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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

MATTAMY HOMES
WATERIDGE VILLAGE – BLOCK 15
245 SQUADRON CRESCENT

CITY OF OTTAWA
FILE #: D07-12-19-0020

PROJECT NO.: 17-946

DECEMBER 2019 – REV. 6
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General Plan of Services, Drawing No. 100E, Project No. 38298, prepared by IBI Group, dated April 16, 2018.
Squadron Crescent Moses Tennisco Street (STA. 0+400 to STA. 0+700), Drawing No. 135, Project No. 38298, prepared by IBI Group, dated June 15, 2018.
Grading Plan, Drawing No. 210, Project No. 38298, prepared by IBI Group, dated February 2, 2018.
Grading Plan, Drawing No. 211, Project No. 38298, prepared by IBI Group, dated February 2, 2018.
Grading Plan, Drawing No. 212, Project No. 38298, prepared by IBI Group, dated February 2, 2018.
Grading Plan, Drawing No. 213, Project No. 38298, prepared by IBI Group, dated November 13, 2017.
Grading Plan, Drawing No. 214, Project No. 38298, prepared by IBI Group, dated August 2, 2017.
Grading Plan, Drawing No. 215, Project No. 38298, prepared by IBI Group, dated December 5, 2017.
Ponding Plan, Drawing No. 751, Project No. 38298, prepared by IBI Group, dated June 16, 2018.

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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT FOR MATTAMY HOMES WATERIDGE VILLAGE – BLOCK 15

245 squadron crescent

DECEMBER 2019 – REV. 6

CITY OF OTTAWA

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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Mattamy Homes to prepare a Functional Servicing and Stormwater Management report to amend the previously approved Site Plan Control Application (SPC), dated March 2018, for Block 15 of Wateridge Village at 245 Squadron Crescent. Subject lands are within the former CFB Rockcliffe lands, which are currently under re-development by the Canada Lands Company.

The subject property is located within the City of Ottawa urban boundary, in the Rideau-Rockcliffe Ward. The proposed development lies within the Wateridge Village at Rockcliffe subdivision Phase 1B, as illustrated in ***Figure 1***, below. The subject property is encompassed by Hemlock Road, Mikinak Road and Moses Tennisco Street, all of which are currently under construction. Comprised of a single parcel, the subject property measures approximately ***1.96 ha*** and is zoned Residential Fourth Density Zone (R4Y[2311]). A copy of the registered 4M-Plan is included in ***Drawings/ Figures***.

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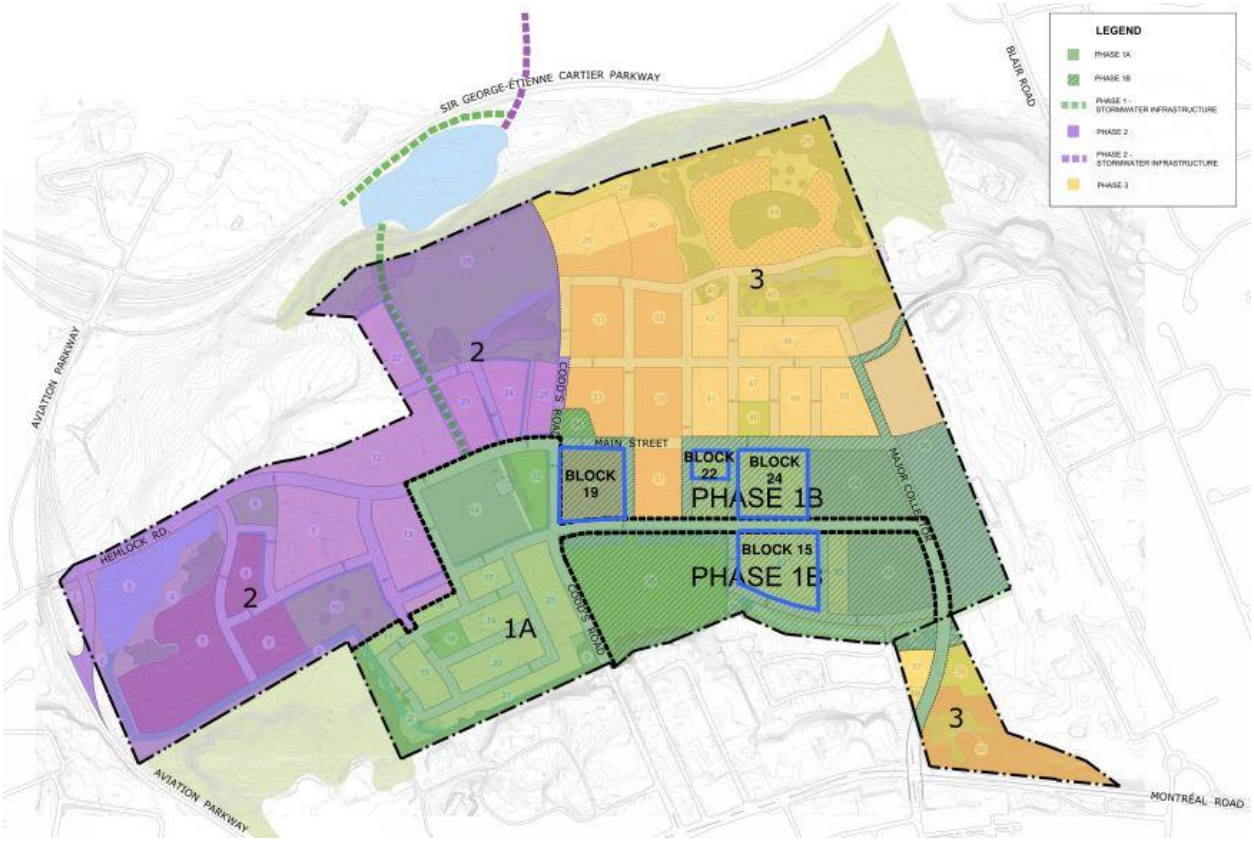

Image taken from Design Brief Wateridge Village at Rockcliffe Phase 1B, prepared by IBI Group, dated: June 16, 2017.

Figure 1: Site Location

The proposed development by Mattamy Homes involves the construction of 124 Stacked Townhomes (Blocks 1-7 per the Site Plan included in ***Drawings/Figures***) and 68 Back-to-Back Townhomes (Blocks 8-14 per the Site Plan included in ***Drawings/Figures***). The Back-to-Back Townhomes are proposed to be slab-on-grade units and the Stacked Townhomes are proposed to have basements. Of the Back-to-Back Townhomes, 34 units are proposed to be freehold units and to have laneway access directly to Squadron Crescent. These 34 units as shown in the Site Plan will require Part Lot Control. The previously approved ***FSR-Block15,*** prepared by DSEL and dated March 2018, contemplated 124 rear lane townhomes, whereas, the amendment proposes an additional 68 townhouse style units for a proposed total of 192 townhomes.

The objective of this report is to provide sufficient detail with respect to the availability of site services to support the amended application for Site Plan Control.

1.1 Existing Conditions

The construction of the surrounding road network and underground services was completed in 2018, while the existing lands encompassing the subject property remain vacant. Historically, the lands were part of the Canadian Forces Base Rockcliffe (CFB

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Rockcliffe). The development of the lands, previously part of CFB Rockcliffe, were divided into phases. Phase 1 of the development, designed by IBI Group is completed and Phase 2 is currently under construction.

A ***Geotechnical Investigation*** was completed by Paterson Group Inc. updated in June, 2019. Per the ***Geotechnical Investigation***, the subject site consists of a layer of existing fill from the previous land use, underlain by stiff to very stiff brown silty clay. Practical refusal was encountered between 9.1 m and 24.1 m, below existing grade. Further summary is discussed in ***Section 6.0***.

Supplemental information from Paterson Group Inc. was also received regarding the anticipated infiltration rates. An infiltration rate of 140 mm/day was estimated for Block 15. Collaborating correspondence is found in ***Appendix A***.

The Canada Lands Company will be delivering the site to a pre-grade condition, in accordance with Mattamy Homes requirements.

Existing infrastructure, outlined below, was garnered from design drawings, not As-Built drawings. The design drawings are as per the most recent ***Wateridge Village at Rockcliffe, Phase 1B,*** drawing set, prepared by IBI Group, included in ***Drawings/ Figures***:

Squadron Crescent

- 200 mm diameter PVC watermain;
- 525-2400 mm diameter storm sewer;
- 250-300 mm diameter sanitary sewer; and

Mikinak Road

- 300 mm diameter watermain;
- 825-900 mm diameter storm sewer; and
- 250 mm diameter sanitary sewer.

The servicing received from IBI Group September 15, 2017 was updated by IBI Group to provide stubs to the proposed property and to confirm storm and sanitary capacity within the external system at these new connection points. The approved drawings, prepared by IBI Group detailing the services within Squadron Crescent and Mikinak Road, are included in the appendix ***Drawings/Figures***.

The existing services per ***Design Brief Phase 1B*** are considered “in service” as per correspondence with IBI Group included in ***Appendix A***.

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1.2 Required Permits / Approvals

The proposed development is subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control. Lots fronting Squadron Crescent require Part Lot Control.

An ECA Approval will be required through the Ministry of the Environment, Conservation and Parks (MECP) through the Direct Submission process as the development does not fall under the exemptions set out in O.Reg 525/98.

As per consultation with the RVCA, additional stormwater quality control is not required for the subject site as the water quality objectives are being achieved through the Eastern SWM Facility. Supporting correspondence is included in ***Appendix A***.

The City of Ottawa reviews watermains on behalf of the MECP. The MECP "Form 1" is submitted to the City of Ottawa for approval of watermains.

1.3 Pre-consultation

Pre-consultation correspondence, along with the servicing guidelines checklist, is located in ***Appendix A***.

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2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- **Ottawa Sewer Design Guidelines**,
  City of Ottawa, *SDG002*, October 2012.
  (City Standards)

  - **Technical Bulletin ISTB-2018-01**
    City of Ottawa, March 21, 2018.
    (*ISTB-2018-01*)

  - **Technical Bulletin ISTB-2018-04**
    City of Ottawa, June 27, 2018.
    (*ISTB-2018-04*)

- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, July 2010.
  (Water Supply Guidelines)

  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISD-2010-2*)

  - **Technical Bulletin ISDTB-2014-02**
    City of Ottawa, May 27, 2014.
    (*ISDTB-2014-02*)

  - **Technical Bulletin ISDTB-2018-02**
    City of Ottawa, March 21, 2018.
    (*ISDTB-2018-02*)

- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, 2008.
  (MOE* Design Guidelines*)

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

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010, Update.
  (OBC)

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- **Low Impact Development Stormwater Management Planning and Design Guide**
  Credit Valley Conservation & Toronto and Region Conservation, 2010.
  (LID Guide)

- **Former CFB Rockcliffe Master Servicing Study**
  IBI Group, August 2015.
  (MSS)

- **Low Impact Development (LID) Demonstration Project**
  Aquafor Beech Ltd., August 2015.
  (LID Demonstration Project)

- **Design Brief Wateridge Village at Rockcliffe Phase 1A**
  IBI Group., April 2016.
  (Design Brief Phase 1A)

- **Design Brief Wateridge Village at Rockcliffe Phase 1B**
  IBI Group., June 2017.
  (Design Brief Phase 1B)

- **Functional Servicing and Stormwater Management Report – Wateridge Village Block 15**
  DSEL, March 2018.
  (FSR-Block15)

- **Geotechnical Investigation Proposed Residential Development Block 15, 22 and 24 – Revision 3**
  Paterson, December 4, 2019.
  (Geotechnical Investigation)

- **Geotechnical Response to City of Ottawa Review Comments – Wateridge Residential Development – Phase 1B**
  Paterson, July 11, 2018.
  (PG4064-MEMO.07)

- **Infiltration Rates – Proposed Residential Development – Block 15 – Wateridge Village – Ottawa**
  Paterson, January 21, 2019.
  (PG4064-MEMO.09)

- **Grading Plan Review – Wateridge Residential Development – Phase 1B – Block 15**
  Paterson, November 6, 2019.
  (PG4064-MEMO.10)

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- **Geotechnical Response to City Review Comments – Wateridge Residential Development**
  Paterson, September 27, 2019.
  (PG4064-MEMO.11)

- **Geotechnical Recommendations – Review of Servicing – Installation Impact on Adjacent Building Foundations – Wateridge Residential Development**
  Paterson, December 19, 2019.
  (PG4064-MEMO.12)

- **Geotechnical Recommendations – Review of Servicing – Installation Impact on Adjacent Building Foundations – Wateridge Residential Development**
  Paterson, November 6, 2019.
  (PG4064-MEMO.14)

- **Landscaping Plan Review – Block 15 – Wateridge Residential Development**
  Paterson, December 18, 2019.
  (PG4064-MEMO.15)

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3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa MONT pressure zone, as shown by the Pressure Zone map in ***Appendix B***. A local 200 mm diameter watermain exists within the Squadron Crescent right-of-way to service the subject site.

The water servicing for the subject site was accounted for in the design of the water distribution system outlined in the ***Design Brief Phase 1B***. Water demand for the subject property is summarized below:

Table 1
Summary of Water Demand per *Design Brief Phase 1B*

Design Parameter	Total Demand (L/min)
Average Day	185.9
Peak Hour	709.8
Max Day + Fire Flow	13,000 + 322.7

3.2 Water Supply Servicing Design

It is proposed to provide two connections plus individual connections to the 200 mm watermain within Squadron Crescent. The site is serviced by surrounding fire hydrants on Squadron Crescent, Mikinak Road, and internal hydrants proposed on-site.

Individual units cannot be serviced horizontally through an adjacent unit, unless that service is accessible, see ***OBC*** section 7.1.5.4 (4) for detail. The proposed units could not be developed to accommodate the requirements of ***OBC*** section 7.1.5.4 (4) therefore, individual services are proposed for the back-to-back townhomes. Refer to ***SSP-1,*** accompanying this report***,*** for servicing layout. Due to the limiting distance from the property line to the townhomes, it is proposed to provide a sanitary sewer and watermain along the north property line with a separation of 1.0 m between both. The water and sanitary sewers are designed in accordance with *Procedures to Govern Separation of Sewers and Watermains (Procedure F-6-1)* prepared by the Ontario Ministry of the Environment, Parks and Conservation.

Table 2, summarizes the ***Water Supply Guidelines*** employed in the preparation of the water demand estimate for the proposed development.

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Table 2
Water Supply Design Criteria

Design Parameter	Value
Townhouse	2.7 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	2.5 x avg. day *
Residential Maximum Hourly	5.5 x max. day *
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa

Daily average based on Appendix 4-A from **Water Supply Guidelines*
*** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.*
-Table updated to reflect ISD-2010-2

Table 3, summarizes the anticipated water supply demand and boundary conditions for the subject site, received from the City of Ottawa.

Table 3
Proposed Water Demand and Boundary Conditions
Proposed Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] Connection 1 (m H_2O / kPa)		Boundary Condition[2] Connection 2 (m H_2O / kPa)	
Average Daily Demand	100.9	57.4	563.1	56.1	550.6
Peak Hour	555.0	57.7	566.0	56.4	553.6
Max Day + Fire Flow	19,000 + 252.3	32.7	320.8	32.4	318.1

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary supplied by the City of Ottawa for the demands indicated in the correspondence. The assumed ground elevation for Connection 1 to Squadron Crescent, close to Mikanik Road is 89.26 m, and for Connection 2 to Squadron Crescent is 90.06 m. See ***Appendix B.***

The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow, as indicated by the correspondence in ***Appendix A***. The required fire flow (RFF) was estimated in accordance with City of Ottawa Technical Bulletin ***ISTB-2018-02***. Parameters used in calculating the RFF were received from Q4 Architects Incorporated, included in ***Appendix A*** and summarized below:

- Type of construction – Wood Frame Construction;
- Occupancy type – Limited Combustible; and

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- Sprinkler Protection – The sprinkler system that will be used for the stacked townhomes does not qualify for a reduction per ***ISTB-2018-02*** *so is considered non-sprinklered* and non-sprinklered for back-to-back townhomes.

The maximum estimated fire flow is ***19,000 L/min*** at Blocks 2 and 3; see ***Appendix B*** for detailed calculations.

Table 4, summarizes the fire flow requirement calculated for each block, per the above assumptions and the available fire flow per ***Table 18.5.4.3*** of the ***ISTB-2018-02***. See ***Appendix B*** for Hydrant Coverage Figures for the Blocks with the lowest available fire flow (Blocks 5, 6 and 7).

Table 4
Estimated Fire Flow Demand

Block, Street and Townhome Type	Estimated Fire Demand (L/min)	Fire Hydrants within 75m	Fire Hydrants within 150m	Available Fire Flow per Table 18.5.4.3 of ISTB-2018-02 (L/min)
Block 1 (Stacked) – Takamose Private	18,000	2	4	26,496
Block 2 (Stacked) – Takamose Private	19,000	4	2	30,282
Block 3 (Stacked) – Takamose Private	19,000	3	4	32,174
Block 4 (Stacked) – Takamose Private	18,000	3	3	28,398
Block 5 (Stacked) – Makwa Private	16,000	2	2	18,926
Block 6 (Stacked) – Kiniw Private	16,000	2	2	18,926
Block 7 (Stacked) – Kiniw Private	16,000	2	2	18,926
Block 8 (Back-to-Back) – Kiniw Private	12,000	3	2	24,604
Block 9 (Back-to-Back) – Kiniw Private	13,000	4	1	26,497
Block 10 (Back-to-Back) – Kiniw Private	11,000	3	2	24,604
Block 11 (Back-to-Back) – Makwa Private	10,000	2	3	22,711
Block 12 (Back-to-Back) – Makwa Private	10,000	1	4	20,818
Block 13 (Back-to-Back) – Makwa Private	12,000	2	3	22,711
Block 14 (Back-to-Back) – Makwa Private	12,000	1	5	24,603

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The property has eight (8) adjacent hydrants used to calculate the available fire flow, as well as, two (2) proposed hydrants within the site:

- Four (4) hydrants are located along the south side of Mikinak Road, one east of the property, one west of the property and two north of the property;
- Four (4) hydrants are located on Squadron Crescent, one west of the property, one east of the property and two south of the property; and
- Two (2) proposed hydrants within the development; one is located at the south-west corner of Takamose Private and Kiniw Private and the other at the north west corner of Makawa Private and the Private Lane.

3.3 Watermain Modelling

EPANet was utilized to determine the availability of pressures throughout the system during average day, max day plus fire flow, and peak hour demands. This static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties have been selected in accordance with ***Water Supply Guidelines***. The model was prepared to assess the available pressure at the finished first floor of each building, as well as the pressures the watermain provides to fire hydrants during fire flow conditions.

A summary of the resulting pressures at the critical nodes resulting in the lowest pressures are summarized in ***Table 5,*** below. A summary of all resulting pressures for each simulation is included in ***Appendix B***.

Table 5
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
Node 8	549.4	234.2	540.6
Node 9	544.0	233.7	535.1
Node 13	540.6	237.2	531.7
Node 14(Hydrant)	550.2	232.2	541.5
Node 20 (Hydrant)	544.2	237.8	535.4
Node 18	565.8	314.7	562.9

In order to demonstrate the fire flow scenario, the maximum flow of ***5,700 L/min*** was divided between the two proposed hydrants as per the maximum hydrant capacity specified in ***Table 18.5.4.3*** of ***ISTB-2018-02***. The minimum pressures shown in ***Table 5***, above, during the maximum daily flow plus fire flow scenario are above the minimum

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required pressure described in ***Table 2***. Based on the boundary conditions received from the City of Ottawa, included in ***Appendix A***, there is sufficient pressure within the existing hydrants to supply the remaining ***9,500 L/min*** required fire flow at the existing hydrants.

As shown in ***Table 5***, above, the pressure at some locations during Average Day and Peak Hour exceed the maximum allowable pressure described in ***Table 2***, therefore pressure reducing valves are required.

Water will flow in all areas of the system and no 'dead' zones were found. ***Appendix B*** contains output reports and model schematics for each scenario. EPANet was used to run an age analysis on the pipes and nodes, and it was determined that no part of the watermain network exceed a total travel time of 5 days during the average day scenario, thus complying with the ***Water Design Guidelines***. Figures and outputs of the age analysis are included in ***Appendix B***.

Backflow preventers are required to be installed on all water services.

3.4 Water Supply Conclusion

It is proposed to service the development through two separate connections to the 200 mm diameter watermain within Squadron Crescent; one along the west and one along the south.

The anticipated water demand was submitted to the City of Ottawa for establishing boundary conditions.

The maximum fire flow for the development is ***19,000 L/min***, the flow was analyzed through 2 hydrants using EPANET. The resulting pressure exceeded the minimum per the ***Water Supply Guidelines***. Pressures during the average day and peak hour scenario are higher than allowable pressure in ***Table 2***; thus, pressure reducing valves are recommended.

A total travel time of 5 days, as per the ***Water Supply Guidelines***, was not exceeded at any part of the watermain network based on the EPANet analysis completed for the average day scenario.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

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4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The sanitary flow from the subject property was considered in the wastewater design for the Wateridge Subdivision. The overall flow from Block 15 was contemplated to discharge to the existing 300 mm sanitary sewer within Squadron Crescent, which outlets to the 375 mm diameter sewer within Mikinak Road. The total wastewater flow from the ***Design Brief Phase 1B*** is summarized in ***Table 6,*** below.

Table 6
Wastewater Flow per Design Brief Phase 1B – Total Site Area

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.97
Estimated Peak Dry Weather Flow	7.85
Estimated Peak Wet Weather Flow	8.40

The total flow summarized in ***Table 6***, above, is from the drainage areas from Block 15. Please refer to ***Appendix C*** for reduced copies of the IBI sanitary design calculations and drainage area map. These values were calculated based on the ***Sewer Design Guidelines*** prior to the issuing of ***ISTB-2018-01***.

The existing 300 mm diameter sanitary sewer within Squadron Crescent discharges to the existing 375 mm sanitary sewer within Mikinak Road. The collected sanitary flow from the abovementioned sanitary sewers is ultimately directed to the existing 2400 mm diameter Codd's Road Shaft sewer.

It is contemplated in ***Design Brief Phase 1B*** for Block 15 to have 3 drainage areas. A 0.79 ha area of Block 15 was contemplated to discharge between MH 215A and 216A; a 0.67 ha area to MH 216A and MH217A; and 1.46 ha between MH 220A and MH221A. The sanitary drainage area and associated calculation sheets extracted form ***Design Brief Phase 1B*** are included in ***Appendix C***.

4.2 Wastewater Design

It is proposed that the development will connect to the 300 mm diameter sewer within the Squadron Crescent right-of-way, as contemplated in the ***Design Brief Phase 1B***. Individual services laterals are proposed to service the back to back townhomes directly from the 250 mm and 300 mm diameter sanitary sewer within Squadron Crescent. ***Table 7***, below, summarizes the ***City Standards*** employed in the design of the proposed wastewater sewer system.

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Table 7
Wastewater Design Criteria

Design Parameter	Value
Townhouse	2.7 P/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 3.8, Min 2.0 Harmon's Corrector Factor 0.8
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012 and *ISTB-2018-01*	

Table 8, below, demonstrates the anticipated peak flow from the proposed development compared to the estimated sanitary flow proposed in ***FSR-Block 15***. See ***Appendix C*** for associated calculations.

Table 8
Summary of Total Estimated Peak Wastewater Flow

Design Parameter	Total Flow per *FSR-Block15* (L/s)	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.37	1.78
Estimated Peak Dry Weather Flow	5.48	6.22
Estimated Peak Wet Weather Flow	6.03	7.52

The estimated total sanitary flow discharged to the existing sanitary sewers within Squadron Crescent, based on the site plan provided in ***Drawings/Figures,*** anticipates a peak wet weather flow of ***7.52 L/s***.

The development proposes for an internal sanitary sewer network to collect sanitary flow from the stacked townhomes (Blocks 1 to 7) as well as from the back-to-back townhomes the front both Makwa Private and Kiniw Private. The back-to-back townhomes fronting Squadron Crescent are proposed to have sanitary services connecting directly to the existing sanitary sewers within Squadron Crescent. The proposed sanitary drainage areas are shown on drawing ***SAN-1***.

The internal sewer network is proposed to outlet to the existing sewer within Squadron Crescent between MH 222A and MH 169A, with the back-to-back townhomes facing Squadron Crescent proposed to be freehold units with individual connections to the existing sanitary sewers within Squadron Crescent. This differs from the sanitary drainage

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areas and outlets proposed in ***Design Brief Phase 1B***, which only proposed 3 sanitary drainage areas with different outlets as summarized in ***Section 4.1***.

Since the proposed sanitary drainage plan differs from that proposed in ***Design Brief Phase 1B,*** two sanitary design sheets were completed; one for the internal sewer network and another to recreate the sanitary design sheet for ***Design Brief Phase 1B*** using the updated ***Sewer Design Guidelines*** based on ***ISTB-2018-01*** and was updated to represent the proposed site plan and sanitary drainage plan. Based on the updated design sheet, there is sufficient capacity within the existing sewers within Squadron Crescent to support the proposed sanitary design. The supporting design sheets are included in ***Appendix C***.

The proposed peak sanitary flow discharging to the existing sewers within Mikinak Road is ***37.71 L/s***. This is a ***16.8 L/s*** decrease from the Peak flow per ***Design Brief Phase 1B*** of ***54.54 L/s***; therefore, there is sufficient capacity within the downstream sewers to accommodate the proposed sanitary flow.

4.3 Wastewater Servicing Conclusions

The sanitary flow from the subject property has been considered in the wastewater design for the Wateridge Subdivision, as outlined in the ***Design Brief Phase 1B***.

The proposed development results in an overall decrease in wastewater flow than what was contemplated in the ***Design Brief Phase 1B***; therefore, no negative impact is anticipated to the existing downstream sanitary network.

The existing sewer within Squadron Crescent contain sufficient capacity to convey both the direct services from the back-to-back townhomes, as well as, the sanitary flow from the internal sanitary sewer network.

The proposed wastewater design conforms to all relevant ***City Standards***.

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5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Minor and major flow from the subject site were accounted for in the Wateridge Subdivision. The subject site was contemplated in the ***Design Brief Phase 1B*** to be conveyed to the Eastern SWM Facility and ultimately to the Ottawa River, through bulk storm sewers within Mikinak Road and Codd's Road. Major flow was proposed to be directed to a dry pond to the south of Mikinak Road for quantity control and will eventually discharge through the minor system to the Eastern SWM Facility.

The ***Design Brief Phase 1B*** contemplated minor and major system drainage from Block 15 to be directed to Squadron Crescent. Refer to ***Appendix D*** for reduced copy of the storm design sheet and drainage area figures, prepared by IBI, for the Wateridge Subdivision.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Ottawa River watershed, and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA). Correspondence with the RVCA regarding water quality requirements is located in ***Appendix A.***

5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were reviewed with the City of Ottawa and CLC, where the proposed development is required to:

- Follow quantity and quality controls outlined in the ***Design Brief Phase 1B;*** and
- Incorporate Low Impact Development measures in accordance with the ***Design Brief Phase 1B*** and ***LID Demonstration Project.***

5.3 Model Summary

The hydrology and hydraulics of the proposed stormwater management system were analyzed in EPASWMM using the Dynamic Wave Routing Model.

The following assumptions were made in the preparation for the EPASWMM model:

Hydrology

- Initial abstraction parameters per City of Ottawa standards;
- Horton's infiltration for soil loss, per City guidelines;
- Calculated % impervious area;
- Estimated average catchment slope for each catchment; and

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- Sub-catchment width measured as perpendicular area to catch basins for longest distance of travel.

Hydraulics

- All PVC and concrete sewers have been assigned a Mannings n = 0.013
- Overland spill is modeled as a representative cross section (irregular for road), from high point to low point;
- Catch Basin capacity has been analyzed through a separate calculation found in ***Appendix D***;
- Orifices are all side mounted or bottom draw, circular and rectangular and have a 0.61 discharge coefficient;
- Entrance losses determined from Appendix 6-B of the ***City Standards,*** Exit loses losses equal to 1.0 per *Water Resources Engineering (rev 2) prepared by David A. Chin (2006)***;**
- An analysis of various storm distributions was completed to determine the critical storm event based on the proposed conditions. It was determined that during the 100-year storm event, the Chicago 6 Hour storm distribution resulted in the highest flow and storage requirements. This distribution is to be used in all future analysis of the system; and
- HGL at outlet per ***Wateridge Village at Rockcliffe Phase 1B, drawing 135, prepared by IBI (Project # 38298),*** equal to 86.38 m.

A summary of the hydrological parameters used for each sub catchment has been included in ***Appendix D***.

5.4 Proposed Stormwater Management System

It is proposed that the stormwater from the development will be directed to the 2400 mm storm sewer within Squadron Crescent.

As discussed in ***Section 5.1***, the quantity controls for Block 15 will be provided by the dry pond south of the subject site and through the Eastern SWM Facility as outlined in the ***Design Brief Phase 1B***.

The subject site was also accounted for in the design of the permanent pool of the Eastern SWM Facility which provides 80% TSS removal for the subdivision.

As per consultation with the RVCA, no additional stormwater quality controls are required as the water quality objective is being achieved through the Eastern SWM Facility. Correspondence with the RVCA is included in ***Appendix A***.

A storm design sheet was prepared to support the capacity of the internal storm sewers, refer to ***Appendix D*** for the calculation sheet and ***SWM-1,*** accompanying this report, for

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the drainage area figure. Each catch basin has been equipped with an inlet control device (ICD) to ensure only the 5-year flow will enter the proposed minor system equal to a maximum ***308.1 L/s*** in the 100-year storm event. The overall Runoff Coefficient from the site is equal to what was allocated in the ***Design Brief Phase 1B*** and therefore, no additional quantity or quality controls are required.

The internal sewer network is proposed to outlet to the existing sewer within Squadron Crescent between MH 222 and MH 169. The storm drainage areas that are not collected in the internal storm sewer system are proposed to be directed to the Squadron Crescent ROW and collected through existing catch basins and conveyed through the existing storm sewer within Squadron Crescent.

Runoff Coefficients (RC) were calculated for each drainage area. A coefficient of 0.2 was used for permeable areas; 0.9 was used for impermeable areas; and 0.6 was used for locations with interlocking as per the proposed Site Plan. These calculations resulted in RCs lower than 0.8, which was anticipated for the development in ***Design Brief Phase 1B.*** For internal drainage areas, a conservative RC of 0.8 was used, while the calculated RCs were used for the drainage areas directing flow directly to Squadron Crescent. Since the RC calculated for the development is lower than that which was anticipated in ***Design Brief Phase 1B***, there is sufficient capacity downstream to accommodate the proposed design. Runoff Coefficient calculations are included in ***Appendix D.***

The stormwater design sheet from ***Design Brief Phase 1B*** for Squadron Crescent and Mikinak Road between Squadron Crescent was recreated using updated ***Sewer Design Guidelines*** and to include the proposed stormwater drainage plan for Block 15. As per the updated stormsewer design sheet, the existing sewers have sufficient capacity accommodate the proposed storm plan. Although there is sufficient capacity within the existing sewers, it should be noted that the sewers within Squadron Crescent, between MH 221 and MH 222; and MH 222 and MH 165 are at ***96.3%*** capacity and ***99.8%*** capacity respectively. Despite the sewers being near capacity the proposed peak flow discharging from Squadron Crescent to the existing sewer within Mikinak Road of ***8157 L/s*** is ***21 L/s*** less than the proposed peak flow per ***Design Brief Phase 1B*** of ***8178 L/s*** resulting in an overall decrease in the flow directed to the storm sewers within Squadron than was proposed in ***Design Brief Phase 1B***. Supporting calculations are included in ***Appendix D.***

The development also proposes for a 0.16 ha section to the north of the property to direct runoff to the existing catch basins and sanitary sewers within Mikinak Road as shown in the drainage areas in drawing ***SWM-1***. This deviates from ***Design Brief Phase 1B,*** which did not contemplate any flow from Block 15 being directed to storm sewers within Mikinak Road, upstream of MH165. Based on calculations completed based on the ***Design Brief Phase 1B*** storm design sheets, there is ***772 L/s*** of residual capacity within the sewer within Mikinak Road to convey the proposed tributary area from within Block 15.

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As per correspondence with IBI Group, dated August 16, 2017, included in ***Appendix A***, there is ***396 L/s*** of capacity in the downstream sewers. As the proposed development does not exceed this flow, there is sufficient capacity within the downstream sewers and Eastern SWM facility to accommodate the proposed flow.

5.5 Hydraulic Grade Line (HGL) Analysis & Overland Flow Depth

A detail EPASWMM model was prepared for the internal minor and major system to determine the conveyance of the minor system and review major system their relation to the critical underside of footing (USF) and surrounding house grade (SHG). A model schematic has been included in ***Appendix D*** for reference.

Tables 9, below, summarizes the HGL in the 100-year and the 100-year + 20% storm events within the site and the USF elevation.

Table 9
HGL 100-Year and 100-Year + 20% Storms vs Underside of Footing

Node ID (per EPASWMM)	Critical Block ID	Critical USF (m)	100-Year HGL (m)	Freeboard to Critical USF (m)	100-Year + 20% HGL (m)	Freeboard to Critical USF (m)	Minimum USF (2) (m)
MH108	Block 1	87.80	86.69	1.11	86.70	1.10	86.99
MH108-MH107 (1)	Block 2	88.25	87.13	1.12	87.14	1.11	87.43
MH108-MH107 (1)	Block 3	88.60	87.53	1.07	87.54	1.06	87.83
MH107	Block 4	88.75	87.91	0.84	87.91	0.84	88.21
MH101	Block 5	88.00	87.22	0.78	87.26	0.74	87.52
MH101	Block 6	88.75	87.22	1.53	87.26	1.49	87.52
MH102	Block 7	88.60	87.21	1.39	87.25	1.35	87.51
MH107	Block 8	89.48	87.91	1.57	87.91	1.57	88.21
MH103	Block 9	89.30	88.06	1.24	87.70	1.60	88.36
MH103	Block 10	89.09	88.06	1.03	87.70	1.39	88.36
MH103	Block 11	88.87	88.06	0.81	87.70	1.17	88.36
MH104	Block 12	88.80	87.21	1.59	87.25	1.55	87.51
MH105	Block 13	88.44	87.04	1.40	87.08	1.36	87.34
MH106	Block 14	87.96	86.93	1.03	86.96	1.00	87.23

1) 100-Year HGL interpolated between manholes
2) Minimum USF equal to 0.30m above HGL

As per ***Table 9***, above, there is a minimum 0.30 m freeboard between the 100-year HGL and the USF which does not extend to the footing during the 100-year + 20% events.

A freeboard of 0.30 m between the 100-year hydraulic grade line and the underside of footing is targeted throughout. All of the proposed underside of footing elevations are

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0.30 m (or greater) above the 100-year hydraulic grade line. The 100 year + 20% stress test also provides 0.30 m clearance; which confirms that it does not reach the footing of the building.

Since the back-to-back townhomes fronting Squadron Crescent do not have foundation drain connections to the existing storm sewer, an HGL analysis was not completed for the sewers within Squadron Crescent.

The depth of flow may extend adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100 year + 20%). 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. The summary of the overland flow is summarized in ***Table 10,*** below.

Table 10
Overland Flow 100-Year and 100-Year + 20% Storms vs Surrounding House Grade

Node ID (per EPASWMM)	Critical Block ID	Critical SHG (m)	Overland Flow Elev. 100-Year (m)	Freeboard to Critical SHG (m)	Overland Flow Elev. 100-Year + 20% HGL (m)	Freeboard to Critical SHG (m)
OVRLND102	Block 8	91.25	90.94	0.31	90.95	0.30
CB103A	Block 9	90.81	90.53	0.28	90.54	0.27
CB103B	Block 7	90.35	90.06	0.29	90.07	0.28
OVRLN101	Block 13	90.39	90.24	0.15	90.24	0.15
CB104A	Block 5	90.06	89.88	0.18	89.93	0.13
OVERLAND106	Block 14	89.99	89.8	0.19	89.92	0.07
CB107A	Block 4	90.73	90.58	0.15	90.58	0.15
CB107B	Block 3	90.50	90.19	0.31	90.2	0.30
CB107C	Block 2	89.88	89.72	0.16	89.73	0.15
CB108A	Block 1	89.79	89.32	0.47	89.35	0.44

A separate review was completed for the on-site blocks that front Squadron Crescent. Refer to ***Table 11*** below for summary of the freeboard from the major system flow on Squadron in relation to the on-site blocks.

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Table 11
Overland Flow Spill Elev. and 100-Year + 20% Storms vs Surrounding House Grade

Critical Block ID	Critical SHG (m)	Spill Elevation (m)	Freeboard to Spill Elevation (m)	100-Year + 20% Depth (m)	Spill Elev + 100-Year + 20% Depth (m)	Freeboard to Critical SHG (m)
Block 1 (1)	89.7	89.18	0.52	0	89.18	0.52
Block 2 (2)	90.21	89.87	0.34	0.11	89.98	0.23
Block 3 (2)	90.56	90.22	0.34	0.11	90.33	0.23
Block 4 (1)	90.94	90.77	0.17	0.05	90.82	0.12
Block 8 (1)	91.03	90.77	0.26	0.05	90.82	0.21
Block 9 (1)	90.99	90.77	0.22	0.05	90.82	0.17
Block 10 (1)	90.84	90.47	0.37	0.08	90.55	0.29
Block 10 (1)	90.60	90.17	0.43	0.08	90.25	0.35
Block 11 (1)	90.38	90.17	0.21	0.08	90.25	0.13
Block 12 (1)	90.42	89.87	0.55	0.09	89.96	0.46
Block 13 (1)	90.19	89.87	0.32	0.09	89.96	0.23
Block 14 (1)	89.53	89.18	0.35	0.00	89.18	0.35

1) 100-Year + 20% Depth from Table 5-7 Design Brief Wateridge Village at Rockcliffe Phase 1B prepared by IBI Group June 2017
2) Spill Elevation Equal to road grade on Mikinak Road, 100-Year + 20% Depth from Table 5-5 Design Brief Wateridge Village at Rockcliffe Phase 1A prepared by IBI Group April 2016

As shown in the table above, there is sufficient freeboard from the Surrounding House Grade compared with the existing major flow elevations on Squadron Crescent. No low points exist on Mikinak Road fronting the subject property, therefore,

5.6 Low Impact Development (LID) Practices

LID measures are proposed in accordance with the ***Design Brief Phase 1B*** and ***LID Demonstration Project***. It is proposed that flow from rooftops, sidewalks, landscaped areas and access lanes be directed to bioretention cells located throughout the property. Refer to drawing ***SSP-1*** for bioretention cell locations. The granular base below the overflow elevation has been sized in accordance with the ***LID Design Guide*** and based on infiltration rates, to ensure a maximum drawdown time of 48 hours. Based on correspondence with Paterson Group, included in ***Appendix A***, an infiltration rate of ***140 mm/day*** was estimated for the soil in Block 15.

The bioretention cells are designed with a 75 mm layer of mulch/riverstone; underlain by 600 mm deep layer of filter media (3 parts sand, 2 parts topsoil, 1 part organic soil components and additives); a 100 mm layer of pea gravel; and a 525 mm layer of clear stone equipped with a perforated pipe. When the perforated pipe and clearstone is saturated an overflow is provided which directs flow to the minor system.

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Details of the bioretention cells are shown on drawing ***DS-2***, accompanying this report.

All LID measures are designed to infiltrate or detain an equivalent of the 4 mm event over the site area and each LID measure must treat the minimum of the 15 mm event. A total infiltration requirement of 4 mm or ***78.4 m³*** and a total treatment volume of the 15 mm event, or ***181.7 m³*** is required per the ***LID Demonstration Project***. The bioretention cells provide ***146.9 m³*** of volume being retained within the perforated pipe and clear stone below the overflow to the minor system. The filter media, clear stone, perforated pipe and ponding volume results in a treatment volume of ***299.8 m³,*** exceeding the 15 mm volume described above.

Stormwater from the ROW is proposed to access the proposed LID features through proposed curb cuts at the barrier curbs along each LID feature. The curb cuts were sized in order to capture the 15 mm storm event. Supporting calculations are included in ***Appendix D***.

5.7 Stormwater Servicing Conclusions

Minor and major system flow from Block 15 were accounted for in the Wateridge subdivision design. Quantity and quality controls are provided through a dry stormwater pond to the south and the Eastern SWM Facility to the north.

There is sufficient capacity within the existing storm sewers within Squadron Crescent to convey the proposed stormwater drainage plan.

LID practices in the form bioretention cells are proposed for treatment, storage and infiltration of roof, landscaped and road runoff from the site, in accordance with the ***LID Demonstration Project.***

The proposed stormwater design conforms to all relevant ***City Standards*** and Policies.

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6.0 GEOTECHNICAL CONSIDERATIONS

A ***Geotechnical Investigation*** entitled ***Proposed Residential Development Block 15, 22 and 24*** was prepared by Paterson Group, dated December 4, 2019, detailing geotechnical recommendations for the Wateridge at Rockcliffe development Blocks 15, 22 and 24 inclusively.

Grade raise restrictions as outlined in the above-mentioned geotechnical report (1.0 m permissible) are exceeded in the proposed development. As per the geotechnical memo ***PG4064-MEMO.10***, prepared by Paterson Group, dated November 6, 2019, the proposed grading plan is supported and lightweight fill is not required. Geotechnical memo ***PG4064-MEMO.10*** is included in ***Appendix A***.

The review of LID features and infiltration rates of the subsoils below the proposed infiltration systems was determined for Block 15. The theoretical infiltration rates of the subsoils are included in the geotechnical memo ***PG4064-MEMO.09***, prepared by Paterson Group, dated January 21, 2019. Geotechnical memo ***PG4064-MEMO.09*** is included in ***Appendix A*** for reference.

As the development proposes service connections from the back-to-back townhomes, directly to the services within Squadron Crescent, the existing road is to be reinstated to the extents shown on DSEL drawing, ***GP-1,*** accompanying this report, as per the pavement design outlined in the ***Geotechnical Investigation***. The reinstated pavement structure, where it abuts the existing pavement that is not being replaced, is to be installed as per the structure outlined in geotechnical memo ***PG4064-MEMO.11***, prepared by Paterson Group, dated September 27, 2019, which can be found in ***Appendix A***.

It is anticipated that bedrock removal will be required for the development of this site. Note that bedrock removal is to be completed in accordance with the ***Geotechnical Investigation.***

As per the ***Geotechnical Investigation***, the groundwater table is anticipated to be a minimum of 1 m below the proposed underside of footing elevations. Geotechnical comments regarding the groundwater table with regards to the proposed development are included in ***PG4064-MEMO.11***.

The development proposes watermain, water meter boxes and sanitary sewers that have a horizontal separation distance less than 2.5 m from the edge of proposed building. A review of the servicing installation impact of these sewers and structures to the adjacent footings and recommendations for foundation support is completed as summarized in geotechnical memo ***PG4064-MEMO.12***, prepared by Paterson Group, dated December 19, 2019 and ***PG4064-MEMO.14***, prepared by Paterson Group, dated November 6, 2019. It is recommended that a lightweight concrete infilled trench be installed under the footings for units which have servicing infrastructure within 2.5 m of the building footprint, including Blocks 1-4 and Block 14. It is also recommended that the sanitary and

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watermain that cross beneath stairways be provided with a sleeve where it is to be encased in concrete as per geotechnical memo ***PG4064-MEMO.07***, prepared by Paterson Group, dated July 11, 2018. Geotechnical recommendations for the footings and sleeves are shown both on ***GP-1*** and ***DS-3***. Geotechnical memos ***PG4064-MEMO.12, PG4064-MEMO.14***, and ***PG4064-MEMO.07*** are included in ***Appendix A*** for reference.

Proposed landscaping constraints and recommendations are presented in the landscaping plan review memo ***PG4064-MEMO.15***, prepared by Paterson Group, dated December 18, 2019, included in ***Appendix A*** for reference.

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7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. During construction the extent of erosion losses is exaggerated due to the removal of vegetation and the top layer of soil becoming agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catch basins will have SILTSACKs or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents:

- Limit extent of exposed soils at any given time;
- Re-vegetate exposed areas as soon as possible;
- Minimize the area to be cleared and grubbed;
- Protect exposed slopes with plastic or synthetic mulches;
- Install silt fence to prevent sediment from entering existing ditches;
- No refueling or cleaning of equipment near existing watercourses;
- Provide sediment traps and basins during dewatering;
- Install filter cloth between catch basins and frames;
- Plan construction at proper time to avoid flooding; and
- Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers; and
- Clean and change filter cloth at catch basins.

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8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by Mattamy Homes, to amend the previously approved Site Plan Control Application (SPC), dated March 2018, for Block 15 of Wateridge Village at 245 Squadron Crescent, which is currently under re-development. The preceding report outlines the following:

- Based on boundary conditions from the City of Ottawa, sufficient pressure exists to support average day flow, maximum daily flow and peak hourly flow requirements of the proposed development. Pressure reducing valves are required;
- Based on estimated fire flow per ***Table 18.5.4.3*** of ***ISTB-2018-02***, a combination of internal and existing hydrants have the capacity to supply the required fire flow for the development and based on boundary conditions and the EPANet model, the hydrants have sufficient pressure to provide the maximum required fire flow;
- The proposed development is anticipated to have a peak wet weather flow of ***7.52 L/s***, a reduction in flow compared to the ***Design Brief Phase 1B***;
- The quantity and quality controls are provided for the site through a dry pond to the south of the site and the Eastern SWM Facility outlined in the ***Design Brief Phase 1B,*** thus no on-site quantity and quality control measures are required; and
- LID practices in the form of bioretention cells are proposed to treat, storage and infiltrate roof, landscaped and road runoff from the site, in accordance with the ***LID Demonstration Project.***

Prepared by,
David Schaeffer Engineering Ltd.



Per: Jennifer Ailey, P.Eng

Prepared by,
David Schaeffer Engineering Ltd.

Per: Genavieve Greenberg

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APPENDIX A

Pre-Consultation Notes

Geotechnical Memos

R-Plan

DEVELOPMENT SERVICING STUDY CHECKLIST

17-948 08/08/2017

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	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.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
☐	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).	N/A
☒	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 neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N/A
☐	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.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	N/A

4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 1.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	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.	Section 3.2
☐	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.	N/A
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	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	Section 3.2, 3.3
☐	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.	N/A
☐	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.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

☒	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).	Section 4.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	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.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	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)	Section 4.2
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 4.2, Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	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).	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
☒	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.	Section 5.2
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	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.	Section 5.1, 5.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
☐	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.	N/A
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☐	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	N/A
☐	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.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	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 ct. 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.	Section 1.2
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 7.0
☐	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.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

Genavieve Greenberg

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: Wednesday, October 2, 2019 4:37 PM
To: Genavieve Greenberg
Cc: Adam Fobert
Subject: RE: Wateridge Block 15 - Boundary Conditions Request
Attachments: Wateridge Village (rockcliffe) Block 15 Oct 2019.pdf

Hi Genavieve,

Please find below boundary conditions, HGL, for hydraulic analysis at 245 Squadron Cres. (Wateridge Village-Block 15) assumed to be connected to the 203mm on Squadron (see attached for connection locations):

Block 15-Wateridge Village Subdivision
Type of Development: Residential
Site Address: 245 Squadron Cres.
Average Day Demand: 1.68 L/s
Maximum Daily Demand: 4.20 L/s
Maximum Hourly Demand: 9.25 L/s
Fire Flow: 19,000 L/min.

