrees to implement the recommendations of the approved assessment, including mitigation, through preservation or removal and documentation of archaeological resources; and iii. The Owner agrees that no site works shall take place until any archaeological resource conservation concerns have been addressed. All of the above noted conditions shall be to the satisfaction of the Ministry of Tourism and Culture and the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning MTCS**
	Stormwater Management	
82.	The Owner shall provide any and all stormwater reports and addendums (in accordance with the Master Serving Study for East Urban Community Phase 3) that may be required by the City for approval prior to the commencement of any works in any phase of the Plan of Subdivision. Such reports shall be in accordance with any watershed or subwatershed studies, conceptual stormwater reports, City or Provincial standards, specifications and guidelines. The reports shall include, but not be limited to, the provision of erosion and sedimentation control measures,	**OTTAWA Planning CA**

	implementation or phasing requirements of interim or permanent measures, and all stormwater monitoring and testing requirements. All reports and plans shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	
83.	(a) Prior to the commencement of construction of any phase of this Subdivision (roads, utilities, any off-site work, etc.) the Owner shall: i. have a Stormwater Management Plan and an Erosion and Sediment Control Plan prepared by a Professional Engineer in accordance with current best management practices; ii. provide all digital models and modelling analysis in an acceptable format; iii. have said plans approved by the General Manager, Planning, Infrastructure and Economic Development Department, and iv. provide certification through a Professional Engineer licensed in the province of Ontario that the plans have been implemented. (b) All submissions and any changes made to the Plan shall be submitted to the satisfaction to the City and the Rideau Valley Conservation Authority. (c) The Owner shall implement an inspection and monitoring plan to maintain erosion control measures.	**OTTAWA Planning CA**
84.	On completion of all stormwater works, the Owner agrees to provide certification to the General Manager, Planning, Infrastructure and Economic Development Department through a Professional Engineer, licensed in the province of Ontario, that all measures have been implemented in conformity with the approved Stormwater Site Management Plan.	**OTTAWA Planning**
85.	The Owner agrees to be a party to the expansion of EUC Pond 1 upon the completion of the Master Servicing Study in support of the on-going East Urban Community Phase 3 Area Community Design Plan. Furthermore, the construction of the expansion of Pond 1 shall be completed to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
86.	Prior to the registration, or the making of an application for a Ministry of Environment, Environmental Compliance Approval, for any stormwater works, whichever event first occurs, the Owner shall prepare a Stormwater Site Management Plan in accordance with a Conceptual Stormwater Site Management Plan. The Stormwater Site Management Plan shall identify the sequence of its implementation in relation to the construction of the	**OTTAWA Planning**

	subdivision and shall be to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department and the Rideau Valley Conservation Authority.	
87.	The Owners acknowledges and agrees to maintain the storm sewers within the subdivision until such time as the storm water connection and the expansion of EUC Pond 1 have been constructed and the City has given final acceptance to the storm sewers and pond. The storm sewers shall be inspected every two years and will be cleaned as necessary prior to final acceptance from the City. All costs shall be the sole responsibility of the Owner.	**OTTAWA Planning**
88.	The Owner agrees, prior to registration or the commencement of work, which ever comes first, to obtain all land and easements over adjacent lands necessary for storm water management and conveyance.	**OTTAWA Planning**
89.	The Owner acknowledges and agrees that an interim storm water management facility may be temporarily required prior to the expansion of Pond 1 unless it can be demonstrated that the existing Pond 1 has sufficient capacity to proceed with servicing Phase 1 without interim measures or expansion. If required, the Owner shall construct, maintain, operate, and decommission the interim storm water facility. All works associated with the interim stormwater management facility shall be at the sole cost of the Owner. The Owner shall demonstrate capacity to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
90.	The Owner acknowledges and agrees that an interim storm water facility (or solutions) will be contained within the lands south of Street 7 on the draft plan, including Street 8 surrounding lots and blocks.	**OTTAWA Planning**
91.	The Owner acknowledges and agrees that prior to registration of the lands noted in condition 2 (above) the ultimate storm water servicing conditions will be coordinated with the MSS.	**OTTAWA Planning**
92.	The Owner agrees to design and construct, as part of the stormwater management infrastructure, at no cost to the City, a monitoring facility or facilities (if required) and vehicular access to the satisfaction of the City.	**OTTAWA Planning**
93.	The Owner agrees that the development of the Subdivision shall be undertaken in such a manner as to prevent any adverse effects, and to protect, enhance or restore any of the existing or natural environment, through the preparation of any storm water management reports, as required by the City. All reports are to be approved by the General Manager, Planning, Infrastructure and Economic Development Department prior to the commencement of any Works.	**OTTAWA Planning**