Domestic demands for Blocks 19, 22 and 24 were also included in the model.

Existing Conditions based on current pump operations:

CONNECTION 1 (200mm dia. - Squadron Cres.)
MAX HGL = 147.0m, *the maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required*.
MIN HGL = 146.7m
MXDY+Fire (317 L/s) = 122.0m

CONNECTION 2 (200mm dia. - Squadron Cres.)
MAX HGL = 147.0m, *the maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required*.
MIN HGL = 146.7m
MXDY+Fire (317 L/s) = 123.0m

Please note the following:

- *Boundary conditions provided above are for existing conditions. Upgrades to the Montreal and Brittany pump stations are currently being planned to support the CFB Rockcliffe development. The City plans to control the discharge HGL to 143.0m. Furthermore, the current plan is to use a different pumping strategy that will try to maintain a constant HGL of 143.0m even during peak hour and/or fire flow conditions.*

These are for current conditions and are based on computer model simulation.

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.

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

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From: Fraser, Mark
Sent: September 30, 2019 4:16 PM
To: Genavieve Greenberg <GGreenberg@dsel.ca>
Cc: Adam Fobert <AFobert@dsel.ca>
Subject: RE: Wateridge Block 15 - Boundary Conditions Request

Hi Genavieve,

Please accept this email as confirmation that updated boundary conditions have been requested from the Water Resources Assets Unit. Please note that it can take approximately 5 business days.

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

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From: Genavieve Greenberg <GGreenberg@dsel.ca>
Sent: September 30, 2019 11:26 AM
To: Fraser, Mark <Mark.Fraser@ottawa.ca>
Cc: Adam Fobert <AFobert@dsel.ca>
Subject: FW: Wateridge Block 15 - Boundary Conditions Request

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Good morning Mark,

We are exploring some alternative servicing options for the site and I was wondering if it would be possible to get boundary conditions for the connection 2 on the figure below.



None of the site demands have changed as listed below:

- The proposed development is residential and would consist of 124 stacked townhomes and 68 back-to-back townhomes.
- We are proposing to two connections to the 200 mm diameter watermain within Squadron Crescent.
- The maximum fire flow demand for the proposed development is 19,000 L/min

	L/min	L/s
Avg. Daily	100.9	1.68
Max Day	252.3	4.20
Peak Hour	555.0	9.25

The emails below outline the demands at the surrounding blocks of the development.

Please let me know if you need any additional information form me. Do you know how soon we might be able to get this information?

Thank you,

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: Wednesday, January 30, 2019 1:46 PM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: RE: Wateridge Block 15 - Boundary Conditions Request

Hey Richard,

I have attached a figure showing the location of the different blocks as well as their connection points. The demand for each Block is included below.

Block 19:

Design Parameter	Anticipated Demand[1] (L/min)
Average Daily Demand	128.5
Peak Hour	697.1
Max Day + Fire Flow	15,000 + 317.8

Block 22:

Design Parameter	Anticipated Demand[1] (L/min)
Average Daily Demand	33.5
Peak Hour	248.2
Max Day + Fire Flow	11,000 + 164.4

Block 24:

Design Parameter	Anticipated Demand[1] (L/min)
Average Daily Demand	82.2
Peak Hour	369.7
Max Day + Fire Flow	12,000 + 246.5

Please let me know if there is any more information that you would be needing. Do you know how soon it would be possible it would be to get the boundary conditions back?

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: gmelatti@DSEL.ca

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From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: Wednesday, January 23, 2019 9:58 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: Wateridge Block 15 - Boundary Conditions Request

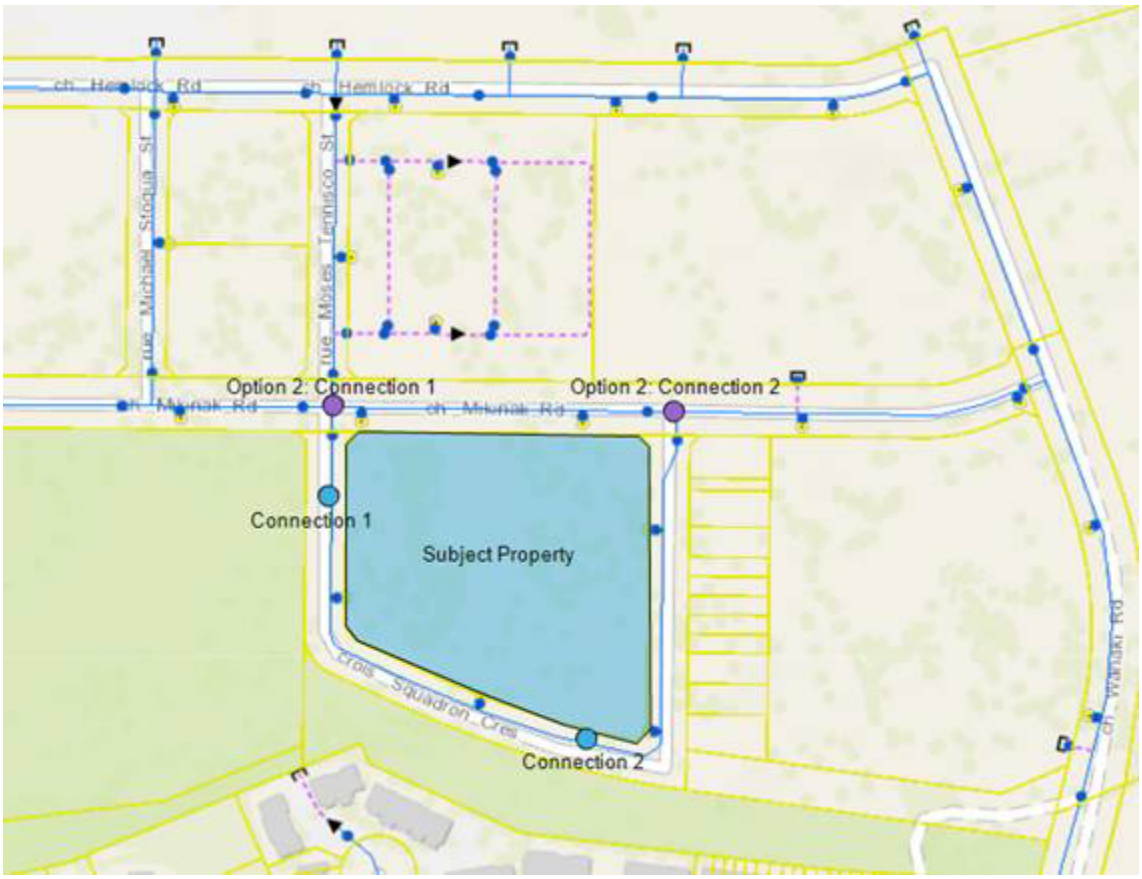
Good morning Richard,

Would we be able to request boundary conditions for Wateridge Block 15:

1. Location of Service / Street Number: Block 15 - the property is bound by Mikinak Road to the north and Squadron Crescent to the west, south and east

2. Type of development and the fire flow required for the proposed development:

- The proposed development is residential and would consist of 124 stacked townhomes and 68 back-to-back townhomes.
- We are proposing to two connections to the 200 mm diameter watermain within Squadron Crescent.
- The maximum fire flow demand for the proposed development is 19,000 L/min at Blocks 2 and 3. The calculations and parameters used in these calculations are in the attached FUS calculation sheet.
- We are looking for the boundary conditions at the proposed connection point shown below in blue. We were hoping that these point were available in the City model, however, if not, would it be possible to have the boundary conditions for the points labeled as option 2 in purple on the sketch where both ends of Squadron Crescent meet Mikinak Road.



3.

	L/min	L/s
Avg. Daily	100.9	1.68
Max Day	252.3	4.20
Peak Hour	555.0	9.25

If you have any questions please feel free to contact me.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: gmelatti@DSEL.ca

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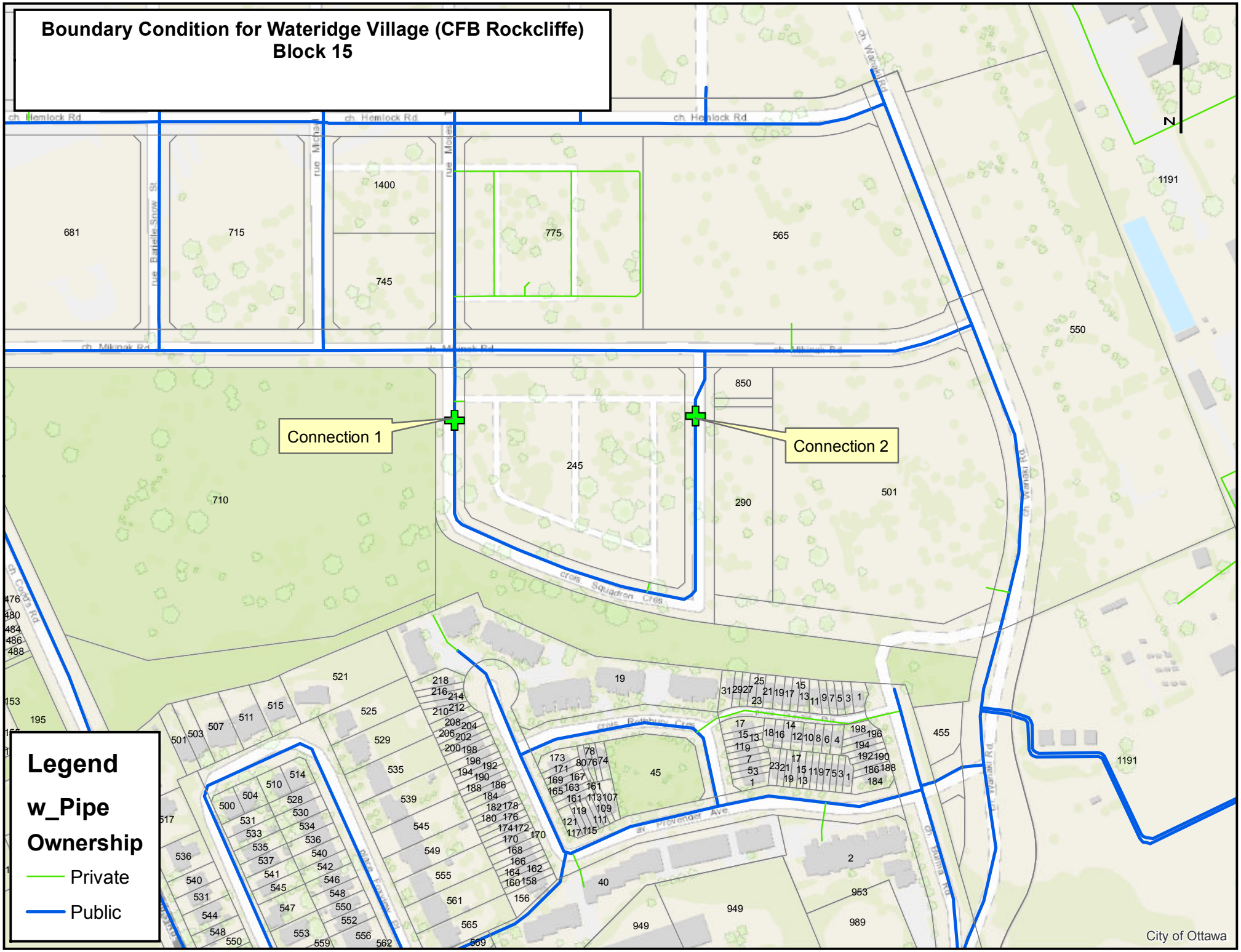
Boundary Condition for Wateridge Village (CFB Rockcliffe)
Block 15
Connection 1
Connection 2
Legend
w_Pipe
Ownership
Private
Public
N
City of Ottawa

Genavieve Melatti

From: Sabrina Castellanos <scastellanos@q4architects.com>
Sent: Tuesday, January 22, 2019 11:02 AM
To: Genavieve Melatti
Cc: Steve Merrick; Conor Sutherland; Jillian Normand; Daniel Sousa
Subject: RE: Wateridge Block 15 FUS Information

Hi Genavieve,

Please see my answers in red below

Regards,

Sabrina Castellanos
Project Manager, B.Arch

Q4 Architects Inc.
2171 Avenue Road, Suite 302, Toronto, Ontario M5M 4B4
T: 416-322-6334 x256 F: 416-322-7294
www.q4architects.com

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From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: January 17, 2019 10:08 AM
To: Sabrina Castellanos <scastellanos@q4architects.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: RE: Wateridge Block 15 FUS Information

Hey Sabrina,

As mentioned below we are looking for the following information:

- Confirmation that these blocks will not have a sprinkler system installed? They are not sprinkler – Part 9 of the OBC
- The ISO class for the for each Block style. All the blocks will be Wood frame construction – Class 1

I have included the ISO Guide in which sections 1, 2 and 3 on pages 3 to 10 provides definitions to clarify as well as the section from the City's technical bulletin. Note that ISO refers only to fire-resistive for fire ratings not less than 1-hour.

A. *Determine the type of construction.*

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require ⅔ (67%) or more of the total wall area and ⅔ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

If you need any more information please let me know.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: gmelatti@DSEL.ca

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From: Conor Sutherland <Conor.Sutherland@mattamycorp.com>
Sent: Thursday, January 17, 2019 10:04 AM

To: Genavieve Melatti <GMelatti@dsel.ca>
Cc: Steve Merrick <SMerrick@dsel.ca>; Jillian Normand <Jillian.Normand@mattamycorp.com>; Sabrina Castellanos <scastellanos@q4architects.com>
Subject: RE: Wateridge Block 15 FUS Information

Hi Genavieve,

Please find Sabrina's contact information below. She is also cc'd in this email.

scastellanos@q4architects.com

Sabrina if you could please work with DSEL to assist them in the design of Block 15 it would be greatly appreciated!

Thank you,
Conor

Conor Sutherland, B.Eng.
Land Development Coordinator
T (613) 831-3548 (direct). **F** (613) 831-9060
Conor.Sutherland@mattamycorp.com
Ottawa Office: 50 Hines Road, Suite 100, Ottawa, ON Canada K2K 2M5

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From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: Thursday, January 17, 2019 9:55 AM
To: Conor Sutherland <Conor.Sutherland@mattamycorp.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: Wateridge Block 15 FUS Information

Good morning Conor,

I was wondering if you could let me know who from Q4 I should contact for some information we will need for FUS calculations.

We will be needing the following information:

- We assume that as these are townhomes there will not be sprinkler systems installed. I would need this to please be confirmed.
- We will need the the ISO class for each Block style.

If you are able to let me know who I should contact with regards to this that would be great.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103

Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: gmelatti@DSEL.ca

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Genavieve Greenberg

From: Matt Brown <MBrown@q4architects.com>
Sent: Friday, November 1, 2019 10:53 AM
To: Genavieve Greenberg
Subject: RE: Block 15

Yes they are wood frame

Mathew Brown
Associate, Sr. Project Manager, Tech

Q4 Architects Inc.
2171 Avenue Road, Suite 302, Toronto, Ontario M5M 4B4
T: 416-322-6334 x240 F: 416-322-7294
www.q4architects.com

From: Genavieve Greenberg <GGreenberg@dsel.ca>
Sent: November 1, 2019 10:48 AM
To: Matt Brown <MBrown@q4architects.com>; Bill Yip <byip@q4architects.com>; Daniel Sousa <dsousa@q4architects.com>; Neil Corbilla <NCorbilla@q4architects.com>; Pino Lavecchia <Pino.Lavecchia@mattamycorp.com>
Subject: RE: Block 15

Hi Matt,

Thank you for getting back to me, would you consider all buildings to be Class 1 Wood Construction per the ISO guide and the City's technical bulletin?

A. *Determine the type of construction.*

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require ⅔ (67%) or more of the total wall area and ⅔ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

Thank you,

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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From: Matt Brown <MBrown@q4architects.com>
Sent: Friday, November 1, 2019 10:39 AM
To: Bill Yip <byip@q4architects.com>; Daniel Sousa <dsousa@q4architects.com>; Neil Corbilla <NCorbilla@q4architects.com>; Pino Lavecchia <Pino.Lavecchia@mattamycorp.com>

Cc: Genavieve Greenberg <GGreenberg@dsel.ca>
Subject: RE: Block 15

Hi Genavieve

We are building all of the units out of wood, block 1-7 are 75% brick on the end walls blocks 8-14 are 90% siding on the end walls

We do not believe any of the buildings are sprinklered

Mathew Brown
Associate, Sr. Project Manager, Tech

Q4 Architects Inc.
2171 Avenue Road, Suite 302, Toronto, Ontario M5M 4B4
T: 416-322-6334 x240 F: 416-322-7294
www.q4architects.com

From: Bill Yip <byip@q4architects.com>
Sent: November 1, 2019 9:51 AM
To: Matt Brown <MBrown@q4architects.com>; Daniel Sousa <dsousa@q4architects.com>; Neil Corbilla <NCorbilla@q4architects.com>
Subject: FW: Block 15

For your attention.

Bill Yip
Coordinator

Q4 Architects Inc.
2171 Avenue Road, Suite 302, Toronto, Ontario M5M 4B4
Direct: 416-347-5504 T: 416-322-6334 x260 F: 416-322-7294
www.q4architects.com

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From: Genavieve Greenberg <GGreenberg@dsel.ca>
Sent: November 1, 2019 9:48 AM
To: Bill Yip <byip@q4architects.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: Block 15

Hi Bill,

I was wondering if you would be able to confirm a couple of things for this Block in order for us to verify our FUS calculations. I know there was some back and forth between the buildings being sprinklered. Are either of the block types to be sprinklered? Would you also be able to confirm the ISO class for the blocks, we currently have them as wood frame construction Class 1, would you be able to confirm that this is still the case?

I have attached the ISO Guide for reference, sections 1, 2 and 3 on pages 3 to 10 provide definitions and below is the section from the City's technical bulletin to clarify. Note that ISO refers only to fire-resistive for fire ratings not less than 1-hour.

A. *Determine the type of construction.*

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
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	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
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- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

Please let me know if you have any questions.

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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Conservation Partners
Partenaires en conservation

Mississippi Valley Conservation Authority

Rideau Valley Conservation Authority

South Nation Conservation de la Nation Sud

File: 19-OTT-SPC-0086

March 11th, 2019

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

Attention: Kimberley Baldwin

Subject: Mattamy (Rockcliffe) Inc.
Site Plan Control Application D07-12-19-0020
245 Squadron Crescent, City of Ottawa

Dear Ms. Baldwin:

The Conservation Partners Planning and Development Review Team has completed a review of the above noted application to revise a previous submission, including increasing the number of units and altering the layout of the proposed development. The revision provides 192 residential units through a mix of stacked and townhouse developments.

We have undertaken our review within the context of Sections 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement, 2014 issued under Section 3 of the *Planning Act*, and from the perspective of the Conservation Authority regulations. The following comments are offered for your consideration.

Natural Heritage/Natural Hazards

We have not identified any natural hazards or natural heritage features on this property which would preclude the approval of this application.

3889 Rideau Valley Drive, P.O. Box 599
Manotick, Ontario, K4M 1A5

Tel: 613-692-3571
Fax: 613-692-0831

Stormwater Management

We note that stormwater from this site is being directed to an existing 2400 mm storm sewer within Michael Stoqua Street which ultimately outlets to the Eastern SWM Facility as outlined in the Design Brief Phase 1B prepared by DSEL. Please note that the RVCA has not completed a technical review of the stormwater management plan. We will rely on the City to ensure that the stormwater management plan is consistent with the overall Master Servicing Study and the Design Brief Phase 1B.

Conclusion

In conclusion, the RVCA has no objection to this Site Plan Control application. The Conservation Authority kindly requests a copy of decision related to this file. For any questions regarding the information contained in this letter, please feel free to contact me.

Respectfully,

Jamie Batchelor, MCIP, RPP
Planner, Planning and Watershed Science
Rideau Valley Conservation Authority
613-692-3571 ext. 1191
Jamie.batchelor@rvca.ca

Cc: Jillian Normand: Mattamy (Rockcliffe) Inc.

Genavieve Greenberg

From: Jillian Normand <Jillian.Normand@mattamycorp.com>
Sent: Friday, December 6, 2019 12:20 PM
To: Genavieve Greenberg; Jennifer Ailey; Steve Merrick
Cc: Conor Sutherland; Matt Brown; Jessica McLellan; Pino Lavecchia
Subject: FW: Wateridge Block 15 - Stacks + sprinklers

Hi Genavieve,

Please see below regarding the FUS calculations.

Thanks,
Jillian

mattamyHOMES

Jillian Normand, MCIP, RPP
Senior Land Development Manager
T (613) 831-5144 (direct). C (613) 415-7786. F (613) 831-9060
Jillian.Normand@mattamycorp.com
Ottawa Office: 50 Hines Road, Suite 100, Ottawa, ON Canada K2K 2M5

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From: Andrew MacDonald <andrewm@jp2g.com>
Sent: December 6, 2019 11:43 AM
To: Daniel Potechin <Daniel.Potechin@mattamycorp.com>
Cc: Jillian Normand <Jillian.Normand@mattamycorp.com>; Mark MacIsaac <MarkM@jp2g.com>
Subject: RE: Wateridge Block 15 - Stacks + sprinklers

Hi Daniel,

The sprinkler systems do not qualify for the FUS water reduction for sprinkler systems as they are partial sprinkler systems without fire department hose connections or fire alarm supervision.

Regards,

Andrew MacDonald, P.Eng.
Mechanical Engineer
Jp2g Consultants Inc.

Email: andrewm@jp2g.com | Web: www.jp2g.com
T: 613.828.7800 x 218 | C: 613.282.0306 | F: 613.828.2600
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

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Keep it Clean - Go Green

From: Daniel Potechin <Daniel.Potechin@mattamycorp.com>
Sent: Friday, December 6, 2019 11:32 AM
To: Andrew MacDonald <andrewm@jp2g.com>
Cc: Jillian Normand <Jillian.Normand@mattamycorp.com>; Mark MacIsaac <MarkM@jp2g.com>
Subject: Fwd: Wateridge Block 15 - Stacks + sprinklers

Hi Andrew,

Per my voicemail, please see the attached bulletin and the note below from our civil engineer.

They are looking for the classification of sprinkler system as it relates to the attached bulletin from the City of Ottawa to finalize their calculations with respect to any reductions that may apply to the FUS.

Ultimately they will need a letter to confirm and include with their submission but need that classification in short order. If you can give me a ring and/or reply to this email it would be greatly appreciated.

Regards,

Daniel Potechin

Project Director, Wateridge Village

T (613)831-3506 (direct). F(613)831-9060.daniel.potechin@mattamycorp.com

Ottawa Office: 50 Hines Road, Suite 100, Ottawa, ON K2K 2M5

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From: Jillian Normand <Jillian.Normand@mattamycorp.com>
Sent: Friday, December 6, 2019, 11:25 a.m.
To: Daniel Potechin
Subject: FW: Wateridge Block 15 - Stacks + sprinklers

FYI re sprinkler classifications

Jillian Normand, MCIP, RPP
Senior Land Development Manager
T (613) 831-5144 (direct). C (613) 415-7786. F (613) 831-9060
Jillian.Normand@mattamycorp.com
Ottawa Office: 50 Hines Road, Suite 100, Ottawa, ON Canada K2K 2M5

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From: Genavieve Greenberg <GGreenberg@dsel.ca>
Sent: December 6, 2019 10:54 AM
To: Jillian Normand <Jillian.Normand@mattamycorp.com>; Matt Brown <MBrown@q4architects.com>; Pino Lavecchia <Pino.Lavecchia@mattamycorp.com>; Jessica McLellan <Jessica.Mclellan@mattamycorp.com>
Cc: Steve Merrick <SMerrick@dsel.ca>; Jennifer Ailey <JAiley@dsel.ca>
Subject: RE: Wateridge Block 15 - Stacks + sprinklers

Hi Jillian,

We have run the model using the sprinkler demand mentioned below, what we are needing is to confirm the classification of the sprinkler system per the City of Ottawa ISTB attached. When sprinklers are used, there are reductions that apply to the FUS calculation, we are trying to confirm that this reduction does apply and if so to what extent. There are 4 possible options: sprinklered, sprinklered with standard supply, supervised sprinklers and if the system doesn't fall under any of these classifications then it is considered non sprinklered.

We assumed the sprinklered option, but we need confirmation on the classification of the sprinkler system per ISDT-2018-02 section F on page 8 and section F on pages 20 and 21 describe the qualifications for these different levels.

Please let me know if you have any questions regarding these classifications.

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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From: Jillian Normand <Jillian.Normand@mattamycorp.com>
Sent: Friday, December 6, 2019 10:37 AM
To: Genavieve Greenberg <GGreenberg@dsel.ca>; Matt Brown <MBrown@q4architects.com>; Pino Lavecchia <Pino.Lavecchia@mattamycorp.com>; Jessica McLellan <Jessica.Mclellan@mattamycorp.com>
Cc: Steve Merrick <SMerrick@dsel.ca>; Jennifer Ailey <JAiley@dsel.ca>
Subject: RE: Wateridge Block 15 - Stacks + sprinklers

Hi Genavieve,

We spoke to the mechanical engineer who provided that the flow rate required for the most conservative unit required 60gpm on the 1.5 services when modeling the sprinklers in stacks at Wateridge.

Do you require a formal letter stating this?

Thanks,
Jillian

Genavieve Greenberg

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Wednesday, September 4, 2019 9:35 AM
To: Genavieve Greenberg
Subject: RE: Wateridge Block 15 - RVCA Approval

Good Morning Genavieve,

I can confirm that no additional water quality controls are required as the water quality objective is being achieved through the overall SWM Pond.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
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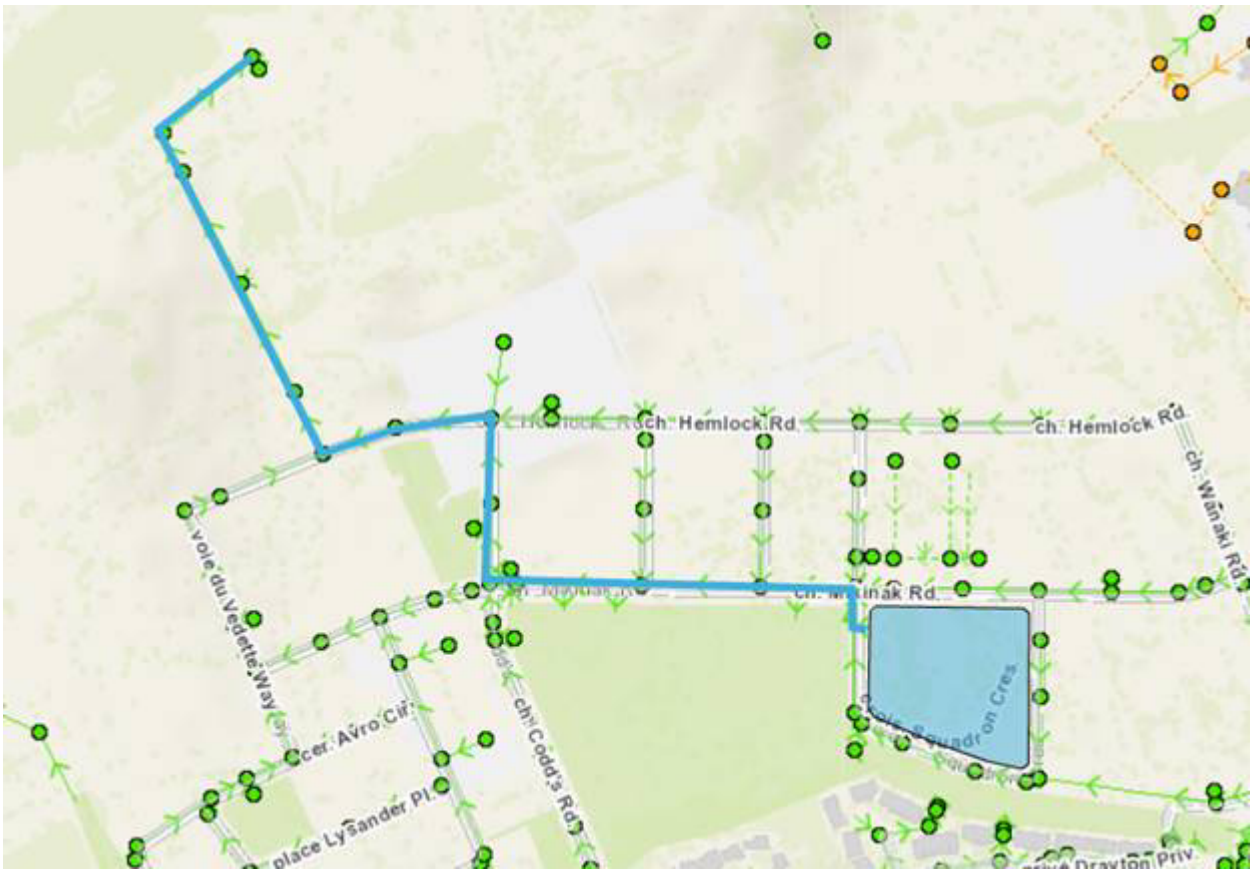
and any copy of the e-mail and any printout thereof, immediately. Your cooperation is appreciated.

From: Genavieve Greenberg <GGreenberg@dsel.ca>
Sent: Tuesday, August 20, 2019 2:32 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: Wateridge Block 15 - RVCA Approval

Hey Jamie,

I wanted to touch base with you regarding the Wateridge-Block 15 Development at 245 Squadron Crescent.



The subject property is located within the Ottawa River watershed. The site was contemplated in the ***Design Brief Wateridge Village at Rockcliffe Phase 1B,*** prepared by IBI Group., dated June 2017 (***Design Brief Phase 1B***). The drainage plan per the report is attached to this email and shows the subject lands with a Runoff coefficient of 0.8 with flow directed to the Eastern SWM Facility and quantity control provided by the dry pond south of the property ultimately directed to the Eastern SWM facility..

The development proposes 124 stacked townhomes and 68 back-to-back townhomes on 1.96ha of land. The development will direct flow as contemplated to the Eastern SWM Facility with major flow directed to the dry pond south of the property and ultimately to Eastern SWM facility. The development proposed to have a runoff coefficient no greater than 0.8 as contemplated in ***Design Brief Phase 1B.***

The subject site was also accounted for int the design of the permanent pool of the Eastern SWM Facility which provides 80% TSS removal for the subdivision.

If you could please confirm if any additional quality controls are required for the development.

Please feel free to contact me should you have any questions or would like to discuss.

Thank you,

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

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patersongroup **memorandum**

consulting engineers

re:	**Geotechnical Response to City of Ottawa Review Comments** **Wateridge Residential Development - Phase 1B** **335 St. Laurent Boulevard - Ottawa**
to:	Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com
cc:	DSEL - **Mr. Steve Merrick** - SMerrick@dsel.ca
date:	July 11, 2018
file:	PG4064-MEMO.07

Further to your request, Paterson Group (Paterson) prepared a response to the City of Ottawa review comment for the fourth site plan submission prepared for the aforementioned development.

Site Servicing Comment - Watermain Sleeves

Comment: *Provide structural/geotechnical design of watermain sleeving.*

Paterson Response

Paterson reviewed the following site servicing plan prepared by DSEL:

- ❑ Site Servicing Plan - Wateridge Block 22 - Project No. 17-948 - Drawing No. SSP-1 - Sheet 3 of 6 - Revision 7 dated June 20, 2018.

As part of a previous review, Paterson provided details regarding lean mix concrete backfill where the excavation for services would undermine front porch footings within Block 22. Based on the details provided, the 100 mm diameter watermain is required to be encased in concrete below the front porch footings. The following provides recommendations regarding the sleeve to encase the watermain.

- ❑ A high grade PVC pipe, such as PVC-SDR26 can be provided for the sleeve around the watermain within the concrete backfill below the front porch footings.
- ❑ The diameter of the sleeve should be slightly larger than the outside diameter of the watermain. Since the proposed watermain pipe is 100 mm in diameter, the PVC-SDR26 sleeve can be 150 mm in diameter to accommodate the sidewall thickness of the watermain pipe.
- ❑ It is recommended that the voids between the PVC sleeve and the watermain pipe be filled with sand prior to backfilling. It is also recommended that both ends of each sleeve be plugged with concrete to reduce water infiltration which may wash the sand away and to hold the pipes in place within the sleeves.

We trust that this information satisfies your requirements.

Paterson Group Inc.



Colin Belcourt, P.Eng.

David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re:	**Infiltration Rates** **Proposed Residential Development** - **Block 15** **Wateridge Village - Ottawa**
cc:	David Shaeffer Engineering Ltd. - **Mr. Steve Merrick** - smerrick@dsel.ca
date:	January 21, 2019
file:	PG4064-MEMO.09

Further to your request, Paterson Group (Paterson) carried out a review of available information obtained from a geotechnical program at a location adjacent to Block 15 of the proposed Wateridge Development.

Background

The purpose of this review was to provide a range of theoretical infiltration rates to be encountered within the subsoils below the proposed infiltration system at the aforementioned site.

The subsurface profile encountered at the test hole locations in Block 15 of the proposed development generally consisted of an overlaying fill extending to a maximum depth of 1.8 m below existing grade, underlain by a very stiff to stiff brown silty clay, which in turn is onderlain by a stiff to firm grey silty clay.

Geotechnical Commentary

The field saturated hydraulic conductivity (K_{fs}) values were slected using Engineering Technologies Canada (ETC) Ltd and based on a clay. Reference tables provided in the most recent ETC Pasl Permeameter User Guide. The infiltration rates were determined using Appendix C of the Low Impact Development Stormwater Managment Planning and Design Guide (CVC 2011). It should be noted that a safety correction factor of 3.5 was used when calculating the infiltration rate to account for any variations in the soil.

Based on the theoretical calculations, the infiltration rate of the subsoils below the proposed infiltration system for Block 15 will be approximately **140 to 200 mm/d**.

Please note that the values in this memorandum report are strictly theoretical and based on values obtained in similar materials during previous investigations in the surrounding area. It should also be noted that it was assumed the infiltration system will be installed within the silty clay layer of the subsurface.

We trust that this information is satisfactory for your immediate requirements.

Paterson Group Inc.





January 21, 2019



Nick Giamberardino, E.I.T. . David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re:	**Grading Plan Review** **Wateridge Residential Development - Phase 1B - Block 15** 335 St. Laurent Boulevard - Ottawa
to:	Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com
cc:	DSEL - **Mr. Steve Merrick** - SMerrick@dsel.ca
date:	November 6, 2019
file:	PG4064-MEMO.10 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a review of the grading plan for Block 15 of the aforementioned residential development. The following memorandum should be read in conjunction with Paterson Report PG4064-2 - Blocks 15, 22 and 24 Revision 2 dated June 25, 2019.

Grading Plan Review

Paterson reviewed the following grading plan prepared by DSEL regarding the aforementioned development:

- ❑ Grading Plan - Block 15 - Job No. 17-946, Drawing No. GP-1, Sheet 2 of 13, Revision 4 dated November 11, 2019.

Based on our review of the above noted grading plan, the proposed grade raises within Block 15 of the aforementioned development are acceptable from a geotechnical perspective. Minor exceedances of the grade raise restriction were noted at select areas. However, Paterson has further reviewed the grades with respect to the soil conditions and proposed foundations. Based on further review, the proposed grades are acceptable from a geotechnical perspective and lightweight fill will not be required for the proposed buildings within Block 15 of the proposed development

Table 1 attached to this memo presents our summary of design details for the current phase.

We trust that this information satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.



Colin Belcourt, P.Eng.

David J. Gilbert, P.Eng.

Table 1 - Summary of Grading Design Details - Wateridge Village - Block 15

Legal Lot/ Block Number	Civic Address	Underside of Footing Elevation (Proposed) (m)	Original GS Front (m)	Proposed GS Front (m)	Approx. Proposed Frost Cover Depth (m)	Minimum Bearing Capacity - Serviceability Limit States (kPa)	Seismic Site Class	Permissible Grade Raise (m)	Above Permissible Grade Raise Front (m)	LWF required in Garage and Front Porch (m)	LWF Required (m)
Block 1 - Unit 1A/1B	501/503 Takamose Private	87.80	89.21	89.70	1.90	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 2A/2B	505/507 Takamose Private	87.80	89.25	89.70	1.90	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 3A/3B	511/509 Takamose Private	87.80	89.50	89.86	2.06	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 4A/4B	513/515 Takamose Private	87.80	89.25	89.94	2.14	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 5A/5B	519/517 Takamose Private	87.80	89.00	89.98	2.18	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 6A/6B	778/776 Mikinak Road	87.80	89.99	90.20	2.40	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 7A/7B	772/774 Mikinak Road	87.80	91.00	90.07	2.27	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 8A/8B	770/768 Mikinak Road	87.80	89.90	90.03	2.23	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 9A/9B	764/766 Mikinak Road	87.80	89.86	89.95	2.15	150.00	D	1.00	n/a	n/a	n/a
Block 1 - Unit 10A/10B	762/760 Mikinak Road	87.80	89.36	89.91	2.11	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 1A/1B	To Be Provided	88.25	89.25	90.15	1.90	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 2A/2B	To Be Provided	88.25	89.25	90.18	1.93	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 3A/3B	To Be Provided	88.25	89.25	90.24	1.99	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 4A/4B	To Be Provided	88.25	89.50	90.30	2.05	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 5A/5B	To Be Provided	88.25	89.50	90.45	2.20	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 6A/6B	To Be Provided	88.25	89.50	90.50	2.25	150.00	D	1.00	0.00	n/a	n/a
Block 2 - Unit 7A/7B	To Be Provided	88.25	90.50	90.45	2.20	150.00	D	1.00	n/a	n/a	n/a
Block 2 - Unit 8A/8B	To Be Provided	88.25	89.35	90.38	2.13	150.00	D	1.00	0.03	n/a	n/a
Block 2 - Unit 9A/9B	To Be Provided	88.25	89.30	90.33	2.08	150.00	D	1.00	0.03	n/a	n/a
Block 2 - Unit 10A/10B	To Be Provided	88.25	89.25	90.26	2.01	150.00	D	1.00	0.01	n/a	n/a
Block 3 - Unit 1A/1B	To Be Provided	88.60	89.75	90.50	1.90	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 2A/2B	To Be Provided	88.60	89.80	90.53	1.93	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 3A/3B	To Be Provided	88.60	89.85	90.55	1.95	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 4A/4B	To Be Provided	88.60	89.90	90.58	1.98	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 5A/5B	To Be Provided	88.60	90.00	90.63	2.03	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 6A/6B	To Be Provided	88.60	90.25	90.83	2.23	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 7A/7B	To Be Provided	88.60	90.00	90.77	2.17	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 8A/8B	To Be Provided	88.60	90.00	90.70	2.10	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 9A/9B	To Be Provided	88.60	90.00	90.66	2.06	150.00	D	1.00	n/a	n/a	n/a
Block 3 - Unit 10A/10B	To Be Provided	88.60	90.00	90.59	1.99	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 1A/1B	To Be Provided	88.75	90.00	90.75	2.00	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 2A/2B	To Be Provided	88.75	90.00	90.84	2.09	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 3A/3B	To Be Provided	88.75	90.25	90.90	2.15	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 4A/4B	To Be Provided	88.75	90.00	90.98	2.23	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 5A/5B	To Be Provided	88.75	90.00	90.98	2.23	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 6A/6B	To Be Provided	88.75	90.00	91.10	2.35	150.00	D	1.00	0.10	n/a	n/a
Block 4 - Unit 7A/7B	To Be Provided	88.75	90.00	91.01	2.26	150.00	D	1.00	0.01	n/a	n/a
Block 4 - Unit 8A/8B	To Be Provided	88.75	90.00	91.01	2.26	150.00	D	1.00	0.01	n/a	n/a
Block 4 - Unit 9A/9B	To Be Provided	88.75	90.25	90.93	2.18	150.00	D	1.00	n/a	n/a	n/a
Block 4 - Unit 10A/10B	To Be Provided	88.75	90.00	90.93	2.18	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 1A/1B	601/603 Makwa Private	88.00	89.25	89.95	1.95	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 2A/2B	605/607 Makwa Private	88.00	89.25	89.96	1.96	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 3A/3B	611/609 Makwa Private	88.00	89.50	89.98	1.98	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 4A/4B	615/613 Makwa Private	88.00	89.50	90.01	2.01	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 5A/5B	617/619 Makwa Private	88.00	89.50	90.25	2.25	150.00	D	1.00	n/a	n/a	n/a
Block 5 - Unit 6A/6B	621/623 Makwa Private	88.00	89.25	90.29	2.29	150.00	D	1.00	0.04	n/a	n/a
Block 5 - Unit 7A/7B	627/625 Makwa Private	88.00	89.25	90.32	2.32	150.00	D	1.00	0.07	n/a	n/a
Block 5 - Unit 8A/8B	631/629 Makwa Private	88.00	89.25	90.40	2.40	150.00	D	1.00	0.15	n/a	n/a

Table 1 - Summary of Grading Design Details - Wateridge Village - Block 15

Legal Lot/ Block Number	Civic Address	Underside of Footing Elevation (Proposed) (m)	Original GS Front (m)	Proposed GS Front (m)	Approx. Proposed Frost Cover Depth (m)	Minimum Bearing Capacity - Serviceability Limit States (kPa)	Seismic Site Class	Permissible Grade Raise (m)	Above Permissible Grade Raise Front (m)	LWF required in Garage and Front Porch (m)	LWF Required (m)
Block 6 - Unit 1A/1B	To Be Provided	88.75	89.75	90.75	2.00	150.00	D	1.00	0.00	n/a	n/a
Block 6 - Unit 2A/2B	To Be Provided	88.75	89.50	90.65	1.90	150.00	D	1.00	0.15	n/a	n/a
Block 6 - Unit 3A/3B	To Be Provided	88.75	89.50	90.64	1.89	150.00	D	1.00	0.14	n/a	n/a
Block 6 - Unit 4A/4B	To Be Provided	88.75	89.50	90.62	1.87	150.00	D	1.00	0.12	n/a	n/a
Block 6 - Unit 5A/5B	To Be Provided	88.75	89.75	90.88	2.13	150.00	D	1.00	0.13	n/a	n/a
Block 6 - Unit 6A/6B	To Be Provided	88.75	89.75	90.91	2.16	150.00	D	1.00	0.16	n/a	n/a
Block 6 - Unit 7A/7B	To Be Provided	88.75	89.75	90.95	2.20	150.00	D	1.00	0.20	n/a	n/a
Block 6 - Unit 8A/8B	To Be Provided	88.75	89.75	90.99	2.24	150.00	D	1.00	0.24	n/a	n/a
Block 7 - Unit 1A/1B	To Be Provided	88.60	89.75	90.60	2.00	150.00	D	1.00	n/a	n/a	n/a
Block 7 - Unit 2A/2B	To Be Provided	88.60	89.75	90.50	1.90	150.00	D	1.00	n/a	n/a	n/a
Block 7 - Unit 3A/3B	To Be Provided	88.60	89.75	90.40	1.80	150.00	D	1.00	n/a	n/a	n/a
Block 7 - Unit 4A/4B	To Be Provided	88.60	89.75	90.78	2.18	150.00	D	1.00	0.03	n/a	n/a
Block 7 - Unit 5A/5B	To Be Provided	88.60	90.00	90.73	2.13	150.00	D	1.00	n/a	n/a	n/a
Block 7 - Unit 6A/6B	To Be Provided	88.60	89.75	90.82	2.22	150.00	D	1.00	0.07	n/a	n/a
Block 8 - Unit 1	801 Kiniw Private	89.48	90.00	91.25	1.77	150.00	D	1.00	0.25	n/a	n/a
Block 8 - Unit 2	803 Kiniw Private	89.48	90.00	91.25	1.77	150.00	D	1.00	0.25	n/a	n/a
Block 8 - Unit 3	805 Kiniw Private	89.48	90.00	91.25	1.77	150.00	D	1.00	0.25	n/a	n/a
Block 8 - Unit 4	807 Kiniw Private	89.48	90.00	91.18	1.70	150.00	D	1.00	0.18	n/a	n/a
Block 8 - Unit 5	809 Kiniw Private	89.48	90.00	91.18	1.70	150.00	D	1.00	0.18	n/a	n/a
Block 8 - Unit 6	317 Squadron Crescent	89.48	89.80	91.14	1.66	150.00	D	1.00	0.34	n/a	n/a
Block 8 - Unit 7	319 Squadron Crescent	89.48	89.80	91.14	1.66	150.00	D	1.00	0.34	n/a	n/a
Block 8 - Unit 8	321 Squadron Crescent	89.48	89.87	91.14	1.66	150.00	D	1.00	0.27	n/a	n/a
Block 8 - Unit 9	323 Squadron Crescent	89.48	89.87	91.14	1.66	150.00	D	1.00	0.27	n/a	n/a
Block 8 - Unit 10	325 Squadron Crescent	89.48	89.87	91.03	1.55	150.00	D	1.00	0.16	n/a	n/a
Block 9 - Unit 1	To Be Provided	89.30	89.75	91.00	1.70	150.00	D	1.00	0.25	n/a	n/a
Block 9 - Unit 2	To Be Provided	89.30	89.75	91.00	1.70	150.00	D	1.00	0.25	n/a	n/a
Block 9 - Unit 3	To Be Provided	89.30	89.75	90.98	1.68	150.00	D	1.00	0.23	n/a	n/a
Block 9 - Unit 4	To Be Provided	89.30	89.75	90.98	1.68	150.00	D	1.00	0.23	n/a	n/a
Block 9 - Unit 5	To Be Provided	89.30	89.75	90.98	1.68	150.00	D	1.00	0.23	n/a	n/a
Block 9 - Unit 6	To Be Provided	89.30	89.75	91.05	1.75	150.00	D	1.00	0.30	n/a	n/a
Block 9 - Unit 7	To Be Provided	89.30	89.75	91.15	1.85	150.00	D	1.00	0.40	n/a	n/a
Block 9 - Unit 8	To Be Provided	89.30	89.75	91.15	1.85	150.00	D	1.00	0.40	n/a	n/a
Block 9 - Unit 9	To Be Provided	89.30	89.75	91.28	1.98	150.00	D	1.00	0.53	n/a	n/a
Block 9 - Unit 10	To Be Provided	89.30	89.75	91.28	1.98	150.00	D	1.00	0.53	n/a	n/a
Block 10 - Unit 1	To Be Provided	89.09	89.75	91.03	1.94	150.00	D	1.00	0.28	n/a	n/a
Block 10 - Unit 2	To Be Provided	89.09	89.75	91.03	1.94	150.00	D	1.00	0.28	n/a	n/a
Block 10 - Unit 3	To Be Provided	89.09	89.75	90.97	1.88	150.00	D	1.00	0.22	n/a	n/a
Block 10 - Unit 4	To Be Provided	89.09	89.50	90.97	1.88	150.00	D	1.00	0.47	n/a	n/a
Block 10 - Unit 5	To Be Provided	89.09	89.50	90.85	1.76	150.00	D	1.00	0.35	n/a	n/a
Block 10 - Unit 6	To Be Provided	89.09	89.50	90.88	1.79	150.00	D	1.00	0.38	n/a	n/a
Block 10 - Unit 7	To Be Provided	89.09	89.50	90.87	1.78	150.00	D	1.00	0.37	n/a	n/a
Block 10 - Unit 8	To Be Provided	89.09	89.75	90.87	1.78	150.00	D	1.00	0.12	n/a	n/a
Block 10 - Unit 9	To Be Provided	89.09	89.75	90.84	1.75	150.00	D	1.00	0.09	n/a	n/a
Block 10 - Unit 10	To Be Provided	89.09	89.75	90.84	1.75	150.00	D	1.00	0.09	n/a	n/a
Block 11 - Unit 1	To Be Provided	88.87	89.50	90.78	1.91	150.00	D	1.00	0.28	n/a	n/a
Block 11 - Unit 2	To Be Provided	88.87	89.50	90.67	1.80	150.00	D	1.00	0.17	n/a	n/a
Block 11 - Unit 3	To Be Provided	88.87	89.50	90.54	1.67	150.00	D	1.00	0.04	n/a	n/a
Block 11 - Unit 4	To Be Provided	88.87	89.50	90.54	1.67	150.00	D	1.00	0.04	n/a	n/a

Table 1 - Summary of Grading Design Details - Wateridge Village - Block 15

Legal Lot/ Block Number	Civic Address	Underside of Footing Elevation (Proposed) (m)	Original GS Front (m)	Proposed GS Front (m)	Approx. Proposed Frost Cover Depth (m)	Minimum Bearing Capacity - Serviceability Limit States (kPa)	Seismic Site Class	Permissible Grade Raise (m)	Above Permissible Grade Raise Front (m)	LWF required in Garage and Front Porch (m)	LWF Required (m)
Block 11 - Unit 5	To Be Provided	88.87	89.50	90.81	1.94	150.00	D	1.00	0.31	n/a	n/a
Block 11 - Unit 6	To Be Provided	88.87	89.50	90.81	1.94	150.00	D	1.00	0.31	n/a	n/a
Block 11 - Unit 7	To Be Provided	88.87	89.50	90.68	1.81	150.00	D	1.00	0.18	n/a	n/a
Block 11 - Unit 8	To Be Provided	88.87	89.50	90.68	1.81	150.00	D	1.00	0.18	n/a	n/a
Block 12 - Unit 1	To Be Provided	88.80	89.25	90.52	1.72	150.00	D	1.00	0.27	n/a	n/a
Block 12 - Unit 2	To Be Provided	88.80	89.25	90.52	1.72	150.00	D	1.00	0.27	n/a	n/a
Block 12 - Unit 3	To Be Provided	88.80	89.25	90.54	1.74	150.00	D	1.00	0.29	n/a	n/a
Block 12 - Unit 4	To Be Provided	88.80	89.25	90.54	1.74	150.00	D	1.00	0.29	n/a	n/a
Block 12 - Unit 5	To Be Provided	88.80	89.50	90.53	1.73	150.00	D	1.00	0.03	n/a	n/a
Block 12 - Unit 6	To Be Provided	88.80	89.50	90.53	1.73	150.00	D	1.00	0.03	n/a	n/a
Block 12 - Unit 7	To Be Provided	88.80	89.50	90.51	1.71	150.00	D	1.00	0.01	n/a	n/a
Block 12 - Unit 8	To Be Provided	88.80	89.50	90.51	1.71	150.00	D	1.00	0.01	n/a	n/a
Block 13 - Unit 1	251 Squadron Crescent	88.44	89.25	90.30	1.86	150.00	D	1.00	0.05	n/a	n/a
Block 13 - Unit 2	253 Squadron Crescent	88.44	89.25	90.33	1.89	150.00	D	1.00	0.08	n/a	n/a
Block 13 - Unit 3	255 Squadron Crescent	88.44	89.25	90.34	1.90	150.00	D	1.00	0.09	n/a	n/a
Block 13 - Unit 4	257 Squadron Crescent	88.44	89.25	90.34	1.90	150.00	D	1.00	0.09	n/a	n/a
Block 13 - Unit 5	259 Squadron Crescent	88.44	89.25	90.55	2.11	150.00	D	1.00	0.30	n/a	n/a
Block 13 - Unit 6	638 Makwa Private	88.44	89.50	90.38	1.94	150.00	D	1.00	n/a	n/a	n/a
Block 13 - Unit 7	636 Makwa Private	88.44	89.50	90.37	1.93	150.00	D	1.00	n/a	n/a	n/a
Block 13 - Unit 8	634 Makwa Private	88.44	89.50	90.37	1.93	150.00	D	1.00	n/a	n/a	n/a
Block 13 - Unit 9	632 Makwa Private	88.44	89.50	90.23	1.79	150.00	D	1.00	n/a	n/a	n/a
Block 13 - Unit 10	630 Makwa Private	88.44	89.50	90.23	1.79	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 1	225 Squadron Crescent	87.96	89.00	89.98	2.02	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 2	227 Squadron Crescent	87.96	89.00	89.98	2.02	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 3	229 Squadron Crescent	87.96	89.00	89.98	2.02	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 4	231 Squadron Crescent	87.96	89.00	89.98	2.02	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 5	233 Squadron Crescent	87.96	89.00	90.12	2.16	150.00	D	1.00	0.12	n/a	n/a
Block 14 - Unit 6	235 Squadron Crescent	87.96	89.00	90.12	2.16	150.00	D	1.00	0.12	n/a	n/a
Block 14 - Unit 7	610 Makwa Private	87.96	89.25	90.04	2.08	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 8	608 Makwa Private	87.96	89.25	90.04	2.08	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 9	606 Makwa Private	87.96	89.25	89.91	1.95	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 10	604 Makwa Private	87.96	89.25	89.91	1.95	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 11	602 Makwa Private	87.96	89.25	89.92	1.96	150.00	D	1.00	n/a	n/a	n/a
Block 14 - Unit 12	600 Makwa Private	87.96	89.25	89.92	1.96	150.00	D	1.00	n/a	n/a	n/a

DSEL Grading Plans Reviewed: Grading Plan - Wateridge - Block 15 - Project 17-946 - Drawing No. GP-1 - Sheet No. 2 of 13 - Revision 4 dated November 11, 2019.

Note: Bearing Capacities noted in the table are the lowest anticipated bearing resistance values. Bedrock and glacial till have higher values, if encountered at footing level.

Note: Reference to block/lot numbers is made in the sense of standing at the street, looking towards the houses, then going from left to right.

patersongroup **memorandum**

consulting engineers

re:	**Geotechnical Response to City Review Comments** **Wateridge Residential Development** **335 St. Laurent Boulevard - Ottawa**
to:	Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com
cc:	DSEL - **Mr. Steve Merrick** - SMerrick@dsel.ca
date:	September 27, 2019
file:	PG4064-MEMO.11

Further to your request, Paterson Group (Paterson) prepared a response to the most recent City of Ottawa review comments in a letter dated August 8, 2019, prepared for the aforementioned development. This memo should be read in conjunction with Paterson Group Report PG4064-2 Revision 2 - Blocks 15, 22 and 24 - June 25-2019.

Geotechnical Comment 1

Comment: *Paterson Group is required to submit a letter to the City of Ottawa signing off on the Grading Plan prepared by DSEL to verify that there are no exceedances from the permissible grade raise, the grading is acceptable from a geotechnical perspective and the proposal is in conformance with the recommendations and statements of the latest Geotechnical Investigation.*

Response: Reference should be made to PG4064-MEMO.08R - Grading Plan Review - April 12, 2019 for Paterson's review of the grading plan for Block 24 and reference should be made to PG4064-MEMO.10 - Grading Plan Review - Block 15 - July 29, 2019 for Paterson's review of the grading plan for Block 15. If site grading has changed since our review of the grading plan, a further assessment should be completed by Paterson.

Geotechnical Comment 2

Comment: *The proposed grading exceeds the permissible grade raise of 1.0 m for the subject site. Please conduct a geotechnical review of the grading information prepared by DSEL and provide lightweight fill requirements for the aforementioned development if this is the selected option being considered by Mattamy Homes to accommodate the grade raise. A summary table of relevant grading information for each housing block shall be provided. Lightweight fill placement details and limits are required to be identified on the Grading Plan prepared by DSEL.*

Response: Reference should be made to PG4064-MEMO.10 - Grading Plan Review - Block 15 - July 29, 2019 for Paterson's review of the grading plan for Block 15. As noted in the grading plan review memo, minor exceedances of the 1 m grade raise were noted. However, Paterson completed further review and the 1 m grade raise is considered very conservative for the soils at the subject site. Therefore, lightweight fill is **not** required based on the current grading for the subject site. If site grading has changed since our review of the grading plan, a further assessment should be completed by Paterson.

Geotechnical Comment 3

Comment: *Clay soils are present within the subject development that are highly sensitive to water depletion by trees of high water demand during periods of dry weather that can cause the clay to shrink resulting in settlement of any adjacent structure(s). Trees proposed within 4.5 m of foundations will be subject to the tree planting conditions established in the Tree Planting in Sensitive Marine Clay Soils 2017 Guidelines. Please establish the Plasticity Index of the clay soil and satisfy the procedures and conditions identified in the Tree Planting in Sensitive Marine Clay Soils2017 Guidelines.*

Response: Reference should be made to PG4064-MEMO.06R - Landscape Plan Review - April 11, 2018 for Paterson's review of the soil plasticity at the subject site. The following is noted in the memo:

"Atterberg testing was completed at seven (7) borehole locations across the overall site, all with plasticity index results of less than 40% (see Atterberg testing results attached). This satisfies the first condition for reducing the tree foundation setback to **4.5 m** in the City of Ottawa guideline "Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines."

Geotechnical Comment 4

Comment: *It is expected that bedrock removal will be required. Any blasting activities shall conform to City of Ottawa standard S.P. Np. F-1201. A pre-blasting survey is required to be completed prior to any blasting operations and written notification to all owners and tenants of buildings within 150 m shall be given a minimum of 15 days prior to any blasting commencing.*

Response: Reference can be made to Section 5.2 of the above noted geotechnical report for recommendations regarding bedrock removal. If blasting is required, a pre-blasting survey could be completed by Paterson for the relevant neighbouring structures upon request.

Geotechnical Comment 5

Comment: *Please provide Squadron Crescent road reinstatement recommendations.*

Response: Reference can be made to Table 4 within Section 5.7 of the above noted geotechnical report. Squadron Crescent would be considered a local roadway within the development and the pavement structure presented in Table 4 would be applicable for this roadway. The following additional recommendations are provided.

The pavement structure, where it abuts the existing pavement not being replaced, should be placed as follows:

- ❑ A 300 mm wide section of the existing asphalt roadway should be sawcut from the existing pavement edge to provide a sound surface to abut the proposed pavement structure.
- ❑ It is recommended to mill a 300 mm wide and 40 mm deep section of the existing asphalt, and construct an extension of the subbase and base to the widened section, and then place a new asphalt surface.
- ❑ The proposed pavement structure subbase materials should be tapered no greater than 3H:1V to meet the existing subbase materials.
- ❑ The new pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD.
- ❑ 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 II material compacted in maximum 300 mm loose lifts.
- ❑ Clean existing granular road subbase materials can be reused upon assessment by the geotechnical consultant at the time of excavation (construction) as to its suitability.

Geotechnical Comment 6

Comment: *Please document what the elevation of the groundwater table is in relation to the proposed USF elevations and foundation drains.*

Response: Based on the results of the geotechnical investigation and the proposed underside of footing elevations, the long-term groundwater level is anticipated to be a minimum of 1 m below the underside of footing and foundation drains. The long-term groundwater elevation is anticipated to be below the elevation of 87 m with respect to the underside of footing elevations which are proposed at 88 m or higher. It should be further noted that a groundwater lowering of 0.5 m is expected due to the proposed development. Therefore, the proposed underside of footing elevations are acceptable from a geotechnical perspective regarding the long term groundwater level.

Geotechnical Comment 7

Comment: *Please review the proposed LID measures and provide recommendations from a geotechnical perspective.*

Response: Reference should be made to PG4064-MEMO.09 - Infiltration Rates - January 21-2019 for recommendations regarding the infiltration rates of the native soils.

Additional recommendations include the following:

- ❑ The fill between the clear stone media and the building footprint should consist of an impermeable silty clay to act as a clay seal. A minimum 3 m offset should be provided between the clear stone trench and the foundation walls of the proposed buildings (where livable space is located on the opposite side).
- ❑ A 150 mm thick scarification can be provided at the interface between the clear stone and the native soil.
- ❑ A non-woven geotextile liner, such as Terrafix 360R or equivalent, should fully surround the clear stone to prevent migration of fines into the clear stone.

Site Servicing Plan Comment 15

Comment: *The proposed private watermain and sanitary sewer along the north property line with a separation less than a horizontal separation distance of 2.5 m (edge of pipe to edge of pipe) is not supported. The reduced separation distance may be supported by Procedure F-6-1 however there appears to have been no consideration for future maintenance challenges as the sewer and watermain are located below the proposed underside of footings with minimal setback from the foundations. Repairing this private infrastructure without adversely impacting the structures and encroaching into the ROW will be difficult and unavoidable. Any maintenance costs will be significantly increased. Please investigate alternatives as any future repair costs will be the responsibility of the condominium corporation. Consideration shall be given to the future maintenance/repair challenges and associated costs with the servicing strategy and stormwater management solution proposals. Please demonstrate how this infrastructure would be serviced in the future for the City to review and provide recommendations from the geotechnical engineer. If these Blocks are to form part of the future condominium corporation the units shall be serviced internal to the development. Individual service connections under the current scenario to the public infrastructure within Mikinak Road would not be supported.*

Response: Reference should be made to PG4064-MEMO.12 - Lateral Support of Footings - September 26-2019 for information regarding the above noted comment. This memo should be read in conjunction with DSEL's drawings. This memo only addresses geotechnical aspects of footing/service lateral support. Impacts to ROW and additional costs to be addressed by Mattamy/DSEL.

We trust that this information satisfies your requirements.

Paterson Group Inc.



Colin Belcourt, P.Eng.

David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re: **Geotechnical Recommendations - Review of Servicing Installation Impact on Adjacent Building Foundations**
Block 15 - Wateridge Residential Development
335 St. Laurent Boulevard - Ottawa

to: Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com

cc: DSEL - **Mr. Steve Merrick** - SMerrick@dsel.ca

date: December 19, 2019

file: PG4064-MEMO.12 Revision 4

Paterson Group (Paterson) has prepared the current memorandum report to provide geotechnical recommendations for the foundation support program for the building footings directly adjacent to the proposed services at the aforementioned site.

Background Information

Paterson reviewed the following plans and sketches provided by David Schaeffer Engineering Limited (DSEL) for servicing at the aforementioned residential development:

- ❏ Site Servicing Plan - Wateridge - Block 15 - Project No. 17-946 - Drawing No. SSP-1 - Sheet 3 of 14 - Revision 7 dated December 19, 2019.
- ❏ Details and Notes - Project No. 17-946 - Drawing No. DS-2 - Sheet 13 of 14 - Revision 7 dated December 19, 2019.
- ❏ Grading Plan - Wateridge - Block 15 - Drawing GP-1 - Sheet 2 of 14, Revision 7 dated December 19, 2019.
- ❏ Cross Section - Wateridge - Block 15 - Project No. 17-946 - Drawing No. DS-3 - Sheet 14 of 14, Revision 7 dated December 19, 2019.

Based on the cross section details provided by DSEL, cross sections A-A, E-E and F-F have service pipes and structures located within the lateral support zone of the adjacent building foundation:

- ❏ A-A: The underside of the bedding for the watermain pipe will be located at approximately 86.57 m and the underside of footing is located at an elevation of 88.63 m. Therefore, the vertical separation is approximately 2.06 m with a lateral separation of approximately 2.2 m which does not include the additional trench excavation.

Cross section A-A and F-F has been updated since Paterson's initial review to include a fire line meter chamber. Based on the updated cross section provided by DSEL, the chamber is located in close proximity to the building footing and is therefore within the lateral support zone. The underside of the chamber appears to be located at an elevation of approximately 85.80 m. However, the chamber is only located within a limited section of the adjacent foundation.

- ❑ E-E: The underside of the bedding for the sanitary sewer pipe will be located at approximately 87.11 m and the underside of footing is located at an elevation of 88.64 m. Therefore, the vertical separation is approximately 1.53 m with a lateral separation of approximately 2.14 m which does not include the additional trench excavation. However, the stair footings are anticipated to be founded directly over the watermain pipe.

Based on the proposed service and structure locations with respect to the adjacent building foundations, the following backfilling program is recommended to ensure that adequate lateral support is provided to the adjacent buildings.

Recommendations

Section A-A

To avoid undermining the footings adjacent to the watermain pipe, the watermain should be raised a minimum of 0.6 m, such that the top of the watermain pipe is located at an elevation of 87.52 m. This would put the underside of the bedding at an approximate elevation of 87.17 m. Based on the lateral separation, the watermain would not longer be within the lateral support zone of the footing if placed at this elevation and additional concrete below the footing would not be required. The watermain can be provided with insulation as per City of Ottawa Standards.

Sections A-A and F-F

To ensure that lateral support is not disturbed for the building footings adjacent to the fire line meter chamber, the space between the chamber and the excavation sidewall below the building foundation should be backfilled with concrete. It is recommended that the chamber be installed and the area backfilled with concrete shortly after the area is excavated. The excavation sidewall should be clean of loose material at the time of concrete placement to prevent voids.

Section E-E

The above noted cross section indicates that a concrete infilled trench has been provided to an elevation of 87.26 m to match the elevation of the sanitary sewer as per previous discussions between Paterson and DSEL Based on our review, the cross section provided is as per Paterson's recommendations and acceptable from a geotechnical perspective for protecting the lateral support zone of the building footings.

However, reference should be made to Paterson's previous memo, PG4064-MEMO.07 - Response to City of Ottawa Review Comments - July 11-2018. As per the previous recommendations in this memo, the watermain is to be encased in concrete where the watermain runs below the porch stair footings. A sleeve is to be provided for the watermain where it is encased in concrete as per the previous recommendations. Based on these recommendations, the concrete infilled trench shown below the footing should be expanded to the following dimensions:

- ❑ The concrete infilled trench should extend from the invert of the sanitary sewer up to the underside of the porch footings. Based on the detail provided, the stair footings appear to be similar in elevation to the building footings.
- ❑ The concrete infilled trench should be a minimum of 300 mm beyond the edge of the footing in the direction parallel to the watermain.
- ❑ The concrete infilled trench should extend past the sleeved watermain away from the building. Depending on the extent of the stair footings with respect to the sanitary sewer pipe, the concrete infilled trench may need to extend past the sanitary sewer pipe if there is insufficient space to install the sanitary sewer adjacent to the concrete infill which extends to the sanitary invert. This could be determined on a case by case basis. A larger sleeve similar to the sleeve detail provided for the watermain could be provided for the sanitary sewer pipe if it is required to be encased in concrete.

With regards to the proposed window well located on this side of the house, the exterior edge of the window well is located approximately directly over the watermain pipe. Therefore, if future excavation down to the watermain pipe is required, the window wells would could be partially impacted and may require minor reinstatement after excavation. It is expected that reinstating the window wells as required would be easier and more cost effective than attempting to protect them from future excavation which may or may not be required.

If excavation down to the sanitary sewer is required, no damage to the window well would be anticipated as a trench box would sufficiently retain the soil beneath a light feature such as a window well.

Additional Recommendations

- ❏ Step 1 - Upon completion of the service placement, a workable, brown silty clay backfill placed under dry conditions and approved by the geotechnical consultant at the time of placement is considered acceptable for reuse. The silty clay backfill should be placed in maximum 300 mm loose lifts and compacted using a sheepsfoot roller making several passes to achieve a minimum 95% of its SPMDD. Where required, the service pipe should be adequately encased in concrete as described above.
- ❏ Step 2 - At the time of house construction, concrete should be placed below footing level within the areas described above. The concrete in-filled trench should extend to the above noted elevations of the adjacent sections of pipe or chamber. The concrete supporting the footings should extend horizontally at least 300 mm beyond the outside of the footing face. The trench should be in-filled with lean mix concrete to the underside of footing level.
- ❏ The recommended sub-excavated trench should extend below the footings which are directly adjacent to the service trenches and adjacent building foundation walls. The trench should extend at least 1.5 m horizontally below the foundation walls running perpendicular to the service pipes and be stepped with maximum 600 mm high steps back up to design underside of footing.
- ❏ Paterson personnel should complete inspections at the time of construction.

We trust that this information is satisfactory to meet your immediate requirements.

Paterson Group Inc.

Colin Belcourt, P.Eng.



David J. Gilbert, P.Eng.

Paterson Group

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patersongroup **memorandum**

consulting engineers

re:	**Geotechnical Response to City Review Comments** **Wateridge Residential Development** **335 St. Laurent Boulevard - Ottawa**
to:	Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com
date:	November 6, 2019
file:	PG4064-MEMO.13

Further to your request, Paterson Group (Paterson) prepared a response to the most recent City of Ottawa review comments in a letter dated October 28, 2019 prepared for the aforementioned development. This memo should be read in conjunction with Paterson Group Report PG4064-2 Revision 2 - Blocks 15, 22 and 24 - June 25-2019.

Geotechnical Comment 1

Comment: *Please confirm that the service pipes (100 mm dia. watermain and 200 mm dia. sanitary sewer) proposed between Block 1 and Block 2 (drawing no. PP-6 prepared by DSEL) are not within the lateral support zone of the proposed building footings. Please confirm that any future excavation of these services will not undermine the lateral support zone of the footings thus no requirement to provide a lightweight concrete in-filled trench to match the underside of the sanitary sewer. Details shall be documented on drawing PP-6 prepared by DSEL.*

Response: Reference should be made to PG4064-MEMO.14 - Lateral Support of Footings - November 6-2019 for recommendations regarding the lateral support of the Block 1 and Block 2 footings adjacent to the proposed service pipes.

Geotechnical Comment 2

Comment: *The reinforcement of foundation walls needs to be confirmed to satisfy the Tree Planting in Sensitive Marine Clay Soils-2017 Guidelines. Due to the presence of sensitive marine clay soils and reduced tree setbacks some foundation walls within the development will require a min. of two 15-M bars in the upper and lower sections of the foundation walls. Please document which Blocks require reinforcement. This needs to be documented in the geotechnical report to satisfy the condition. A condition will be included in the SPA to collect securities for the reinforcement of foundation walls and a letter provided to confirm the foundation walls have been reinforced per the Tree Planting in Sensitive Marine Clay Soils 2017 Guidelines.*

Response: Reference should be made to PG4064-MEMO.15 - Landscape Plan Review - Block 15 - November 6, 2019. This memo also includes Paterson's review of the soil plasticity at the subject site.

Geotechnical Comment 3

Comment: *The Landscaping Plan Review memorandum PG4064-MEMO.06R dated April 11, 2018 makes reference to an older revision of the landscaping plans prepared by NAK and is said to be read in conjunction with the Geotechnical Report dated August 8, 2017. The latest revision of the geotechnical report submitted in support of the development control application is dated June 25, 2019. Please provide an updated memorandum.*

Response: Reference should be made to PG4064-MEMO.15 - Landscape Plan Review - Block 15 - November 6, 2019 for a review of the current landscaping plans and referencing the current geotechnical report.

Landscaping Plan Comment 1

Comment: *Clay soils are present within the subject development. Trees are being proposed within 4.5 m of building foundations. Reduced tree to foundation setbacks are subject to the tree planting conditions established in the Tree Planting in Sensitive Marine Clay Soils-2017. The six conditions per the Tree Planting in Sensitive Marine Clay Soils-2017 Guidelines are to be met to allow any trees within 4.5 m of a building foundation. Paterson Group has indicated that the plasticity index of the soil does not exceed 40% satisfying the first condition to reduce the tree to foundation setback to 4.5 m however the other conditions have not been discussed.*

Response: Reference should be made to PG4064-MEMO.15 - Landscape Plan Review - Block 15 - November 6, 2019 which discusses the remaining conditions. However, it should be noted that Paterson is not responsible for all conditions, as indicated in the memo.

Landscaping Plan Comment 6

Comment: *Please include the following in a table format to satisfy the condition per the Tree Planting in Sensitive Marine Clay Soils-2017 Guidelines. The USF is required to be 2.1 m below the finished grade (footing level satisfied within 10 m of the tree).*

- ❏ *The foundation depth (as measured between the underside of footing and the lowest finished grade) identified for every Block with low/medium clay soils*
- ❏ *USF elevation proposed*
- ❏ *Lowest finished grade elevation proposed*
- ❏ *Foundation depth (difference between USF and lowest finished grade).*

Response: Reference should be made to PG4064-MEMO.15 - Landscape Plan Review - Block 15 - November 6, 2019 which provides a table with the above noted elevations and commentary regarding the underside of footing elevations with respect to tree planting.

We trust that this information satisfies your requirements.

Paterson Group Inc.







Colin Belcourt, P.Eng.

David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re: **Geotechnical Recommendations - Review of Servicing Installation Impact on Adjacent Building Foundations**
Wateridge Residential Development
335 St. Laurent Boulevard - Ottawa

to: Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com

cc: DSEL - **Mr. Steve Merrick** - SMerrick@dsel.ca

date: November 6, 2019

file: PG4064-MEMO.14

Paterson Group (Paterson) has prepared the current memorandum report to provide geotechnical recommendations for the foundation support program for the building footings directly adjacent to the proposed services at the aforementioned site.

Background Information

Paterson reviewed the following drawing provided by David Schaeffer Engineering Limited (DSEL) for servicing at the aforementioned residential development:

- ❏ Servicing Between Blk 1 and Blk 2 - Plan and Profile - Project No. 17-946 - Drawing No. PP-6 - Sheet 9 of 14 - Revision 4 dated November 1, 2019.

Based on our review of the above noted drawing, the following information is provided:

- ❏ Block 1: The underside of the bedding for the watermain and sanitary pipes will be located at approximately 87.25 and 86.15 m, respectively. The underside of footing for Block 1 is located at an elevation of 87.80 m. Therefore, the vertical separations are approximately 0.55 m and 1.65 m between the underside of footing and underside of bedding for the watermain and sanitary pipes, respectively. Taking into account the extents of the outside of the footing and the trench excavations, a horizontal separation from the footing of 1.9 m and 3 m has been taken for the watermain and sanitary pipes, respectively.
- ❏ Block 2: The underside of the bedding for the watermain and sanitary pipes will be located at approximately 87.25 and 86.15 m, respectively. The underside of footing for Block 2 is located at an elevation of 88.25 m. Therefore, the vertical separations are approximately 1 m and 2.1 m between the underside of footing and underside of bedding for the watermain and sanitary pipes, respectively. Taking into account the extents of the outside of the footing and the trench excavations, a horizontal separation from the footing of 3.2 m and 2.2 m has been taken for the watermain and sanitary pipes, respectively.
- ❏ To provide adequate lateral support to the footings, a lateral support zone of 1.5H:1V extending down and away from the outside edge of the footing should remain undisturbed by either excavation to install the services or to replace in the future.

Based on the proposed service depths and locations with respect to the proposed footings, the excavation for the service trenches will cause undermining of the footings for Block 2. To avoid undermining of the footings, the following is recommended:

Recommendations

Block 1

Based on our review, the installation of the proposed services will not have an impact on the lateral support zone of the footings for Block 1. Therefore, a concrete infilled trench below the footings for Block 1 is not required.

Block 2

Based on our review of the above noted dimensions provided for Block 2, the excavation of the sanitary sewer pipe will undermine the lateral support zone of the proposed footings. As a result, the following is recommended for the footings of Block 2 adjacent to the service pipes:

- ❑ Step 1 - Upon completion of the service placement, a workable, brown silty clay backfill placed under dry conditions and approved by the geotechnical consultant at the time of placement is considered acceptable for reuse. The silty clay backfill should be placed in maximum 300 mm loose lifts and compacted using a sheepsfoot roller making several passes to achieve a minimum 95% of its SPMDD.
- ❑ Step 2 - At the time of house construction, a lightweight concrete in-filled trench should be sub-excavated below footing level down a minimum elevation of 87.00 m. The near vertical, zero entry trench should extend horizontally at least 300 mm beyond the footing face. The trench should be in-filled with a lightweight concrete, such as a structural lightweight aggregate concrete or polystyrene lightweight fill, to underside of footing level.
- ❑ The recommended sub-excavated trench should extend below the footings which are directly adjacent to the service trenches and extend along the adjacent building foundation walls. The trench should extend at least 1.5 m horizontally below the foundation walls running perpendicular to the service pipes and be stepped with maximum 600 mm high steps back up to design underside of footing.
- ❑ Paterson personnel should complete inspections at the time of construction.

We trust that this information is satisfactory to meet your immediate requirements.

Paterson Group Inc.







Colin Belcourt, P.Eng.

David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re:	**Landscaping Plan Review - Block 15** **Wateridge Residential Development - Phase 1B - Block 15** 335 St. Laurent Boulevard - Ottawa
to:	Mattamy Homes - **Ms. Jillian Normand** - Jillian.Normand@mattamycorp.com
cc:	NAK Design Strategies - **Mr. Christian Matteau** - cmatteau@nak-design.com
date:	December 18, 2019
file:	PG4064-MEMO.15 Revision 3

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a review of the landscaping drawings for Block 15 of the aforementioned residential development. It should be noted that Block 15 is located both on City of Ottawa publicly owned roads and on a private road. The following memorandum should be read in conjunction with Paterson Report PG4064-2 Revision 3 - Blocks 15, 22 and 24 dated December 4, 2019. It should be noted that this memo supersedes any landscaping plan review memos issued before this date.

Landscaping Plan Review

Paterson reviewed the following landscaping plan prepared by Nak Design Strategies and grading plan prepared by DSEL regarding the aforementioned development:

- ❏ Block 15 Site Plan - Job No. Mattamy - Wateridge, File No. D07-12-19-0020, Drawing No. A1, Revision dated November 21, 2019.
- ❏ Landscape Plan - Blocks 15 - Job No. 17-047, Sheet No. L-02, Revision 8 dated December 3, 2019.
- ❏ Grading Plan - Wateridge Block 15 - 245 Squadron Crescent - Project No. 17-946, Drawing No. GP-1, Sheet 2 of 14, Revision 5 dated November 11, 2019.
- ❏ Streetscape Plan (proposed) prepared by Lashley and Associates.

Lots Adjacent to publicly owned roads

Based on the landscaping plans provided, the proposed tree planting is in compliance with the recommendations provided by Paterson and is considered acceptable from a geotechnical perspective, provided the items noted below are addressed. Atterberg testing was completed at seven (7) borehole locations across the overall site, all with plasticity index results of less than 40% (see Atterberg testing results attached). This satisfies the first condition for reducing the tree foundation setback to **4.5 m** in the City of Ottawa guideline “Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines.”

The following conditions are also required to be met based on the tree planting guidelines:

- ❏ The proposed trees should have a minimum setback of 4.5 m from the proposed foundation walls. Based on our review of the landscaping plan, a 4.5 m setback has been provided for all street trees. It was noted that the 4.5 m setback intersected with some front steps along Mikinak Road.
- ❏ The underside of footing is required to be 2.1 m below finished grade at the locations of the trees. Reference should be made to Table 1 below and following comments regarding the underside of footing elevations.
- ❏ Adequate soil volumes are required to be provided for the proposed trees - 25 cubic meters for small trees and 30 cubic meters for medium trees. This should be confirmed by the landscape architect.
- ❏ Tree species are required to be small to medium size, confirmed by the landscape architect. Reference should be made to the section below for comments regarding the tree species and appropriate setbacks from building foundation walls.
- ❏ The foundation walls are required to have a minimum of two 15-M bars in the upper and lower sections of the foundation walls. This should be indicated on the drawings for the relevant blocks foundation wall. Reference should be made to the additional comments below.
- ❏ Grading surrounding the tree should be designed to promote draining towards the tree root zone. This should be confirmed by the landscape architect and civil engineer.

Table 1 below provides a summary of the landscaping and grading information for the relevant Blocks:

Table 1 - Landscaping Plan and Grading Details					
Block	**Underside of Footing Elevation**	**Lowest Prop. Finished Grade**	**Foundation Depth (m)**	**Underside of Engineered Pad (If Required)**	**Tree to Foundation (m)**
1	87.86	89.70	1.84	87.6	5.5
2	88.06	90.15	2.09	88.05	5.5
3	88.35	90.50	2.15	n/a	5.6
4	88.57	90.68	2.11	n/a	5.6
5	*88.00*	*89.89*	*1.89*	*n/a*	*4.8*
6	*88.75*	*90.62*	*1.87*	*n/a*	*5.2*
7	*88.60*	*90.40*	*1.8*	*n/a*	*4.5*
8	89.48	91.03	1.55	88.93	5.6
9	89.30	90.81	1.51	88.71	5.6
10	89.09	90.85	1.76	88.75	7.0
11	88.87	90.52	1.65	88.42	5.0
12	88.80	90.31	1.51	88.21	5.5
13	88.44	90.13	1.69	88.03	5.0
14	87.96	89.91	1.95	87.81	5.2
❑ Italicized blocks are located on privately owned roads					

Based on our review, the following outstanding issues need to be completed for the proposed development to qualify for the reduced tree planting setback:

Item A: Underside of Footing Elevation

Based on our review, a 2.1 m depth to underside of footing has not been provided for the blocks which have trees less than 7.5 m from the foundation wall. To provide the equivalent of a 2.1 m foundation depth, the following is recommended:

To compensate for the reduced foundation depth, an engineered fill pad (OPSS Granular A or Granular B Type II) can be placed below the footing to the elevation of 2.1 m below proposed finished grade surrounding the building. The engineered fill pad will effectively increase the depth between the finished grade and the underlying silty clay deposit to the required 2.1 m which achieves the same goal as lowering the footing from a tree planting perspective. Reference can be made to Figure 1 attached for additional information.

These recommendations are required for Blocks 1, 2, 8, 9, 10, 11, 12 and 13.

Item B: Tree Species

As discussed with the landscape architect, it should be confirmed that the tree species placed within 7.5 m of the foundation wall consist of small and medium size trees with a mature tree height less than or equal to 14 m. It is understood that the tree heights listed on the plan are the mature heights of these trees in natural conditions and not in city conditions.

Item C: Additional Reinforcing Requirements

As required by the guidelines, the foundation walls should be provided with a minimum of two 15-M bars in the upper and lower sections of the foundation walls. This should be indicated on the relevant drawings and reviewed by Paterson at the time of construction. This requirement applies to **all residential blocks** within Block 15 of Phase 1B.

It is understood that some trees may be provided by others. If these trees meet the requirements to provide the additional reinforcing steel for the remaining blocks, this should be completed as required.

Provided these remaining conditions have been met, the landscaping drawings noted above are in compliance with the City of Ottawa tree planting guidelines.

Item D: Trees within 4.5 m of Front Stairs

Based on our review of the above noted drawings, the footing depths were found to be at a minimum of 1.8 m below proposed finished grade or lower. Based on the newest tree planting guidelines, the footings need to be placed at a minimum depth of 2.1 m below finished grade. It is understood that a number of the stair case structures have 2 or 3 of risers extending horizontally beyond the foundation walls towards Mikinak Road, which includes **Blocks 1-4**. In order to avoid lowering the footings and/or have differential settlement due to part of the riser being within the 4.5 m tree setback, it is recommended that where the front porch footings/risers are located within the 4.5 m setback, a granular backfill be introduced. Where the 2.1 m soil cover is not satisfied, the native material within the footprint of the front porch footings should be sub-excavated to a maximum 300 below the usf level and replaced with a granular pad consisting of OPSS Granular A or Granular B Type II placed in 300 mm loose lifts and compacted to 98% of the material's SPMDD. The granular pad should only be extended horizontally a minimum of 600 mm beyond the face of the foundation wall (towards the interior side of the front porch). It is important to note that a minimum 3H:1V frost taper will be required to transition from the granular pad to the native soil. Please refer to Figure 1 attached.

In addition, the backfill against the front facing porch foundation should also be backfilled with the above noted granular material. The horizontal extent of the foundation wall backfill should be dependent on the extent of the risers above, a minimum of 300 mm wide layer should be provided beyond the lowest riser.

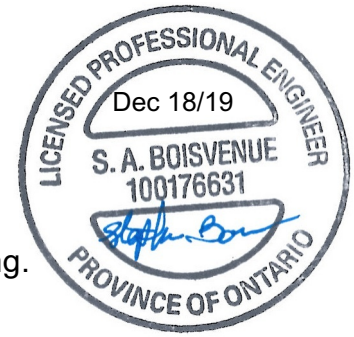
Lots adjacent to privately owned roads

It is noted that Blocks 5, 6 and 7 of this proposed development is to be serviced by a private road. It should also be noted that the City of Ottawa guidelines are not applicable to this subject block due to the block being serviced by a private road. Upon review of the aforementioned drawings, all proposed tree setbacks are considered acceptable from a geotechnical perspective and damage due to the proposed tree planting will not occur.

We trust that this information satisfies your immediate requirements.

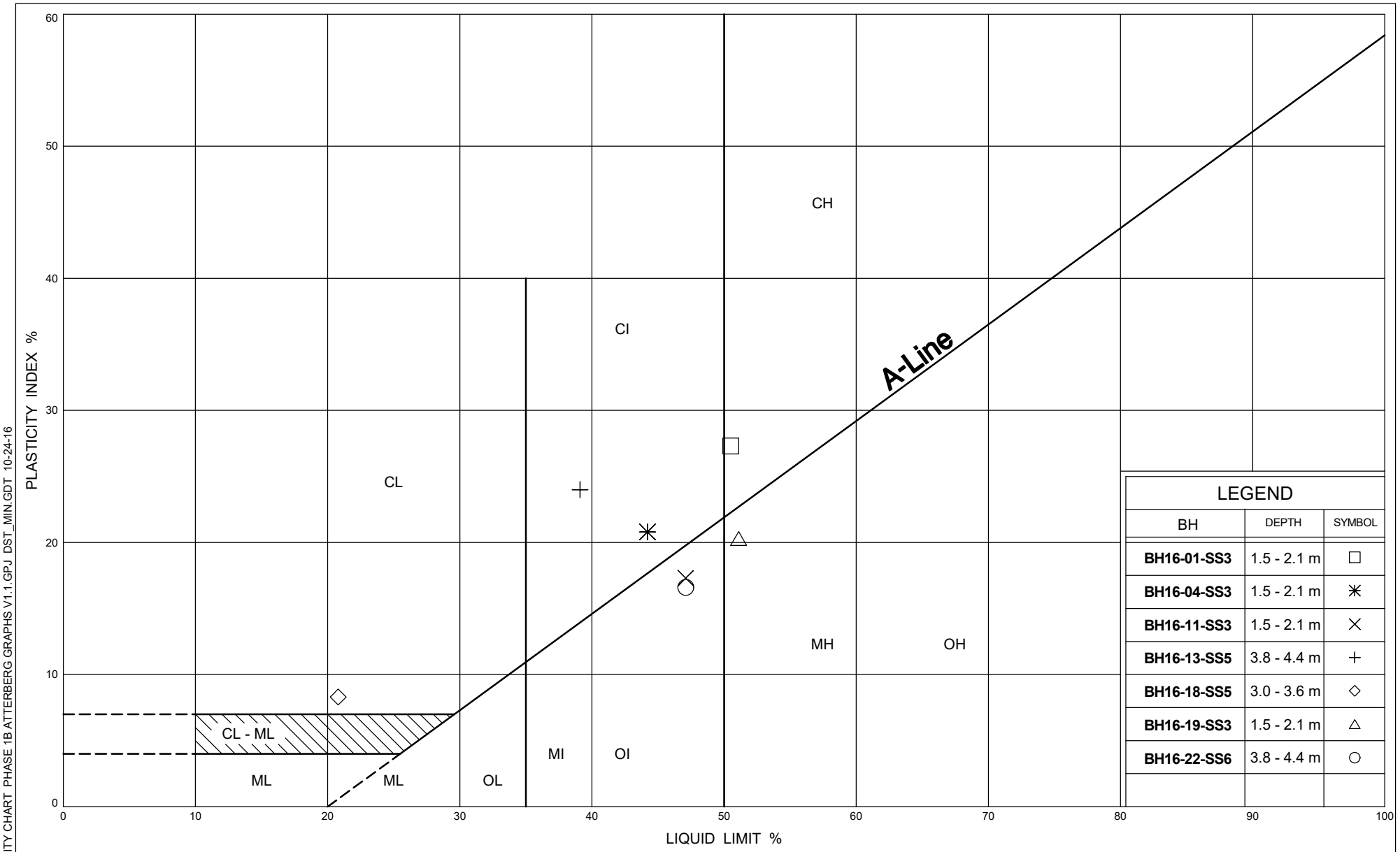
Best Regards,

Paterson Group Inc.



Stephanie A. Boisvenue, P.Eng.

Faisal I. Abou-Seido, P.Eng.



ONTARIO MOT PLASTICITY CHART PHASE 1B ATTERBERG GRAPHS V1.1.GPJ DST_MIN.GDT 10-24-16

DST consulting engineers

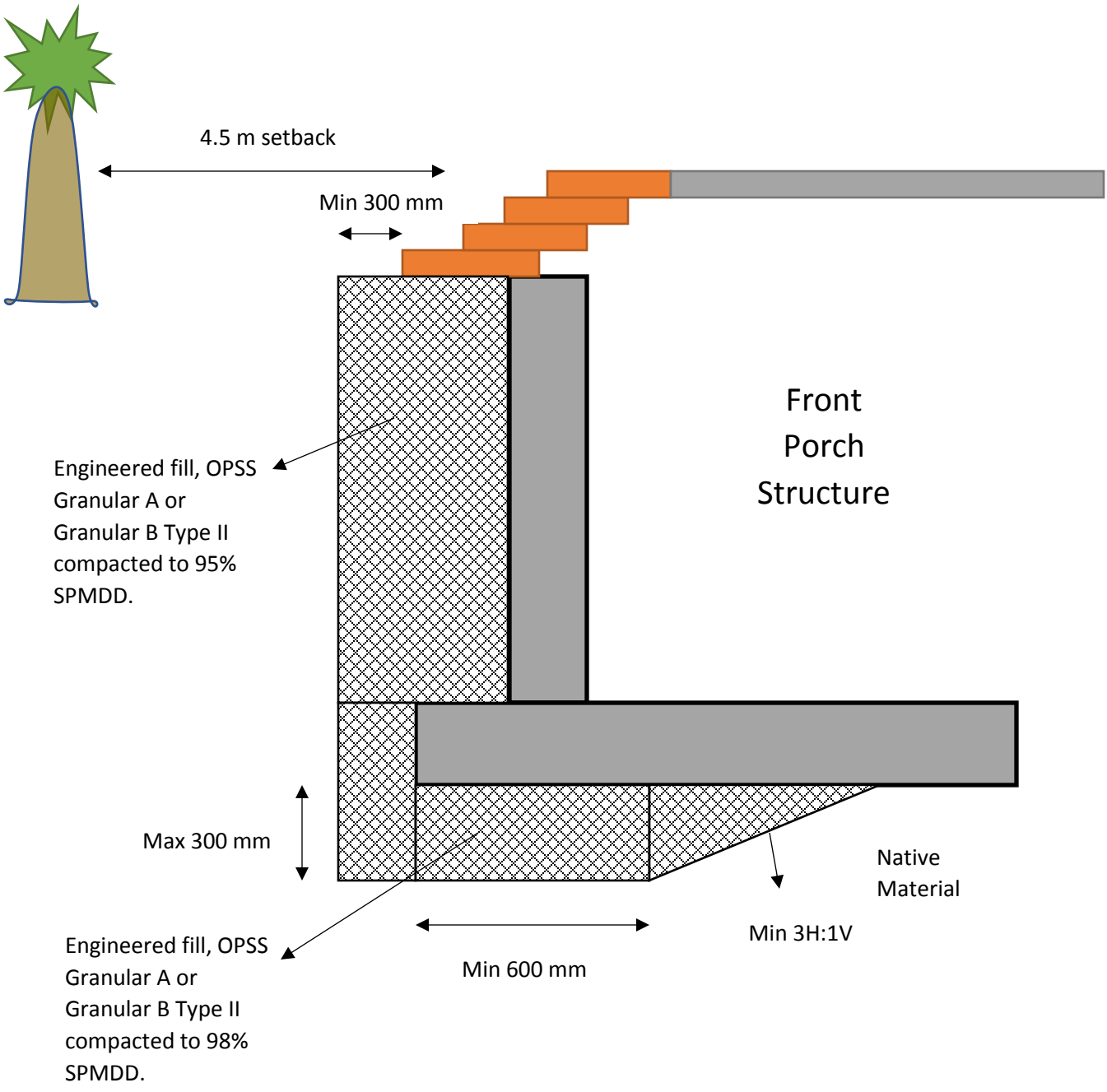
PLASTICITY CHART

DST Ref. No.: **IN-SO-026755**

Client: **Canada Lands Company**

Project: **Site Servicing Phase 1B**

Figure 1 - Trees Along Mikinak Road Intersecting with Front Porch Structures



Note:

- Where front porch footings have a minimum depth below finished grade of 2.1 m, the granular pad below the footings will not be required.
- The placement of the engineered fill should be reviewed and approved in the field by Paterson personnel.

Steve Merrick

From: Winston Yang <Winston.Yang@ibigroup.com>
Sent: Wednesday, August 16, 2017 11:50 AM
To: Adam Fobert; Jean Lachance
Cc: Jillian Normand; Jim Moffatt
Subject: RE: 918 Mattamy - Wateridge: IBI Servicing Review

Hi Adam and Jean,

I have reviewed the impact as per DSEL design for Block 15, 22 and 24.

Upon review of the proposed grading plans for Blocks 15, 22, and 24, we found the leave grades provided by DSEL to be reasonable.
We do not have a conceptual plan for Block 19 yet. The leave grades for that block seem low for a typical basement development. However they might be fine if underground parking is planned.

For the Servicing side, the storm and sanitary outlets location for each block were changed compared to the MSS and Design Brief.
Then we have implemented the changes DSEL made into our sewer design and have examined the capacity for each downstream sewers.
The result shows that the downstream sewers for storm and sanitary have the capacity to convey the flow for all new outlets for blocks, 15, 22 and 24.