94.	The Owner covenants and agrees that the following clause shall be incorporated into all agreements of purchase and sale for the whole, or any part, of a lot or block on the Plan of Subdivision, and registered separately against the title: "The Owner acknowledges that some of the rear yards within this subdivision are used for on-site storage of infrequent storm events. Pool installation and/or grading alterations and/or coach houses on some of the lots may not be permitted and/or revisions to the approved Subdivision Stormwater Management Plan Report may be required to study the possibility of modification on any individual lot. The Owner must obtain approval of the General Manager, Planning, Infrastructure and Economic Development Department of the City of Ottawa prior to undertaking any grading alterations."	**OTTAWA Legal**
95.	Where the Owner is required under this Agreement to provide the oversize and/or over-depth storm sewers or open drains in order to make provisions for later development of upstream lands not owned by the Owner herein, as referred to in the approved plans, the City will, insofar as it legally may, require that payment shall be made by the Owner of such upstream undeveloped land which will utilize the said storm sewers as an outlet(s), prior to registration. The amount of payment shall be determined by the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
96.	That prior to registration a detailed stormwater management plan consistent with the conceptual plan "Conceptual Site Serving and Stormwater Management Report – 3610 Innes Road (Former BMR Lands)" dated April 3rd 2020, prepared by Novatech Engineering, Planners and Landscape Architects be prepared and approved to the satisfaction of the Rideau Valley Conservation Authority and the City of Ottawa.	**RVCA**
97.	That the subdivision agreement contain a clause with wording to the satisfaction of the Rideau Valley Conservation Authority and the City of Ottawa whereby the Owner acknowledges and agrees to implement all of the recommendations in the approved final stormwater management plan.	**RVCA**
	Sanitary Services	
98.	The Owner agrees to submit detailed municipal servicing plans, prepared by a Professional Civil Engineer licensed in the Province of Ontario, to the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**

99.	Where the Owner is required under this Agreement to provide and install sanitary sewers of a diameter larger and/or at a greater depth than would be required to service the area to be developed, as detailed in the approved plans of this agreement, the Owner shall convey to the City such 0.3m reserves as may be necessary to prevent the Owners and developers of adjacent lands from making connections to the sanitary sewers installed by the Owner, the City will, insofar as it legally may, require other persons connecting to the sewer to pay an equitable share of the cost thereof to the Owner. The amount of payment shall be determined by the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
100.	As the Owner proposes a road allowance(s) of less than 20 metres, and if the Owner also proposed boulevards between 4.0 and 5.0 metres wide, the Owner shall meet the following requirements: a) extend water, sanitary, and storm services a minimum of 2.0 metres onto private property during installation before being capped; b) install high voltage electrical cable through the transformer foundations to maintain adequate clearance from the gas main; c) provide and install conduits as required by each utility; d) provide and install transformer security walls when a 3.0 metres clearance, as required by the Electrical Code, cannot be maintained. The design and location of the security wall must be approved by the local hydro utility; and e) install all road-crossing ducts at a depth not to exceed 1.2 metres from top of duct to final grade.	**OTTAWA Planning**
	<u>Water Services</u>	
101.	The Owner shall design and construct all necessary watermains and the details of services and meters for the lots abutting the watermains within the subject lands to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. The Owner shall pay all related costs, including the cost of connection, inspection and sterilization by City personnel, as well as the supply and installation of water meters by the City.	**OTTAWA Planning**
102.	The Owner shall prepare, at its cost, a hydraulic network analysis of the proposed water plant within the Plan of Subdivision and as it relates to the existing infrastructure. This analysis shall be submitted for review and approval as part of the water plant design submission.	**OTTAWA Planning**
103.	The Owner acknowledges and agrees not to permit any occupancy of buildings on the individual Lots described in Schedule "A" until the water	**OTTAWA Planning**

	plant has been installed, sterilized and placed in service to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	
104.	The Owner further acknowledges and agrees that the service post, which is the fitting located near the property line that allows access to the shutoff valve, must be visible, raised to finished grade and in working condition in order for the City to turn on the service.	**OTTAWA Planning**
105.	The owner acknowledges and agrees to provide a Water Age Analysis prior to registration which reflects their proposed phasing and scheduling. Where required, through this analysis or through testing, the Owner acknowledges and agrees that flushing infrastructure will be installed at no cost to the City, and that the Owner will be responsible for all costs associated with the consumption and disposal of water, as required, to ensure that adequate chlorine residual is maintained throughout the water system, all to the satisfaction of the General Manager, Public Works and Environmental Services	**OTTAWA Planning**
106.	The Owner acknowledges and agrees not to apply for, nor shall the City issue, building permits for more than 50 dwelling units (or the equivalent) or 75 dwelling units on interim basis for less than two years where the watermain for such units is not looped. Any unit serviced by a looped watermain that is not looped shall be required to have sufficient fire protection, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
	Serviced Lands	
107.	The Owner shall be responsible for the provisions of the following works, including oversizing and over depth (where appropriate), at its cost, in accordance with plans approved by the General Manager, Planning, Infrastructure and Economic Development Department, and/or the Province: a. Watermains; b. Sanitary Sewers; c. Storm Sewers; d. Roads and traffic plant(s); e. Street Lights; f. Sidewalks; g. Landscaping; h. Street name, municipal numbering, and traffic signs; i. Stormwater management facilities; and j. Grade Control and Drainage.	**OTTAWA Planning**

108.	The Owner shall not commence construction of any Works or cause or permit the commencement of any Works until the City issues a Commence Work Notification, and only then in accordance with the conditions contained therein.	**OTTAWA Planning**
109.	The Owner agrees to provide services oversized and over depth to service lands beyond the limits of the subdivision as required and to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
110.	The Owner shall not be entitled to a building permit, early servicing, or commencement of work construction until they can demonstrate that there is adequate road, sanitary, storm, and watermain capacity and any Environmental Compliance Approvals (ECA) necessary are approved. All are to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning**
	Utilities	
111.	The Owner is hereby advised that prior to commencing any work within the subdivision, the Owner must confirm that sufficient wire-line communication /telecommunication infrastructure is currently available to the proposed development to provide communication/telecommunication service to the proposed development. In the event that such infrastructure is not available, the Owner is hereby advised that the Owner shall ensure, at no cost to the City, the connection to and/or extension of the existing communication / telecommunication infrastructure. The Owner shall be required to demonstrate to the municipality that sufficient communication /telecommunication infrastructure facilities are available within the proposed development to enable, at a minimum, the effective delivery of communication /telecommunication for emergency management services (i.e. 911 Emergency Services).	**Bell Canada OTTAWA Planning**
112.	The Owner shall pre-consult with Hydro Ottawa for any proposed reduction to the City of Ottawa three-metre minimum standard setback prior to designing the electrical servicing, as it may affect the electrical servicing design, timeline for installation and cost; this includes any proposed overhang encroachment into the 3m-setback space.	**Hydro Ottawa**
113.	The Owner may be required to enter into an Electrical Servicing Agreement with Hydro Ottawa Limited, to the satisfaction of Hydro Ottawa.	**Hydro Ottawa**
114.	The Owner is advised that there is limited capacity to service the proposed development at this time. The Owner may be responsible for a Capital Contribution payment(s) towards a distribution system expansion if the proposed development requires electrical servicing greater than can be	**Hydro Ottawa**

	provided by the existing distribution system in the vicinity, either in capacity or in extension limit. This amount shall be in accordance with Hydro Ottawa's Contributed Capital Policy and Conditions of Service.	
115.	Hydro Ottawa's standard distribution network is overhead for any voltage system along or through open fields, business parks, rural areas, arterial, major collector and collector roads; any additional premium costs beyond the standard shall be at the Owner's cost; in all instances, electrical distribution above 27kV shall be via overhead distribution.	**Hydro Ottawa**
116.	The Owner shall be responsible for servicing the buildings within the property. Only one service entrance per property shall be permitted.	**Hydro Ottawa**
117.	Prior to commencement of any construction activities, the Owner shall inform Hydro Ottawa of any acute shock construction process or rubbelization to be used during construction and apply Hydro Ottawa's work procedure UDS0022 "Protecting Electrical Distribution Underground Plant & Support Structures from Acute Shock Construction Processes". The Owner shall be responsible for any damage to Hydro Ottawa distribution assets.	**Hydro Ottawa**
118.	The Owner is advised that there is medium voltage underground infrastructure near the proposed entrance off of Innes Rd and within the roads of the adjacent Caivan development a. There shall be no mechanical excavation within one and a half meters (1.5m) of any Hydro Ottawa underground plant unless the exact position of plant is determined by hand digging methods. Direct supervision by Hydro Ottawa forces, and protection or support of the underground assets shall be at the Owner's expense. b. The Owner shall not use steel curb and sidewalk form support pins in the vicinity of Hydro Ottawa underground plant for electrical safety.	**Hydro Ottawa**
119.	Hydro Ottawa prohibits any change of grade that results in reduced life expectancy of the asset. Any change in grade of more than 0.3m in the vicinity of proposed or existing electric utility equipment shall be reviewed with Hydro Ottawa. The proposed grade change around XX [state where] is more than 0.3m.	**Hydro Ottawa**
120.	The Owner shall ensure that any landscaping or surface finishing does not encroach into existing or proposed Hydro Ottawa's overhead or underground assets or easement. When proposing to place plantings in proximity of existing power lines, the Owner shall refer to Hydro Ottawa's free publication "Tree Planting Advice". The shrub or tree location and expected growth must be considered. If any Hydro Ottawa related activity	**Hydro Ottawa**

	requires the trimming, cutting or removal of vegetation, or removal of other landscaping or surface finishing, the activity and the re-instatement shall be at the Owner's expense.	
121.	The Owner is advised that there are overhead medium voltage overhead lines along Innes Road. The Owner shall ensure that no personnel or equipment encroaches within three metres (3.0m) of the Hydro Ottawa overhead medium voltage distribution lines, unless approved by Hydro Ottawa. The Owner shall contact Hydro Ottawa prior to commencing work when proposing to work within 3.0m of the Hydro Ottawa distribution lines as noted above. No such work shall commence without approval of Hydro Ottawa.	**Hydro Ottawa**
122.	The Owner acknowledges and agrees that prior to commencing Works identified within the Draft Plan; it shall confirm the proposed development is sufficiently serviced by all necessary utilities. The Owner further agrees to comply with all relevant and existing utility Conditions of Service, construction processes and guidelines. The Owner further agrees it shall be responsible for engaging the providers of any necessary utilities to determine servicing for the proposed development and that it shall be responsible for all costs relating to the relocation, placement and/or upgrade of existing or future utility infrastructure for the proposed development. The Owner shall be required to demonstrate to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development that sufficient utility servicing and infrastructure exist to service the proposed development and that communication / telecommunication infrastructure facilities are available, at a minimum, for the delivery of emergency management services. The Owner acknowledges and agrees to convey, at their cost, any easements as may be required by the necessary utilities and agrees to abide by all conditions of the City's inhibiting order. The Owner further acknowledges and agrees that such easements shall not be granted on any lands being conveyed to the City, or those proposed to be conveyed to the City, without City's approval. Should any lands owned or proposed to be owned by the City be encumbered as a result of these conditions, the Owner shall bear the sole responsibility and costs associated with correcting such actions, including but not limited to the conveyance of additional lands, the relocation of any such easements or infrastructure as may be deemed appropriate by the General Manager, Planning, Infrastructure and Economic Development.	**Hydro Ottawa**
123.	The Owner acknowledges that servicing from new rear lanes is not permitted.	**Hydro Ottawa**