In order to minimize the impact and cost, we are going to shift some manholes to accommodate the new outlets base on DSEL design.
For Block 22, MH210 and MH210A can be shifted to the south to replace the STM101 and SAN1 along Michael Stoqua Street.
For Block 24, MH213 and MH213A can be shifted to the south to replace the STM101 and SAN1 along Moses Tenisco Street. At the same time, MH212 and MH212A will be shifted to the south in order to reduce the length of the sewers.
For Block 15, there is no choice, the manhole STM101 and SAN1 are required for Squadron Crescent.
Since the typical 1200mm Dia. Manholes have been already ordered by the contractor.
We will contact the contractor to find out any further impacts will be caused by shifting the manholes.

For the storm section below. DSEL met the IBI criteria for the proposed lots.
In regards to Block 19, the drainage areas should be corresponded to IBI Lot141, Lot 167 in Phase 1A and Lot208B, Lot209 in Phase 1B.
And the IBI 100 year capture rate is 475l/s (283l/s+63l/s+46l/s+83l/s). Please considered in your design later on.

Should you have any questions please do not hesitate to contact either Jim or me.

Yours truly,

Winston Yang P.Eng.

email Winston.Yang@ibigroup.com web www.ibigroup.com

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From: Adam Fobert [mailto:AFobert@dsel.ca]
Sent: Tuesday, August 15, 2017 5:27 PM
To: Winston Yang <Winston.Yang@ibigroup.com>; Jim Moffatt <jmoffatt@IBIGroup.com>
Cc: Jean Lachance <JLachance@clc.ca>; Jillian Normand <Jillian.Normand@mattamycorp.com>
Subject: 918 Mattamy - Wateridge: IBI Servicing Review

Hello Jim and Winston,

How is your review of our site servicing is coming along? I have reviewed your Design Brief's for Phase 1A and 1B and have compared the analysis contained within to our proposed design.

I offer the following considerations based on my review:

General:
DSEL proposed one storm and one sanitary connection to each block. The City indicated that this was their expectation during our pre-consultation as it is their standard practice for multi-block parcels.

Block 15: The servicing brief shows three connections to Squadron Crescent. DSEL are proposing one connection downstream of the contemplated connections.

Block 22: The surrounding grades slope from east to west. The servicing brief shows a drainage divide mid-block, where half the site drains to Moses Tenisco and the other to Michael Stoqua . Moses Tenisco is 1.14m higher than Michael Stoqua at the proposed road connection points. As such, to avoid fighting grades DSEL proposed storm and sanitary connections to Michael Stoqua only.

Block 24: Moses Tenisco slopes from north to south 1.1m from Hemlock to Mikinak. The servicing brief shows a drainage divide mid-block with connections to Moses Tenisco and Mikinak. DSEL proposed a storm and sanitary outlet at the southern road connection on Moses Tenisco based on Mattamy's proposed site. This avoids fighting grades internally.

Wastewater:
Block 15:

IBI Servicing Brief = 487.3p
Mattamy Proposal = 335p

Proposed connections are downstream of IBI contemplated connections. Population is less than included in servicing brief. Therefore, we do not expect servicing issues with Block 15.

Block 22:

IBI Servicing Brief ~ 105p (note that I am interpolating since half of Block 22 is included in northern half of Block 24.)

Mattamy Proposal = 52p

IBI servicing brief assumed 52.5p tributary to Moses Tenisco. Therefore, we do not expect capacity issues.

Block 24:

IBI Servicing Brief ~284.4p (note that I am interpolating based on the population shown on phase 1A southern half of block 24).

Mattamy Proposal = 364p

DSEL reviewed the available capacity in the receiving sewers and did not see any capacity issues.

Note: Mattamy's proposed servicing eliminates the need for 63.8m of sanitary sewer on Moses Tennisco from MH213A to MH212A. Savings to CLC.

Stormwater:

I have reviewed Appendix E of the servicing briefs to compare our calculations to the assumptions used in the model.

Review of the Summary of DDSWMM Parameters

Block 15:

IBI Servicing brief: No storage assumed. 5 and 100 year capture 396L/s

Mattamy's proposal: 275m3 of storage provided. DSEL's estimated 5-year peak 357.4L/s

Block 19:

IBI Servicing brief: No storage assumed. 194 + 57 (note that Lot 209 and 208B are missing from chart).

Mattamy's proposal: TBD.

Block 22:

IBI Servicing brief: No storage assumed. 5 and 100 year (46 + 46) 92L/s

Mattamy's proposal: 46.5m3 of storage provided. DSEL's estimated 5-year peak 87L/s.

Block 24:

IBI Servicing brief: No Storage. 5 and 100 year capture (162 +162) 324L/s.

Mattamy's proposal: 27.3m3 of storage provided. DSEL's estimated 5-year peak 325.7L/s.

Let me know if you have any comments or questions. Thank you for your time.

Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
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email: afobert@DSEL.ca

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Genavieve Greenberg

From: Jim Moffatt <jmoffatt@IBIGroup.com>
Sent: Tuesday, October 1, 2019 11:26 AM
To: Genavieve Greenberg; Ed Ireland; Karlinda Hinds
Cc: Jillian Normand; Adam Fobert
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

All sewers and watermains in Wateridge Village Phase 1B, including those on Squadron Crescent and downstream, are in service. If you require any further confirmation of Phase 1B services or have other questions about this Phase, just call me.

From: Genavieve Greenberg [mailto:GGreenberg@dsel.ca]
Sent: Friday, September 27, 2019 11:00 AM
To: Jim Moffatt <jmoffatt@IBIGroup.com>; Ed Ireland <ed.ireland@IBIGroup.com>; Karlinda Hinds <Karlinda.Hinds@ibigroup.com>
Cc: Jillian Normand <Jillian.Normand@mattamycorp.com>; Adam Fobert <AFobert@dsel.ca>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Good morning Jim,

We are working on the servicing plan for this block currently.

We have been asked by the City just to obtain confirmation that the services within Squadron Crescent and the rest of Phase 1B are in fact “in service”. Would it be possible to have that confirmed?

Thank you,

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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From: Jim Moffatt <jmoffatt@IBIGroup.com>
Sent: Friday, September 27, 2019 10:17 AM
To: Ed Ireland <ed.ireland@IBIGroup.com>; Karlinda Hinds <Karlinda.Hinds@ibigroup.com>
Cc: Genavieve Greenberg <GGreenberg@dsel.ca>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Do we have a plan from Dsel showing the servicing requirements for Block 15. We provided sewer outlets near the north west portion of the site.

From: Ed Ireland
Sent: Friday, September 27, 2019 10:06 AM
To: Jim Moffatt <jmoffatt@IBIGroup.com>; Karlinda Hinds <Karlinda.Hinds@ibigroup.com>
Cc: GGreenberg@dsel.ca
Subject: FW: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Jim and Karlinda,

Can you email Genavieve the Wateridge files she needs and the construction group must have some correspondence with the City regarding service installation.

Ed

From: Genavieve Greenberg [mailto:GGreenberg@dsel.ca]
Sent: Friday, September 27, 2019 10:00 AM
To: Ed Ireland <ed.ireland@IBIGroup.com>
Subject: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Good morning Ed,

We have been requested by the City to obtain correspondence to confirm that the surrounding services for the proposed development are in service. Would you be able to provide confirmation that all of Wateridge Village at Rockcliffe Phase 1B are in service. Would you be able to confirm this for us?

I was also wondering if you might be able to send the most recent drawings for Phase 1B and if possible CAD for the Ponding Plan, Drawing No. 751.

I will give you a call this morning to discuss these items. If you have any questions at all please feel free to reach out to me.

Thank you,

Genavieve Greenberg
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569
email: ggreenberg@DSEL.ca

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Genavieve Greenberg

From: Genavieve Greenberg
Sent: Friday, November 29, 2019 3:56 PM
To: Genavieve Greenberg
Subject: FW: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

From: Shagha Attar [mailto:shagha.attar@ibigroup.com]
Sent: Wednesday, November 13, 2019 4:08 PM
To: Steve Merrick <SMerrick@dsel.ca>
Cc: Jim Moffatt <jmoffatt@IBIGroup.com>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Hi Steve,

As summarized in Table 5-6, and 5-7 of the IBI report "Design Brief Wateridge Village at Rockcliffe Phase 1B, June 2017", the maximum ponding depth including the cascading depth for area S218 was 0.25m and 0.26m for the 100 year and 100 year + 20% increase, respectively.
Due to the current CB relocation, the depth of ponding has been increased by 5 cm. However, it is still below the maximum allowable ponding depth and it allows for dynamic conveyance during the storm events.

Regards,

Shagha Attar P.ENG.

Water Resources Engineer

IBI GROUP
Suite 400, 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 ext 64063 fax +1 613 225 9868

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From: Shagha Attar
Sent: Wednesday, November 13, 2019 1:31 PM
To: SMerrick@dsel.ca
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Hi Steve,

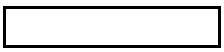
Sorry for the late reply. I was away for couple of weeks.
Can you inform with the increase of 5cm in the depth of ponding, what is the current ponding volume?

Thanks!

Shagha Attar P.ENG.

Water Resources Engineer

IBI GROUP
Suite 400, 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 ext 64063 fax +1 613 225 9868





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From: Steve Merrick [mailto:SMerrick@dsel.ca]
Sent: Tuesday, November 12, 2019 9:42 AM
To: Jim Moffatt <jmoffatt@IBIGroup.com>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Thank you Jim, can I get something back from IBI today to send to the City?

Thanks!

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

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From: Jim Moffatt [mailto:jmoffatt@IBIGroup.com]
Sent: Tuesday, November 5, 2019 1:58 PM
To: Steve Merrick <SMerrick@dsel.ca>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

I have passed this along to our SWM designer. She is out returning to office on Monday next.

From: Steve Merrick [mailto:SMerrick@dsel.ca]
Sent: Tuesday, November 5, 2019 11:01 AM
To: Jim Moffatt <jmoffatt@IBIGroup.com>; Marian Milne <mmilne@IBIGroup.com>
Cc: Genavieve Greenberg <GGreenberg@dsel.ca>
Subject: RE: Wateridge at Rockcliffe Phase 1B Servicing Confirmation (Block 15)

Hi Jim,

We received our final round of comments from the City on our application for Block 15. We are proposing to relocate 3 CB within Squadron to avoid driveways/site entrances. We will need something from IBI to confirm that this will not have a negative impact on the SWM.

The CB relocated at the north-west corner of the site is not located at a low point, therefore, no re-grading is required. The CB's located at the south-east have been relocated and some re-grading is required. The depth of ponding at the CB's has now increased by 5cm. We will need IBI to review this change and get back to us on their acceptance. I have attached our servicing and grading plans and bubbled the CB locations discussed above.

We are trying to get our submission back into the City as soon as possible and will require email correspondence from IBI to do so. Can you provide a respond today or tomorrow on this?

Thanks,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

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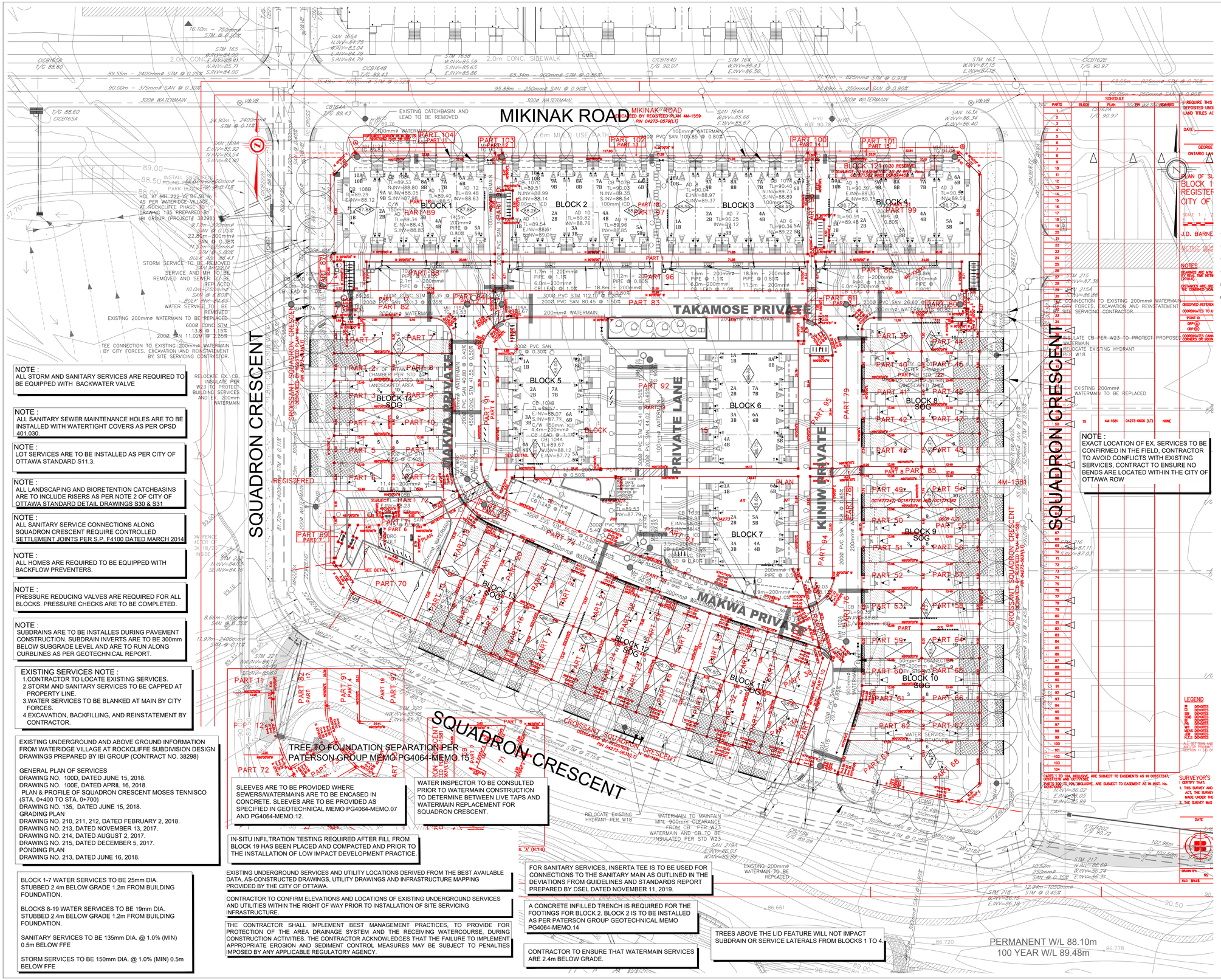
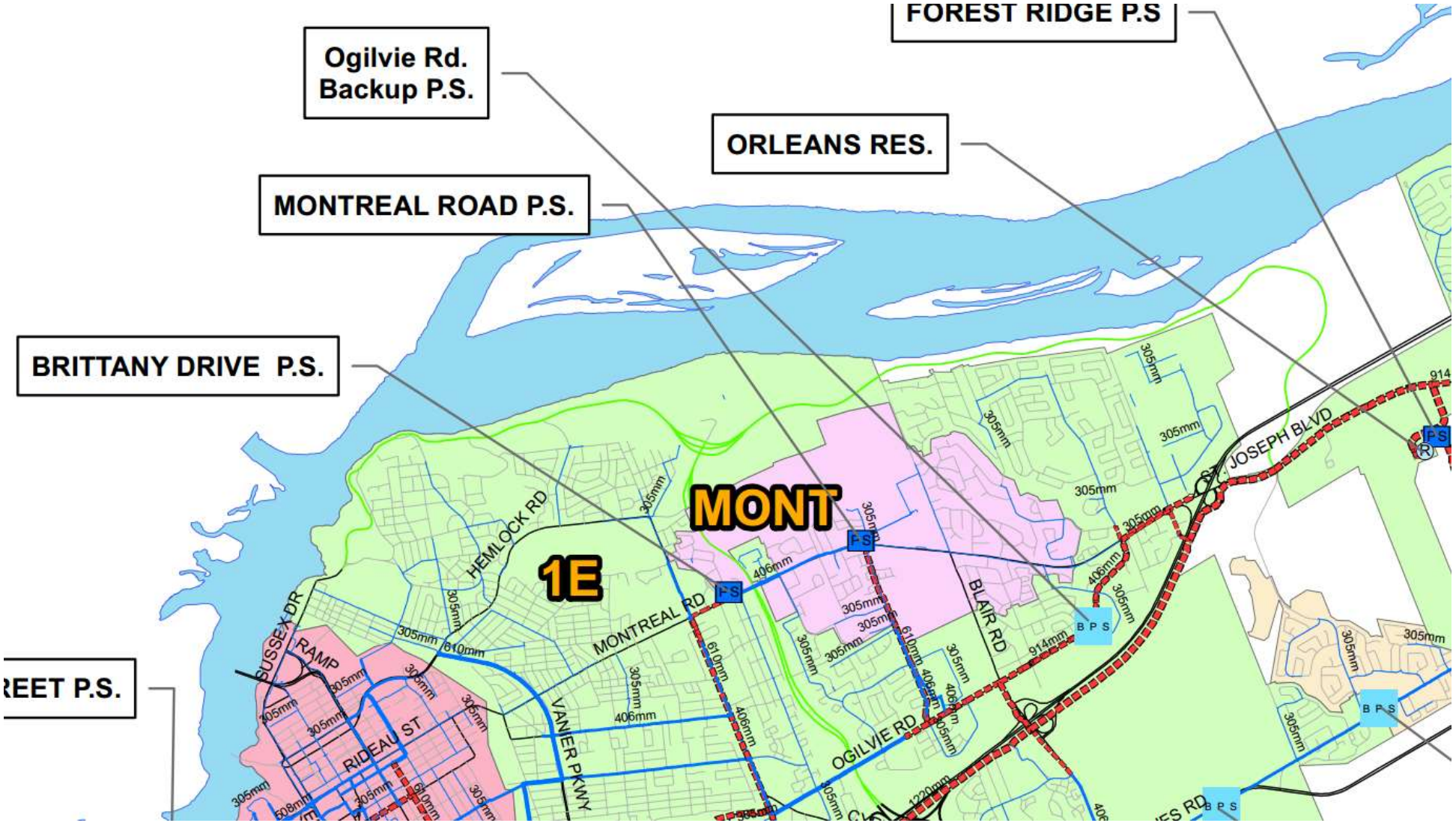

MIKINAK ROAD
SQUADRON CRESCENT
TAKAMOSE PRIVATE
MAKWA PRIVATE
PRIVATE LANE
KINIW PRIVATE
CROISSANT SQUADRON CRESCENT
BLOCK 1
BLOCK 2
BLOCK 3
BLOCK 4
BLOCK 5
BLOCK 6
BLOCK 7
BLOCK 8 SOG
BLOCK 9 SOG
BLOCK 10 SOG
BLOCK 11 SOG
BLOCK 12 SOG
BLOCK 13 SOG
BLOCK 14 SOG
BLOCK 121
PART 100
PART 101
PART 102
PART 103
PART 104
PART 105
PART 106
PART 107
PART 108
PART 109
PART 110
PART 111
PART 112
PART 113
PART 114
PART 115
PART 116
PART 117
PART 118
PART 119
PART

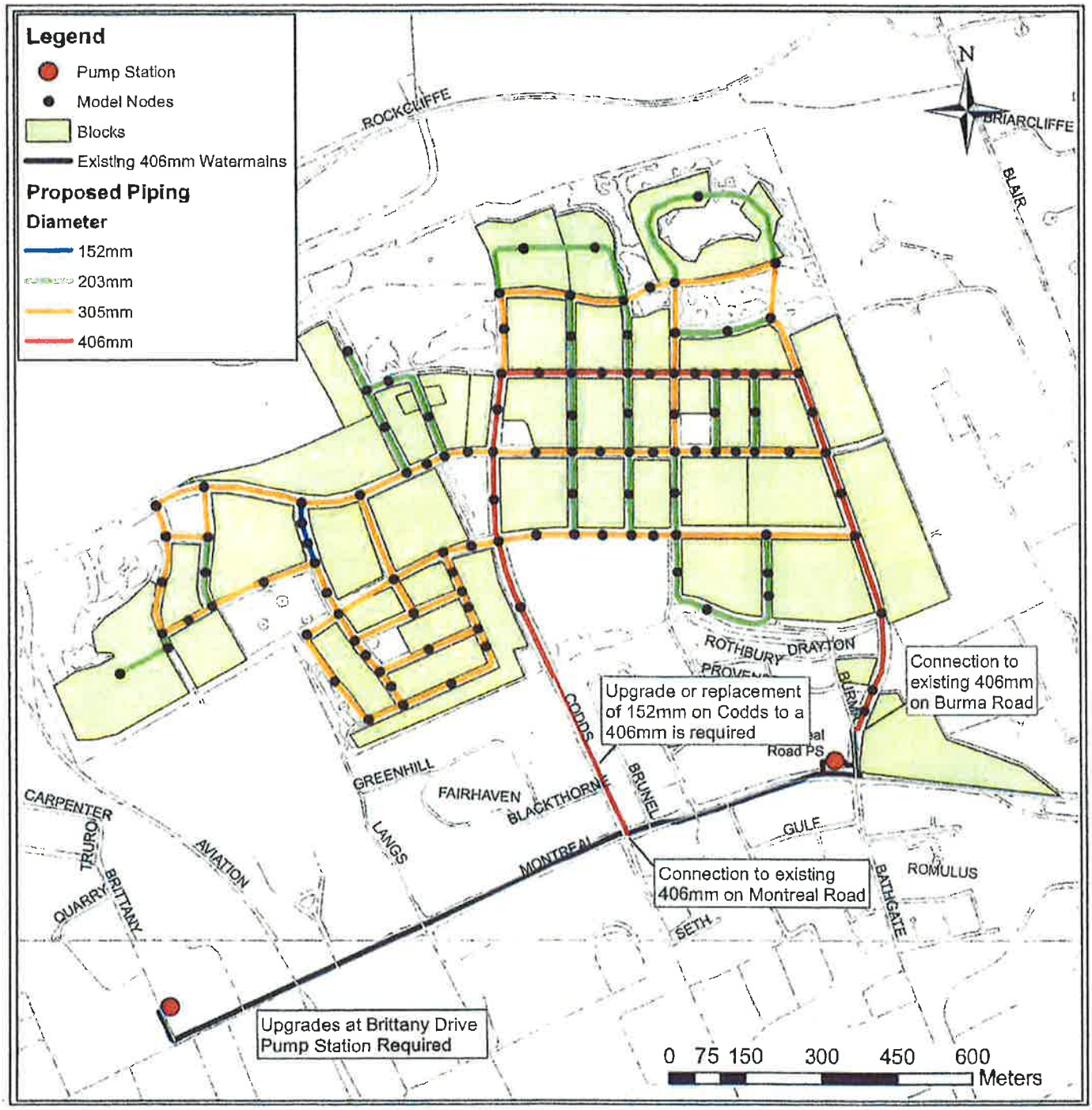
APPENDIX B

Water Supply


FOREST RIDGE P.S
Ogilvie Rd.
Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
REET P.S.
MONT
1E
HEMLOCK RD
MONTREAL RD
BLAIR RD
OGILVIE RD
VANIER PKWY
RIDEAU ST
SUSSEX DR
RAMP
ST. JOSEPH BLVD
P S
B P S
305mm
406mm
610mm
914mm
1220mm

APPENDIX B

- **Figure 4.4 Proposed Pipe alignment and Diameters**
- **Watermain Demand Calculation Sheet**
- **Boundary Conditions**
- **Hydraulic Modeling Results**



J:\32562-RockcliffeRedev\5.0 Drawings\59civil\current\Report Figures\MSS 2015\Section 4\Fig...4.4 Proposed Pipe alignment and Diameters-REV.dwg Layout Name: FIGURE4.4

Stantec

IBI

Project Title	Drawing Title	Sheet No.
FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	PROPOSED PIPE ALIGNMENT AND DIAMETERS	FIGURE 4.4

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : FORMER CFB ROCKCLIFFE - PHASE 1B
LOCATION : CITY OF OTTAWA

FILE: 38298.5.7
DATE PRINTED: 29-Jun-16
DESIGN: LE
PAGE: 1 OF 2

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS SD	RESIDENTIAL UNITS TH	RESIDENTIAL POP'N	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL COMM. (ha.)	NON-RESIDENTIAL INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY DEMAND (l/s) Res.	MAXIMUM HOURLY DEMAND (l/s) Non-res.	MAXIMUM HOURLY DEMAND (l/s) Total	FIRE DEMAND (l/min)
PHASE 1B																	
J50				76.0				0.31	0.00	0.31	0.77	0.00	0.77	1.69	0.00	1.69	13,000
J52				146.5				0.59	0.00	0.59	1.48	0.00	1.48	3.26	0.00	3.26	13,000
J54				199.5				0.81	0.00	0.81	2.02	0.00	2.02	4.44	0.00	4.44	13,000
J56							2.49	0.00	1.44	1.44	0.00	2.16	2.16	0.00	3.89	3.89	13,000
J58				319.0				1.29	0.00	1.29	3.23	0.00	3.23	7.11	0.00	7.11	13,000
J60				212.3				0.86	0.00	0.86	2.15	0.00	2.15	4.73	0.00	4.73	13,000
J62				129.0				0.52	0.00	0.52	1.31	0.00	1.31	2.87	0.00	2.87	13,000
J64				367.0				1.49	0.00	1.49	3.72	0.00	3.72	8.18	0.00	8.18	13,000
J66				241.5				0.98	0.00	0.98	2.45	0.00	2.45	5.38	0.00	5.38	13,000
J68				153.5				0.62	0.00	0.62	1.55	0.00	1.55	3.42	0.00	3.42	13,000
J70				160.5				0.65	0.00	0.65	1.63	0.00	1.63	3.58	0.00	3.58	13,000
J72				358.5				1.45	0.00	1.45	3.63	0.00	3.63	7.99	0.00	7.99	13,000
J74						0.90		0.00	0.52	0.52	0.00	0.78	0.78	0.00	1.41	1.41	13,000
J76						0.65		0.00	0.38	0.38	0.00	0.56	0.56	0.00	1.02	1.02	13,000
J78				304.5				1.23	0.00	1.23	3.08	0.00	3.08	6.78	0.00	6.78	13,000
J80				105.0				0.43	0.00	0.43	1.06	0.00	1.06	2.34	0.00	2.34	13,000
J82				260.0				1.05	0.00	1.05	2.63	0.00	2.63	5.79	0.00	5.79	13,000
J84						0.88		0.00	0.51	0.51	0.00	0.76	0.76	0.00	1.38	1.38	13,000
J86						0.45	2.62	0.00	1.78	1.78	0.00	2.66	2.66	0.00	4.80	4.80	13,000
J88						0.95		0.00	0.55	0.55	0.00	0.82	0.82	0.00	1.48	1.48	13,000
TOTALS	**0**	**0**	**0**	**3033**	**0.00**	**3.83**	**5.11**	**12.28**	**5.18**	**17.46**	**30.71**	**7.74**	**38.45**	**67.56**	**13.98**	**81.54**	

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) 2.7 p / p / u
- Townhouse (TH) 2.7 p / p / u

AVG. DAILY DEMAND
- Residential 350 l / cap / day
- Institutional 50,000 l / ha / day

MAX. DAILY DEMAND
- Residential 875 l / cap / day
- Institutional 75,000 l / ha / day

MAX. HOURLY DEMAND
- Residential 1,925 l / cap / day
- Institutional 135,000 l / ha / day

FIRE FLOW
- SF, SD & TH 10,000 l / min
- ICI 13,000 l / min

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : FORMER CFB ROCKCLIFFE - PHASE 1B
LOCATION : CITY OF OTTAWA

FILE: 38298.5.7
DATE PRINTED: 29-Jun-16
DESIGN: LE

NODE	RESIDENTIAL UNITS SF	SD	TH	POP'N	NON-RESIDENTIAL INDTRL (ha.)	COMM. (ha.)	INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM HOURLY DEMAND (l/s) Res.	Non-res.	Total	FIRE DEMAND (l/min)
PHASE 1A																	
J01			18	48.6				0.20	0.00	0.20	0.49	0.00	0.49	1.08	0.00	1.08	10,000
J02			11	29.7				0.12	0.00	0.12	0.30	0.00	0.30	0.66	0.00	0.66	10,000
J04		4	9	35.1				0.14	0.00	0.14	0.36	0.00	0.36	0.78	0.00	0.78	10,000
J06		4	3	18.9				0.08	0.00	0.08	0.19	0.00	0.19	0.42	0.00	0.42	10,000
J10	4	6	5	43.3				0.18	0.00	0.18	0.44	0.00	0.44	0.96	0.00	0.96	10,000
J12	8			27.2				0.11	0.00	0.11	0.28	0.00	0.28	0.61	0.00	0.61	10,000
J14	10	2		39.4				0.16	0.00	0.16	0.40	0.00	0.40	0.88	0.00	0.88	10,000
J16	16	4		65.2				0.26	0.00	0.26	0.66	0.00	0.66	1.45	0.00	1.45	10,000
J18	9	2		36.0				0.15	0.00	0.15	0.36	0.00	0.36	0.80	0.00	0.80	10,000
J20	5	6		33.2				0.13	0.00	0.13	0.34	0.00	0.34	0.74	0.00	0.74	10,000
J22	11	6		53.6				0.22	0.00	0.22	0.54	0.00	0.54	1.19	0.00	1.19	10,000
J24	8	4	10	65.0				0.26	0.00	0.26	0.66	0.00	0.66	1.45	0.00	1.45	10,000
J26	4	12	3	54.1				0.22	0.00	0.22	0.55	0.00	0.55	1.21	0.00	1.21	10,000
J28	4	10	9	64.9				0.26	0.00	0.26	0.66	0.00	0.66	1.45	0.00	1.45	10,000
J30	6			20.4				0.08	0.00	0.08	0.21	0.00	0.21	0.45	0.00	0.45	10,000
J32				210.8				0.85	0.00	0.85	2.13	0.00	2.13	4.70	0.00	4.70	13,000
R02	26			88.4				0.36	0.00	0.36	0.90	0.00	0.90	1.97	0.00	1.97	10,000
J34							2.50	0.00	1.45	1.45	0.00	2.17	2.17	0.00	3.91	3.91	13,000
TOTA_S	**111**	**60**	**68**	**934**	**0.00**	**0.00**	**2.50**	3.78	1.45	5.23	**9.47**	**2.17**	**11.64**	**20.80**	**3.91**	**24.71**	

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Single Family (SF) — 3.4 p / p / u
- Semi Detached (SD) — 2.7 p / p / u
- Townhouse (TH) — 2.7 p / p / u

AVG. DAILY DEMAND
- Residential — 350 l / cap / day
- Institutional — 50,000 l / ha / day

MAX. DAILY DEMAND
- Residential — 875 l / cap / day
- Institutional — 75,000 l / ha / day

MAX. HOURLY DEMAND
- Residential — 1.925 l / cap / day
- Institutional — 135,000 l / ha / day

FIRE FLOW
- SF, SD & TH — 10,000 l / min
- ICI — 13,000 l / min

Lance Erion

From: Mottalib, Abdul [Abdul.Mottalib@ottawa.ca]
Sent: Wednesday, June 03, 2015 2:00 PM
To: Lance Erion
Cc: Mottalib, Abdul
Subject: FW: Former CFB Rockcliffe - Request for Watermain Boundary Conditions - Phase 1

Please see below:

Thanks,

Abdul Mottalib, P. Eng.

Sent: June 03, 2015 11:29 AM
To: Mottalib, Abdul
Subject: RE: Former CFB Rockcliffe - Request for Watermain Boundary Conditions - Phase 1

Abdul,

Please note the following:

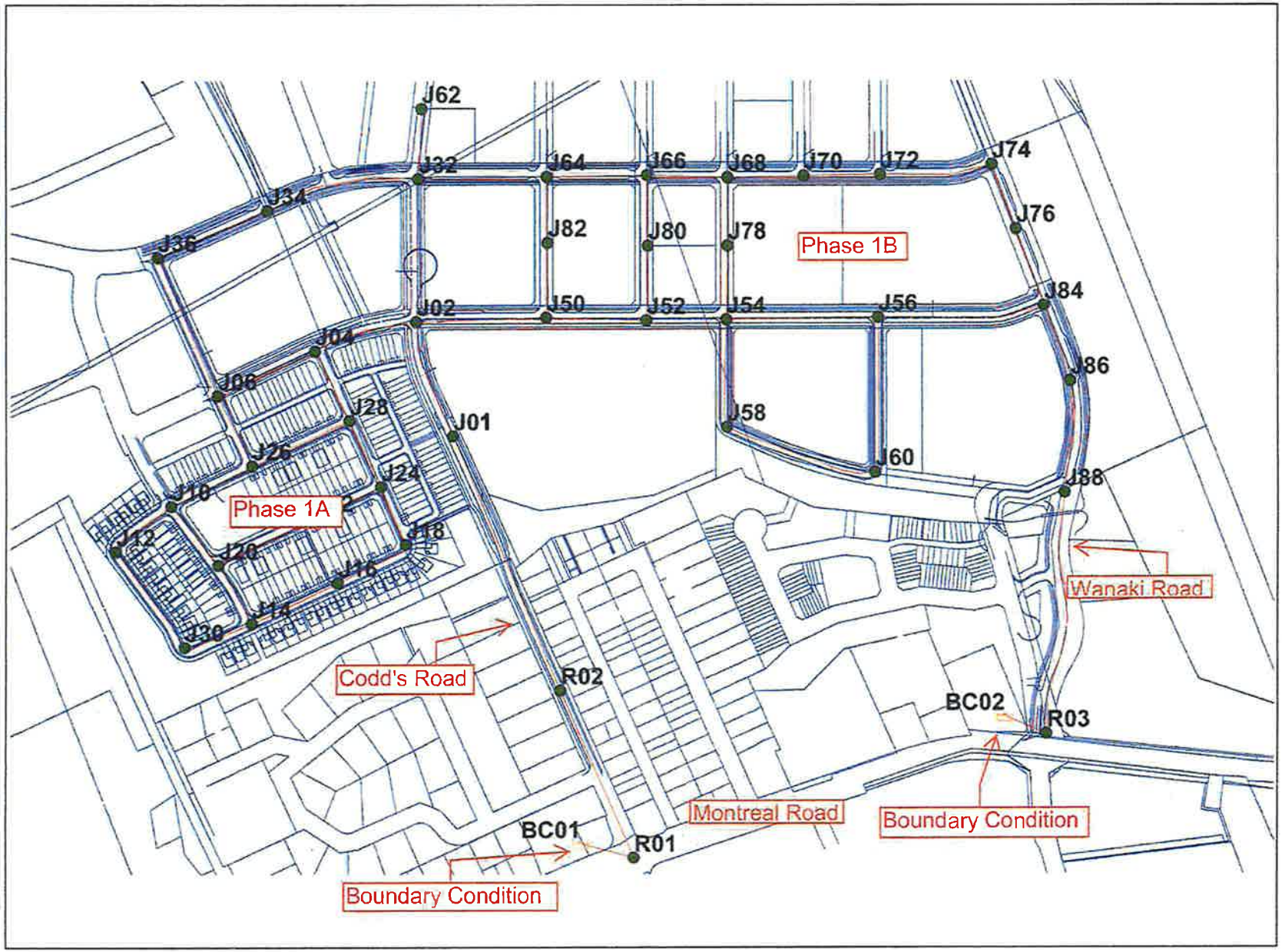
- Boundary conditions provided below are provided for existing conditions. The MSS for CFB Rockcliffe should be carefully reviewed by the designer to assess future conditions (changes to MTL PZ discharge pressures affecting boundary conditions).
- Upgrades to the MTL PZ pump stations are currently being planned to support the CFB Rockcliffe development. These upgrades must be implemented before subdivision construction to ensure adequate reliability of supply. The Class EA and functional design for the station upgrades are currently being updated. Schedule for design and construction will need to be reviewed by my staff with Construction Services if there is a need to confirm timing.

Codd's Road:
MAX HGL = 147.1m
PKHR = 147.0m
MXDY+Fire (13,000 Lpm) = 139.5m
MXDY+Fire (10,000 Lpm) = 140.0m

Burma Road:
MAX HGL = 147.1m
PKHR = 147.1m
MXDY+Fire (13,000 Lpm) = 140.2m
MXDY+Fire (10,000 Lpm) = 140.4m

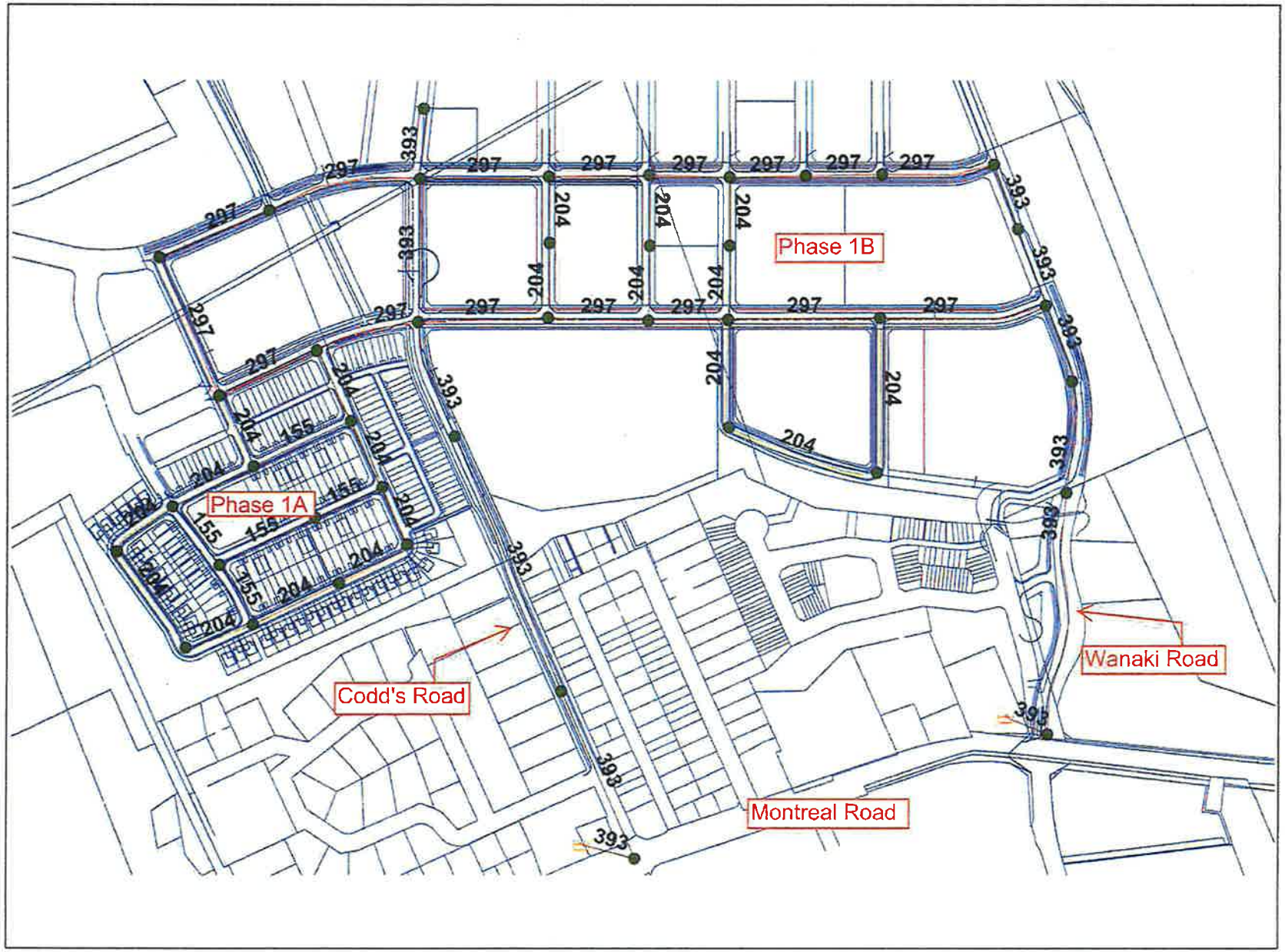
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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.