124.	The Owner shall contact Hydro Ottawa to discuss electrical servicing for the property. By Hydro Ottawa commenting on this proposal, Hydro Ottawa has not committed to, or approved the electrical servicing of the proposed development.	**Hydro Ottawa**
125.	The Owner shall convey, at their cost, all required easements as determined by Hydro Ottawa. The Owner further acknowledges and agrees that the City's Inhibiting Order will not be lifted until such time as the required transfer of easements to Hydro have occurred. The Owner will be required to provide written confirmation from Hydro to the City that the required easements have been obtained to Hydro's satisfaction and that the Inhibiting Order may be lifted, subject to any other City conditions for lifting.	**Hydro Ottawa**
126.	The Owner shall be responsible for all costs for feasible relocations, protection or encasement of any existing Hydro Ottawa plant.	**Hydro Ottawa**
127.	The Owner and its agents shall arrange for an underground electricity cable locate by contacting Ontario One Call at 1-800-400-2255, not less than seven (7) working days prior to excavating. There shall be no mechanical excavation within 1.5m of any Hydro Ottawa underground plant unless the exact position of plant is determined by hand digging methods. Direct supervision by Hydro Ottawa forces, and protection or support of the underground assets shall be at the Owner's expense.	**Hydro Ottawa**
128.	Hydro Ottawa reserves the right to access their plant. Should Hydro Ottawa require the removal of structures, the Owner shall remove the structures within two (2) working days of receipt of notice and re-instate the structures at the Owner's cost when Hydro Ottawa has completed its work. In the event of an emergency, the Owner will respond to Hydro Ottawa's request to remove structures and in the most expeditious manner possible within two (2) hours of the receipt of notice at the Owner's cost. If the Owner cannot remove the structures within the two (2) hours, Hydro Ottawa can undertake the removal of the structures and the Owner shall pay the costs for removal and re-instatement of the structures. Hydro Ottawa will not be responsible for any damage done to the structures which might arise from the removal, provided those actions are taken without any gross negligence on the part of Hydro Ottawa or their contractors or agents.	**Hydro Ottawa**
129.	The Owner shall apply Hydro Ottawa's standards and City approved road cross-section standards for public roads. Hydro Ottawa requests to be consulted before completing the composite utility plan where any four-party trench is proposed.	**Hydro Ottawa**

130.	Hydro Ottawa requests to be consulted before completing the composite utility plan where any four-party trench is proposed.	**Hydro Ottawa**
131.	The Owner shall comply with Hydro Ottawa's Conditions of Service and thus should be consulted for the servicing terms. The document, including referenced standards, guidelines and drawings, may be found at http://www.hydroottawa.com/residential/rates-and-conditions/conditions-of-service/. The Owner should consult Hydro Ottawa prior to commencing engineering designs to ensure compliance with these documents.	**Hydro Ottawa**
132.	Hydro Ottawa reserves the right to raise conditions throughout the development of this proposal should the revisions contain non-conformances with, for example, Hydro Ottawa's Conditions of Service or Standards. To ensure the best outcome, Hydro Ottawa welcomes an early discussion on the proposal.	**Hydro Ottawa**
133.	The Owner acknowledges that Canada post will provide mail delivery service to the subdivision through centralized Community Mailboxes (CMBs). The Owner shall contact Canada Post to determine the suitable permanent locations for the CMBs. The location of the CMBs will be determined at the time of the preparation of the preliminary Composite Utility Plan and shall be indicated on all appropriate plans.	**CANADA POST**
134.	The Owner agrees, prior to offering any dwelling units for sale, to display a map on the wall of the sales office in a place readily accessible to prospective purchasers that indicates the location of all Canada Post approved Community Mailboxes throughout the subdivision.	**CANADA POST**
135.	The Owner agrees to include in all offers of purchase and sale a statement which advises the purchaser that mail will be delivered via Community Mailboxes. The locations of all Community Mailboxes installed throughout the subdivision shall be noted, and the affected homeowners shall be notified of any established easements granted to Canada Post to permit access to the Community Mail Box.	**CANADA POST**
136.	The Owner acknowledges that Canada Post will provide mail delivery to new residents of the subdivision as soon as dwellings are occupied. In this regard, the Owner shall provide a suitable and safe temporary site for a Community Mailbox until curbs, sidewalks and final grading are completed at the permanent Community Mail Box locations.	**CANADA POST**
137.	The Owner acknowledges and agrees to provide the following requirements for each approved Community Mailbox site and to include them on the appropriate servicing plans. a) Any required walkway across the boulevard, per municipal standards;	**CANADA POST**

	b) Any required curb depressions for wheelchair access, with an opening of at least two metres, to Canada Posts detailed specifications.	
138.	The Owner shall indicate in the Agreement, in words satisfactory to Bell Canada, that it will grant to Bell Canada any easements that may be required, which may include a blanket easement, for communication/telecommunication infrastructure. In the event of any conflict with existing Bell Canada facilities or easements, the Owner shall be responsible for the relocation of such facilities or easements.	**Bell Canada**
139.	The Owner shall transfer such new easements and maintenance agreements as are deemed necessary by Rogers Communications Partnership to service this subdivision, to the Utility's satisfaction and that of the appropriate authority and at no cost to the Utility. The Owner also shall ensure that such easement documents are registered on title immediately following registration of the final plan, and the affected agencies duly notified.	**Rogers**
140.	The Owner shall coordinate the preparation of an overall utility distribution plan. This plan should show the locations (shared or otherwise) and the installation timing and phasing of all required utilities (on-ground, below ground) through liaison with the appropriate electrical, gas, water, telephone and cablevision authority; this includes on-site drainage facilities. Such location plan shall be to the satisfaction of all affected authorities.	**Rogers**
141.	The Owner agrees with Rogers Communications Partnership to arrange for and pay the cost of the relocation of any existing services which is made necessary because of this subdivision, to the satisfaction of the authority having jurisdiction.	**Rogers**
	Fire Services	
142.	The Owner shall not demand of the City to issue, nor shall anyone claiming title from it or under its authority, demand of the City to issue, one or building permits to construct any building or other structure on any lots or block in the Subdivision until firebreak lots are designated to the satisfaction of the City's Fire Chief.	**OTTAWA Fire**
	Noise Attenuation	
143.	The Owner shall have a Noise Study undertaken related to noise assessment and land use planning with respect to noises generated by moving and stationary sources prepared by a Professional Engineer, licensed in the province of Ontario to the satisfaction and approval of the General Manager, Planning, Infrastructure and Economic Development Department. The Study shall comply with:	**OTTAWA Planning**

	i. the City of Ottawa's Environmental Noise Control Guidelines, as amended; and ii. address, and be in accordance with, the current version of the Association of Professional Engineers of Ontario Guidelines for Professional Engineers providing Acoustical Engineering Services in Land Use Planning. The study shall provide all specific details on the methods and measures required to attenuate any noise that exceeds the allowable noise limits in locations as determined by the recommendations of the Noise Assessment Study.	
144.	Where structural mitigation measures are required as a result of the Noise Assessment Study, the Owner shall provide, prior to final building inspection, certification to the General Manager, Planning, Infrastructure and Economic Development Department, through a Professional Engineer, that the noise control measures have been implemented in accordance with the approved study.	**OTTAWA Planning**
145.	The Owner agrees that all purchase and sale agreements, and the Deed(s) for the whole or any part of the lot/block on the Plan of Subdivision shall contain the following clauses, as required and determined by an approved Noise Control Study prepared by a professional engineer, that shall be incorporated in all Transfers/Deeds from the Owner so that the clauses shall be covenants running with the lands in the Subdivision. Warning Clause Type A: "Transferees are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."	**OTTAWA Planning and Legal**
	Warning Clause Type B: "Transferees are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."	
	Warning Clause Type C: "This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's	

	noise criteria. (Note: The location and installation of the outdoor air conditioning device should comply with the noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"	
	Warning Clause Type D "This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."	
	Land Transfers	
146.	The Owner shall convey, at no cost to the City, all lands required for public purposes, including but not limited to, reserves, road widenings, daylighting triangles, walkway blocks, open space blocks, lands required for parks (or cash-in-lieu thereof) and for storm water measures, to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department. In particular, the Owner shall convey, at no cost to the City, the following lands: i. Pathway, Walkway or Servicing Blocks – 163 and 166 ii. Park Block– 162 iii. 0.3 m Reserve Blocks – iv. Daylighting Triangles –	**OTTAWA Planning Legal**
147.	The Owner shall convey, at no cost to the City, any easements that may be required for the provision of water and wastewater systems, in addition to underground or overland stormwater drainage systems to the satisfaction of the General Manager, Planning, Infrastructure and Economic Development Department.	**OTTAWA Planning Legal**
	Blasting	
148.	The Owner agree that all blasting activities will conform to the City of Ottawa's standard S.P. No: F-1201 Use of Explosives. Prior to any blasting activities, a pre-blast survey shall be prepared as per F-1201, at the Owner expense for all buildings, utilities, structures, water wells, and facilities likely to be affected by the blast and those within 75 m of the location where explosives are to be used. The standard inspection procedure shall include the provision of an explanatory letter to the owner or occupant and owner with a formal request for permission to carry out an inspection.	**OTTAWA Planning**

	The Owner agree to provide a Notification Letter in compliance with City specification F-1201. Specification indicates that a minimum of 15 Business days prior to blasting the Contractor shall provide written notice to all owner(s) and tenants of buildings or facilities within a minimum of 150m of the blasting location. The Owner agrees to submit a copy of the Notification Letter to the City.	
	Development Charges By-law	
149.	The Owner acknowledges that some of the works of the Subdivision are eligible for development charges revenues pursuant to the City's applicable Development Charges By-law and background study, as well as budget approval by City Council where required. Such contributions are to be determined and agreed to by the City, prior to the commencement of the associated Works or as agreed to by the City. The Owner agrees to enter into any agreements that may be required pursuant to the applicable Development Charges By-law.	**OTTAWA Planning Legal**
150.	The Owner shall inform the purchaser after registration of each lot or block of the development charges that have been paid or which are still applicable to the lot or block. The applicable development charges shall be as stated as of the time of the conveyance of the relevant lot or block and the statement shall be provided at the time of the conveyance. The statement of the Owner of the applicable development charges shall also contain the statement that the development charges are subject to changes in accordance with the *Development Charges Act, 1997* and the *Education Development Charges Act.*	**OTTAWA Planning Legal**
151.	The Owner acknowledges that for building permits issued after January 15, 2010, payment of non-residential development charges, excluding development charges for institutional developments, may be calculated in two installments at the option of the Owner, such option to be exercised by the Owner at the time of the application for the building permit. The non-discounted portion of the development charge shall be paid at the time of issuance of the building permit and the discounted portion of the development charge shall be payable a maximum of two years from the date of issuance of the initial building permit subject to the following conditions: a) a written acknowledgement from the Owner of the obligation to pay the discounted portion of the development charges; b) no reduction in the Letter of Credit below the amount of the outstanding discounted development charges; and c) indexing of the development charges in accordance with the provisions of the Development Charges By-law.	**OTTAWA Planning Legal**