Phase 1B - Node ID's



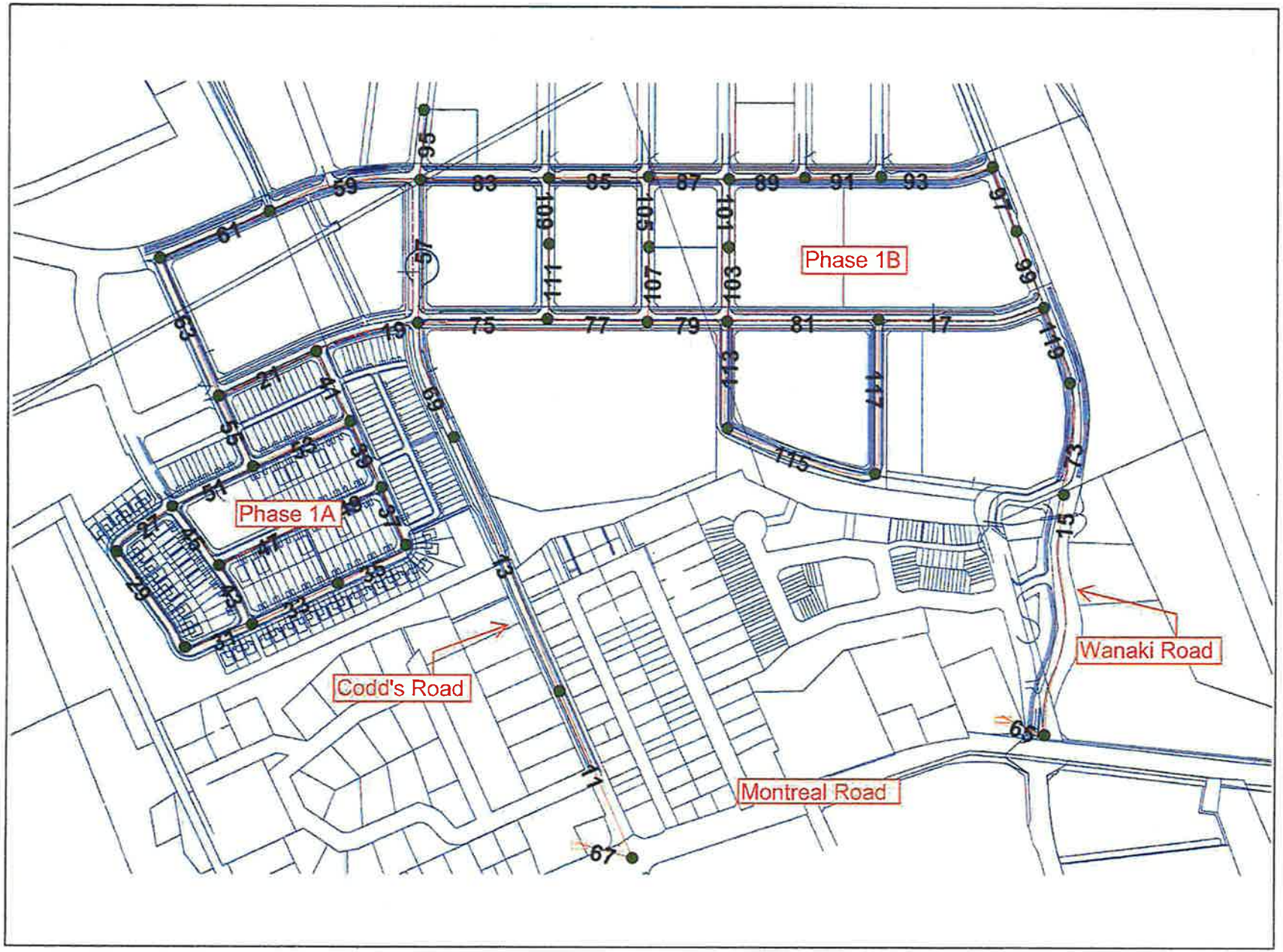
Date: Wednesday, June 29, 2016

Phase 1B - Pipe Sizes



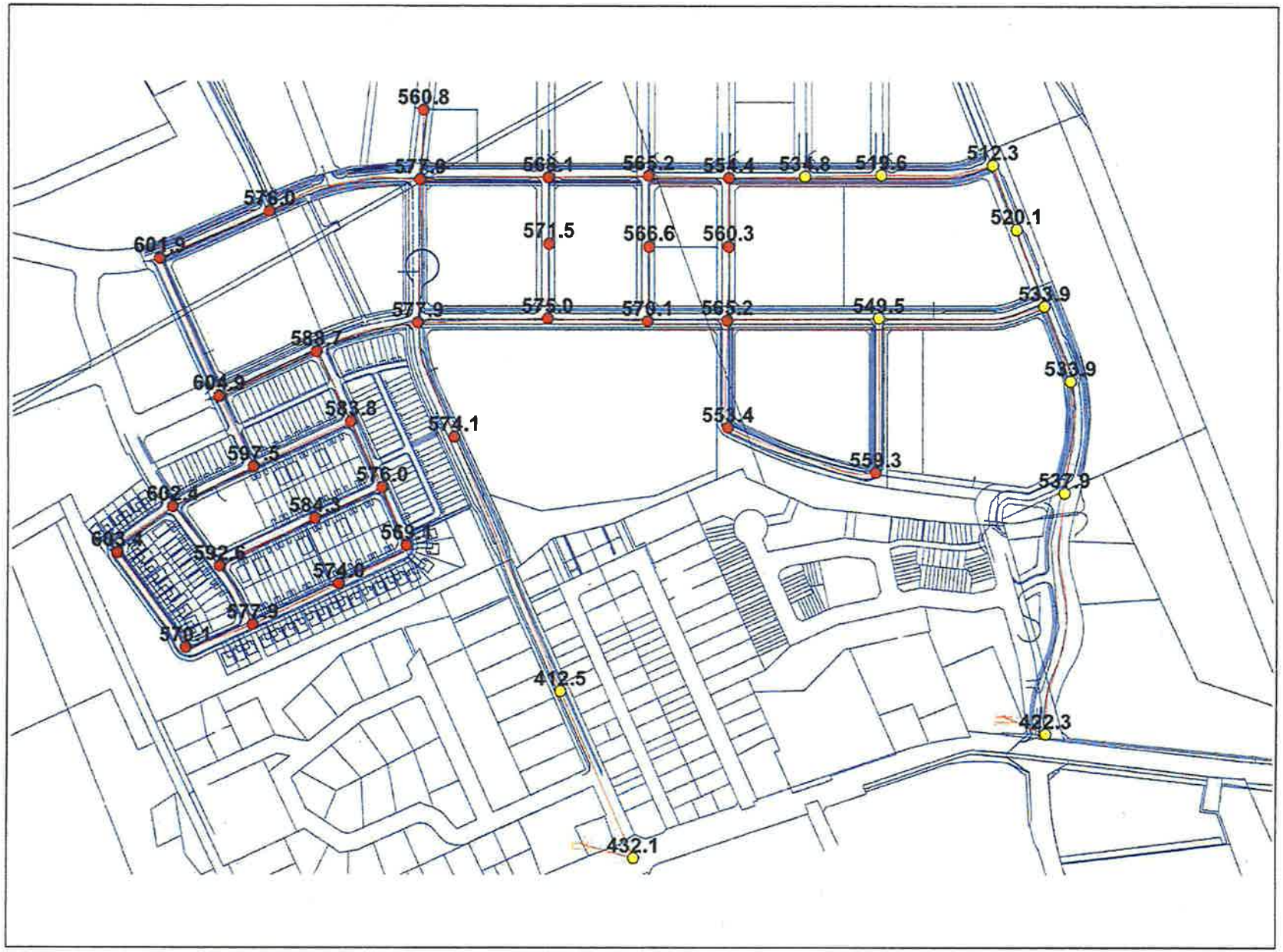
Date: Wednesday, June 29, 2016

Phase 1B - Pipe ID's



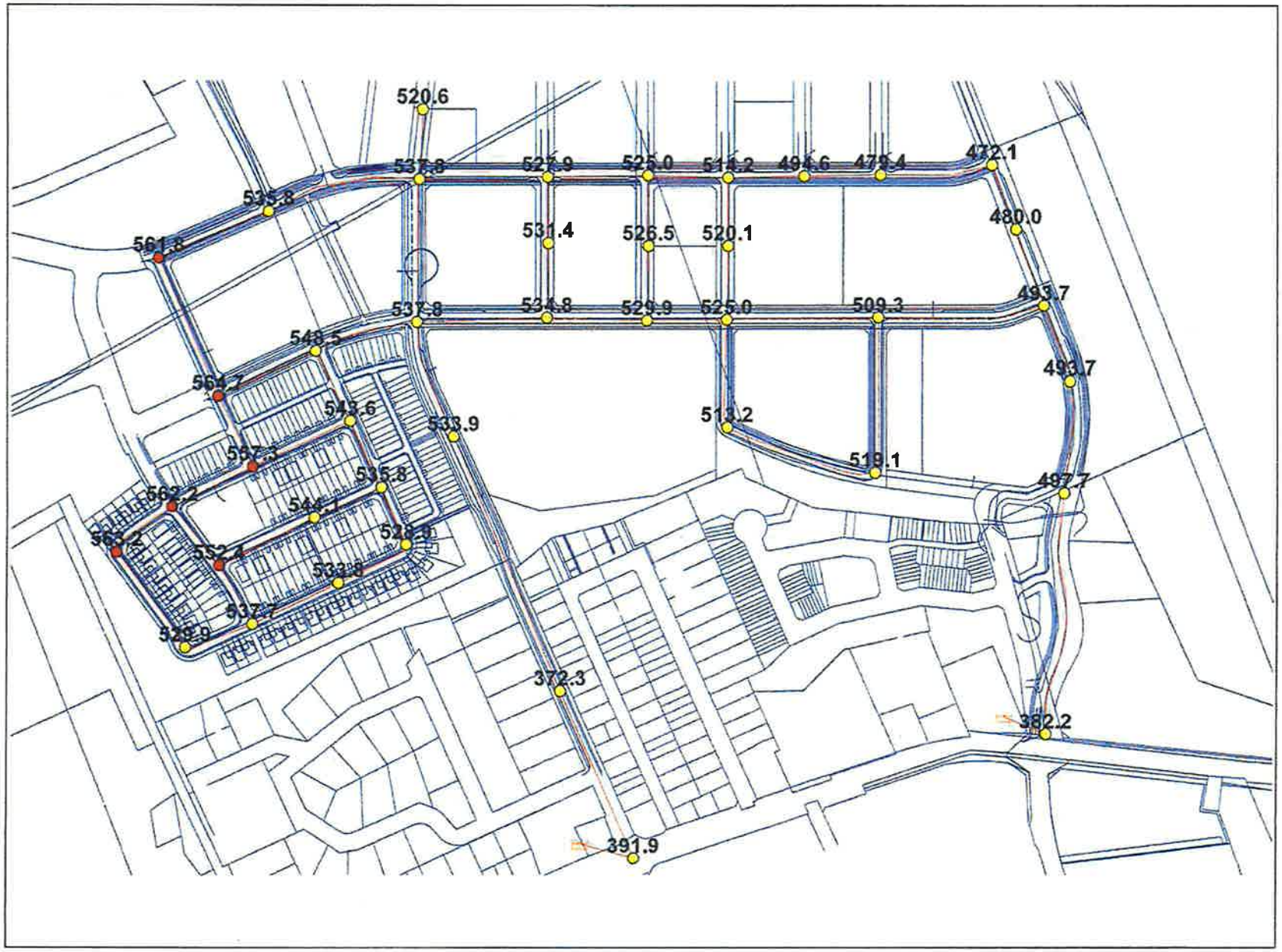
Date: Wednesday, June 29, 2016

Phase 1B - Basic Day (Max HGL) Pressures (kPa) Existing HGL 147.1m



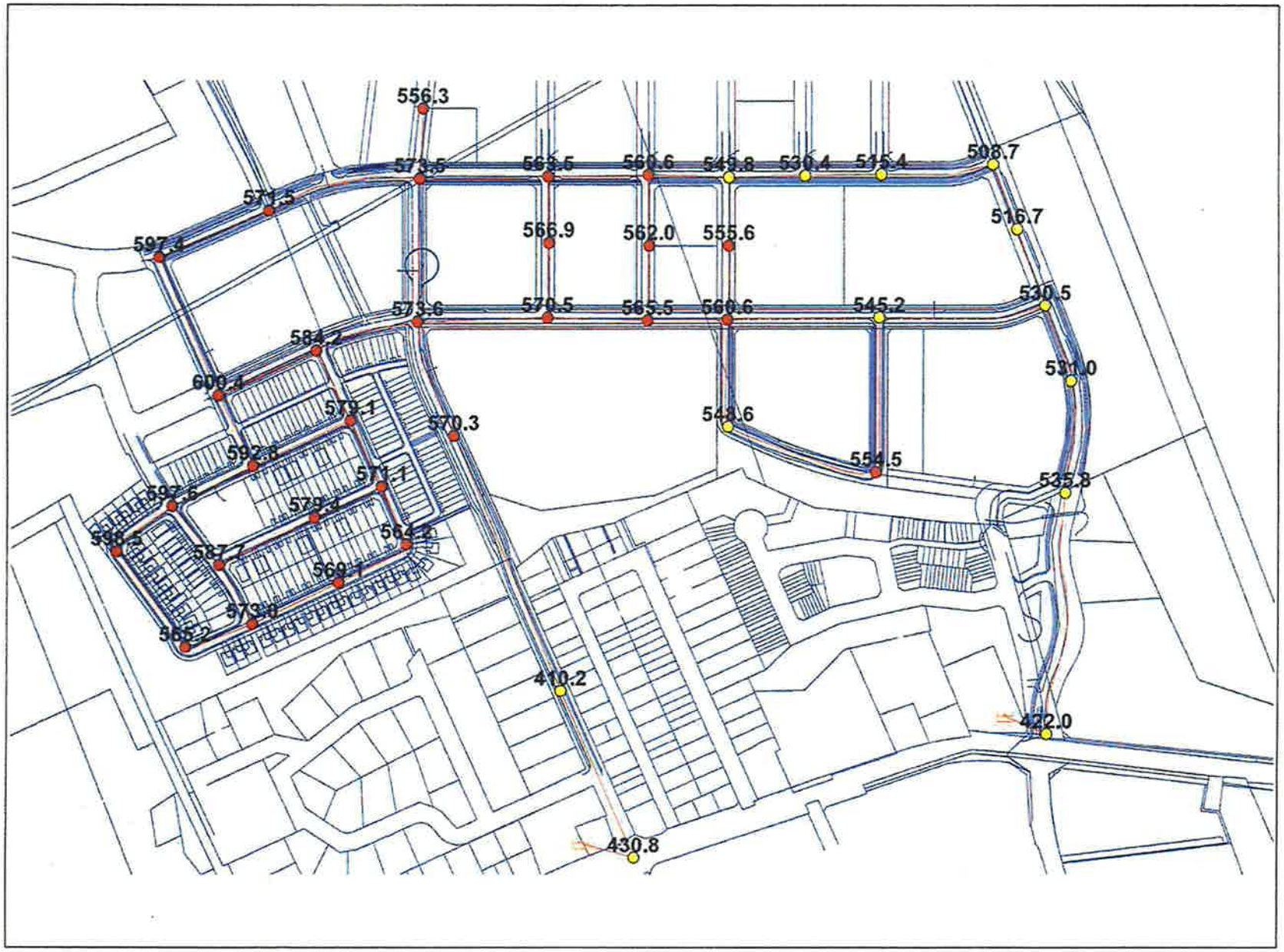
Date: Wednesday, June 29, 2016

Phase 1B - Basic Day (Max HGL) Pressures (kPa) Future HGL 143.0m



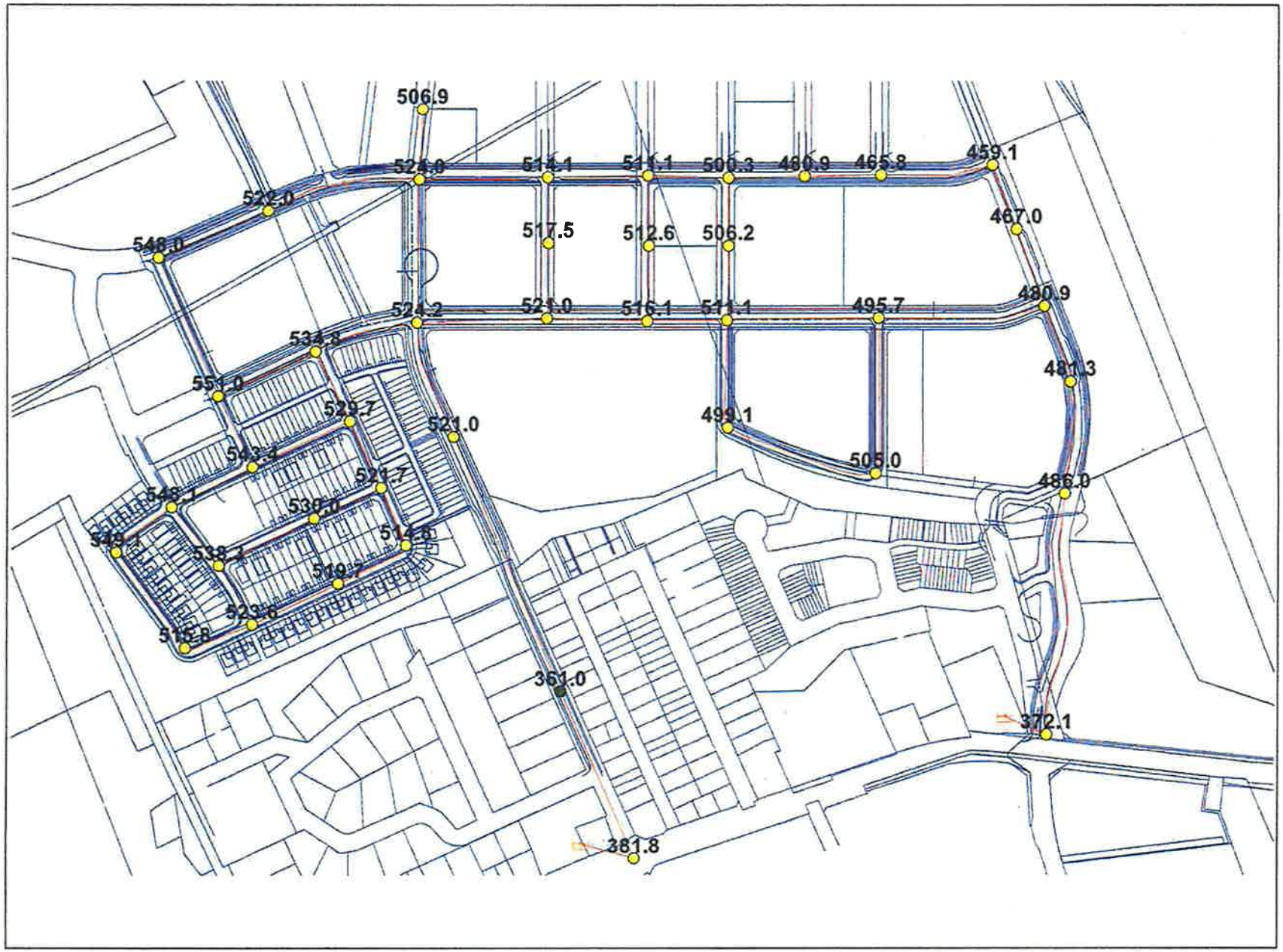
Date: Wednesday, June 29, 2016

Phase 1B - Peak Hour Pressures (kPa) Existing HGL 147.0 - 147.1m



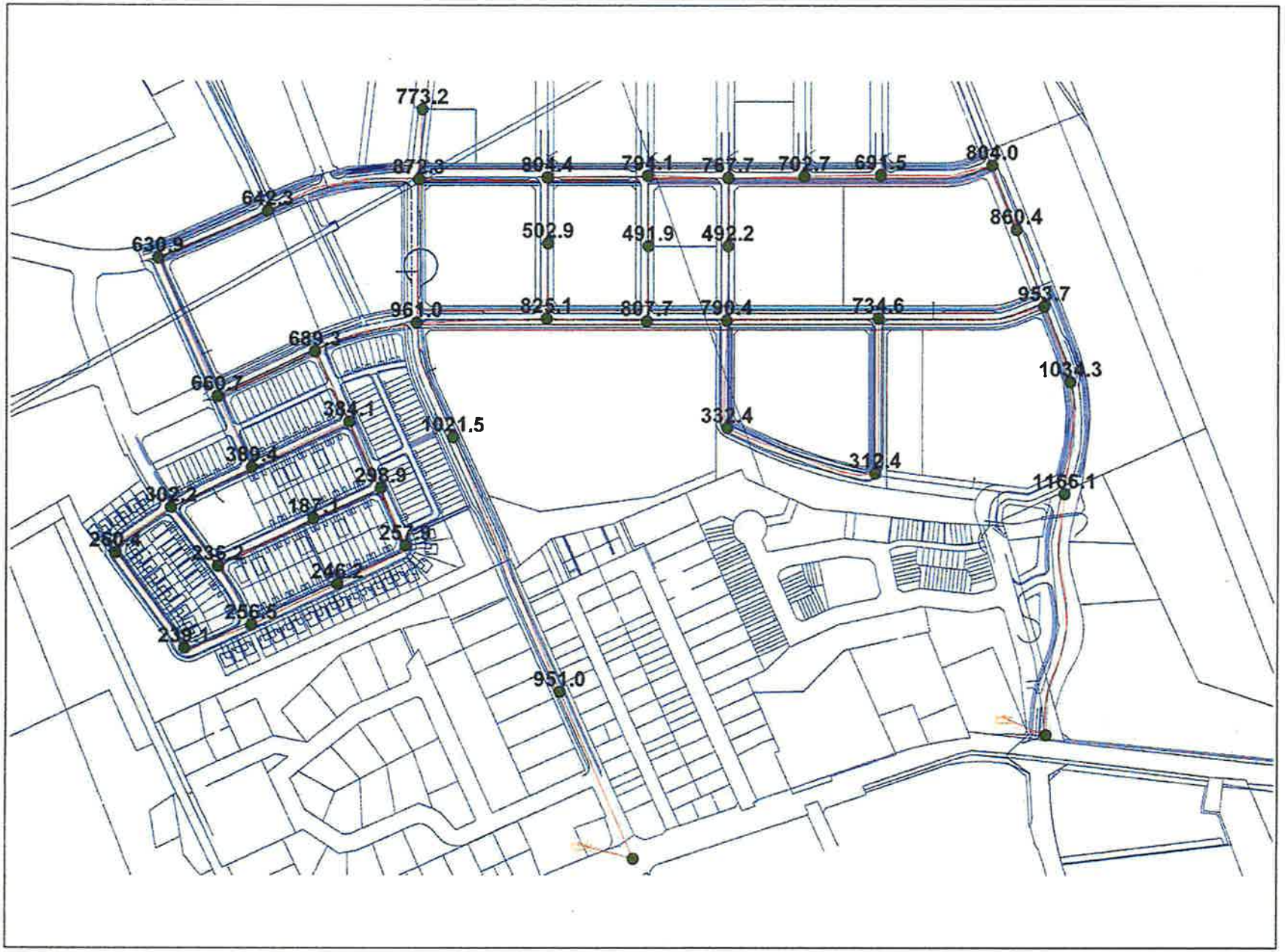
Date: Wednesday, June 29, 2016

Phase 1B - Peak Hour Pressures (kPa) Future HGL 142.0m



Date: Wednesday, June 29, 2016

Phase 1B - Max Day Fireflows (l/s) HGL 139.5 - 140.2m



Date: Wednesday, June 29, 2016

Phase 1A - Basic Day (Max HGL) HGL 147.1m - Junction Report

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J01	0.20	88.50	147.08	574.06
2	J02	0.12	88.10	147.08	577.94
3	J04	0.14	87.00	147.08	588.71
4	J06	0.08	85.35	147.08	604.87
5	J10	0.18	85.60	147.08	602.41
6	J12	0.11	85.50	147.08	603.39
7	J14	0.16	88.10	147.08	577.91
8	J16	0.26	88.50	147.08	573.99
9	J18	0.15	89.00	147.08	569.09
10	J20	0.13	86.60	147.08	592.61
11	J22	0.22	87.45	147.08	584.28
12	J24	0.26	88.30	147.08	575.95
13	J26	0.22	86.10	147.08	597.52
14	J28	0.26	87.50	147.08	583.80
15	J30	0.08	88.90	147.08	570.07
16	J32	0.85	88.10	147.08	577.93
17	J34	1.45	88.30	147.08	575.97
18	J36	0.00	85.65	147.08	601.93
19	J50	0.31	88.40	147.08	574.98
20	J52	0.59	88.90	147.08	570.08
21	J54	0.81	89.40	147.08	565.18
22	J56	1.44	91.00	147.08	549.51
23	J58	1.29	90.60	147.07	553.41
24	J60	0.86	90.00	147.07	559.29
25	J62	0.52	89.85	147.08	560.78
26	J64	1.49	89.10	147.08	568.12
27	J66	0.98	89.40	147.08	565.18
28	J68	0.62	90.50	147.08	554.40
29	J70	0.65	92.50	147.08	534.81
30	J72	1.45	94.05	147.08	519.62
31	J74	0.52	94.80	147.08	512.30
32	J76	0.38	94.00	147.08	520.14
33	J78	1.23	89.90	147.08	560.28
34	J80	0.43	89.25	147.08	566.65
35	J82	1.05	88.75	147.08	571.55
36	J84	0.51	92.60	147.08	533.87
37	J86	1.78	92.60	147.08	533.89
38	J88	0.55	92.20	147.09	537.86
39	R01	0.00	103.00	147.10	432.13
40	R02	0.36	105.00	147.09	412.46
41	R03	0.00	104.00	147.10	422.33

Phase 1B - Peak Hour Existing HGL 147.0 - 147.1m

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J01	1.08	88.50	146.70	570.35
2	J02	0.66	88.10	146.64	573.64
3	J04	0.78	87.00	146.62	584.24
4	J06	0.42	85.35	146.62	600.37
5	J10	0.96	85.60	146.58	597.56
6	J12	0.61	85.50	146.58	598.51
7	J14	0.88	88.10	146.57	573.01
8	J16	1.45	88.50	146.57	569.09
9	J18	0.80	89.00	146.58	564.20
10	J20	0.74	86.60	146.58	587.71
11	J22	1.19	87.45	146.58	579.38
12	J24	1.45	88.30	146.58	571.09
13	J26	1.21	86.10	146.60	592.81
14	J28	1.45	87.50	146.60	579.08
15	J30	0.45	88.90	146.58	565.18
16	J32	4.70	88.10	146.62	573.46
17	J34	3.91	88.30	146.62	571.46
18	J36	0.00	85.65	146.62	597.43
19	J50	1.69	88.40	146.62	570.48
20	J52	3.26	88.90	146.61	565.53
21	J54	4.44	89.40	146.61	560.63
22	J56	3.89	91.00	146.64	545.25
23	J58	7.11	90.60	146.58	548.55
24	J60	4.73	90.00	146.58	554.47
25	J62	2.87	89.85	146.62	556.31
26	J64	8.18	89.10	146.61	563.52
27	J66	5.38	89.40	146.61	560.58
28	J68	3.42	90.50	146.61	549.83
29	J70	3.58	92.50	146.62	530.36
30	J72	7.99	94.05	146.64	515.38
31	J74	1.41	94.80	146.71	508.71
32	J76	1.02	94.00	146.72	516.66
33	J78	6.78	89.90	146.60	555.63
34	J80	2.34	89.25	146.61	562.05
35	J82	5.79	88.75	146.60	566.92
36	J84	1.38	92.60	146.74	530.53
37	J86	4.80	92.60	146.79	531.02
38	J88	1.48	92.20	146.87	535.77
39	R01	0.00	103.00	146.97	430.85
40	R02	1.97	105.00	146.86	410.16
41	R03	0.00	104.00	147.07	422.01

Phase 1B - Peak Hour Future HGL 142.0m - Junction Report

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J01	1.08	88.50	141.67	521.02
2	J02	0.66	88.10	141.60	524.24
3	J04	0.78	87.00	141.58	534.83
4	J06	0.42	85.35	141.57	550.95
5	J10	0.96	85.60	141.54	548.15
6	J12	0.61	85.50	141.54	549.10
7	J14	0.88	88.10	141.53	523.59
8	J16	1.45	88.50	141.53	519.67
9	J18	0.80	89.00	141.53	514.79
10	J20	0.74	86.60	141.53	538.30
11	J22	1.19	87.45	141.53	529.97
12	J24	1.45	88.30	141.54	521.68
13	J26	1.21	86.10	141.55	543.39
14	J28	1.45	87.50	141.55	529.67
15	J30	0.45	88.90	141.53	515.76
16	J32	4.70	88.10	141.58	524.04
17	J34	3.91	88.30	141.57	522.04
18	J36	0.00	85.65	141.57	548.01
19	J50	1.69	88.40	141.57	521.02
20	J52	3.26	88.90	141.56	516.05
21	J54	4.44	89.40	141.56	511.15
22	J56	3.89	91.00	141.59	495.71
23	J58	7.11	90.60	141.53	499.05
24	J60	4.73	90.00	141.53	504.97
25	J62	2.87	89.85	141.58	506.89
26	J64	8.18	89.10	141.56	514.05
27	J66	5.38	89.40	141.56	511.11
28	J68	3.42	90.50	141.56	500.35
29	J70	3.58	92.50	141.57	480.85
30	J72	7.99	94.05	141.59	465.84
31	J74	1.41	94.80	141.65	459.09
32	J76	1.02	94.00	141.66	467.03
33	J78	6.78	89.90	141.55	506.15
34	J80	2.34	89.25	141.56	512.58
35	J82	5.79	88.75	141.56	517.46
36	J84	1.38	92.60	141.67	480.88
37	J86	4.80	92.60	141.72	481.33
38	J88	1.48	92.20	141.80	485.99
39	R01	0.00	103.00	141.96	381.81
40	R02	1.97	105.00	141.84	361.01
41	R03	0.00	104.00	141.97	372.06

Basic Day Future HGL 142.0m - Junction Report

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J01	0.20	88.50	142.98	533.88
2	J02	0.12	88.10	142.98	537.76
3	J04	0.14	87.00	142.98	548.53
4	J06	0.08	85.35	142.98	564.70
5	J10	0.18	85.60	142.98	562.23
6	J12	0.11	85.50	142.98	563.21
7	J14	0.16	88.10	142.98	537.73
8	J16	0.26	88.50	142.98	533.81
9	J18	0.15	89.00	142.98	528.91
10	J20	0.13	86.60	142.98	552.43
11	J22	0.22	87.45	142.98	544.10
12	J24	0.26	88.30	142.98	535.77
13	J26	0.22	86.10	142.98	557.34
14	J28	0.26	87.50	142.98	543.62
15	J30	0.08	88.90	142.98	529.89
16	J32	0.85	88.10	142.98	537.75
17	J34	1.45	88.30	142.98	535.79
18	J36	0.00	85.65	142.98	561.76
19	J50	0.31	88.40	142.98	534.81
20	J52	0.59	88.90	142.98	529.90
21	J54	0.81	89.40	142.98	525.00
22	J56	1.44	91.00	142.98	509.33
23	J58	1.29	90.60	142.97	513.23
24	J60	0.86	90.00	142.97	519.11
25	J62	0.52	89.85	142.98	520.60
26	J64	1.49	89.10	142.98	527.94
27	J66	0.98	89.40	142.98	525.00
28	J68	0.62	90.50	142.98	514.22
29	J70	0.65	92.50	142.98	494.63
30	J72	1.45	94.05	142.98	479.45
31	J74	0.52	94.80	142.98	472.12
32	J76	0.38	94.00	142.98	479.97
33	J78	1.23	89.90	142.98	520.10
34	J80	0.43	89.25	142.98	526.47
35	J82	1.05	88.75	142.98	531.37
36	J84	0.51	92.60	142.98	493.69
37	J86	1.78	92.60	142.98	493.72
38	J88	0.55	92.20	142.99	497.68
39	R01	0.00	103.00	143.00	391.95
40	R02	0.36	105.00	142.99	372.29
41	R03	0.00	104.00	143.00	382.15

Phase 1B - Max Day + Fire HGL 139.5 - 140.2m - Fireflow Design Report

	ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1	J01	167.16	R02	331.32	122.31	1,121.92	1,021.46	J01	139.97	102.78	1,021.48	1,021.48
2	J02	166.97	R02	331.94	121.97	1,198.01	976.69	J62	129.72	101.34	960.99	960.99
3	J04	167.03	R02	331.97	120.88	1,201.90	700.87	J18	129.19	100.18	689.35	689.35
4	J06	166.86	R02	331.98	119.23	1,203.78	660.69	J06	139.97	99.63	660.69	660.69
5	J10	167.11	R02	331.97	119.48	1,202.62	302.21	J10	139.96	99.88	302.21	302.21
6	J12	166.95	R02	331.97	119.38	1,202.42	260.38	J12	139.96	99.78	260.38	260.38
7	J14	167.07	R02	331.97	121.98	1,202.50	256.53	J14	139.96	102.38	256.53	256.53
8	J16	167.33	J16	321.74	121.33	246.17	246.17	J16	139.96	102.78	246.17	246.17
9	J18	167.03	R02	331.97	122.88	1,202.42	257.94	J18	139.96	103.28	257.94	257.94
10	J20	167.01	J20	317.31	118.98	236.20	236.20	J20	139.96	100.88	236.20	236.20
11	J22	167.21	J22	208.86	108.76	187.09	187.09	J22	139.96	101.73	187.09	187.09
12	J24	167.33	R02	331.97	122.18	1,202.69	298.92	J24	139.96	102.58	298.92	298.92
13	J26	167.22	R02	331.97	119.98	1,202.95	389.43	J26	139.96	100.38	389.43	389.43
14	J28	167.33	R02	331.97	121.38	1,202.60	384.11	J28	139.96	101.78	384.11	384.11
15	J30	166.88	J30	310.88	120.63	239.06	239.06	J30	139.96	103.18	239.06	239.06
16	J32	218.80	R02	328.76	121.65	1,230.08	895.98	J62	122.82	100.63	872.30	872.30
17	J34	218.84	R02	328.59	121.83	1,215.80	642.28	J34	139.97	102.58	642.29	642.29
18	J36	216.67	R02	328.53	119.18	1,208.48	630.89	J36	139.97	99.93	630.90	630.90
19	J50	217.44	R02	329.56	122.03	1,306.50	825.07	J50	139.97	102.68	825.07	825.07
20	J52	218.15	R02	330.35	122.61	1,395.62	807.70	J52	139.97	103.18	807.70	807.70
21	J54	218.69	R02	331.05	123.18	1,484.86	790.43	J54	139.97	103.68	790.44	790.44
22	J56	218.83	R02	331.90	124.87	1,607.21	734.61	J56	139.97	105.28	734.61	734.61
23	J58	219.90	J58	320.28	123.28	332.38	332.38	J58	139.96	104.88	332.39	332.38
24	J60	218.82	J60	305.43	121.17	312.36	312.37	J60	139.96	104.28	312.37	312.36
25	J62	217.98	R02	328.76	123.40	1,229.26	773.19	J62	139.97	104.13	773.20	773.20
26	J64	220.39	R02	329.62	122.74	1,315.85	804.42	J64	139.97	103.38	804.43	804.43
27	J66	219.12	R02	330.35	123.11	1,397.22	794.11	J66	139.97	103.68	794.12	794.12
28	J68	218.22	R02	331.00	124.28	1,479.87	767.72	J68	139.97	104.78	767.73	767.73
29	J70	218.30	R02	331.59	126.34	1,563.02	702.65	J70	139.97	106.78	702.65	702.65
30	J72	220.30	R02	332.08	127.94	1,632.26	691.52	J72	139.97	108.33	691.53	691.53
31	J74	217.45	R02	332.67	128.75	1,753.48	804.04	J74	139.97	109.08	804.04	804.04
32	J76	217.23	R02	332.82	127.96	1,794.90	864.82	J74	137.21	108.00	860.44	860.44
33	J78	219.75	R02	330.85	123.66	1,467.48	492.19	J78	139.96	104.18	492.19	492.19
34	J80	217.73	R02	330.27	122.95	1,388.98	491.89	J80	139.96	103.53	491.90	491.90
35	J82	219.30	R02	329.53	122.38	1,306.06	502.89	J82	139.96	103.03	502.89	502.89
36	J84	217.43	R02	333.09	126.59	1,865.81	977.08	J74	126.62	105.52	953.70	953.70
37	J86	219.33	R02	333.73	126.66	2,029.46	1,034.26	J86	139.97	106.88	1,034.28	1,034.28
38	J88	217.49	R02	334.75	126.36	2,359.29	1,166.02	J88	139.98	106.48	1,166.05	1,166.05
39	R02	167.57	R02	329.43	138.62	951.03	951.01	R02	139.97	119.28	951.03	951.03

Peak Hour Existing HGL 147.0 - 147.2m - Pipe Report

	ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1	101	J68	J78	74.96	204.00	110.00	3.26	0.10	0.01	0.10
2	103	J78	J54	82.08	204.00	110.00	-3.52	0.11	0.01	0.12
3	105	J66	J80	77.33	204.00	110.00	-0.19	0.01	0.0000	0.000
4	107	J80	J52	82.87	204.00	110.00	-2.53	0.08	0.01	0.06
5	109	J64	J82	72.60	204.00	110.00	1.71	0.05	0.00	0.03
6	11	R01	R02	205.21	393.00	120.00	49.27	0.41	0.11	0.54
7	111	J82	J50	82.87	204.00	110.00	-4.08	0.12	0.01	0.15
8	113	J54	J58	118.98	204.00	110.00	5.56	0.17	0.03	0.27
9	115	J58	J60	175.07	204.00	110.00	-1.55	0.05	0.00	0.03
10	117	J60	J56	171.69	204.00	110.00	-6.28	0.19	0.06	0.34
11	119	J84	J86	88.16	393.00	120.00	-50.70	0.42	0.05	0.57
12	13	J01	R02	306.73	393.00	120.00	-47.30	0.39	0.15	0.50
13	15	R03	J88	270.72	393.00	120.00	56.98	0.47	0.19	0.71
14	17	J84	J56	186.99	297.00	120.00	23.20	0.33	0.10	0.52
15	19	J02	J04	118.60	297.00	120.00	12.00	0.17	0.02	0.15
16	21	J04	J06	119.01	297.00	120.00	5.34	0.08	0.00	0.03
17	27	J10	J12	81.37	204.00	110.00	1.86	0.06	0.00	0.04
18	29	J12	J30	131.14	204.00	110.00	1.25	0.04	0.00	0.02
19	31	J30	J14	79.50	204.00	110.00	0.80	0.02	0.000	0.01
20	33	J14	J16	105.90	204.00	110.00	0.16	0.01	0.0000	0.000
21	35	J16	J18	88.67	204.00	110.00	-1.29	0.04	0.00	0.02
22	37	J24	J18	69.60	204.00	110.00	2.09	0.06	0.00	0.04
23	39	J24	J28	81.38	204.00	110.00	-4.58	0.14	0.02	0.19
24	41	J28	J04	86.06	204.00	110.00	-5.88	0.18	0.03	0.30
25	43	J14	J20	75.25	155.00	100.00	-0.25	0.01	0.000	0.00
26	45	J20	J10	83.78	155.00	100.00	-1.14	0.06	0.01	0.07
27	47	J20	J22	118.40	155.00	100.00	0.15	0.01	0.000	0.00
28	49	J22	J24	81.94	155.00	100.00	-1.04	0.06	0.00	0.06
29	51	J10	J26	100.14	204.00	110.00	-3.95	0.12	0.01	0.14
30	53	J26	J28	119.49	155.00	100.00	0.14	0.01	0.000	0.00
31	55	J26	J06	87.10	204.00	110.00	-5.31	0.16	0.02	0.25
32	57	J02	J32	157.46	393.00	120.00	21.51	0.18	0.02	0.12
33	59	J32	J34	175.10	297.00	120.00	4.30	0.06	0.00	0.02
34	61	J34	J36	132.79	297.00	120.00	0.39	0.01	0.0000	0.000
35	63	J36	J06	165.55	297.00	120.00	0.39	0.01	0.0000	0.000
36	65	R03	BC02	48.86	393.00	120.00	-56.98	0.47	0.03	0.71
37	67	R01	BC01	60.49	393.00	120.00	-49.27	0.41	0.03	0.54
38	69	J01	J02	133.74	393.00	120.00	46.22	0.38	0.06	0.48
39	73	J86	J88	125.70	393.00	120.00	-55.50	0.46	0.08	0.67
40	75	J50	J02	145.16	297.00	120.00	-12.05	0.17	0.02	0.16
41	77	J52	J50	112.09	297.00	120.00	-6.28	0.09	0.01	0.05
42	79	J54	J52	89.74	297.00	120.00	-0.49	0.01	0.0000	0.000
43	81	J56	J54	170.28	297.00	120.00	13.03	0.19	0.03	0.18
44	83	J32	J64	143.50	297.00	120.00	9.64	0.14	0.01	0.10
45	85	J64	J66	112.06	297.00	120.00	-0.25	0.00	0.00000	0.0000
46	87	J66	J68	89.98	297.00	120.00	-5.44	0.08	0.00	0.04
47	89	J68	J70	85.23	297.00	120.00	-12.12	0.17	0.01	0.16
48	91	J70	J72	85.23	297.00	120.00	-15.70	0.23	0.02	0.25
49	93	J72	J74	126.16	297.00	120.00	-23.69	0.34	0.07	0.54
50	95	J32	J62	77.50	393.00	120.00	2.87	0.02	0.000	0.00
51	97	J74	J76	75.91	393.00	120.00	-25.10	0.21	0.01	0.15
52	99	J76	J84	90.33	393.00	120.00	-26.12	0.22	0.02	0.17

APPENDIX C

- **Figure 5.1 – Recommended Wastewater Plan (MSS)**
- **Figure 3.1 – Recommended Wastewater Plan**
- **Sanitary Sewer Design Sheets**
- **Drawing 38298-501A, Sanitary Drainage Area Plan**

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	-	0
Semi-detached	2.7	-	0
Townhouse	2.7	192	519
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1	-	0
Average	1.8	-	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	519	145.3	100.9	363.3	252.3	799.3	555.0

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5 $L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Restaurant*	125 L/seat/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Total I/CI Demand			0.0	0.0	0.0	0.0	0.0	0.0
Total Demand			**145.3**	**100.9**	**363.3**	**252.3**	**799.3**	**555.0**

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 1

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	2033.4	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14880.8	L/min	
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**12750.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	30.1m-45m	32	3	96	5%	
S	Wood Frame	20.1m-30m	32	3	96	10%	
E	Wood Frame	3.1m-10m	16	3	48	18%	
W	Wood Frame	30.1m-45m	16	3	48	5%	
		% Increase				**38%**	*value not to exceed 75%*

Increase	**4845.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	17595.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 2

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	2022.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14840.2	L/min	
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**12750.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	30.1m-45m	32	3	96	5%
S	Wood Frame	20.1m-30m	32	3	96	10%
E	Wood Frame	3.1m-10m	16	3	48	18%
W	Wood Frame	3.1m-10m	16	3	48	18%
		% Increase				**51%** *value not to exceed 75%*

Increase	**6502.5**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	19252.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	19000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 3

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	2022.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14840.2	L/min	
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**12750.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	30.1m-45m	32	3	96	5%
S	Wood Frame	20.1m-30m	32	3	96	10%
E	Wood Frame	3.1m-10m	16	3	48	18%
W	Wood Frame	3.1m-10m	16	3	48	18%
		% Increase				**51%** *value not to exceed 75%*

Increase	**6502.5**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	19252.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	19000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 4

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	2033.4	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14880.8	L/min	
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**12750.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	30.1m-45m	32	3	96	5%
S	Wood Frame	20.1m-30m	32	3	96	10%
E	Wood Frame	30.1m-45m	16	3	48	5%
W	Wood Frame	3.1m-10m	16	3	48	18%
		% Increase				**38%** *value not to exceed 75%*

Increase	**4845.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	17595.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 5

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1622.7	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	13293.4	L/min	
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**11050.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	18	3	54	8%	
S	Wood Frame	10.1m-20m	18	3	54	13%	
E	Wood Frame	20.1m-30m	26	3	78	9%	
W	Wood Frame	10.1m-20m	26	3	78	14%	
		% Increase				**44%**	*value not to exceed 75%*

Increase	**4862.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	15912.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 6

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1622.7	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	13293.4	L/min	
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**11050.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	18	3	54	8%	
S	Wood Frame	3.1m-10m	18	3	54	18%	
E	Wood Frame	20.1m-30m	26	3	78	9%	
W	Wood Frame	10.1m-20m	26	3	78	14%	
		% Increase				**49%**	*value not to exceed 75%*

Increase	**5414.5**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	16464.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 7

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1222.9	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11540.1	L/min	
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**10200.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	3.1m-10m	18	3	54	18%	
S	Wood Frame	10.1m-20m	18	3	54	13%	
E	Wood Frame	10.1m-20m	26	3	78	14%	
W	Wood Frame	20.1m-30m	26	3	78	9%	
		% Increase				**54%**	*value not to exceed 75%*

Increase	**5508.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	15708.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 8

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	745.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9008.9	L/min	
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**7650.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	24	3	72	9%	
S	Wood Frame	3.1m-10m	24	3	72	19%	
E	Wood Frame	10.1m-20m	33	3	99	15%	
W	Wood Frame	10.1m-20m	33	3	99	15%	
		% Increase				**58%**	*value not to exceed 75%*

Increase	**4437.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	12087.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 9

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	758.4	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9087.7	L/min	
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**7650.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	3.1m-10m	24	3	72	19%	
S	Wood Frame	3.1m-10m	24	3	72	19%	
E	Wood Frame	10.1m-20m	33	3	99	15%	
W	Wood Frame	10.1m-20m	33	3	99	15%	
		% Increase				**68%**	*value not to exceed 75%*

Increase	**5202.0**	**L/min**	

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	12852.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 10

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	744.5	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9004.3	L/min	
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**7650.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	3.1m-10m	24	3	72	19%
S	Wood Frame	>45m	24	3	72	0%
E	Wood Frame	10.1m-20m	33	3	99	15%
W	Wood Frame	10.1m-20m	33	3	99	15%
		% Increase				**49%** *value not to exceed 75%*

Increase	**3748.5**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	11398.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	11000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 11

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	617.8	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	8202.4	L/min	
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**6800.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	10.1m-20m	26	3	78	14%	
S	Wood Frame	>45m	26	3	78	0%	
E	Wood Frame	10.1m-20m	24	3	72	14%	
W	Wood Frame	3.1m-10m	24	3	72	19%	
		% Increase				**47%**	*value not to exceed 75%*

Increase	**3196.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	9996.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 12

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	617.8	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	8202.4	L/min	
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**6800.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	10.1m-20m	26	3	78	14%	
S	Wood Frame	>45m	26	3	78	0%	
E	Wood Frame	3.1m-10m	24	3	72	19%	
W	Wood Frame	3.1m-10m	24	3	72	19%	
		% Increase				**52%**	*value not to exceed 75%*

Increase	**3536.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	10336.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 13

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	745.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9008.9	L/min
	9000.0	**L/min** *rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**7650.0 L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%
Reduction	**0 L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	10.1m-20m	33	3	99	15%
S	Wood Frame	>45m	33	3	99	0%
E	Wood Frame	3.1m-10m	24	3	72	19%
W	Wood Frame	3.1m-10m	24	3	72	19%
		% Increase				**53%** *value not to exceed 75%*

Increase	**4054.5 L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	11704.5	L/min *fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	12000.0	**L/min** *rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

BLOCK 14

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	904.5	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9924.7	L/min	
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**8500.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	20.1m-30m	24	3	72	9%
S	Wood Frame	3.1m-10m	24	3	72	19%
E	Wood Frame	10.1m-20m	39	3	117	15%
W	Wood Frame	>45m	39	3	117	0%
		% Increase				**43%** *value not to exceed 75%*

Increase	**3655.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	12155.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.
-Calculations based on Fire Underwriters Survey - Part II

```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.0                             *
******************************************************************
```

Input File: 2019-11-29_946_Block15_ggg.net

DSEL EPANet - Wateridge Block 15

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
3	9	8	49.3	200	
5	3	6	9.3	200	
6	6	12	46.3	200	
8	12	22	24.4	100	
9	14	11	30.0	200	
11	3	11	43.8	200	
4	19	3	24.6	200	
10	12	15	29.7	200	
12	2	9	78.9	200	
14	21	17	27.17	50	
2	2	4	22.3	200	
7	13	16	33.02	100	
13	10	6	36.4	100	
15	7	10	32.7	100	
16	20	2	8.7	200	
17	8	14	16.9	200	
21	18	WSquadron	7	200	
1	1	5	12.43	200	
18	16	10	73.85	100	
22	16	15	36.39	100	
23	15	20	2.13	200	
24	21	9	1.76	200	
25	22	8	45.6	100	
20	19	18	#N/A	200	Valve
19	5	4	#N/A	200	Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
3	4.80	146.13	56.61	0.15
6	4.80	146.13	56.48	0.22

8	4.80	146.13	56.00	1.38
9	4.80	146.13	55.45	2.37
11	4.80	146.13	56.29	0.69
12	4.80	146.13	56.05	0.72

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
2	4.80	146.13	55.41	2.86	
4	4.80	146.13	55.28	3.25	
7	4.80	146.13	56.39	1.51	
10	4.80	146.13	55.97	0.62	
13	4.80	146.13	55.11	3.39	
14	4.80	146.13	56.09	1.11	
15	4.80	146.13	55.49	1.11	
17	4.80	146.13	55.96	2.65	
18	4.80	147.00	57.68	0.03	
19	4.80	146.13	56.73	0.03	
5	4.80	146.00	54.99	3.25	
16	4.80	146.13	55.32	2.49	
20	4.80	146.13	55.47	1.15	
21	4.80	146.13	55.44	2.47	
22	4.80	146.13	56.01	2.87	
WSquadron	-121.56	147.00	0.00	0.00	Reservoir
1	20.66	146.00	0.00	0.00	Reservoir

Link Results:

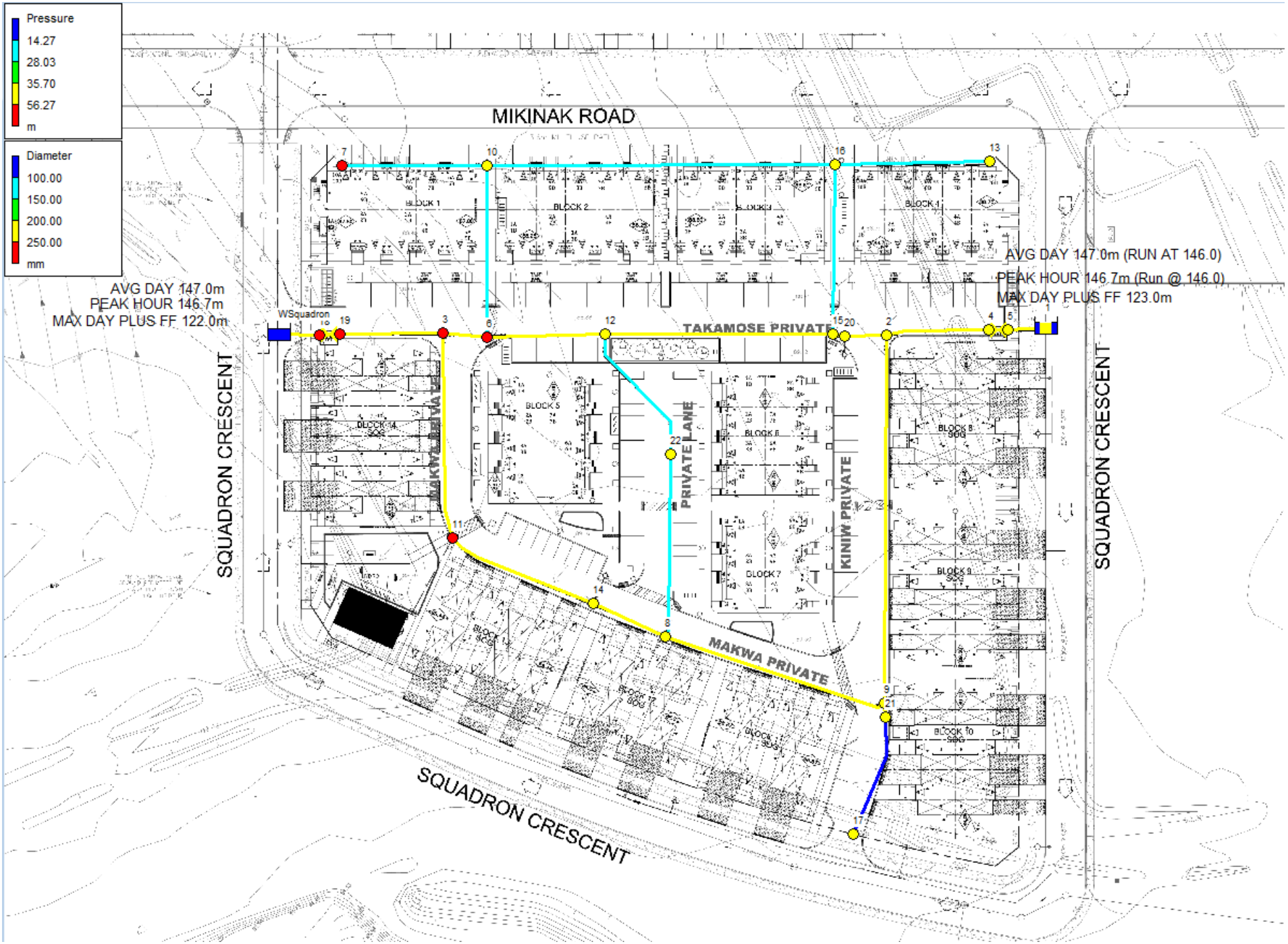
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	26.06	0.01	0.00	Open
5	64.94	0.03	0.02	Open
6	48.12	0.03	0.01	Open
8	3.07	0.01	0.00	Open
9	37.40	0.02	0.01	Open
11	42.21	0.02	0.01	Open
4	111.95	0.06	0.04	Open
10	40.24	0.02	0.01	Open
12	11.64	0.01	0.00	Open
14	4.80	0.04	0.12	Open
2	30.27	0.02	0.00	Open
7	4.80	0.01	0.00	Open
13	12.02	0.03	0.02	Open
15	4.80	0.01	0.00	Open
16	23.43	0.01	0.00	Open