	The Owner further acknowledges that Council may terminate the eligibility for this two-stage payment at any time without notice, including for the lands subject to this agreement and including for a building permit for which an application has been filed but not yet issued. For the purposes of this provision, "discounted portion" means the costs of eligible services, except fire, police and engineered services that are subject to 90% cost recovery of growth-related net capital costs for purposes of funding from development charges. The 10% discounted portion, for applicable services, must be financed from non-development charge revenue sources. "Non-discounted portion" means the costs of eligible services, fire, police and engineered services, that are subject to 100% cost recovery of growth-related net capital costs for purposes of funding from development charges.	
152.	The Owner acknowledges and agrees that in the case where the Lands benefit from a front-ended project that was constructed by others, the Owner shall pay all of its area-specific development charges owed either at the time of registration of a plan of subdivision or upon the issuance of the first conditional building permit, whichever comes first.	**OTTAWA Planning Legal**
153.	In the case where multiple Front-Ending Agreements are in force in the same area-specific development charge By-law, and the City has approved the front-ended works for area-specific development charge reimbursements, the front-enders will share in the distribution of area-specific development charge revenues on a pro-rata basis with other storm water drainage projects. The pro-rated works shall be based on the balance of the outstanding amount owing on the date the repayment is due. Existing front-enders will be advised of new Front-Ending Agreements for storm water works within the same benefiting area and area-specific development charge By-law.	**OTTAWA Planning Legal**
	Survey Requirements	
154.	The Owner shall provide the final plan intended for registration in a digital format that is compatible with the City's computerized system.	**OTTAWA Planning**
155.	The Plan of Subdivision shall be referenced to the Horizontal Control Network in accordance with the City requirements and guidelines for referencing legal surveys.	**OTTAWA Surveys**
156.	The distance from the travelled Centreline of all existing adjacent roads to the subdivision boundary should be set out in the Plan of Subdivision.	**OTTAWA Surveys**

	Closing Conditions	
157.	The City Subdivision Agreement shall state that the conditions run with the land and are binding on the Owner's, heirs, successors and assigns.	**OTTAWA Legal**
158.	At any time prior to final approval of this plan for registration, the City may, in accordance with Section 51 (44) of the *Planning Act*, amend, delete or add to the conditions and this may include the need for amended or new studies.	**OTTAWA Legal**
159.	The owner shall pay any outstanding taxes owing to the City of Ottawa prior to registration.	**OTTAWA Planning Revenue**
160.	Prior to registration of the Plan of Subdivision, the City is to be satisfied that conditions 1 to 162 have been fulfilled.	**OTTAWA Planning**
161.	The Owner covenants and agrees that should damage be caused to any of the Works in this Subdivision by any action or lack of any action whatsoever on its part, the General Manager, Planning, Infrastructure and Economic Development Department may serve notice to the Owner to have the damage repaired and if such notification is without effect for a period of two full days after such notice, the General Manager, Planning, Infrastructure and Economic Development Department may cause the damage to be repaired and shall recover the costs of the repair plus the Management Fee under Section 427, of the *Municipal Act*, *2001*, like manner as municipal taxes.	**OTTAWA Planning**
162.	If the Plan(s) of Subdivision, including all phases within the draft approved plan of subdivision, has not been registered by *May 26,2024,* the draft approval shall lapse pursuant to Section 51 (32) of the *Planning Act*. Extensions may only be granted under the provisions of Section 51 (33) of said *Planning Act* prior to the lapsing date.	**OTTAWA Planning**

[i] For Clearing Agencies:
"Planning" refers to Planning Services.

"LG" refers to applicable landowners group, such as Kanata North (KNLG), Kanata West (KWLG), Fernbank (FLG), East Urban (EULG), Manotick SDA (MLG), and Barrhaven South (BSLG).

"CA" refers to applicable conservation authorities, including RVCA, MVCA, and SNCA.

"Legal" refers to Legal Services.

"Parks" refers to Parks and Facilities Planning Services.

"BCS" refers to Building Code Services.

"Transit" refers to Transit Planning.

"Transpo Plg" refers to Transportation Planning.

"Forestry" refers to Forest Management.

"MTCS" refers to the Ministry of Tourism, Culture and Sport.

"Revenue" refers to Revenue Services.

"Surveys" refers to Surveys & Mapping/City Surveyor.

DRAFT PLAN OF SERVICED SUBDIVISION APPLICATION
DELEGATED AUTHORITY REPORT
MANAGER, DEVELOPMENT REVIEW, EAST,
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT
DEPARTMENT

Site Location:	3610s Innes Road
File No.:	D07-16-19-0027
Date of Application:	October 9, 2019

This application submitted by Michael Michaud on behalf of Glenview Homes is recommended for DRAFT APPROVAL, subject to the following Standard and Special Conditions, as attached.

May 3rd, 2021

Date

Jeff McEwen
Manager, Development Review
Planning, Infrastructure and Economic
Development Department

Attach(s):

1. Conditions of Draft Approval
2. Draft Plan of Subdivision

DRAFT PLAN OF SERVICED SUBDIVISION APPLICATION
SUPPORTING INFORMATION

SITE LOCATION

3610 Innes Road.

SYNOPSIS OF APPLICATION

The City of Ottawa received application for a Draft Plan of Subdivision and Zoning By-law Amendment to permit construction of 151 single-detached dwellings 151 townhouse dwellings, a park block, nine public streets, four pathway blocks and two future development blocks. The subdivision will have vehicular access from Innes Road at the existing signalized intersection at Boyer Road and have two connections with the existing subdivision to the west. Two future connections will be made once the subdivision to the east is registered.

The subject lands are located on the southside of Innes Road east of Page Road at the intersection of Innes Road and Boyer Road. The site is irregularly shaped with an area of 15.68 hectares with a small frontage on Innes Road at the intersection. To the north of the site is the U-Haul Storage and Truck Rental Centre and an automatic Car Wash Facility both of which front on Innes but, get their vehicular access from the future street entering the subject subdivision. To the west is an existing subdivision, now under construction, with a mix of single detached, on-street townhouses, a park block and large future development blocks abutting the subject lands. To the east and south are development lands to be the subject of a future subdivision as part of the EUC – Phase 3 Community Design Plan (CDP). To the south and west of the site is an existing stormwater management pond.

The front portion of the site was formerly used as a Building Supply Centre and the southern portion was farmed. The site is flat with no trees. The front portion is covered in gravel, in the location of the former lumber yard, with the remainder recently tilled.

The site is in the northwest corner of the recently approved East Urban Community – Phase 3 CDP. The CDP extends east from this property across Mer Bleue Road and south of Brian Coburn Boulevard. The landowners in this area are required to entering into cost sharing agreements to cover the costs of the plan and provide land and resource to develop parklands within the area. The Plan includes a Master Servicing Study which is to guide servicing of each subdivision. The approved servicing studies and plans for this subdivision are consistent with the MSS.

Zoning

The subject lands are currently zoned IL2 H(14) and there is a holding provision over most of the Site except for a narrow portion between Innes Road and the southern property line of the U-Haul property. The zoning will be amended to implement the planned residential development as described above.

The lots and blocks where the singles and townhouse units are planned are proposed to be rezoned to Residential Third Density, subzone YY exception XXXX. This is a similar zone that has be applied to the low-density lands in the abutting subdivision to the west and will conform to the condition of the draft plan. This will allow for a mix of residential uses, ancillary uses to permit residents to work from home, and permit a different development standard to promote efficient land use and compact form in a Developing Community designation.

The park block will be rezoned to O1 – Parks and Open Space Zone to reflect the indented use.

The future medium density blocks are within the Arterial Mainstreet designation and the applicant is proposing to rezone these lands as Arterial Mainstreet. This would be consistent with the Official Plan Policies.

The Zoning amendments will be brought to Planning Committee once the Subdivision is draft approved.

DISCUSSION AND ANALYSIS

It is recommended that the application be approved as it is consistent with approved East Urban Community - Phase 3 CDP and represents good planning

The subject application has been examined pursuant to the provisions of the Official Plan and is deemed to comply with its provisions for development in a General Urban designation. The intent of the General Urban designation is to permit a full range of housing types to accommodate the needs of all ages, income levels and life circumstances, along with conveniently located retail, leisure, institutional and employment uses to create a complete and sustainable community. The proposal also meets several principles under the Urban Design Objectives and Principles as well as the Compatibility criteria within the Official Plan.

The proposed subdivision is also consistent with the Provincial Policy Statement since it is providing residential development within a settlement area, utilizing land and existing infrastructure efficiently. The proposal is designed to promote appropriate development standards which facilitates intensification. It also promotes a healthy and active community by providing easy access to area recreational amenities within a combined pedestrian and cycling network promoting active transportation.

Parkland

A new one-hectare park block will add to the existing park located on the abutting subdivision to the west. This block will have street frontages and will accommodate the nearby community.

Landscaping

The standard street tree requirements for planting in areas of sensitive marine clay soils apply to this subdivision as detailed in the draft conditions.

The conditions of approval are supported by the applicant and the Ward Councillor.

The proposed development does not require an expenditure of municipal funds over and above those funds recovered by development charges or for which an allocation has been made in a Council approved budget.

CONSULTATION DETAILS

Councillor Laura Dudas has concurred with the proposed conditions of Draft Approval and is aware of this report.

Public Comments

This application was subject to the Public Notification and Consultation Policy. Enhanced notification was carried out and included a public meeting held on January 28, 2020.

APPLICATION PROCESS TIMELINE STATUS

This Plan of Subdivision application was processed by the “On Time Decision Date” established for the processing of an application that has Manager Delegated Authority.

Contact: Steve Belan Tel: 613-580-2424, extension 27591, Fax 613-580-2576 or e-mail: Steve.Belan@ottawa.ca.

File Number D07-16-19-0027

June 11, 2021

Jillian Normand by email: JNormand@glenview.ca

Dear Ms. Normand:

Re: Draft Plan approval of Plan of Subdivision – (File No. D07-16-19-0027**)**

Please be advised that on May 25, 2021, the Manager, Urban Services's decision to draft approve Draft Plan (File No. D07-16-19-0027) Subject to the attached conditions, came into effect May 26, 2021.