17	32.60	0.02	0.00	Open
21	121.56	0.06	0.05	Open
1	20.66	0.01	0.00	Open
18	2.41	0.01	0.00	Open
22	7.20	0.02	0.01	Open
23	28.23	0.01	0.00	Open
24	9.61	0.01	0.01	Open
25	1.73	0.00	0.00	Open
20	116.76	0.06	0.86	Open Valve

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
19	25.46	0.01	0.13	Open Valve

Average Day Scenario - Block 15



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******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.0                             *
******************************************************************
```

Input File: 2019-11-29_946_Block15_ggg.net

DSEL EPANet - Wateridge Block 15

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
3	9	8	49.3	200	
5	3	6	9.3	200	
6	6	12	46.3	200	
8	12	22	24.4	100	
9	14	11	30.0	200	
11	3	11	43.8	200	
4	19	3	24.6	200	
10	12	15	29.7	200	
12	2	9	78.9	200	
14	21	17	27.17	50	
2	2	4	22.3	200	
7	13	16	33.02	100	
13	10	6	36.4	100	
15	7	10	32.7	100	
16	20	2	8.7	200	
17	8	14	16.9	200	
21	18	WSquadron	7	200	
1	1	5	12.43	200	
18	16	10	73.85	100	
22	16	15	36.39	100	
23	15	20	2.13	200	
24	21	9	1.76	200	
25	22	8	45.6	100	
20	19	18	#N/A	200	Valve
19	5	4	#N/A	200	Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
3	26.43	145.24	55.72	0.06
6	26.43	145.24	55.59	0.08

8	26.43	145.24	55.11	0.54
9	26.43	145.23	54.55	1.15
11	26.43	145.24	55.40	0.25
12	26.43	145.24	55.16	0.31

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
2	26.43	145.24	54.52	0.14	
4	26.43	145.24	54.39	0.04	
7	26.43	145.22	55.48	0.33	
10	26.43	145.22	55.06	0.17	
13	26.43	145.22	54.20	0.93	
14	26.43	145.24	55.20	0.41	
15	26.43	145.24	54.60	0.52	
17	26.43	145.15	54.98	1.20	
18	26.43	146.70	57.38	0.02	
19	26.43	145.25	55.85	0.02	
5	26.43	146.00	54.99	0.04	
16	26.43	145.22	54.41	0.77	
20	26.43	145.24	54.58	0.25	
21	26.43	145.23	54.54	1.17	
22	26.43	145.23	55.11	0.73	
WSquadron	-387.92	146.70	0.00	0.00	Reservoir
1	-167.11	146.00	0.00	0.00	Reservoir

Link Results:

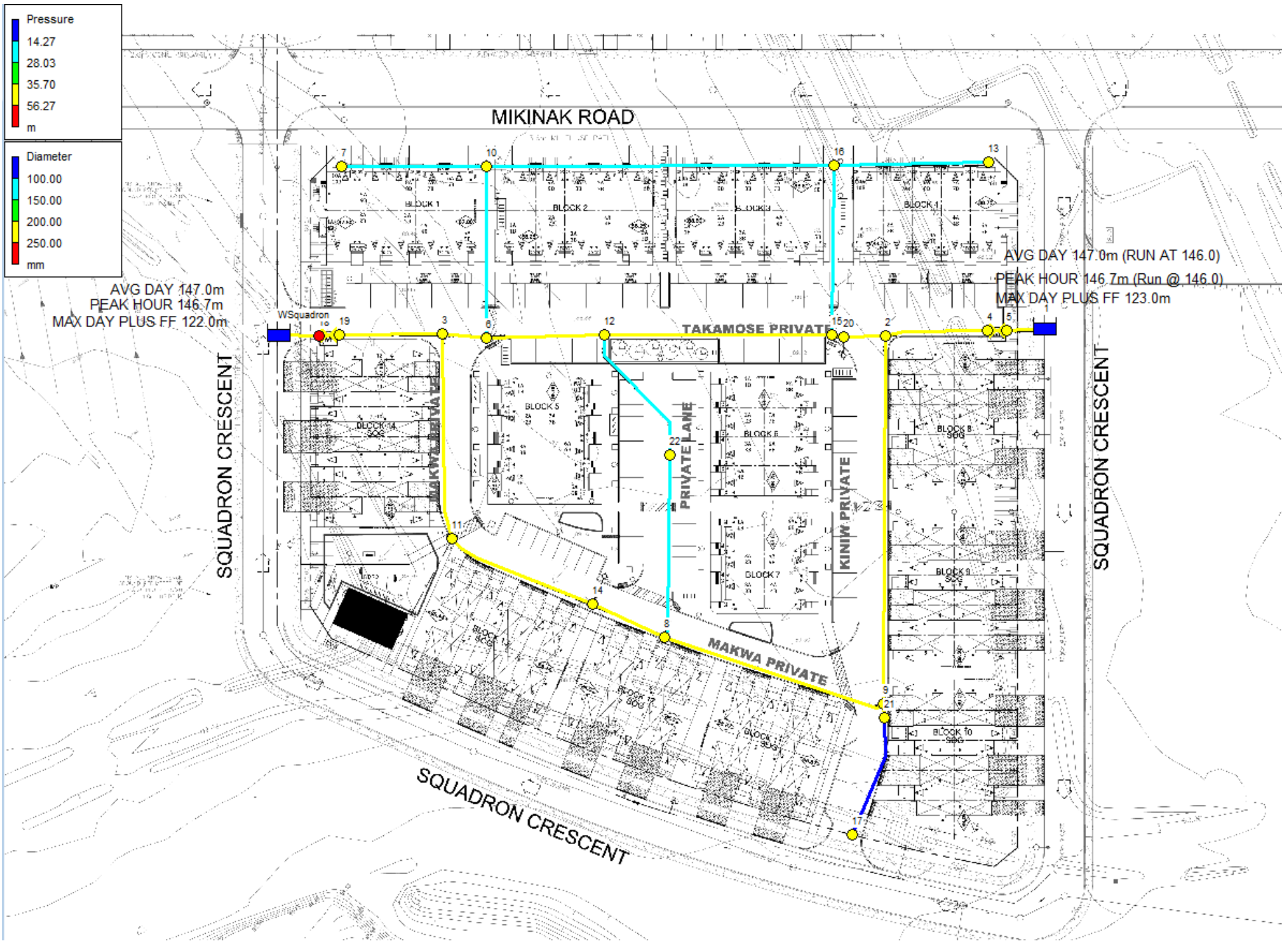
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	32.81	0.02	0.00	Open
5	187.86	0.10	0.15	Open
6	105.43	0.06	0.04	Open
8	17.76	0.04	0.06	Open
9	94.34	0.05	0.04	Open
11	120.77	0.06	0.06	Open
4	335.06	0.18	0.34	Open
10	61.24	0.03	0.01	Open
12	46.48	0.02	0.01	Open
14	26.43	0.22	2.96	Open
2	114.25	0.06	0.06	Open
7	26.43	0.06	0.10	Open
13	56.00	0.12	0.42	Open
15	26.43	0.06	0.11	Open
16	41.34	0.02	0.01	Open

17	67.91	0.04	0.02	Open
21	387.92	0.21	0.46	Open
1	167.11	0.09	0.14	Open
18	3.14	0.01	0.00	Open
22	49.72	0.11	0.37	Open
23	14.91	0.01	0.00	Open
24	52.86	0.03	0.03	Open
25	8.67	0.02	0.01	Open
20	361.49	0.19	1.45	Open Valve

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
19	140.68	0.07	0.76	Open Valve

Peak Hour Scenario - Block 15



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******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.0                             *
******************************************************************
```

Input File: 2019-11-29_946_Block15_ggg.net

DSEL EPANet - Wateridge Block 15

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
3	9	8	49.3	200	
5	3	6	9.3	200	
6	6	12	46.3	200	
8	12	22	24.4	100	
9	14	11	30.0	200	
11	3	11	43.8	200	
4	19	3	24.6	200	
10	12	15	29.7	200	
12	2	9	78.9	200	
14	21	17	27.17	50	
2	2	4	22.3	200	
7	13	16	33.02	100	
13	10	6	36.4	100	
15	7	10	32.7	100	
16	20	2	8.7	200	
17	8	14	16.9	200	
21	18	WSquadron	7	200	
1	1	5	12.43	200	
18	16	10	73.85	100	
22	16	15	36.39	100	
23	15	20	2.13	200	
24	21	9	1.76	200	
25	22	8	45.6	100	
20	19	18	#N/A	200	Valve
19	5	4	#N/A	200	Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
3	12.01	116.21	26.69	0.03
6	12.01	115.97	26.32	0.05

8	12.01	114.00	23.87	0.08
9	12.01	114.50	23.82	0.05
11	12.01	114.78	24.94	0.05
12	12.01	115.29	25.21	0.07

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
2	12.01	115.22	24.50	0.03	
4	12.01	117.07	26.22	0.02	
7	12.01	115.67	25.93	0.42	
10	12.01	115.67	25.51	0.07	
13	12.01	115.20	24.18	0.47	
14	5712.01	113.80	23.76	0.08	
15	12.01	114.98	24.34	0.09	
17	12.01	114.48	24.31	0.17	
18	12.01	121.40	32.08	0.02	
19	12.01	118.25	28.85	0.02	
5	12.01	121.64	30.63	0.02	
16	12.01	115.20	24.39	0.11	
20	5712.01	114.90	24.24	0.07	
21	12.01	114.50	23.81	0.09	
22	12.01	114.77	24.65	0.08	
WSquadron	-6323.29	122.00	0.00	0.00	Reservoir
1	-5329.00	123.00	0.00	0.00	Reservoir

Link Results:

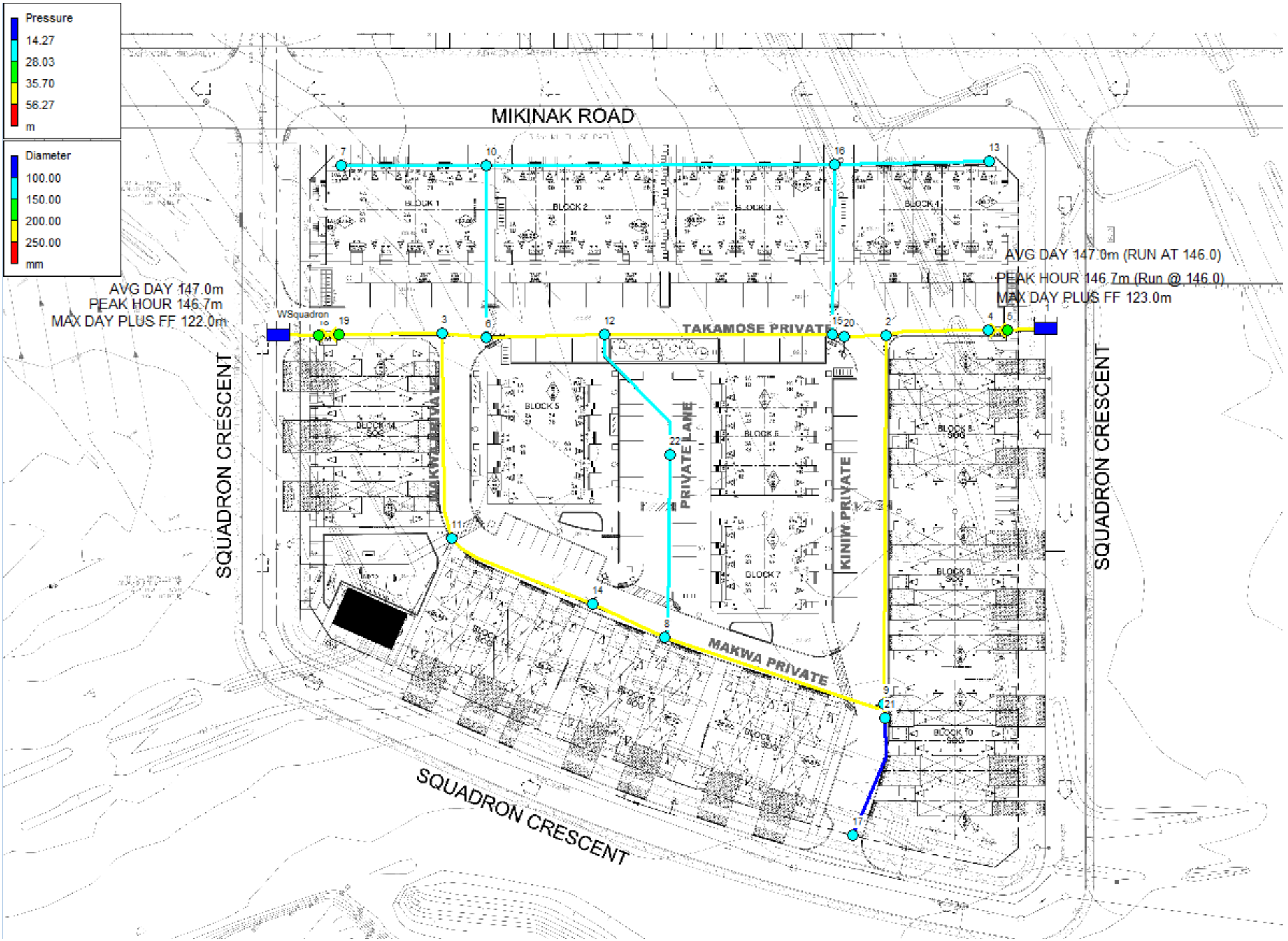
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	1891.35	1.00	10.14	Open
5	2844.97	1.51	25.83	Open
6	2560.47	1.36	14.66	Open
8	414.43	0.88	21.42	Open
9	3430.26	1.82	32.53	Open
11	3442.28	1.83	32.64	Open
4	6299.26	3.34	82.93	Open
10	2134.03	1.13	10.62	Open
12	1927.39	1.02	9.19	Open
14	12.01	0.10	0.68	Open
2	5304.97	2.81	82.81	Open
7	12.01	0.03	0.02	Open
13	272.49	0.58	8.12	Open
15	12.01	0.03	0.02	Open
16	3365.57	1.79	36.56	Open

17	2281.75	1.21	11.41	Open
21	6323.29	3.35	85.93	Open
1	5329.00	2.83	109.62	Open
18	248.46	0.53	6.40	Open
22	224.43	0.48	6.22	Open
23	2346.45	1.24	33.32	Open
24	24.03	0.01	0.01	Open
25	402.42	0.85	16.90	Open
20	6311.28	3.35	3.15	Open Valve

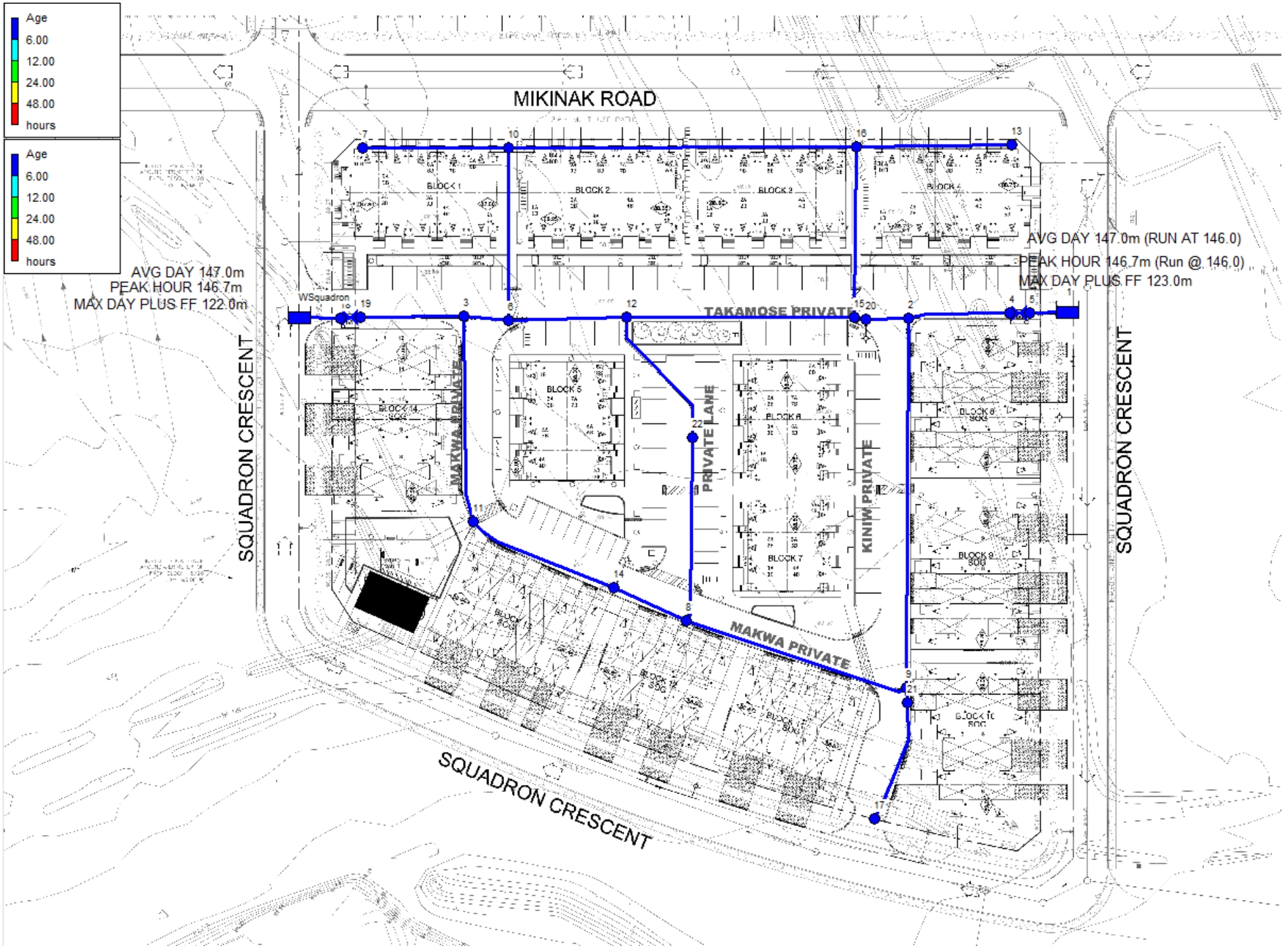
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
19	5316.99	2.82	4.57	Open Valve

Max. Day + Fire Flow Scenario - Block 15



Water Age


Age
6.00
12.00
24.00
48.00
hours
Age
6.00
12.00
24.00
48.00
hours
AVG DAY 147.0m
PEAK HOUR 146.7m
MAX DAY PLUS FF 122.0m
AVG DAY 147.0m (RUN AT 146.0)
PEAK HOUR 146.7m (Run @ 146.0)
MAX DAY PLUS FF 123.0m
MIKINAK ROAD
SQUADRON CRESCENT
SQUADRON CRESCENT
SQUADRON CRESCENT
WSquadron
TAKAMOSE PRIVATE
MAKWA PRIVATE
PRIVATE LANE
KINIW PRIVATE
MAKWA PRIVATE
BLOCK 1
BLOCK 2
BLOCK 2
BLOCK 4
BLOCK 5
BLOCK 6
BLOCK 7
BLOCK 8
BLOCK 9
BLOCK 10
BLOCK 11
BLOCK 12
BLOCK 13
BLOCK 14
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21
22

DSEL EPANet - Wateridge Block 15

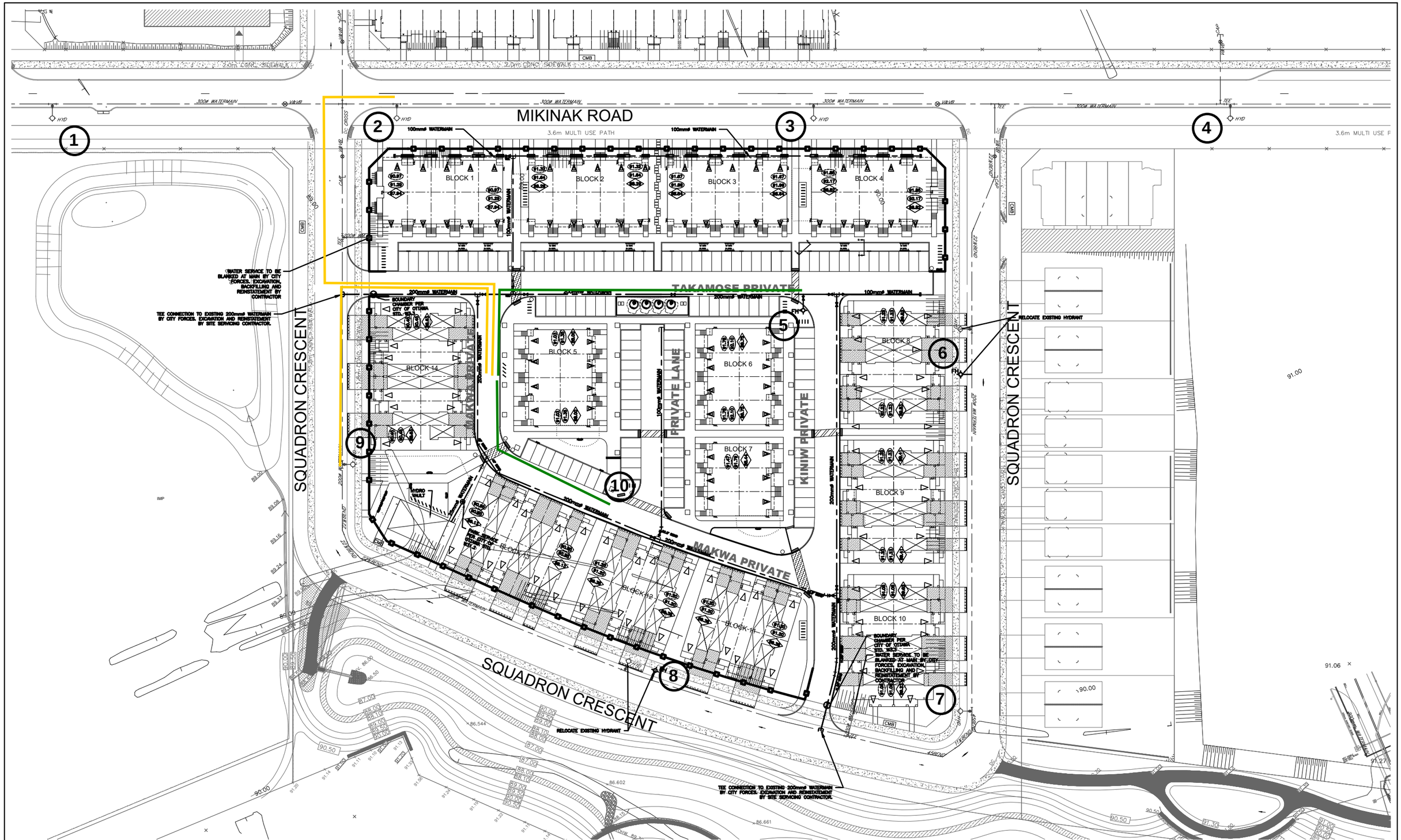
Network Table - Nodes

Node ID	Demand LPM	Head m	Pressure m	Age hours
Junc 3	4.80	146.13	56.61	0.15
Junc 6	4.80	146.13	56.48	0.22
Junc 8	4.80	146.13	56.00	1.38
Junc 9	4.80	146.13	55.45	2.37
Junc 11	4.80	146.13	56.29	0.69
Junc 12	4.80	146.13	56.05	0.72
Junc 2	4.80	146.13	55.41	2.86
Junc 4	4.80	146.13	55.28	3.25
Junc 7	4.80	146.13	56.39	1.51
Junc 10	4.80	146.13	55.97	0.62
Junc 13	4.80	146.13	55.11	3.39
Junc 14	4.80	146.13	56.09	1.11
Junc 15	4.80	146.13	55.49	1.11
Junc 17	4.80	146.13	55.96	2.65
Junc 18	4.80	147.00	57.68	0.03
Junc 19	4.80	146.13	56.73	0.03
Junc 5	4.80	146.00	54.99	3.25
Junc 16	4.80	146.13	55.32	2.49
Junc 20	4.80	146.13	55.47	1.15
Junc 21	4.80	146.13	55.44	2.47
Junc 22	4.80	146.13	56.01	2.87
Resvr WSquadron	-121.56	147.00	0.00	0.00
Resvr 1	20.66	146.00	0.00	0.00

DSEL EPANet - Wateridge Block 15

Network Table - Links

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Age hours
Pipe 3	26.06	0.01	0.00	1.87
Pipe 5	64.94	0.03	0.02	0.17
Pipe 6	48.12	0.03	0.01	0.46
Pipe 8	3.07	0.01	0.00	1.24
Pipe 9	37.40	0.02	0.01	0.89
Pipe 11	42.21	0.02	0.01	0.41
Pipe 4	111.95	0.06	0.04	0.08
Pipe 10	40.24	0.02	0.01	0.91
Pipe 12	11.64	0.01	0.00	4.14
Pipe 14	4.80	0.04	0.12	2.55
Pipe 2	30.27	0.02	0.00	3.05
Pipe 7	4.80	0.01	0.00	2.93
Pipe 13	12.02	0.03	0.02	0.41
Pipe 15	4.80	0.01	0.00	1.05
Pipe 16	23.43	0.01	0.00	1.24
Pipe 17	32.60	0.02	0.00	1.24
Pipe 21	121.56	0.06	0.05	0.01
Pipe 1	20.66	0.01	0.00	3.40
Pipe 18	2.41	0.01	0.00	2.62
Pipe 22	7.20	0.02	0.01	1.43
Pipe 23	28.23	0.01	0.00	1.12
Pipe 24	9.61	0.01	0.01	2.41
Pipe 25	1.73	0.00	0.00	3.10
Valve 20	116.76	0.06	0.86	0.03
Valve 19	25.46	0.01	0.13	3.25



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Fax. (613) 836-7183
www.DSEL.ca

HYDRANT COVERAGE FIGURE - BLOCK 5

Distance from Hydrant to Building
- **<76 m**
- **>76 m and < 152 m**

PROJ NO.:	17-946
DRAWN BY:	G.G.G.
DATE:	2019-08-21
SCALE:	1:900
FIGURE NO.:	FIG-1

z:\projects\17-946-wateridge_block 15\b_design\b2_drawings\b2-2_main (dsel)\2019-08_subm4\2019-08-21_946_spa_ggg.dwg

MIKINAK ROAD

3.6m MULTI USE PATH

TAKAMOSE PRIVATE

MAKWA PRIVATE

PRIVATE LANE

KINIW PRIVATE

SQUADRON CRESCENT

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

BLOCK 14

1

2

3

4

5

6

7

8

9

10

WATER SERVICE TO BE BLANKED AT MAIN BY CITY FORCES. EXCAVATION, BACKFILLING AND REINSTATEMENT BY CONTRACTOR

TEE CONNECTION TO EXISTING 200mmø WATERMAIN BY CITY FORCES. EXCAVATION AND REINSTATEMENT BY SITE SERVICING CONTRACTOR.

RELOCATE EXISTING HYDRANT

RELOCATE EXISTING HYDRANT

TEE CONNECTION TO EXISTING 200mmø WATERMAIN BY CITY FORCES. EXCAVATION AND REINSTATEMENT BY SITE SERVICING CONTRACTOR.

BOUNDARY CHAMBER PER CITY OF OTTAWA STD. 1903

WATER SERVICE TO BE BLANKED AT MAIN BY CITY FORCES. EXCAVATION, BACKFILLING AND REINSTATEMENT BY CONTRACTOR

HYDRO VAULT

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

HYDRANT COVERAGE FIGURE - BLOCK 7

Distance from Hydrant to Building
- **<76 m**
- **>76 m and < 152 m**

PROJ NO.:	17-946
DRAWN BY:	G.G.G.
DATE:	2019-08-21
SCALE:	1:900
FIGURE NO.:	FIG-2

z:\projects\17-946-wateridge_block 15\b_design\b2_drawings\b2-2_main (dsel)\2019-08_subm4\2019-08-21_946_spa_ggg.dwg

MIKINAK ROAD

3.6m MULTI USE PATH

SQUADRON CRESCENT

TAKAMOSE PRIVATE

PRIVATE LANE

KINIW PRIVATE

MAKWA PRIVATE

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

BLOCK 14

1

2

3

4

5

6

7

8

9

10

WATER SERVICE TO BE BLANKED AT MAIN BY CITY FORCES. EXCAVATION, BACKFILLING AND REINSTATEMENT BY CONTRACTOR

TEE CONNECTION TO EXISTING 200mmø WATERMAIN BY CITY FORCES. EXCAVATION AND REINSTATEMENT BY SITE SERVICING CONTRACTOR.

RELOCATE EXISTING HYDRANT

TEE CONNECTION TO EXISTING 200mmø WATERMAIN BY CITY FORCES. EXCAVATION AND REINSTATEMENT BY SITE SERVICING CONTRACTOR.

DSEL
david schaeffer engineering ltd.
SMART SUBDIVISIONS™

120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

HYDRANT COVERAGE FIGURE - BLOCK 6

Distance from Hydrant to Building
- **<76 m**
- **>76 m and < 152 m**

PROJ NO.:	17-946
DRAWN BY:	G.G.G.
DATE:	2019-08-21
SCALE:	1:900
FIGURE NO.:	FIG-2

z:\projects\17-946-wateridge_block 15\b_design\b2_drawings\b2-2_main (dsel)\2019-08_subm4\2019-08-21_946_spa_ggg.dwg

APPENDIX C

Wastewater Collection

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		FLOW									(full)		
STREET	AREA ID	FROM MH	TO MH	Phase 1B (Ha)	SF	SD	TH	APT	EXTERNAL (Ha)	IND	CUM	FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
Phase 1B																																
Hemlock Road	201A	MH201A	MH202A	0.31						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.31	0.31	0.09	0.00	0.09	50.02	87.06	250	0.65	0.987	49.93	99.83%
Future Street No. 6	EX202A	BULK202AN	MH202A						2.08	358.5	358.5	4.00	5.81		0.00		0.00		0.00	0.00	2.08	2.08	0.58	0.00	6.39	31.02	21.00	250	0.25	0.612	24.63	79.40%
Hemlock Road	202A	MH202A	MH203A	0.21						0.0	358.5	4.00	5.81		0.00		0.00		0.00	0.00	0.21	2.60	0.73	0.00	6.54	75.98	86.00	250	1.50	1.500	69.44	91.40%
Future Street No. 5	EX203A	BULK203AN	MH203A						1.40	160.5	160.5	4.00	2.60		0.00		0.00		0.00	0.00	1.40	1.40	0.39	0.00	2.99	83.23	21.00	250	1.80	1.643	80.24	96.40%
Hemlock Road	203A, EXPARK2	MH203A	MH204A	0.20					0.44	0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.64	0.64	0.18	0.00	0.18	82.07	86.00	250	1.75	1.620	81.89	99.78%
rue Moses Tennisco Street	EX204A	BULK204AN	MH204A						1.39	153.5	153.5	4.00	2.49		0.00		0.00		0.00	0.00	1.39	1.39	0.39	0.00	2.88	83.23	21.00	250	1.80	1.643	80.36	96.54%
Hemlock Road	204A	MH204A	MH205A	0.21						0.0	153.5	4.00	2.49		0.00		0.00		0.00	0.00	0.21	1.60	0.45	0.00	2.94	67.96	90.00	250	1.20	1.341	65.02	95.68%
rue Michael Stoqua Street	EX205A	BULK205AN	MH205A						1.38	241.5	241.5	4.00	3.91		0.00		0.00		0.00	0.00	1.38	1.38	0.39	0.00	4.30	67.96	21.00	250	1.20	1.341	63.66	93.67%
Hemlock Road	205A	MH205A	MH206A	0.25						0.0	395.0	4.00	6.40		0.00		0.00		0.00	0.00	0.25	3.23	0.90	0.00	7.30	31.02	112.00	250	0.25	0.612	23.71	76.45%
rue Bareille-Snow Street	EX206A-B	BULK206AN	MH206A						9.61	1755.0	1755.0	3.63	25.80		0.00		0.00		0.00	0.00	9.61	9.61	2.69	0.00	28.49	87.74	21.00	250	2.00	1.731	59.24	67.52%
Hemlock Road	206A	MH206A	MH207A	0.20						0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.20	13.04	3.65	0.00	34.67	55.26	89.33	300	0.30	0.757	20.59	37.26%
Block 20	PARK1	MH207AN	MH207A	0.32						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.32	0.32	0.09	0.00	0.09	39.24	14.00	250	0.40	0.774	39.15	99.77%
Hemlock Road	PARK1, 207A	MH207A	*BULK176AE*	0.12						0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.12	13.48	3.77	0.00	34.79	65.38	33.16	300	0.42	0.896	30.59	46.79%
Phase 1A																																
Hemlock Road		*BULK176AE*	*MH176A*							0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.00	13.48	3.77	0.00	34.79	65.38	*21.97*	*300*	*0.42*	0.896	30.59	46.79%
Phase 1B																																
chemin Wanaki Road	200A, COM1	MH200A	MH214A	0.25						0.0	0.0	4.00	0.00		0.00	0.90	0.90		0.00	0.78	1.15	1.15	0.32	0.00	1.10	73.41	98.28	250	1.40	1.449	72.30	98.50%
chemin Wanaki Road	214A, COM2	MH214A	*BULK153AN*	0.16						0.0	0.0	4.00	0.00		0.00	0.65	1.55		0.00	1.35	0.81	1.96	0.55	0.00	1.89	51.91	44.22	250	0.70	1.024	50.01	96.35%
Phase 1B																																
chemin Wanaki Road	143B	BULK143AE	MH143A	0.31						104.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.31	0.31	0.09	0.00	1.77	43.87	21.50	250	0.50	0.866	42.10	95.96%
chemin Wanaki Road	143A	MH143A	MH144A	0.27						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.27	0.58	0.16	0.00	1.85	87.74	47.73	250	2.00	1.731	85.89	97.89%
chemin Wanaki Road	144A, 144B	MH144A	MH145A	0.72						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.72	1.30	0.36	0.00	2.05	87.74	40.57	250	2.00	1.731	85.69	97.66%
chemin Wanaki Road	145A, 145B, 145C	MH145A	MH146A	2.77						835.6	939.6	3.82	14.53		0.00		0.00		0.00	0.00	2.77	4.07	1.14	0.00	15.67	107.45	53.01	250	3.00	2.121	91.79	85.42%
chemin Wanaki Road	146A	MH146A	MH147A	0.14						0.0	939.6	3.82	14.53		0.00		0.00		0.00	0.00	0.14	4.21	1.18	0.00	15.71	43.54	37.48	250	1.00	1.224	27.83	63.92%
chemin Wanaki Road	PARK2	BLK147AE	MH147A	0.55						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.55	0.55	0.15	0.00	0.15	39.24	17.66	250	0.40	0.774	39.08	99.61%
chemin Wanaki Road	147C	BLK147AW	MH147A	0.10						33.6	33.6	4.00	0.54		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.00	0.57	43.87	17.33	250	0.50	0.866	43.30	98.70%
chemin Wanaki Road	147A	MH147A	MH170A	0.03						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.03	4.89	1.37	0.00	16.38	31.02	10.23	250	0.25	0.612	14.64	47.19%
chemin Wanaki Road	147B	MH107A	MH147C	0.16						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.16	5.05	1.41	0.00	16.42	31.02	39.00	250	0.25	0.612	14.59	47.05%
chemin Wanaki Road		MH147C	*BLK148AW*							0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.00	5.05	1.41	0.00	16.42	31.02	11.77	250	0.25	0.612	14.59	47.05%
Phase 1B																																
Block 9	154A	*MH158A*	MH217A	0.19						0.0	973.2	3.81	15.01		2.62		3.83		0.00	5.60	0.19	12.94	3.62	0.00	24.23	53.37	171.95	250	0.74	1.053	29.13	54.59%
croissant Squadron Crescent	215Aa-b	MH215A	MH216A	0.79	3	4				117.8	117.8	4.00	1.91		0.00		0.00		0.00	0.00	0.79	0.79	0.22	0.00	2.13	50.02	80.00	250	0.65	0.987	47.89	95.74%
croissant Squadron Crescent	216Aa-b	MH216A	MH217A	0.67	2	6				94.5	212.3	4.00	3.44		0.00		0.00		0.00	0.00	0.67	1.46	0.41	0.00	3.85	50.02	71.19	250	0.65	0.987	46.17	92.30%
croissant Squadron Crescent	217A	MH217A	MH218A	0.02						0.0	1185.5	3.75	18.01		2.62		3.83		0.00	5.60	0.02	14.42	4.04	0.00	27.65	36.70	10.52	250	0.35	0.724	9.05	24.66%
croissant Squadron Crescent	218A	MH218A	MH218B	0.02						0.0	1185.5	3.75	18.01		2.62		3.83		0.00	5.60	0.02	14.44	4.04	0.00	27.66	36.70	12.49	250	0.35	0.724	9.05	24.65%
	THORN1	*EX SANMH*	MH218B						5.55	1574.0	1574.0	3.66	23.36		0.00		0.00		0.00	0.00	5.55	5.55	1.55	0.00	24.92	74.13	46.02	300	0.54	1.016	49.21	66.39%
croissant Squadron Crescent	218B	MH218B	MH219A	0.07						0.0	2759.5	3.47	38.82		2.62		3.83		0.00	5.60	0.07	20.06	5.62	0.00	50.04	59.68	37.08	300	0.35	0.818	9.64	16.16%
croissant Squadron Crescent	219A	MH219A	MH220A	0.15						0.0	2759.5	3.47	38.82		2.62		3.83		0.00	5.60	0.15	20.21	5.66	0.00	50.08	59.68	72.49	300	0.35	0.818	9.60	16.09%
croissant Squadron Crescent	220A, 220B	MH220A	MH221A	1.46						319.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	1.46	21.67	6.07	0.00	54.48	59.68	43.77	300	0.35	0.818	5.21	8.72%
croissant Squadron Crescent	221A	MH221A	MH222A	0.02						0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.02	21.69	6.07	0.00	54.48	59.68	8.66	300	0.35	0.818	5.20	8.71%
croissant Squadron Crescent	222A	MH222A	*MH169A*	0.22						0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.22	21.91	6.13	0.00	54.54	59.68	89.42	300	0.35	0.818	5.14	8.61%

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u	INST	50,000	L/Ha/day	1.5
TH/SD	2.7	p/p/u	COM	50,000	L/Ha/day	1.5
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: WY

Checked: JIM

Dwg. Reference: 38298-501

No.	Revision	Date
1.	City submission No. 1	7/8/2016
2.	City submission No. 2	11/4/2016
3.	City submission No. 3	1/25/2017

File Reference:	Date:	Sheet No:
38298.5.7.1	7/8/2016	1 of 2

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	Phase 1B (Ha)	SF	SD	TH	APT	EXTERNAL (Ha)	IND	CUM	FACTOR	FLOW (L/s)	INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	FLOW (L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Phase 1A																																
croissant Squadron Crescent		*MH169A*	*MH165A*							0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.00	21.91	6.13	0.00	54.54	63.80	*27.00*	*300*	*0.40*	0.874	9.26	14.51%
Phase 1B																																
rue Moses Tennisco Street	212A	MH212A	MH213A	1.20						252.0	252.0	4.00	4.08		0.00		0.00		0.00	0.00	1.20	1.20	0.34	0.00	4.42	50.02	63.80	250	0.65	0.987	45.60	91.16%
rue Moses Tennisco Street	213A	MH213A	*BULK165AN*	0.35						52.5	304.5	4.00	4.93		0.00		0.00		0.00	0.00	0.35	1.55	0.43	0.00	5.37	39.24	50.79	250	0.40	0.774	33.87	86.32%
Phase 1A																																
rue Moses Tennisco Street		*BULK165AN*	*MH165A*							0.0	304.5	4.00	4.93		0.00		0.00		0.00	0.00	0.00	1.55	0.43	0.00	5.37	39.24	*22.50*	*250*	*0.40*	0.774	33.87	86.32%
Phase 1B																																
rue Michael Stoqua Street	210A	MH210A	MH211A	0.40						52.5	52.5	4.00	0.85		0.00		0.00		0.00	0.00	0.40	0.40	0.11	0.00	0.96	50.02	64.80	250	0.65	0.987	49.05	98.08%
rue Michael Stoqua Street	211A	MH211A	MH166B	0.35						52.5	105.0	4.00	1.70		0.00		0.00		0.00	0.00	0.35	0.75	0.21	0.00	1.91	50.02	52.19	250	0.65	0.987	48.11	96.18%
Phase 1A																																
rue Michael Stoqua Street		MH166B	*MH166A*							0.0	105.0	4.00	1.70		0.00		0.00		0.00	0.00	0.00	0.75	0.21	0.00	1.91	39.24	*21.10*	*250*	*0.40*	0.774	37.33	95.13%
Phase 1B																																
rue Bareille-Snow Street	208A	MH208A	MH209A	1.01						207.4	207.4	4.00	3.36		0.00		0.00		0.00	0.00	1.01	1.01	0.28	0.00	3.64	50.02	64.85	250	0.65	0.987	46.37	92.72%
rue Bareille-Snow Street	209A	MH209A	MH167B	0.35						52.6	260.0	4.00	4.21		0.00		0.00		0.00	0.00	0.35	1.36	0.38	0.00	4.59	50.02	52.87	250	0.65	0.987	45.42	90.82%
Phase 1A																																
rue Bareille-Snow Street		MH167B	*MH167A*							0.0	260.0	4.00	4.21		0.00		0.00		0.00	0.00	0.00	1.36	0.38	0.00	4.59	63.80	*20.43*	*300*	*0.40*	0.874	59.21	92.80%
Phase 1B																																
Codd's Road	230A	BLK231AN	MH231A						0.87	85.7	85.7	4.00	1.39		0.00		0.00		0.00	0.00	0.87	0.87	0.24	0.00	1.63	75.98	3.00	250	1.50	1.500	74.35	97.85%
Codd's Road	231A, EXPARK1	MH231A	*BULK176AN*						0.76	43.3	129.0	4.00	2.09		0.00		0.00		0.00	0.00	0.76	1.63	0.46	0.00	2.55	87.74	50.22	250	2.00	1.731	85.19	97.10%
Phase 1A																																
Codd's Road		*BULK176AN*	*MH176A*							0.0	129.0	4.00	2.09		0.00		0.00		0.00	0.00	0.00	1.63	0.46	0.00	2.55	55.49	*23.23*	*250*	*0.80*	1.095	52.94	95.41%

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	50,000	L/Ha/day	1.5
APT	1.8	p/p/u	COM	50,000	L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed: WY

Checked: JIM

Dwg. Reference: 38298-501

No.	Revision	Date
1.	City submission No. 1	7/8/2016
2.	City submission No. 2	11/4/2016
3.	City submission No. 3	1/25/2017

File Reference:	Date:	Sheet No:
38298.5.7.1	7/8/2016	2 of 2

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

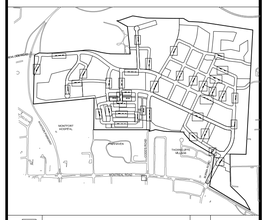
Date _____ 2017

Plan Number _____

LEGEND :

S168 2.01|0.80 — AREA NUMBER / RUNOFF COEFFICIENT / AREA IN HECTARES

POTENTIAL DRAINAGE DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

30 Metcalfe Street Suite 601
Ottawa, On K1P 5L4
613 998 7777

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

PROFESSIONAL ENGINEER — J. I. MOFFATT — 17/06/07 — PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

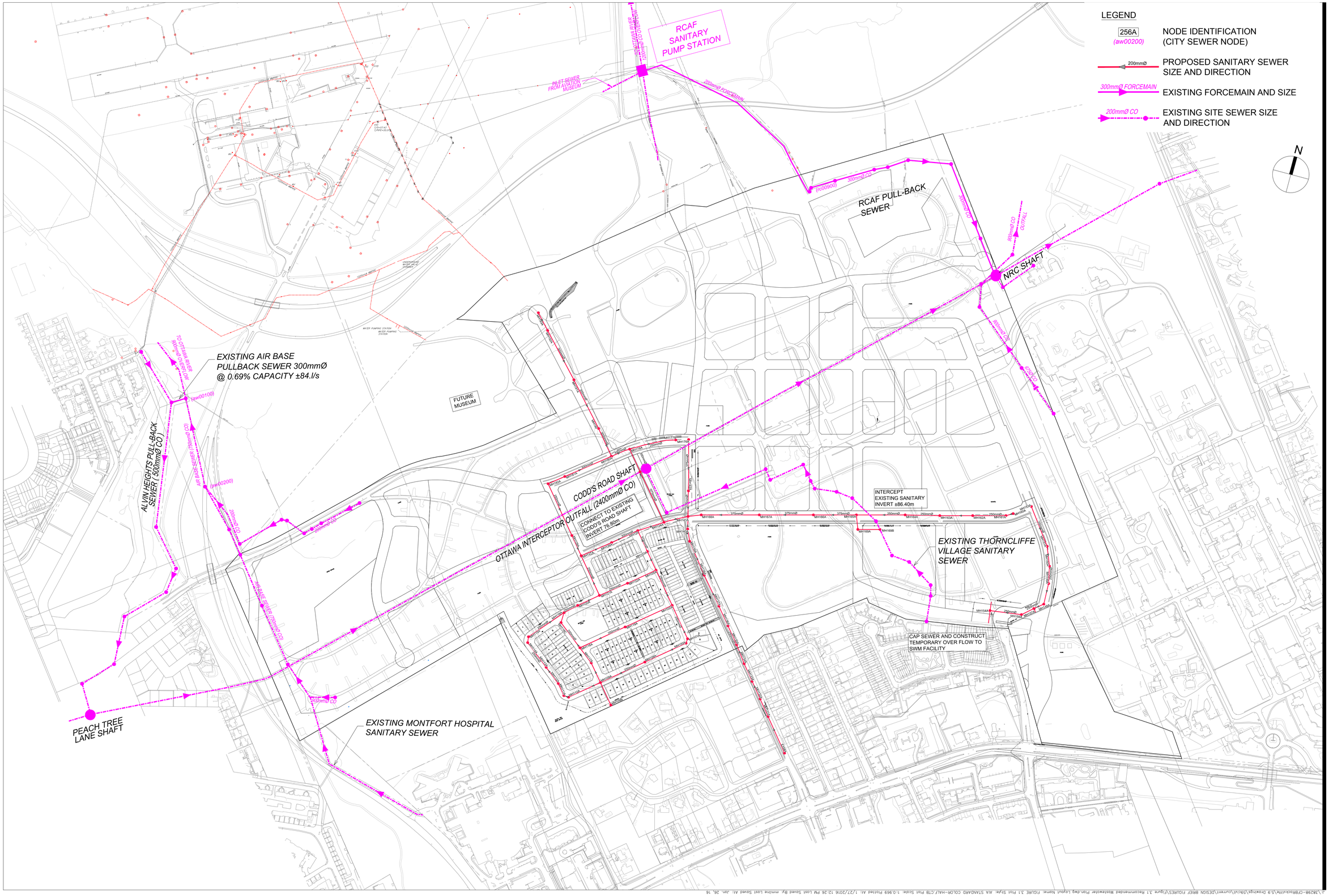
Scale: 1 : 2000

Design	Date
J.I.M.	MAY 2016
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
38298	501A

D07-16-15-0003

#17063

L:\38298-CP\Acad\Civil\3 Drawings\Sanitary Drainage Area Plan\38298 SANITARY DRAINAGE AREA PLAN.dwg Layout: None SANITARY DRAINAGE AREA PLAN Plot Style: ibi STANDARD.ctb Plot Scale: 1:1.0 Plotted: Apr 4,2017 9:23 AM Last Saved By: monica.lust Saved: Apr 4,2017 9:23 AM



IBI

Scale

Project Title

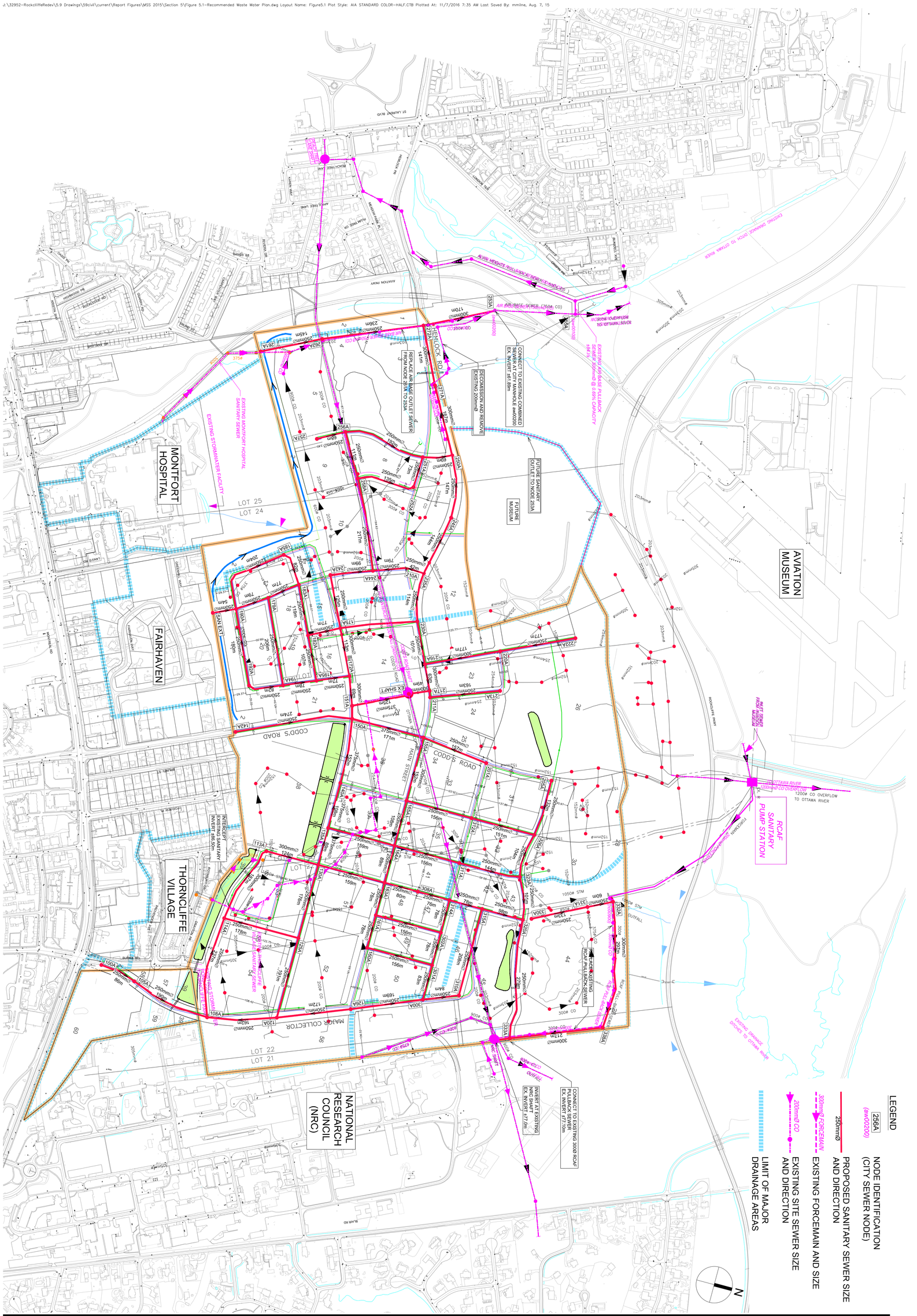
DESIGN BRIEF
WATERIDGE VILLAGE
AT ROCKCKIFFE
PHASE 1A

Drawing Title

RECOMMENDED
WASTEWATER PLAN

Sheet No.