By copy of this letter, and the draft approval conditions, the City is notifying those public bodies and agencies who requested draft approval conditions. Please contact the relevant public bodies and agencies to secure the clearance letters that will allow City staff to register one or more phases of the Draft Plan.

When you are preparing to have the Final 4-M Plan approved for registration, please provide me with electronic copies of the Draft 4-M Plan – PDF and AutoCAD versions, along with five white paper prints, which include the approved street names for all new roadways. Please also provide a completed "Proposed Land Use" table (attached) for the phase(s) to be registered and a request to prepare a subdivision agreement. A copy of the document "Estimate of Costs" has been provided for your review. Owners are required to pay engineering design, review and inspection fees, and submit securities, which are based upon the cost estimates of the hard and soft services related to their development. The "Estimate of Costs" provides information on how to submit the quantity estimates online and provides a list of the City's current costing. Quantity estimates are required to be submitted prior to the preparation of a subdivision agreement. Please provide five, white paper prints of any required, draft Landscape Plan(s).

Attached for your information is a one-page summary of the information required to facilitate the completion of the subdivision agreement. If you would like to meet with representatives of either this Department or Legal Services to review or clarify these requirements, please contact the undersigned at 613-580-2424, extension 27591.

When the Final 4-M Plan for registration has been completed, please forward to me the original mylar of this plan, three duplicate mylars, and one white paper print with the surveyor's embossed decal. If the final plan complies with the draft approval conditions and the City has received assurances from the other interested public bodies that the necessary arrangements have been made to clear all the draft approval conditions, the General Manager, Planning, Infrastructure and Economic Development Department's signature will be endorsed on the above-noted Plans, which will then be sent to the Land

Titles Office for registration, along with the necessary copies required under the *Land Titles Act*. (Please note that it is the Owner's responsibility to secure the required clearances).

If you wish to make a major revision to this plan prior to registration, please submit a revised full size mylar, an 21.6 x 35.6 cm cronaflex reduction of same, twenty-five folder paper prints, the fee (if required) and a revised "Proposed Land Use" table (attached).

Should the Draft Plan not receive final approval within three (3) years of the date on which draft approval came into effect, the draft approval may lapse pursuant to Section 51(32) of the *Planning Act*. Draft approval may be extended by the City in accordance with Section 51 (33) of the *Planning Act* provided the Owner submits an application for such extension and the prevailing extension processing fee is paid in full**.**

Yours truly,

Steve Belan

Steve Belan
Planner
Planning, Infrastructure and Economic Development Department

Attach.
Draft Approval Conditions
Draft Plan of Subdivision

cc: Councillor Laura Dudas
Sara Mashaie, Infrastructure Approvals, PIED
Matthew Wilson, Development Inspection, PIED
Christine Enta, Legal Counsel
Wendy Hickson, Development Agreement Officer
Bill Harper, Program Manager, Surveys and Mapping
Krista O'Brien, Revenue Services **(2 copies of all plans)**
Pauline Prevost, Circulation Clerk, Design Review and Implementation
Richard Ashe, Manager, Permit Approvals, Building Code Services
John Buck, Manager, Building Inspections, Building Code Services
Randal Rodger, Program Manager, Mapping and Graphics Unit
Douglas.Wallace@ottawa.ca, Zoning Plan Examiner, Building Code Services **(2 copies)**
Ian Baxter, Manager of Planning, Ottawa Carleton Catholic District School Board
Bell Canada
Rogers Communications
Enbridge Gas Distribution
Hydro Ottawa
RVCA - S. Casgrain-Robertson
Ottawa Carleton District School Broad
Canada Post
Fairouz Wahab, P.Eng. RICHCRAFT Group of Companies, fwahab@richcraft.com
James Ireland, MCIP, RPP, NOVATECH , j.ireland@novatech-eng.com

INFORMATION REQUIRED TO PERMIT COMPLETION OF SUBDIVISION AGREEMENTS

The City of Ottawa is committed to the timely provision of subdivision agreements following draft approval. The provision of the following will assist in ensuring that such is possible. In all cases, the requested information should be provided to the assigned planner who will ensure that the information is forwarded to Infrastructure Approvals and Legal Services as required.

1. Request drafting of the agreement;
2. Provide Draft M-Plan (five paper prints, and electronic copies – PDF and AutoCAD versions), which shows the approved street names for all new roadways;
3. Completion of the Applicant's Estimate of Costs to permit the completion of the financial schedules of the subdivision agreement (Schedules "B" and "C");
4. Completion of any reports required by the conditions of draft approval; In particular, any noise study must be completed to enable any required noise warning clauses to be incorporated into the subdivision agreement;
5. The determination of easements for drainage purposes must occur, unless such will be subject to a subsequent site plan approval;
6. Reference Plans to permit the conveyance of the easement must also be prepared, again unless such will be subject to subsequent site plan approval. The reference plans must be submitted in draft for City concurrence prior to be deposited on title.

The subdivision agreement cannot be finalized until the six items listed above have been submitted to Planning, approved and forwarded by Planning to Legal Services.

The City has observed that following draft approval and authorization for pre-servicing, it often occurs that developers proceed with the installation of services without also addressing the matters that are required to ensure that the agreement can be finalized so that plan registration can occur. Provision of the above information in a timely fashion will assist in ensuring that the expectations of the developer and its purchasers can be met.