FIGURE 3.1



Sheet No.

FIGURE 5.1

Drawing Title

RECOMMENDED WASTEWATER PLAN

Project Title

FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY

Scale

IBI

Wateridge Block 15
Wastewater Flow per MSS

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area 1.960 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.55**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		487
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		

Total Pop	**487**	
Average Domestic Flow	**1.97**	**L/s**
Peaking Factor	**3.98**	
Peak Domestic Flow	**7.85**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.00**
Peak Institutional / Commercial Flow	0.00
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.00**

** assuming a 12 hour commercial operation*

*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**1.97**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**7.85**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**8.40**	**L/s**

DSEL©

Wateridge Block 15
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area 1.960 **ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**0.10 L/s**
Infiltration / Inflow (Wet)	**0.55 L/s**
Infiltration / Inflow (Total)	**0.65 L/s**

Extraneous Flow Allowances

Infiltration / Inflow **0.65 L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7	192	519
			0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop **519**

Average Domestic Flow **1.68 L/s**

Peaking Factor **3.37**

Peak Domestic Flow **5.67 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Dining room	125 L/seat/d		0.00
Commercial floor space	28,000.0 L/ha/d		0.00
Water Closets**	150 L/hr		0.00
Laundry Facility	1,200 L/unit/d		0.00

Average I/C/I Flow **0.00**

Peak Institutional / Commercial Flow 0.00
Peak I/C/I Flow **0.00**

Total Estimated Average Dry Weather Flow Rate	**1.78 L/s**
Total Estimated Peak Dry Weather Flow Rate	**6.22 L/s**
Total Estimated Peak Wet Weather Flow Rate	**7.52 L/s**

** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation

DSEL©

Mattamy Homes
Wateridge Block 15
Proposed Development - Internal Sanitary Flow

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area* 1.560 **ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**0.08 L/s**
Infiltration / Inflow (Wet)	**0.44 L/s**
Infiltration / Inflow (Total)	**0.51 L/s**

Extraneous Flow Allowances

Infiltration / Inflow	**0.51 L/s**

Domestic Contributions*

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7	158	427
			0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**427**
Average Domestic Flow	**1.38 L/s**
Peaking Factor	**3.41**
Peak Domestic Flow	**4.71 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Dining room	125 L/seat/d		0.00
Commercial floor space	28,000.0 L/ha/d		0.00
Water Closets**	150 L/hr		0.00
Laundry Facility	1,200 L/unit/d		0.00

Average I/C/I Flow	**0.00**
Peak Institutional / Commercial Flow	0.00
Peak I/C/I Flow	**0.00**

Total Estimated Average Dry Weather Flow Rate	**1.46 L/s**
Total Estimated Peak Dry Weather Flow Rate	**5.15 L/s**
Total Estimated Peak Wet Weather Flow Rate	**6.18 L/s**

*Consists only of areas and units tributary to the proposed internal sewer network and does not include areas for units discharging to the existing sewer within Squadron Crescent.

** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation

DSEL©

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)	UNITS	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)
Makwa Private																											
Contribution From Kiniw Private, Pipe 101A - 102A						0.04	11				0.00		0.00		0.00		0.04	0.04									
	102A	105A	0.14		19	0.18	30	3.5	0.34		0.00		0.00		0.00	0.00	0.14	0.18	0.05	0.39	53.40	200	0.40	20.74	0.02	0.66	0.26
Contribution From Private Lane, Pipe 104A - 105A						0.20	60				0.00		0.00		0.00		0.20	0.20									
	105A	106A	0.10		14	0.48	104	3.4	1.14		0.00		0.00		0.00	0.00	0.10	0.48	0.14	1.28	37.10	200	0.40	20.74	0.06	0.66	0.36
	106A	107A	0.05		6	0.53	110	3.4	1.21		0.00		0.00		0.00	0.00	0.05	0.53	0.15	1.36	7.15	200	0.34	19.12	0.07	0.61	0.35
	107A	115A	0.12		36	0.65	146	3.4	1.59		0.00		0.00		0.00	0.00	0.12	0.65	0.19	1.77	40.80	200	0.40	20.74	0.09	0.66	0.40
To Takamose Private, Pipe 115A - 116A						0.65	146				0.00		0.00		0.00			0.65									
Mikinak Road (Rear Yard Service)																											
	111A	113A	0.14		81	0.14	81	3.4	0.90		0.00		0.00		0.00	0.00	0.14	0.14	0.04	0.94	105.85	200	0.80	29.34	0.03	0.93	0.42
To Servicing Between Block 1 and 2, Pipe 113A - 114A						0.14	81				0.00		0.00		0.00			0.14									
	112A	113A	0.05		27	0.05	27	3.5	0.31		0.00		0.00		0.00	0.00	0.05	0.05	0.01	0.32	33.40	200	0.65	26.44	0.01	0.84	0.28
To Servicing Between Block 1 and 2, Pipe 113A - 114A						0.05	27				0.00		0.00		0.00			0.05									
Servicing Between Block 1 and 2																											
Contribution From Mikinak Road (Rear Yard Service), Pipe 111A - 113A						0.14	81				0.00		0.00		0.00		0.14	0.14									
Contribution From Mikinak Road (Rear Yard Service), Pipe 112A - 113A						0.05	27				0.00		0.00		0.00		0.05	0.19									
	113A	114A				0.19	108	3.4	1.19		0.00		0.00		0.00	0.00	0.00	0.19	0.05	1.24	34.45	200	1.35	38.11	0.03	1.21	0.55
To Takamose Private, Pipe 114A - 115A						0.19	108				0.00		0.00		0.00			0.19									
Private Lane																											
	103A	104A	0.20		60	0.20	60	3.4	0.67		0.00		0.00		0.00	0.00	0.20	0.20	0.06	0.73	44.02	200	0.65	26.44	0.03	0.84	0.36
	104A	105A	0.00		0	0.20	60	3.4	0.67		0.00		0.00		0.00	0.00	0.00	0.20	0.06	0.73	6.50	200	0.40	20.74	0.03	0.66	0.30
To Makwa Private, Pipe 110A - 114A						0.20	60				0.00		0.00		0.00			0.20									
Kiniw Private																											
	101A	102A	0.04		11	0.04	11	3.5	0.13		0.00		0.00		0.00	0.00	0.04	0.04	0.01	0.14	29.70	200	0.65	26.44	0.01	0.84	0.22
To Makwa Private, Pipe 102A - 103A						0.04	11				0.00		0.00		0.00			0.04									
	102A	110A	0.27		68	0.27	68	3.4	0.76		0.00		0.00		0.00	0.00	0.27	0.27	0.08	0.83	78.80	200	0.65	26.44	0.03	0.84	0.38
To Takamose Private, Pipe 108A - 110A						0.27	68				0.00		0.00		0.00			0.27									
Takamose Private																											
	109A	110A	0.08		22	0.08	22	3.5	0.25		0.00		0.00		0.00	0.00	0.08	0.08	0.02	0.27	29.81	200	0.65	26.44	0.01	0.84	0.27
Contribution From Kiniw Private, Pipe 102A - 108A						0.27	68				0.00		0.00		0.00		0.27	0.35									
	110A	114A	0.27		60	0.62	150	3.4	1.63		0.00		0.00		0.00	0.00	0.27	0.62	0.18	1.81	80.47	200	1.54	40.70	0.04	1.30	0.64
Contribution From Servicing Between Block 1 and 2, Pipe 113A - 114A						0.19	108				0.00		0.00		0.00		0.19	0.81									
	114A	115A	0.03		6	0.84	264	3.3	2.81		0.00		0.00		0.00	0.00	0.03	0.84	0.24	3.05	8.03	200	0.33	18.84	0.16	0.60	0.44
Contribution From Makwa Private, Pipe 107A - 115A						0.65	146				0.00		0.00		0.00		0.65	1.49									
	115A	116A	0.08		22	1.57	432	3.2	4.49		0.00		0.00		0.00	0.00	0.08	1.57	0.45	4.94	30.06	200	0.35	19.40	0.25	0.62	0.51
	116A	117A				1.57	432	3.2	4.49		0.00		0.00		0.00	0.00	0.00	1.57	0.45	4.94	11.08	200	2.35	50.28	0.10	1.60	1.01

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.286	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	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 =	1.00				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designe G.G.G.

Checkec S.L.M

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.

PROJECT Mattamy Homes Wateridge Village Block 15

LOCATIO Wateridge Village Block 15

City of Ottawa

File Ref: 17-946

Date: **November 29 2019**

Sheet No. 1 of 1

LICENSED PROFESSIONAL ENGINEER S. L. MERRICK 100186523 2019-12-06 PROVINCE OF ONTARIO

JOB #17-946

2019-12-10_946_SAN_ggg.xlsx

EXTERNAL 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)	UNITS	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)
Squadron Crescent																												
From Block 15 to pipe between MH215A and MH216A				0.06	6	16	0.06	16	3.7	0.19		0.00		0.00		0.00	0.00	0.06	0.06	0.02	0.21							
	215Aa	215A	216A	0.45		21	0.51	37	3.7	0.44		0.00		0.00		0.00	0.00	0.45	0.51	0.15	0.59	80.0	250	0.65	47.94	0.01	0.98	0.33
From Block 15 to pipe between MH216A and MH217A				0.90	8	22	0.90	59	3.6	0.69		0.00		0.00		0.00	0.00	0.90	1.41	0.40	1.10							
	216Aa	216A	217A	0.42		23	1.83	82	3.6	0.96		0.00		0.00		0.00	0.00	0.42	1.83	0.52	1.48	71.2	250	0.65	47.94	0.03	0.98	0.44
Block 9	154A			0.19		973	2.02	1055	3.2	11.03	2.620	2.62	3.830	3.83		0.00	2.09	6.64	12.94	3.70	16.83							
	217A	217A	218A	0.02		0	2.04	1055	3.2	11.03		2.62		3.83		0.00	2.09	0.02	12.96	3.71	16.83	10.5	250	0.35	35.18	0.48	0.72	0.71
From Block 15 to pipe between MH218A and MH218B				0.02	1	3	2.06	1058	3.2	11.06		2.62		3.83		0.00	2.09	0.02	12.98	3.71	16.86							
	218A	218A	218B	0.02		0	4.12	1058	3.2	11.06		2.62		3.83		0.00	2.09	0.02	13.00	3.72	16.87	12.5	250	0.35	35.18	0.48	0.72	0.71
THORN1							5.55	1574				0.00		0.00		0.00		5.55	5.55									
From Block 15 to pipe between MH218B and MH219A				0.02	1	3	9.69	2634	3.0	25.54		2.62		3.83		0.00	2.09	0.02	18.57	5.31	32.94							
	218B	218B	219A	0.07		0	9.76	2634	3.0	25.54		2.62		3.83		0.00	2.09	0.07	18.64	5.33	32.96	37.1	300	0.35	57.21	0.58	0.81	0.84
From Block 15 to pipe between MH219A and MH220A				0.10	10	27	9.86	2661	3.0	25.78		2.62		3.83		0.00	2.09	0.10	18.74	5.36	33.23							
	219A	219A	220A	0.15		0	10.01	2661	3.0	25.78		2.62		3.83		0.00	2.09	0.15	18.89	5.40	33.27	72.5	300	0.35	57.21	0.58	0.81	0.84
	220B			0.00		0	10.01	2661	3.0	25.78		2.62		3.83		0.00	2.09	0.00	18.89	5.40	33.27							
From Block 15 to pipe between MH220A and MH221A				0.05	3	8	10.06	2669	3.0	25.85		2.62		3.83		0.00	2.09	0.05	18.94	5.42	33.35							
	220A	220A	221A	0.09		0	10.15	2669	3.0	25.85		2.62		3.83		0.00	2.09	0.09	19.03	5.44	33.38	43.8	300	0.35	57.21	0.58	0.81	0.84
	221A	221A	222A	0.02		0	10.17	2669	3.0	25.85		2.62		3.83		0.00	2.09	0.02	19.05	5.45	33.39	8.7	300	0.35	57.21	0.58	0.81	0.84
From Block 15 to pipe between MH222A and MH117A				0.08	3	8	10.25	2677	3.0	25.92		2.62		3.83		0.00	2.09	0.08	19.13	5.47	33.48							
	222A	222A	117A	0.22		0	10.47	2677	3.0	25.92		2.62		3.83		0.00	2.09	0.22	19.35	5.53	33.54	65.9	300	0.35	57.21	0.59	0.81	0.84
Contribution From Block 15, Pipe 116A - 117A							1.57	432.00				0.00		0.00		0.00		1.57	20.92									
	221A	117A	169A	0.02		0	12.06	3109	2.9	29.66		2.62		3.83		0.00	2.09	0.02	20.94	5.99	37.74	22.8	300	0.35	57.21	0.66	0.81	0.86

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	Industrial Peak Factor = as per MOE Graph		
Average Daily Flow =	280	l/p/day					
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.286	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	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 =	1.00				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designer G.G.G.

Checked J.A.

Dwg. Reference:
Sanitary Drainage Plan, Dwgs. No.

PROJECT Mattamy Homes Wateridge Village Block 15

LOCATIO Wateridge Village Block 15

City of Ottawa

File Ref: 17-946

Date: 04 Oct 2019

Sheet No 1
of 1

LICENSED PROFESSIONAL ENGINEER
S. MERRICK
100136523
2019-12-04
PROVINCE OF ONTARIO

APPENDIX D

Stormwater Management

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Name of Client/Developer

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.45	C= 0.50	C= 0.56	C= 0.60	C= 0.65	C= 0.70	C= 0.73	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
Phase 1B																																		
Hemlock Road	S201A-B, EX201	MH201	MH202								0.31		0.56	1.85	1.85	10.00	1.17	11.17	104.19	122.14	178.56	192.62				192.62	210.32	90.18	450			0.50	1.281	17.70	8.41%
Future Street No. 6	EX202A	BULK202N	MH202										0.90	2.00	2.00	12.23	0.27	12.50	93.72	109.82	160.45	187.60				187.60	286.47	16.00	600			0.20	0.982	98.87	34.51%
Hemlock Road	S202A, EX202B-C	MH202	MH203								0.10		0.55	1.42	5.27	12.50	0.53	13.03	92.61	108.50	158.52	487.86				487.86	784.52	86.00	600			1.50	2.688	296.66	37.81%
Future Street No. 5	S203B, EX203	BULK203N	203								0.09		0.73	1.80	1.80	10.88	0.12	11.00	99.76	116.92	170.90	179.44				179.44	351.93	16.00	450			1.40	2.144	172.49	49.01%
Hemlock Road	S203A, EXP203	MH203	MH204		0.44						0.16			0.68	7.75	13.03	0.49	13.53	90.49	106.01	154.87	700.89				700.89	847.38	86.00	600			1.75	2.903	146.49	17.29%
rue Moses Tennisco Street	S204B, EX204A	BULK204N	MH204								0.08		0.72	1.76	1.76	10.89	0.11	11.00	99.72	116.87	170.81	175.20				175.20	399.05	16.00	450			1.80	2.431	223.85	56.10%
Hemlock Road	S204A, EX204B	MH204	MH205								0.14		0.47	1.32	10.82	13.53	0.54	14.07	88.63	103.82	151.66	958.99				958.99	1,272.26	90.00	750			1.20	2.790	313.27	24.62%
rue Michael Stoqua Street	S205A, EX205A	BULK205N	MH205								0.08		0.81	1.96	1.96	11.15	0.15	11.30	98.49	115.42	168.69	192.75				192.75	297.43	16.01	450			1.00	1.812	104.68	35.20%
Hemlock Road	S205B-C, EX205B	MH205	MH206								0.17		0.63	1.73	14.51	14.07	1.20	15.26	86.70	101.55	148.32	1,257.92				1,257.92	1,818.95	112.01	1200			0.20	1.558	561.03	30.84%
Temp Ditch	FUTURE PHASE	DI 10	BULK206N		7.68									6.41	6.41	59.66	0.16	59.82	33.08	38.61	56.13	211.89				211.89	297.43	17.03	450			1.00	1.812	85.54	28.76%
rue Bareille-Snow Street	S206A, EX206A	BULK206N	MH206								0.06		1.02	2.39	2.39	10.85	0.15	11.00	99.91	117.09	171.14	238.30				238.30	448.66	17.50	525			1.00	2.008	210.35	46.89%
Hemlock Road	S206B, EX206B	MH206	MH207								0.03		0.46	1.08	17.98	15.26	0.78	16.04	82.71	96.86	141.44	1,486.80				1,486.80	2,227.75	89.33	1200			0.30	1.908	740.96	33.26%
Block 20	P207	CBMH207N	MH207		0.32									0.27	0.27	10.00	0.27	10.27	104.19	122.14	178.56	27.81				27.81	63.80	14.00	300			0.40	0.874	36.00	56.42%
Hemlock Road	S207	MH207	*BULK176E*								0.22			0.43	18.67	16.04	0.37	16.42	80.33	94.05	137.32	1,499.75				1,499.75	2,156.55	32.62	1350			0.15	1.460	656.80	30.46%
Phase 1A																																		
Ex. Hemlock Road	S176C	*BULK176E*	*MH176*								0.02			0.04	18.71	16.42	0.27	16.69	79.24	92.78	135.45	1,482.57				1,482.57	2,156.55	*24.06*	*1350*			*0.15*	1.460	673.98	31.25%
Phase 1B																																		
Codd's Road	S230, LOT230A-B	230	231								0.16		0.70	1.87	1.87	10.00	0.63	10.63	104.19	122.14	178.56	194.65				194.65	364.28	84.30	450			1.50	2.219	169.63	46.57%
Codd's Road	S231, LOT231	231	*BULK176N*								0.12		0.30	0.90	2.77	10.63	0.36	11.00	100.96	118.34	172.97	279.55				279.55	549.49	53.76	525			1.50	2.459	269.94	49.12%
Phase 1A																																		
Ex. Codd's Road	---	*BULK176N*	*MH176*											0.00	2.95	11.77	0.29	12.06	95.69	112.12	163.84	281.96				281.96	339.63	*18.21*	*525*			*1.50*	0.919	57.67	16.98%
Phase 1B																																		
chemin Wanaki Road	S200, LOT200	MH200	MH214								0.20		0.91	2.41	2.41	10.00	0.78	10.78	104.19	122.14	178.56	251.42				251.42	351.93	99.75	450			1.40	2.144	100.51	28.56%
chemin Wanaki Road	S214, LOT214	MH214	*BULK152N*								0.19		0.84	2.24	4.65	10.78	0.42	11.20	100.27	117.52	171.77	466.34				466.34	535.93	46.51	600			0.70	1.836	69.59	12.99%
Phase 1B																																		
chemin Wanaki Road	EX143	BULK143E	MH143										0.33	0.73	0.73	10.00	0.29	10.29	104.19	122.14	178.56	76.47				76.47	129.34	20.00	375			0.50	1.134	52.87	40.88%
chemin Wanaki Road		MH143	MH144											0.00	0.73	10.29	0.37	10.66	102.67	120.34	175.92	75.35				75.35	258.68	50.50	375			2.00	2.269	183.33	70.87%
chemin Wanaki Road	S144, EX144	MH144	MH145		0.55						0.18			0.81	1.54	10.66	0.30	10.97	100.81	118.15	172.70	155.54				155.54	258.68	41.15	375			2.00	2.269	103.14	39.87%
chemin Wanaki Road	S145, EX145	MH145	MH146								0.15		2.74	6.39	7.93	10.97	0.28	11.24	99.35	116.44	170.18	787.69				787.69	1,324.21	48.01	750			1.30	2.904	536.53	40.52%
chemin Wanaki Road		MH146	MH147											0.00	7.93	11.24	0.25	11.49	98.06	114.92	167.95	777.46				777.46	2,296.77	38.53	1050			0.65	2.570	1519.32	66.15%
chemin Wanaki Road	S147C	BULK147E	MH147		0.40									0.33	0.33	10.00	0.28	10.28	104.19	122.14	178.56	34.76				34.76	71.33	16.51	300			0.50	0.978	36.58	51.27%
chemin Wanaki Road	EX147	BULK 147W	MH147	0.16										0.09	0.09	12.00	0.32	12.32	94.70	110.96	162.13	8.42				8.42	71.33	18.72	300			0.50	0.978	62.91	88.19%
chemin Wanaki Road		MH147	MH170											0.00	8.35	12.32	0.09	12.41	93.35	109.38	159.81	779.62				779.62	2,296.77	13.96	1050			0.65	2.570	1517.16	66.06%
chemin Wanaki Road	S147A	MH170	BOX CULVERT								0.14			0.27	8.62	12.41	0.10	12.51	92.98	108.94	159.17	801.83				801.83	2,296.77	15.00	1050			0.65	2.570	1494.94	65.09%
Phase 1B																																		
rue Moses Tennisco Street	S212, LOT212A-B	MH212	MH213								0.15		1.03	2.58	2.58	10.00	0.66	10.66	104.19	122.14	178.56	269.09				269.09	361.72	63.80	525			0.65	1.619	92.63	25.61%
rue Moses Tennisco Street	S213, LOT213	MH213	*BULK165N*								0.21		0.23	0.92	3.50	10.66	0.82	11.47	100.85	118.20	172.77	353.25				353.25	519.40	55.71	750			0.20	1.139	166.15	31.99%
Temp Ditch	BLOCK 24	DI 1	MH165N		1.60									1.33	1.33	26.41	0.25	26.66	58.73	68.69	100.13	78.37				78.37	129.34	17.03	375			0.50	1.134	50.96	39.40%
Phase 1A																																		
Ex. Street No. 3	---	*BULK165N*	*MH165*											0.00	3.50	11.47	0.24	11.71	97.01	113.68	166.14	339.81				339.81	519.40	*16.10*	*750*			*0.20*	1.139	179.59	34.58%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: WY
Checked: JIM
Dwg. Reference: 38298-500

No.	Revision	Date
1.	City submission No. 1	7/8/2016
2.	City submission No. 2	11/4/2016
3.	City submission No. 3	1/25/2017

File Reference: 38298.5.7.1
Date: 7/8/2016
Sheet No: 1 of 2

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400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Name of Client/Developer

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.56	C= 0.60	C= 0.65	C= 0.70	C= 0.73	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
Phase 1B																																			
Block 9	---	*MH157*	MH217											0.00	12.28	13.26	0.93	14.19	89.63	105.00	153.38	1,100.86				1,100.86	2,337.95	168.50	975			1.00	3.034	1237.09	52.91%
croissant Squadron Crescent	S215, R215	MH215	MH216					0.14				0.38		0.99	0.99	10.00	0.94	10.94	104.19	122.14	178.56	103.06				103.06	317.25	79.94	525			0.50	1.420	214.19	67.51%
croissant Squadron Crescent	S216, R216A-B	MH216	MH217					0.20				0.28		0.88	1.87	10.94	0.86	11.80	99.48	116.60	170.41	185.91				185.91	429.70	75.99	600			0.45	1.472	243.79	56.74%
croissant Squadron Crescent	---	MH217	MH218											0.00	14.15	14.19	0.10	14.29	86.28	101.05	147.59	1,220.93				1,220.93	1,911.03	12.94	1050			0.45	2.138	690.10	36.11%
croissant Squadron Crescent	S218	MH218	MH219								0.17			0.33	14.48	14.29	0.51	14.80	85.93	100.64	146.99	1,244.42				1,244.42	1,424.40	49.00	1050			0.25	1.594	179.98	12.64%
croissant Squadron Crescent	---	MH219	MH220											0.00	14.48	14.80	0.90	15.70	84.21	98.62	144.02	1,219.47				1,219.47	1,575.26	73.09	1200			0.15	1.349	355.79	22.59%
croissant Squadron Crescent	S220, LOT220	MH220	MH221								0.18		1.96	4.71	19.19	15.70	0.54	16.24	81.35	95.26	139.09	1,561.24				1,561.24	1,575.26	43.47	1200			0.15	1.349	14.02	0.89%
														FIXED OUTLET FLOW FROM SWM FACILITY = 6660 L/s																					
croissant Squadron Crescent	---	MH221	MH222											0.00	19.19	16.24	0.11	16.35	79.75	93.38	136.33	1,530.55			6,660.00	8,190.55	8,565.43	11.97	2400			0.11	1.834	374.88	4.38%
croissant Squadron Crescent	S222A-B	MH222	*BULK165S*								0.26			0.51	19.70	16.35	0.86	17.21	79.44	93.01	135.79	1,564.69			6,660.00	8,224.69	8,565.43	94.49	2400			0.11	1.834	340.74	3.98%
Phase 1A																																			
croissant Squadron Crescent	---	*BULK165S*	*MH165*											0.00	19.70	17.21	0.23	17.43	77.04	90.19	131.66	1,517.52			6,660.00	8,177.52	8,565.43	*24.90*	*2400*			*0.11*	1.834	387.92	4.53%
Temp Ditch	BLOCK 15	DI 4	MH165S		1.96									1.63	1.63	50.88	0.17	51.05	37.18	43.41	63.14	60.73				60.73	182.91	16.50	375			1.00	1.604	122.18	66.80%
Phase 1B																																			
rue Michael Stoqua Street	S210, LOT210	MH210	MH211								0.20		0.23	0.90	0.90	10.00	0.83	10.83	104.19	122.14	178.56	93.85				93.85	147.47	64.80	375			0.65	1.293	53.62	36.36%
Temp Ditch	BLOCK 22	DI 12	MH211N		0.46									0.38	0.38	19.39	0.33	19.72	71.62	83.82	122.31	27.44				27.44	43.87	17.38	250			0.50	0.866	16.43	37.45%
Temp Ditch	BLOCK 23	DI 13	MH166N		0.46									0.38	0.38	22.34	0.34	22.68	65.50	76.63	111.77	25.06				25.06	43.87	17.50	250			0.50	0.866	18.81	42.88%
rue Michael Stoqua Street	S211, LOT211	MH211	*BULK166N*								0.17		0.23	0.84	1.74	10.83	1.09	11.93	99.98	117.18	171.27	174.27				174.27	248.09	55.70	600			0.15	0.850	73.82	29.75%
Phase 1A																																			
rue Michael Stoqua Street	---	*BULK166N*	*MH166*											0.00	1.74	11.93	0.32	12.24	95.01	111.33	162.67	165.61				165.61	248.09	*16.10*	*600*			*0.15*	0.850	82.48	33.25%
Phase 1B																																			
rue Bareille-Snow Street	S208, LOT208A-B	MH208	MH209								0.19		0.81	2.17	2.17	10.00	0.76	10.76	104.19	122.14	178.56	226.22				226.22	317.25	64.85	525			0.50	1.420	91.03	28.69%
rue Bareille-Snow Street	S209, LOT209	MH209	*BULK167N*								0.20		0.20	0.83	3.01	10.76	1.01	11.77	100.34	117.60	171.89	301.53				301.53	339.63	55.70	675			0.15	0.919	38.10	11.22%
Temp Ditch	BLOCK 21	DI 11	MH167N		1.22									1.02	1.02	35.74	0.21	35.95	47.82	55.88	81.38	48.58				48.58	100.88	17.52	300			1.00	1.383	52.30	51.84%
Phase 1A																																			
rue Bareille-Snow Street	---	*BULK167N*	*MH167*											0.00	3.01	11.77	0.29	12.06	95.69	112.12	163.84	287.55				287.55	339.63	*16.10*	*675*			*0.15*	0.919	52.08	15.34%

Definitions:
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[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
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Notes:
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File Reference: 38298.5.7.1
Date: 7/8/2016
Sheet No: 1 of 2

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

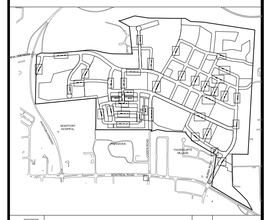
Date _____ 2017

Plan Number _____

LEGEND :

S168 2.01|0.80 — AREA NUMBER / RUNOFF COEFFICIENT / AREA IN HECTARES

POTENTIAL DRAINAGE DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA
30 Metcalfe Street Suite 601
Ottawa, On K1P 5L4
613 998 7777

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

J. I. MOFFATT
17/06/07
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1 : 2000

Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No.: 38298	Drawing No.: 500A

D07-16-15-0003

#17063

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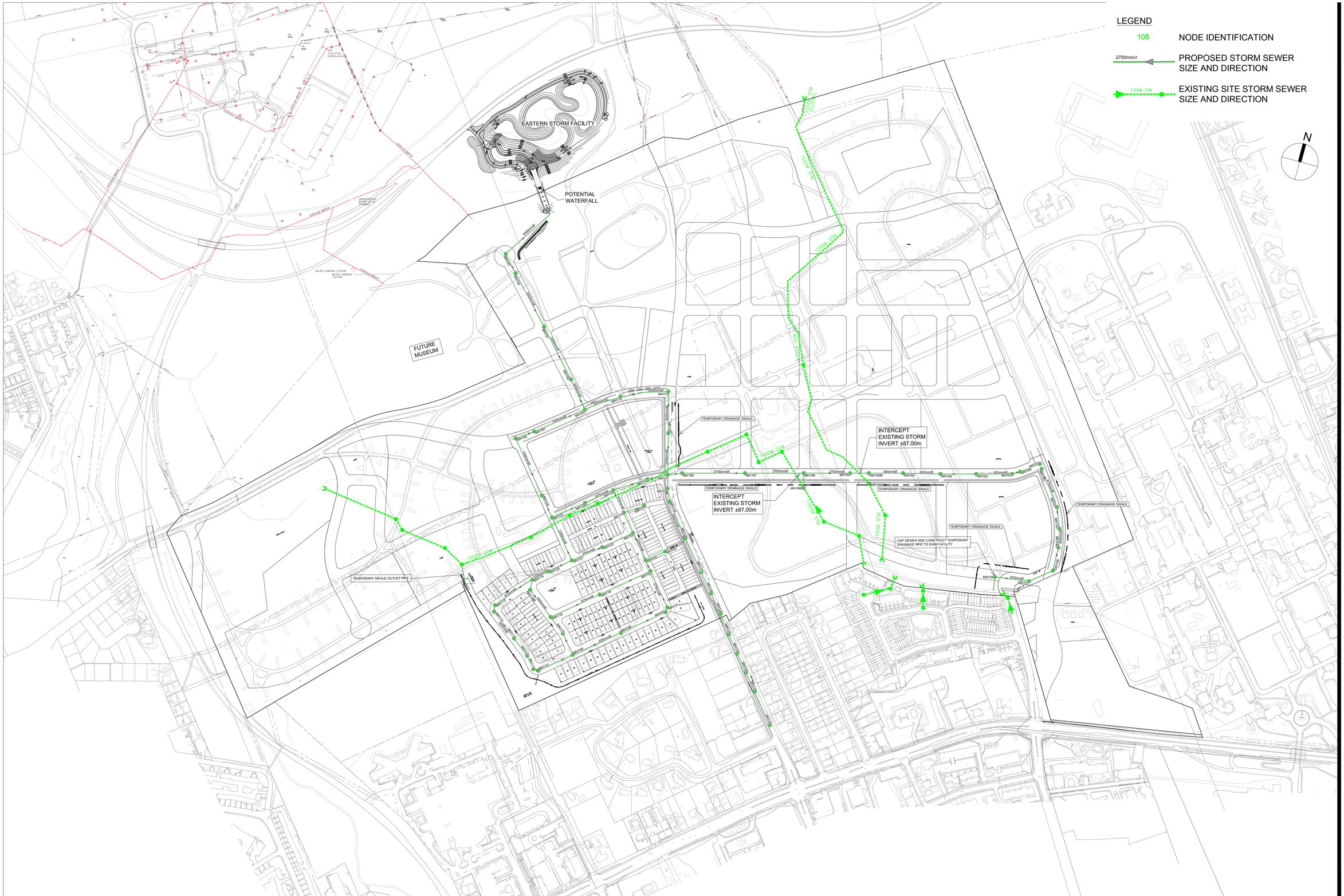
LEGEND
108 NODE IDENTIFICATION
2700mmØ PROPOSED STORM SEWER SIZE AND DIRECTION
1050Ø STM EXISTING SITE STORM SEWER SIZE AND DIRECTION
N
EASTERN STORM FACILITY
POTENTIAL WATERFALL
FUTURE MUSEUM
TEMPORARY SWALE OUTLET PIPE
TEMPORARY DRAINAGE SWALE
INTERCEPT EXISTING STORM INVERT ±87.00m
CAP SEWER AND CONSTRUCT TEMPORARY DRAINAGE PIPE TO SWM FACILITY
1050Ø STM
2700mmØ
1800mmØ
1650mmØ
1500mmØ
1350mmØ
1200mmØ
1050mmØ
900mmØ
825mmØ
750mmØ
675mmØ
600mmØ
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MH139

XP-SWMM NODE ID	MH NO.	GROUND ELEVATION (M)	USF (M)	100 YEAR 3 HOUR CHICAGO†		100 YEAR 24 HOUR SCS (103.2MM)‡		JULY 1, 1979¥		100 YEAR 3 HOUR CHICAGO INCREASED BY 20%£	
				HGL (M)	FREE BOARD (M)*	HGL (M)	FREE BOARD (M)*	HGL (M)	FREE BOARD (M)*	HGL (M)	FREE BOARD (M)*
S176	176	88.03	85.63	83.73	1.90	83.62	2.01	83.69	1.94	83.82	1.81
S178	178	89.00	86.60	83.37	3.23	83.28	3.32	83.35	3.25	83.46	3.14
S180	180	N/A	N/A	81.85	N/A	81.60	N/A	81.81	N/A	82.23	N/A
S190	190	N/A	N/A	81.54	N/A	81.33	N/A	81.51	N/A	81.91	N/A
S191	191	N/A	N/A	81.33	N/A	81.14	N/A	81.31	N/A	81.66	N/A
S192	192	N/A	N/A	81.11	N/A	80.95	N/A	81.09	N/A	81.39	N/A
S193	193	N/A	N/A	80.96	N/A	80.80	N/A	80.95	N/A	81.22	N/A

Notes:

* The free board is the USF minus the HGL (USF – HGL).
† HGL results for the 100 year 3 hour Chicago storm event were taken from the results of the XPSWMM model entitled "38298-ph1B-100ch.xp/out" and presented on the CD in **Appendix E**.
‡ HGL results for the 100 year 24 hour SCS Type II storm event were taken from the results of the XPSWMM model entitled "38298- ph1B-100SCS.xp/out" and presented on the CD in **Appendix E**.
¥ HGL results for the July 1, 1979 historical storm were taken from the results of the XPSWMM model entitled "38298- ph1B-JUL79.xp/out" and presented on the CD in **Appendix E**.
£ HGL results for the 100 year 3 hour Chicago storm event increased by 20% were taken from the results of the XPSWMM model entitled "38298- ph1B-120CH.xp/out" and presented on the CD in **Appendix E**.

The results indicate that the minimum 0.3 m clearance between the USF and HGL is maintained across the proposed Phase 1B site during the 100 year 3 hour Chicago design storm event. The results of the sensitivity analysis show that the minimum 0.3 m clearance is maintained across the site and there would be no flooding to properties during the 100 year Chicago storm with a 20% increase in intensity or the July 1, 1979 historical storm.

5.5.2 Performance of the Park Dry Pond

The hydraulic functioning of the park dry pond has been confirmed in XPSWMM. The hydraulic evaluation was completed for the following storm events:

- 100 year 3 hour Chicago storm event with a 10 minute time step
- 100 year 24 hour SCS Type II storm event with a 12 minute time step
- July 1 1979, August 4 1988 and August 8 1996 historical storms with a 5 minute time step
- and 100 year 3 hour Chicago storm event with a 20% increase in intensity, 10 minute time step

The dry pond is designed to provide water quantity control for approximately 41 ha of the ultimate Rockcliffe development as discussed in **Section 5.3.2**. Outflow from the facility will be ultimately conveyed to the Eastern SWM Facility for treatment, via storm sewers, prior to being released to the Ottawa River.

The results are provided in **Table 5-10** and detailed discussion on each component of the proposed dry pond is provided in **Section 5.6**.

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA								
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Private Lane																																	
	101	102			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.50	43.4	68.3778	0.9673	0.7477	0.000
	102	104			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.75	74.05	100.40	117.68	172.00	0	300	300	PVC	0.50	5.4	68.3778	0.9673	0.0930	0.000
Makwa Private, Pipe 104 - 105						0.00				0.00				0.00				0.00	10.84														
Makwa Private																																	
	103	104			0.00	0.00	0.34	0.80	0.76	0.76			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	79	300	300	PVC	0.91	43.3	92.3480	1.3065	0.5524	0.853
Private Lane, Pipe 102 - 104						0.00				0.00				0.00				0.00	10.84														
	104	105			0.00	0.00	0.42	0.80	0.93	1.69			0.00	0.00			0.00	0.00	10.84	73.72	99.95	117.15	171.22	169	450	450	CONC	0.47	35.0	195.4589	1.2290	0.4747	0.864
	105	106			0.00	0.00			0.00	1.69			0.00	0.00			0.00	0.00	11.32	72.10	97.72	114.52	167.37	165	450	450	CONC	0.39	6.5	178.0487	1.1195	0.0968	0.928
	106	108			0.00	0.00			0.00	1.69			0.00	0.00			0.00	0.00	11.41	71.78	97.28	114.00	166.60	164	450	450	CONC	0.49	41.6	199.5743	1.2548	0.5519	0.824
Takamose Private, Pipe 108 - 109						0.00				1.69				0.00				0.00	11.96														
Takemose Private																																	
					0.00	0.00	0.12	0.80	0.27	0.27			0.00	0.00			0.00	0.00															
	107	108			0.00	0.00	0.22	0.80	0.49	0.76			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	79	300	300	PVC	1.19	112.1	105.4881	1.4924	1.2519	0.747
Contribution From Makwa Private, Pipe 106 - 108						0.00				1.69				0.00				0.00	11.96														
	108	109			0.00	0.00	0.24	0.80	0.53	2.98			0.00	0.00			0.00	0.00	11.96	70.01	94.85	111.14	162.40	283	600	600	CONC	0.87	30.4	571.3892	2.0209	0.2505	0.495
	109	EX. STM Sewer			0.00	0.00			0.00	2.98			0.00	0.00			0.00	0.00	12.21	69.23	93.79	109.89	160.57	280	600	600	CONC	1.16	13.8	661.1454	2.3383	0.0984	0.423
						0.00				2.98				0.00				0.00	12.31														



Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: G.G.G.	PROJECT:		
Checked: S.L.M.	LOCATION: City of Ottawa		
Dwg. Reference: SS	File Ref:	Date: November 29 2019	Sheet No. SHEET 1 OF 1

SQUADRON CRESCENT EXISTING SEWERS STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW							SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	Fixed Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)		(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Squadron Crescent																																	
From Block 15 to pipe between MH215 and MH216					0.00	0.00	0.07	0.75	0.15				0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0									
R215					0.00	0.00	0.14	0.56	0.22				0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0									
S215	215	216			0.00	0.00	0.38	0.73	0.77	1.14			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	118		525	525	PVC	0.50	79.9	304.0999	1.4048	0.9484	0.389
From Block 15 to pipe between MH216 and MH217					0.00	0.00	0.08	0.79	0.18				0.00	0.00																			
R216A					0.00	0.00	0.14	0.56	0.22				0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0									
R216B					0.00	0.00	0.06	0.56	0.09				0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0									
S216	216	217			0.00	0.00	0.28	0.73	0.57	2.19			0.00	0.00			0.00	0.00	10.95	73.35	99.44	116.54	170.33	218		600	600	PVC	0.45	76.0	411.8915	1.4568	0.8694	0.529
						0.00				12.28				0.00				0.00	14.11														
	217	218			0.00	0.00			0.00	14.47			0.00	0.00			0.00	0.00	14.11	63.95	86.55	101.37	148.06	1252		1050	1050	PVC	0.45	12.9	1831.8262	2.1155	0.1019	0.000
From Block 15 to pipe between MH218 and MH219					0.00	0.00	0.12	0.72	0.24				0.00	0.00																			
S218	218	219			0.00	0.00	0.17	0.70	0.33	15.04			0.00	0.00			0.00	0.00	14.21	63.69	86.19	100.95	147.44	1296		1050	1050	PVC	0.25	49.0	1365.3626	1.5768	0.5179	0.950
	219	220			0.00	0.00	0.00	0.00	0.00	15.04			0.00	0.00			0.00	0.00	14.73	62.41	84.44	98.89	144.42	1270		1200	1200	PVC	0.15	73.1	1509.9717	1.3351	0.9124	0.841
From Block 15 to pipe between MH220 and MH221					0.00	0.00	0.10	0.77	0.21				0.00	0.00																			
S220	220	221			0.00	0.00	0.18	0.70	0.35	15.61			0.00	0.00			0.00	0.00	15.64	60.29	81.54	95.48	139.41	1272		1200	1200	PVC	0.15	43.5	1509.9717	1.3351	0.5427	0.843
Fixed Flow from Burma SWM Facility																								6660									
	221	222			0.00	0.00	0.00	0.00	0.00	15.61			0.00	0.00			0.00	0.00	16.18	59.11	79.91	93.57	136.61	7907		2400	2400	PVC	0.11	12.0	8210.4354	1.8149	0.1099	0.963
S222A					0.00	0.00	0.12	0.70	0.23				0.00	0.00																			
From Block 15 to pipe between MH222 and MH165					0.00	0.00	0.08	0.74	0.16				0.00	0.00																			
S222B	222	Block 15 Connection			0.00	0.00	0.14	0.70	0.27	16.28			0.00	0.00			0.00	0.00	16.29	58.87	79.59	93.19	136.06	7956		2400	2400	PVC	0.11	79.6	8210.4354	1.8149	0.7310	0.969
Flow from Internal Block 15 Sewers						0.00				2.98				0.00				0.00	12.31														
	Block 15	165			0.00	0.00			0.00	19.26			0.00	0.00			0.00	0.00	17.03	57.37	77.54	90.77	132.51	8153		2400	2400	PVC	0.11	49.1	8210.4354	1.8149	0.4509	0.993
Mikinak Road																																	
From upstream pipe per IBI Phase 1A						0.00				12.74								0.00	13.20														
From Block 15 to pipe between MH165B and MH165					0.00	0.00	0.18	0.80	0.40	0.40			0.00	0.00																			
S164B	164	165B			0.00	0.00	0.22	0.73	0.45	13.59			0.00	0.00			0.00	0.00	13.20	66.37	89.86	105.27	153.78	1221		900	900	PVC	0.86	65.3	1678.8135	2.6389	0.4127	0.727
S164A	165B	165			0.00	0.00	0.18	0.73	0.37	13.95			0.00	0.00			0.00	0.00	13.61	65.25	88.32	103.46	151.13	1232		1050	1050	PVC	0.52	35.5	1969.1539	2.2741	0.2601	0.626

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed:	G.G.G.	PROJECT:	**Wateridge - Block 15**
Checked:	S.L.M.	LOCATION:	**City of Ottawa**
Dwg. Reference:	SS	File Ref:	Date: November 29 2019 / Sheet No. SHEET 1 OF 1



INLET CONTROL DEVICE (ICD) DATA (Circular Orifice Plate)

STREET NAME	CB ID	OUTLET PIPE			INVERT DEPTH		TOP OF GRATE	INVERT		ICD DIA. (mm)	RELEASE RATE AT MAX. ALLOWABLE PONDING (L/S)	GRATING COVER	CB Type
		DIA. (mm)	TYPE	LENGTH (m)	INLET INV. DEPTH (m)	OUTLET INV. DEPTH (m)		INLET	OUTLET				
PRIVE KINIW PRIVATE	CB 103A	200	PVC	6.4	-	1.49	90.39	-	88.9	100	30.1	S19 PERFORATED	Single OPSD 400.010
PRIVE MAKWA PRIVATE	CB 103B	200	PVC	3.5	1.02	0.62	89.98	88.96	89.36	150	58.8	S19 PERFORATED	Single OPSD 400.010
PRIVE MAKWA PRIVATE	CB 104A	200	PVC	4.4	1.95	1.55	89.67	87.72	88.12	-	-	S19 PERFORATED	Single OPSD 400.010
PRIVE MAKWA PRIVATE	CB 104B	200	PVC	5.8	1.5	1.8	89.57	88.07	87.77	150	68.9	S19 PERFORATED	Single OPSD 400.010
PRIVE MAKWA PRIVATE	CB 105B	200	PVC	11.4	-	1.6	89.83	-	88.23	100	23.5	S19 PERFORATED	Single OPSD 400.010
PRIVE TAKAMOSE PRIVATE	CB 107A	200	PVC	6.2	0.67	1.51	90.4	89.73	88.89	100	27.2	S19 PERFORATED	Single OPSD 400.010
PRIVE TAKAMOSE PRIVATE	CB 107B	200	PVC	6.2	0.68	1.49	90.03	89.35	88.54	100	26.9	S19 PERFORATED	Single OPSD 400.010
PRIVE TAKAMOSE PRIVATE	CB 107C	200	PVC	6.2	0.52	1.37	89.51	88.99	88.14	100	26.3	S19 PERFORATED	Single OPSD 400.010
PRIVE TAKAMOSE PRIVATE	CB 108A	200	PVC	6.2	0.53	1.35	89.33	88.8	87.98	150	54.3	S19 PERFORATED	Twin OPSD 400.010
PRIVE TAKAMOSE PRIVATE	CB 108B	200	PVC	6.8	-	1.17	89.29	-	88.12	-	-	S19 PERFORATED	Single OPSD 400.010

STORAGE SUMMARY
BLOCK 15
STORAGE VOLUME AVAILABLE BELOW OVERFLOW (CLEARSTONE AND SUBDRAIN)

Total Site			
Rainfall (mm)	**Drainage Area (sq.m)**	**Volume Required (cu.m)**	**Total Provided (cu.m)**
4	19588	78.352	102.83

Area ID	**Drainage Area (sq.m)**	**Volume Req. (cu.m) (4mm Storm)**	**Clear Stone Area (525mm Depth) (sq.m)***	**Volume in Clear Stone (cu.m)****	**Subdrain Length (m)**	**Subdrain Size (mm)**	**Subdrain Volume (cu.m)**	**Total Volume (cu.m)**
103B-1 & 103B-2	2900	11.6	80	16.8	10	200	0.31	17.11
104A-1 & 104A-2	3800	15.2	96	20.16	13.4	200	0.42	20.58
105B-1	400	1.6	145	30.45	0	200	0.00	30.45
107A-1	1000	4.0	45	9.45	31.6	200	0.99	10.44
107B-1	1200	4.8	45	9.45	31.6	200	0.99	10.44
107C-1	1200	4.8	45	9.45	31.6	200	0.99	10.44
108A-1	2400	9.6	16	3.36	0	200	0.00	3.36
Total	**12900**	**51.6**	**472.0**	**99.1**	**118.2**		**3.7**	**102.83**

* Refer to Drawing DS-2 for Bioretention Cross Section
** Volume calculation assumes 40% Void Ratio for Clear Stone

STORAGE SUMMARY
BLOCK 15
TOTAL LID TREATMENT VOLUME

Area ID	Drainage Area (sq.m)	Volume Req. (cu.m) (15mm Storm)	Area of Filter Media & Mulch (675mm Depth) (sq.m)*	Volume in Filter Media & Mulch (cu.m)**	Volume Below Overflow (Clear Stone and Subdrain)	Total Volume (cu.m)
103B-1 & 103B-2	2900	43.5	80	18.90	17.11	36.01
104A-1 & 104A-2	3800	57.0	96	22.68	20.58	43.26
105B-1	400	6.0	145	34.26	30.45	64.71
107A-1	1000	15.0	45	10.63	10.44	21.07
107B-1	1200	18.0	45	10.63	10.44	21.07
107C-1	1200	18.0	45	10.63	10.44	21.07
108A-1	2400	36.0	16	3.78	3.36	7.14
Total	**12900**	**193.5**	**472.0**	**111.5**	**102.8**	**214.34**

* Refer to Drawing DS-2 for Bioretention Cross Section
** Volume calculation assumes 35% Void Ratio for the Filter Media

Curb Cut Capacity Analysis

1) Weir Equation used at Low Point			2) Curb Opening Calc along Slope		
Q = Cw (L-0.1nh)h^1.5			L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Weir Coefficient (Cw)			Curb Opening (L)		m
Side Contractions (n)			Gutter Flow (Q)		cms
Head (h)		m	Longitudinal Slope (SL)		m/m
Req. Length (L)		m	Mannings N (n)		
			Road Cross Slope (SX)		m/m

103B-1			**103B-2**		
DC103B-1			**DC103B-2**		
Area	0.22	Ha	Area	0.12	Ha
RC	0.8		RC	0.8	
15mm Flow (EPASWMM)	16.5	L/s	15mm Flow (EPASWMM)	5.7	L/s
Curb Cut Analysis - Low Point			**Curb Cut Analysis - Along Slope**		
Q = Cw (L-0.1nh)h^1.5			L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Weir Coefficient (Cw)	1.58		Longitudinal Slope (SL)	0.01	m/m
Side Contractions (n)	0		Mannings N (n)	0.013	
Head (h)	0.1	m	Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	0.33024	m	Req. Length (L)	2.6005	m
Actual Length	0.5	m	Actual Length (L)	2.6	m

104A-1			**104A-2**		
DC104A-1			**DC104A-2**		
Area	0.19	Ha	Area	0.19	Ha
RC	0.8		RC	0.8	
15mm Flow (EPASWMM)	14.6	L/s	15mm Flow (EPASWMM)	16.2	L/s
Curb Cut Analysis - Low Point			**Curb Cut Analysis - Along Slope**		
Q = Cw (L-0.1nh)h^1.5			L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Weir Coefficient (Cw)	1.58		Longitudinal Slope (SL)	0.005	m/m
Side Contractions (n)	0		Mannings N (n)	0.013	
Head (h)	0.1	m	Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	0.29221	m	Req. Length (L)	3.2754	m
Actual Length	0.5	m	Actual Length (L)	3.3	m

107A-1
DC107A-1

Area	0.1	Ha
RC	0.8	
15mm Flow (EPASWMM)	8.7	L/s

Curb Cut Analysis - Along Slope

L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Longitudinal Slope (SL)	0.01	m/m
Mannings N (n)	0.013	
Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	3.10586	m
Actual Length (L)	3.3	m

107B-1
DC107B-1

Area	0.12	Ha
RC	0.8	
15mm Flow (EPASWMM)	10.4	L/s

Curb Cut Analysis - Along Slope

L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Longitudinal Slope (SL)	0.02	m/m
Mannings N (n)	0.013	
Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	4.1214	m
Actual Length (L)	4.2	m

107C-1
DC107C-1

Area	0.12	Ha
RC	0.8	
15mm Flow (EPASWMM)	10.5	L/s

Curb Cut Analysis - Along Slope

L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Longitudinal Slope (SL)	0.005	m/m
Mannings N (n)	0.013	
Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	2.73007	m
Actual Length (L)	3	m

108A-1
DC108A-1

Area	0.24	Ha
RC	0.8	
15mm Flow (EPASWMM)	19.4	L/s

Curb Cut Analysis - Along Slope

L = 0.817 x Q^0.42 x SL^0.3 ([1 / (n x SX)]^0.6		
Longitudinal Slope (SL)	0.005	m/m
Mannings N (n)	0.013	
Road Cross Slope (SX)	0.03	m/m
Req. Length (L)	3.5331	m
Actual Length (L)	3.6	m

CB ID	Ponding Depth (m)	Total Maximum Inflow for 5-Year Storm Event (L/s)*	CB Grate Capacity (L/s)**	CB Size Type
CB 107A	0.12	29.65	92	Single OPSD 400.010
CB 107 B	0.1	36.28	60	Single OPSD 400.010
CB 108A	0.1	66.07	90	Twin OPSD 400.010
CB 107C	0.13	35.8	97	Single OPSD 400.010
CB 105B	0.07	11.21	25	Single OPSD 400.010
CB 104A	0.22	106.47	170	Single OPSD 400.010
CB 103B	0.22	59.86	170	Single OPSD 400.010
CB 103A	0.12	70.63	92	Single OPSD 400.010

*5-Year Storm Inflow taken from SWM Model using 5-year storm event

**Inlet Capacity calculated using Table 4.16 of the MTO Drainage Management Manual, 1997

Area ID	Outlet	Area	C	% Imp	Length	Width	Slope
103B-1	CB103B	0.22	0.8	0.86	50	44	0.5
103A-1	CB103A	0.05	0.8	0.86	25	20	0.5
103B-2	CB103B	0.07	0.8	0.86	18	39	0.5
104A-1	CB104A	0.19	0.8	0.86	41	46	0.5
104A-2	CB104A	0.19	0.8	0.86	56	34	0.5
105B-1	CB105B	0.04	0.8	0.86	17	24	1.5
108A-1	CB108A	0.24	0.8	0.86	14	171	2
107C-1	CB107C	0.12	0.8	0.86	35	34	2
107B-1	CB107B	0.12	0.8	0.86	35	34	1
107A-1	CB107A	0.1	0.8	0.86	35	29	0.7

MH108-MH109	Imp.	Perv.	Interlocking	Total
Area	0.204	0.031	0.006	0.241
C	0.9	0.2	0.6	0.80

MH107-MH108	Imp.	Perv.	Interlocking	Total
Area	0.083	0.020	0.001	0.104
C	0.9	0.2	0.6	0.76

MH107-MH108	Imp.	Perv.	Interlocking	Total
Area	0.202	0.035	0.003	0.240
C	0.9	0.2	0.6	0.79

MH101-MH102	Imp.	Perv.	Interlocking	Total
Area	0.339	0.080	0.007	0.426
C	0.9	0.2	0.6	0.76

MH103-MH104	Imp.	Perv.	Interlocking	Total
Area	0.288	0.043	0.008	0.339
C	0.9	0.2	0.6	0.80

EX.MH216-EX.MH217	Imp.	Perv.	Interlocking	Total
Area	0.057	0.005	0.017	0.080
C	0.9	0.2	0.6	0.79

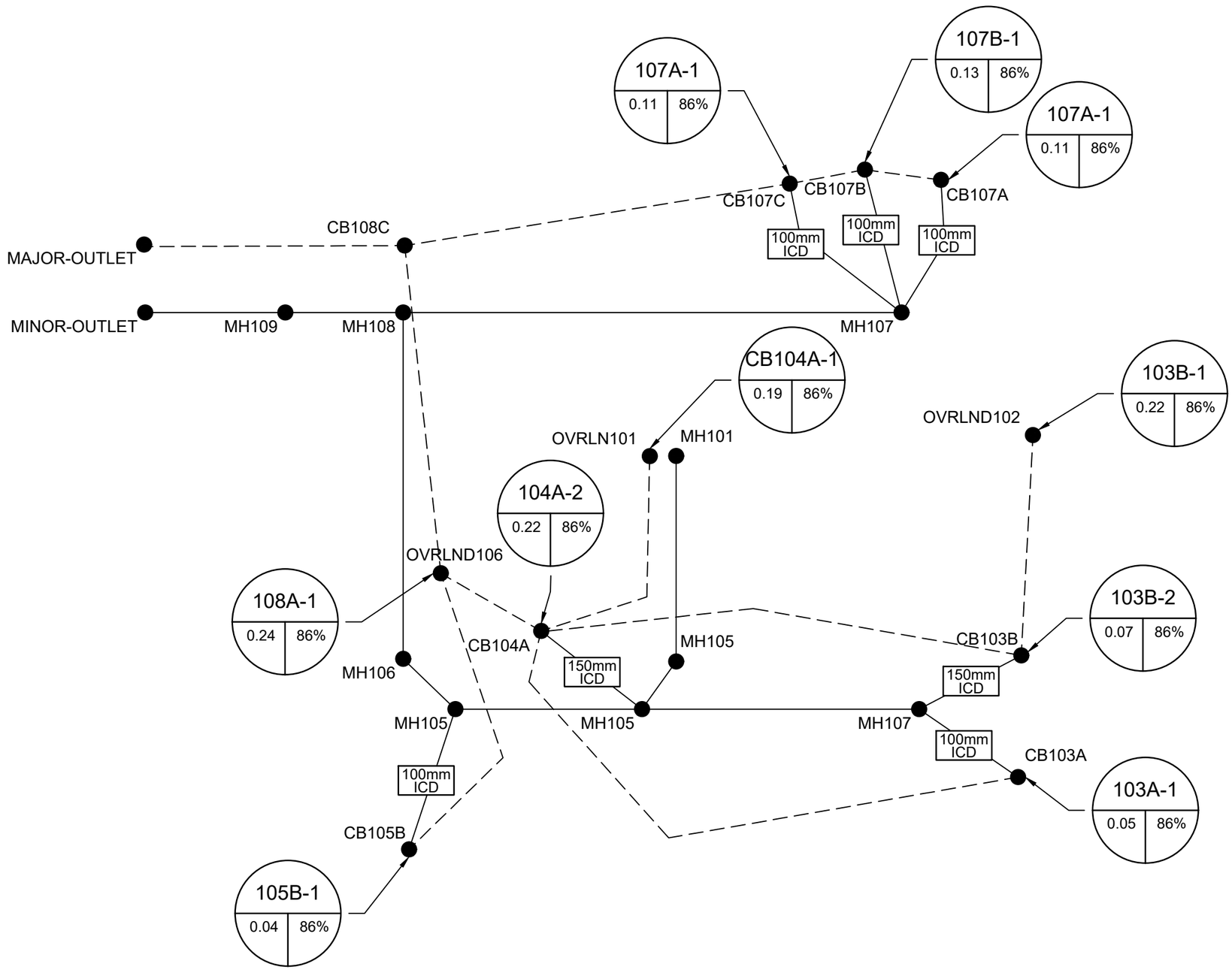
EX.MH218-EX.MH219	Imp.	Perv.	Interlocking	Total
Area	0.084	0.027	0.010	0.121
C	0.9	0.2	0.6	0.72

EX.MH220-EX.MH221	Imp.	Perv.	Interlocking	Total
Area	0.072	0.011	0.017	0.100
C	0.9	0.2	0.6	0.77

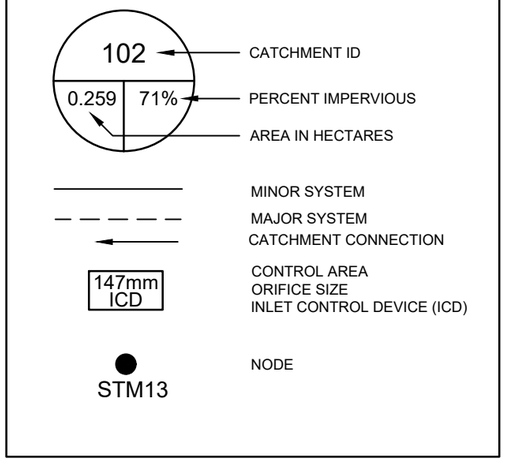
EX.MH222-EX.MH165	Imp.	Perv.	Interlocking	Total
Area	0.048	0.011	0.011	0.071
C	0.9	0.2	0.6	0.74

Mikinak	Imp.	Perv.	Interlocking	Total
Area	0.125	0.033	0.008	0.165
C	0.9	0.2	0.6	0.75

EX.MH215-EX.MH216	Imp.	Perv.	Interlocking	Total
Area	0.044	0.009	0.012	0.065
C	0.9	0.2	0.6	0.75


107A-1
0.11
86%
107B-1
0.13
86%
107A-1
0.11
86%
CB107C
CB107B
CB107A
100mm ICD
100mm ICD
100mm ICD
CB108C
MAJOR-OUTLET
MINOR-OUTLET
MH109
MH108
MH107
CB104A-1
0.19
86%
OVRLN101
MH101
104A-2
0.22
86%
OVRLND106
108A-1
0.24
86%
CB104A
150mm ICD
MH105
MH106
MH105
MH105
100mm ICD
CB105B
105B-1
0.04
86%
OVRLND102
103B-1
0.22
86%
CB103B
150mm ICD
MH107
100mm ICD
CB103A
103B-2
0.07
86%
103A-1
0.05
86%

LEGEND


102
0.259
71%
CATCHMENT ID
PERCENT IMPERVIOUS
AREA IN HECTARES
MINOR SYSTEM
MAJOR SYSTEM
CATCHMENT CONNECTION
147mm ICD
CONTROL AREA
ORIFICE SIZE
INLET CONTROL DEVICE (ICD)
NODE
STM13

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 02: maximum depth increased for Node CB107A
WARNING 02: maximum depth increased for Node CB107B
WARNING 02: maximum depth increased for Node CB108A
WARNING 02: maximum depth increased for Node CB107C
WARNING 02: maximum depth increased for Node CB105B
WARNING 02: maximum depth increased for Node CB104B
WARNING 02: maximum depth increased for Node CB103B
WARNING 02: maximum depth increased for Node CB103A

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.002         1.351
```

Total Precipitation	0.115	82.291
Evaporation Loss	0.000	0.000
Infiltration Loss	0.009	6.506
Surface Runoff	0.106	75.852
Final Storage	0.002	1.351
Continuity Error (%)	-0.080	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.106	1.062
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.106	1.061
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.001	0.013
Final Stored Volume	0.002	0.016
Continuity Error (%)	-0.153	

Highest Continuity Errors

Node CB103B (-3.63%)
Node CB104B (1.68%)

Time-Step Critical Elements

Link 7 (1.59%)

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	0.06 sec
Average Time Step	:	1.99 sec
Maximum Time Step	:	2.00 sec

```
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.03


  **************************
  Subcatchment Runoff Summary
  **************************


-------------------------------------------------------------------------------
-------------------
                           Total      Total      Total      Total      Total
Total     Peak  Runoff
                          Precip      Runon       Evap      Infil     Runoff
Runoff   Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm
10^6 ltr      LPS

-------------------------------------------------------------------------------
-------------------
  103B-1                  82.29       0.00       0.00       6.57      75.77
0.17   105.01   0.921
  103A-1                  82.29       0.00       0.00       6.48      75.88
0.04    24.38   0.922
  103B-2                  82.29       0.00       0.00       6.43      75.96
0.05    34.32   0.923
  CB104A-1                82.29       0.00       0.00       6.54      75.81
0.14    91.45   0.921
  104A-2                  82.29       0.00       0.00       6.59      75.74
0.17   104.33   0.920
  105B-1                  82.29       0.00       0.00       6.42      75.98
0.03    19.62   0.923
  108A-1                  82.29       0.00       0.00       6.44      75.95
0.18   117.64   0.923
  107C-1                  82.29       0.00       0.00       6.45      75.93
0.10    63.64   0.923
  107B-1                  82.29       0.00       0.00       6.48      75.88
0.10    63.39   0.922
  107A-1                  82.29       0.00       0.00       6.50      75.86
0.08    53.45   0.922


  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max    Reported
                                Depth    Depth      HGL   Occurrence   Max Depth
```

Node	Type	Meters	Meters	Meters	days	hr:min	Meters
MH109	JUNCTION	1.38	1.48	86.48	0	01:59	1.48
MH108	JUNCTION	0.42	0.73	86.69	0	01:59	0.73
MH106	JUNCTION	0.07	0.61	86.93	0	01:59	0.61
MH105	JUNCTION	0.04	0.66	87.04	0	01:59	0.65
MH104	JUNCTION	0.03	0.63	87.21	0	01:59	0.62
MH102	JUNCTION	0.01	0.41	87.21	0	01:59	0.41
STM101	JUNCTION	0.00	0.17	87.22	0	01:59	0.17
MH107	JUNCTION	0.02	0.20	87.91	0	01:52	0.20
MH103	JUNCTION	0.02	0.95	88.06	0	01:54	0.54
CB107A	JUNCTION	0.04	1.69	90.58	0	01:59	1.69
CB107B	JUNCTION	0.05	1.65	90.19	0	01:59	1.65
CB108A	JUNCTION	0.05	1.34	89.32	0	01:59	1.34
CB107C	JUNCTION	0.05	1.58	89.72	0	01:59	1.58
CB105B	JUNCTION	0.01	0.90	89.13	0	01:59	0.90
CB104B	JUNCTION	0.10	2.11	89.88	0	02:03	2.11
CB103B	JUNCTION	0.03	1.58	90.06	0	01:59	1.58
CB103A	JUNCTION	0.07	1.81	90.53	0	01:59	1.81
OVRLN101	JUNCTION	0.01	0.09	90.24	0	01:59	0.09
OVRLND102	JUNCTION	0.01	0.09	90.94	0	01:59	0.09
OVERLAND106	JUNCTION	0.01	0.09	89.80	0	01:59	0.09
MINOR-OUTLET	OUTFALL	1.43	1.43	86.38	0	00:00	1.43
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	94.61	0	00:00	0.00
MAJOR-OUTLET	OUTFALL	0.00	0.10	89.22	0	01:59	0.10

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH109	JUNCTION	0.00	308.14	0 01:59	0	0.997	-0.000
MH108	JUNCTION	0.00	308.12	0 01:59	0	0.997	-0.062
MH106	JUNCTION	0.00	174.10	0 01:59	0		

```
0.582      -0.005
  MH105                JUNCTION      0.00   174.07     0  01:59           0
0.582      -0.007
  MH104                JUNCTION      0.00   159.10     0  02:01           0
0.554      -0.106
  MH102                JUNCTION      0.00    10.69     0  01:55           0
0.00447      -0.087
  STM101               JUNCTION      0.00     8.37     0  01:56           0
0.00115       0.000
  MH107                JUNCTION      0.00    80.25     0  01:59           0
0.244       0.000
  MH103                JUNCTION      0.00    88.57     0  01:59           0
0.23       0.000
  CB107A               JUNCTION     53.45    53.45     0  01:59      0.0834
0.0834      -0.432
  CB107B               JUNCTION     63.39    89.52     0  01:59      0.0987
0.11       0.182
  CB108A               JUNCTION      0.00   214.84     0  01:59           0
0.235      -0.612
  CB107C               JUNCTION     63.64   125.49     0  01:59      0.0987
0.124      -0.121
  CB105B               JUNCTION     19.62    19.62     0  01:59      0.0304
0.0304       0.003
  CB104B               JUNCTION    104.33   267.44     0  01:59       0.167
0.344       1.710
  CB103B               JUNCTION     34.32   132.84     0  01:59      0.0532
0.115      -3.506
  CB103A               JUNCTION     24.38   128.90     0  01:59      0.0379
0.205       0.182
  OVRLN101             JUNCTION     91.45    91.45     0  01:59       0.144
0.144      -1.259
  OVRLND102            JUNCTION    105.01   105.01     0  01:59       0.167
0.167       0.066
  OVERLAND106          JUNCTION    117.64   117.71     0  01:59       0.182
0.199       0.635
  MINOR-OUTLET         OUTFALL       0.00   308.16     0  01:59           0
0.998       0.000
  OVERLANDFLOWOUT      OUTFALL       0.00     0.00     0  00:00           0
 0       0.000 ltr
  MAJOR-OUTLET         OUTFALL       0.00   147.90     0  01:59           0
0.0653       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  -------------------------------------------------------------------------
                                                  Max. Height   Min. Depth
```

Node	Type	Hours Surcharged	Above Crown Meters	Below Rim Meters
MH109	JUNCTION	0.20	0.015	2.935
MH108	JUNCTION	0.14	0.027	2.949
MH106	JUNCTION	0.24	0.130	3.019
MH105	JUNCTION	0.25	0.177	2.739
MH104	JUNCTION	0.20	0.138	2.776
MH102	JUNCTION	0.14	0.081	2.836
MH103	JUNCTION	0.19	0.647	2.326

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
MINOR-OUTLET	68.14	18.69	308.16	0.998
OVERLANDFLOWOUT	0.00	0.00	0.00	0.000
MAJOR-OUTLET	1.91	43.08	147.90	0.065
System	23.35	61.76	456.06	1.063

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
3	CONDUIT	308.16	0 01:59	1.09	0.83	1.00
4	CONDUIT	308.14	0 01:59	1.09	0.86	1.00
5	CONDUIT	80.46	0 01:53	1.55	0.76	0.83
6	CONDUIT	174.10	0 01:59	1.09	0.86	1.00
7	CONDUIT	174.10	0 01:59	1.09	0.86	1.00
8	CONDUIT	159.27	0 02:01	1.02	0.79	1.00

9	CONDUIT	10.69	0	01:55	0.31	0.16	1.00
10	CONDUIT	8.37	0	01:56	0.20	0.12	0.78
11	CONDUIT	88.56	0	01:59	1.37	0.98	1.00
17	CHANNEL	90.38	0	01:59	0.60	0.03	0.57
18	CHANNEL	104.55	0	01:59	0.79	0.03	0.26
19	CHANNEL	72.91	0	01:59	0.28	0.02	0.54
20	CHANNEL	31.50	0	02:03	0.47	0.01	0.19
21	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
22	CHANNEL	117.55	0	01:59	0.85	0.03	0.43
23	CHANNEL	98.58	0	01:59	1.50	0.01	0.21
24	CHANNEL	26.14	0	01:59	0.16	0.01	0.31
25	CHANNEL	61.89	0	01:59	0.21	0.01	0.40
26	CHANNEL	97.36	0	01:59	0.31	0.02	0.41
27	CHANNEL	147.90	0	01:59	0.85	0.04	0.30
1	ORIFICE	68.21	0	02:03			1.00
2	ORIFICE	27.16	0	01:59			1.00
12	ORIFICE	26.87	0	01:59			1.00
13	ORIFICE	26.22	0	01:59			1.00
14	ORIFICE	53.78	0	01:59			1.00
15	ORIFICE	19.55	0	01:59			1.00
16	ORIFICE	58.56	0	01:59			1.00
28	ORIFICE	30.01	0	01:59			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
5	1.00	0.00	0.00	0.00	0.75	0.01	0.00	0.24	0.76	0.00
6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.08	0.00
7	1.00	0.00	0.00	0.00	0.78	0.00	0.00	0.22	0.74	0.00

8	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.00
0.00									
9	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00
0.00									
10	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.01
0.00									
11	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00
0.00									
17	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.03
0.00									
18	1.00	0.00	0.00	0.00	0.00	0.02	0.00	0.98	0.01
0.00									
19	1.00	0.96	0.03	0.00	0.01	0.00	0.00	0.00	0.92
0.00									
20	1.00	0.00	0.98	0.00	0.02	0.00	0.00	0.00	0.92
0.00									
21	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00									
22	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.02
0.00									
23	1.00	0.98	0.00	0.00	0.00	0.01	0.00	0.01	0.01
0.00									
24	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.92
0.00									
25	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.92
0.00									
26	1.00	0.98	0.01	0.00	0.02	0.00	0.00	0.00	0.92
0.00									
27	1.00	0.98	0.00	0.00	0.01	0.01	0.00	0.00	0.01
0.00									

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
3	23.98	23.98	23.98	0.01	0.37
4	0.20	0.34	0.20	0.01	0.20
5	0.01	0.01	0.14	0.01	0.01
6	0.27	0.27	0.34	0.01	0.17
7	0.24	0.28	0.24	0.01	0.24
8	0.22	0.22	0.25	0.01	0.08
9	0.18	0.18	0.20	0.01	0.01
10	0.01	0.01	0.14	0.01	0.01
11	0.19	0.19	0.22	0.01	0.18

```
Analysis begun on:  Fri Oct 04 14:51:55 2019
Analysis ended on:  Fri Oct 04 14:51:57 2019
Total elapsed time: 00:00:02
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 02: maximum depth increased for Node CB107A
WARNING 02: maximum depth increased for Node CB107B
WARNING 02: maximum depth increased for Node CB108A
WARNING 02: maximum depth increased for Node CB107C
WARNING 02: maximum depth increased for Node CB105B
WARNING 02: maximum depth increased for Node CB104B
WARNING 02: maximum depth increased for Node CB103B
WARNING 02: maximum depth increased for Node CB103A

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.002         1.351
```

Total Precipitation	0.138	98.754
Evaporation Loss	0.000	0.000
Infiltration Loss	0.010	7.137
Surface Runoff	0.128	91.697
Final Storage	0.002	1.351
Continuity Error (%)	-0.081	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.128	1.284
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.128	1.283
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.001	0.013
Final Stored Volume	0.002	0.016
Continuity Error (%)	-0.110	

****
Highest Continuity Errors
****
Node CB103B (-3.21%)
Node CB104B (1.65%)

****
Time-Step Critical Elements
****
Link 7 (1.61%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 1.99 sec
Maximum Time Step : 2.00 sec

```
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.02


  **************************
  Subcatchment Runoff Summary
  **************************


-------------------------------------------------------------------------------
-------------------
                           Total      Total      Total      Total      Total
Total     Peak  Runoff
                          Precip      Runon       Evap      Infil     Runoff
Runoff   Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm
10^6 ltr      LPS

-------------------------------------------------------------------------------
-------------------
  103B-1                   98.75       0.00       0.00       7.20      91.62
0.20   127.37   0.928
  103A-1                   98.75       0.00       0.00       7.11      91.73
0.05    29.40   0.929
  103B-2                   98.75       0.00       0.00       7.07      91.80
0.06    41.29   0.930
  CB104A-1                 98.75       0.00       0.00       7.17      91.65
0.17   110.70   0.928
  104A-2                   98.75       0.00       0.00       7.22      91.59
0.20   126.72   0.927
  105B-1                   98.75       0.00       0.00       7.06      91.82
0.04    23.60   0.930
  108A-1                   98.75       0.00       0.00       7.07      91.79
0.22   141.56   0.929
  107C-1                   98.75       0.00       0.00       7.09      91.77
0.12    76.62   0.929
  107B-1                   98.75       0.00       0.00       7.11      91.73
0.12    76.44   0.929
  107A-1                   98.75       0.00       0.00       7.13      91.70
0.10    64.53   0.929


  ******************
  Node Depth Summary
  ******************

  ------------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max    Reported
                                Depth    Depth      HGL   Occurrence   Max Depth
```

Node	Type	Meters	Meters	Meters	days	hr:min	Meters
MH109	JUNCTION	1.38	1.48	86.48	0	01:59	1.48
MH108	JUNCTION	0.42	0.74	86.70	0	01:59	0.74
MH106	JUNCTION	0.08	0.64	86.96	0	01:59	0.64
MH105	JUNCTION	0.04	0.69	87.08	0	01:59	0.69
MH104	JUNCTION	0.03	0.66	87.25	0	01:59	0.66
MH102	JUNCTION	0.01	0.45	87.25	0	01:59	0.45
STM101	JUNCTION	0.00	0.21	87.26	0	01:59	0.21
MH107	JUNCTION	0.02	0.20	87.91	0	01:52	0.20
MH103	JUNCTION	0.02	0.58	87.70	0	01:59	0.58
CB107A	JUNCTION	0.04	1.69	90.58	0	01:59	1.69
CB107B	JUNCTION	0.05	1.66	90.20	0	01:59	1.66
CB108A	JUNCTION	0.05	1.37	89.35	0	02:00	1.37
CB107C	JUNCTION	0.05	1.59	89.73	0	01:59	1.59
CB105B	JUNCTION	0.02	1.27	89.50	0	01:59	1.27
CB104B	JUNCTION	0.11	2.16	89.93	0	02:01	2.16
CB103B	JUNCTION	0.03	1.59	90.07	0	01:59	1.59
CB103A	JUNCTION	0.08	1.82	90.54	0	01:59	1.82
OVRLN101	JUNCTION	0.01	0.09	90.24	0	01:59	0.09
OVRLND102	JUNCTION	0.01	0.10	90.95	0	01:59	0.10
OVERLAND106	JUNCTION	0.01	0.11	89.82	0	02:00	0.11
MINOR-OUTLET	OUTFALL	1.43	1.43	86.38	0	00:00	1.43
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	94.61	0	00:00	0.00
MAJOR-OUTLET	OUTFALL	0.00	0.13	89.25	0	02:00	0.13

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH109	JUNCTION	0.00	314.65	0 01:59	0	1.13	-0.001
MH108	JUNCTION	0.00	314.63	0 01:59	0	1.13	-0.053
MH106	JUNCTION	0.00	179.95	0 01:59	0		

```
0.658      -0.006
  MH105                JUNCTION      0.00   179.94     0  01:59           0
0.657      -0.000
  MH104                JUNCTION      0.00   160.58     0  02:01           0
0.624      -0.113
  MH102                JUNCTION      0.00    16.57     0  01:54           0
0.00501      -0.080
  STM101               JUNCTION      0.00    10.99     0  01:55           0
0.00141       0.000
  MH107                JUNCTION      0.00    80.46     0  01:59           0
0.278       0.000
  MH103                JUNCTION      0.00    88.86     0  01:59           0
0.263       0.000
  CB107A               JUNCTION     64.53    64.53     0  01:59       0.101
0.101      -0.430
  CB107B               JUNCTION     76.44   113.65     0  01:59       0.119
0.138       0.172
  CB108A               JUNCTION      0.00   325.94     0  01:59           0
0.347      -0.436
  CB107C               JUNCTION     76.62   162.89     0  01:59       0.119
0.16      -0.239
  CB105B               JUNCTION     23.60    23.60     0  01:59      0.0367
0.0367       0.002
  CB104B               JUNCTION    126.72   343.59     0  01:59       0.202
0.431       1.679
  CB103B               JUNCTION     41.29   167.20     0  01:59      0.0643
0.149      -3.111
  CB103A               JUNCTION     29.40   156.34     0  01:59      0.0459
0.247       0.164
  OVRLN101             JUNCTION    110.70   110.70     0  01:59       0.174
0.174      -1.227
  OVRLND102            JUNCTION    127.37   127.37     0  01:59       0.202
0.202       0.056
  OVERLAND106          JUNCTION    141.56   206.53     0  01:59        0.22
0.286       0.511
  MINOR-OUTLET         OUTFALL       0.00   314.67     0  01:59           0
1.13       0.000
  OVERLANDFLOWOUT      OUTFALL       0.00     0.00     0  00:00           0
 0       0.000 ltr
  MAJOR-OUTLET         OUTFALL       0.00   256.84     0  02:00           0
0.153       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  -------------------------------------------------------------------------
                                                  Max. Height   Min. Depth
```

Node	Type	Hours Surcharged	Above Crown Meters	Below Rim Meters
MH109	JUNCTION	0.26	0.019	2.931
MH108	JUNCTION	0.19	0.040	2.936
MH106	JUNCTION	0.29	0.160	2.989
MH105	JUNCTION	0.31	0.214	2.702
MH104	JUNCTION	0.25	0.178	2.736
MH102	JUNCTION	0.21	0.121	2.796
MH103	JUNCTION	0.23	0.281	2.692

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
MINOR-OUTLET	67.78	20.87	314.67	1.132
OVERLANDFLOWOUT	0.00	0.00	0.00	0.000
MAJOR-OUTLET	2.17	86.43	256.84	0.153
System	23.31	107.31	570.69	1.285

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
3	CONDUIT	314.67	0	01:59	1.11	0.85	1.00
4	CONDUIT	314.65	0	01:59	1.11	0.88	1.00
5	CONDUIT	80.75	0	01:52	1.54	0.76	0.83
6	CONDUIT	179.95	0	01:59	1.13	0.89	1.00
7	CONDUIT	179.95	0	01:59	1.13	0.89	1.00
8	CONDUIT	160.74	0	02:01	1.02	0.80	1.00

9	CONDUIT	16.57	0	01:54	0.30	0.24	1.00
10	CONDUIT	10.99	0	01:55	0.24	0.16	0.84
11	CONDUIT	88.85	0	01:59	1.37	0.98	1.00
17	CHANNEL	109.73	0	01:59	0.61	0.03	0.64
18	CHANNEL	126.97	0	01:59	0.84	0.03	0.28
19	CHANNEL	107.31	0	01:59	0.34	0.03	0.63
20	CHANNEL	144.31	0	02:01	0.83	0.04	0.30
21	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
22	CHANNEL	202.94	0	02:01	0.87	0.05	0.49
23	CHANNEL	125.97	0	01:59	1.53	0.01	0.23
24	CHANNEL	37.21	0	01:59	0.19	0.01	0.33
25	CHANNEL	86.29	0	01:59	0.25	0.02	0.42
26	CHANNEL	135.80	0	01:59	0.36	0.03	0.46
27	CHANNEL	256.84	0	02:00	0.98	0.07	0.37
1	ORIFICE	68.92	0	02:01			1.00
2	ORIFICE	27.21	0	01:59			1.00
12	ORIFICE	26.94	0	01:59			1.00
13	ORIFICE	26.31	0	01:59			1.00
14	ORIFICE	54.28	0	02:00			1.00
15	ORIFICE	23.47	0	01:59			1.00
16	ORIFICE	58.80	0	01:59			1.00
28	ORIFICE	30.06	0	01:59			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
5	1.00	0.00	0.00	0.00	0.75	0.01	0.00	0.23	0.76	0.00
6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
7	1.00	0.00	0.00	0.00	0.78	0.00	0.00	0.22	0.74	0.00

8	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.00
0.00									
9	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.00
0.00									
10	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.02
0.00									
11	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00
0.00									
17	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.04
0.00									
18	1.00	0.00	0.00	0.00	0.00	0.02	0.00	0.98	0.01
0.00									
19	1.00	0.96	0.03	0.00	0.01	0.00	0.00	0.00	0.92
0.00									
20	1.00	0.00	0.98	0.00	0.02	0.00	0.00	0.00	0.92
0.00									
21	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00									
22	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.02
0.00									
23	1.00	0.98	0.00	0.00	0.00	0.01	0.00	0.01	0.01
0.00									
24	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.92
0.00									
25	1.00	0.98	0.01	0.00	0.02	0.00	0.00	0.00	0.92
0.00									
26	1.00	0.97	0.01	0.00	0.02	0.00	0.00	0.00	0.92
0.00									
27	1.00	0.98	0.00	0.00	0.00	0.02	0.00	0.00	0.01
0.00									

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
3	23.98	23.98	23.98	0.01	0.41
4	0.26	0.39	0.26	0.01	0.26
5	0.01	0.01	0.19	0.01	0.01
6	0.32	0.32	0.39	0.01	0.22
7	0.29	0.33	0.29	0.01	0.29
8	0.27	0.27	0.31	0.01	0.11
9	0.23	0.23	0.25	0.01	0.01
10	0.01	0.01	0.21	0.01	0.01
11	0.23	0.23	0.27	0.01	0.22

17	0.01	0.01	0.09	0.01	0.01
19	0.01	0.01	0.09	0.01	0.01

Analysis begun on: Fri Oct 04 15:13:28 2019
Analysis ended on: Fri Oct 04 15:13:30 2019
Total elapsed time: 00:00:02

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

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

START_DATE           01/01/2000
START_TIME           00:01:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:01:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         0:00:02

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.14
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[FILES]
;;Interfacing Files
SAVE HOTSTART "post.hsf"
USE HOTSTART "post.hsf"

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

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
1                INTENSITY 0:10     1.0      TIMESERIES CH6H100

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
103B-1           1                OVRLND102        0.22     86       44       0.5
  0
103A-1           1                CB103A           0.05     86       20       0.5
  0
103B-2           1                CB103B           0.07     86       39       1
  0
CB104A-1         1                OVRLN101         0.19     86       46       0.5
  0
104A-2           1                CB104B           0.22     86       39       0.5
  0
105B-1           1                CB105B           0.04     86       24       1.5
  0
108A-1           1                OVERLAND106      0.24     86       171      0.5
  0
107C-1           1                CB107C           0.13     86       37       2
  0
107B-1           1                CB107B           0.13     86       37       1
  0
107A-1           1                CB107A           0.11     86       31       0.7
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
103B-1           0.013      0.25       1.57       4.67       0          OUTLET
103A-1           0.013      0.25       1.57       4.67       0          OUTLET
103B-2           0.013      0.25       1.57       4.67       0          OUTLET
CB104A-1         0.013      0.25       1.57       4.67       0          OUTLET
104A-2           0.013      0.25       1.57       4.67       0          OUTLET
105B-1           0.013      0.25       1.57       4.67       0          OUTLET
108A-1           0.013      0.25       1.57       4.67       0          OUTLET
107C-1           0.013      0.25       1.57       4.67       0          OUTLET
107B-1           0.013      0.25       1.57       4.67       0          OUTLET
107A-1           0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
```

```
;;-------------- ---------- ---------- ---------- ---------- ----------
103B-1           76.2       13.2       4.14       7          0
103A-1           76.2       13.2       4.14       7          0
103B-2           76.2       13.2       4.14       7          0
CB104A-1         76.2       13.2       4.14       7          0
104A-2           76.2       13.2       4.14       7          0
105B-1           76.2       13.2       4.14       7          0
108A-1           76.2       13.2       4.14       7          0
107C-1           76.2       13.2       4.14       7          0
107B-1           76.2       13.2       4.14       7          0
107A-1           76.2       13.2       4.14       7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
MH109            85         4.41       0          0          0
MH108            85.963     3.677      0          0          0
MH106            86.321     3.629      0          0          0
MH105            86.384     3.396      0          0          0
MH104            86.589     3.401      0          0          0
MH102            86.803     3.247      0          0          0
STM101           87.050     3.2        0          0          0
MH107            87.709     3.221      0          0          0
MH103            87.117     3.273      0          0          0
CB107A           88.89      1.63       0          0          0
CB107B           88.54      1.59       0          0          0
CB108A           87.98      1.45       0          0          0
CB107C           88.14      1.50       0          0          0
CB105B           88.23      1.67       0          0          0
CB104B           87.77      2.02       0          0          0
CB103B           88.48      1.72       0          0          0
CB103A           88.72      1.62       0          0          0
OVRLN101         90.15      0.34       0          0          0
OVRLND102        90.85      0.34       0          0          0
OVERLAND106      89.71      0.34       0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
MINOR-OUTLET     84.95      FIXED      86.38            NO
OVERLANDFLOWOUT  94.61      FREE                        NO
MAJOR-OUTLET     89.12      FREE                        NO

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
3                MINOR-OUTLET     MH109            13.8       0.013      *
*          0          0
```

```
4               MH109           MH108           30.35      0.013      85.860
*          0          0
5               MH108           MH107           112.10     0.013      86.364
*          0          0
6               MH108           MH106           41.55      0.013      86.113
*          0          0
7               MH106           MH105           6.5        0.013      86.351
*          0          0
8               MH105           MH104           35         0.013      86.414
*          0          0
9               MH104           MH102           5.4        0.013      86.776
*          0          0
10              MH102           STM101          43.4       0.013      86.833
*          0          0
11              MH104           MH103           43.1       0.013      86.739
*          0          0
17              OVRLN101        CB104B          91         0.013      *
89.57      0          0
18              OVRLND102       CB103A          56.46      0.013      *
90.44      0          0
19              CB103B          CB104B          60         0.013      89.98
89.57      0          0
20              CB104B          OVERLAND106     14         0.013      89.83
*          0          0
21              CB105B          OVERLAND106     10         0.013      89.90
*          0          0
22              OVERLAND106     CB108A          62         0.013      *
89.12      0          0
23              CB103A          CB103B          10         0.013      90.47
89.98      0          0
24              CB107A          CB107B          37         0.013      90.53
90.03      0          0
25              CB107B          CB107C          37         0.013      90.13
89.51      0          0
26              CB107C          CB108A          37         0.013      89.64
89.12      0          0
27              CB108A          MAJOR-OUTLET    15         0.013      89.22
89.12      0          0

[ORIFICES]
;;Name           From Node       To Node         Type         Offset     Qcoeff
 Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- ----------
1               CB104B          MH104           SIDE         *          0.61
 NO       0
2               CB107A          MH107           SIDE         *          0.61
 NO       0
12              CB107B          MH107           SIDE         *          0.61
 NO       0
```

```
13               CB107C           MH107            SIDE         *          0.61
 NO       0
14               CB108A           MH108            SIDE         *          0.61
 NO       0
15               CB105B           MH105            SIDE         *          0.61
 NO       0
16               CB103B           MH103            SIDE         *          0.61
 NO       0
28               CB103A           MH103            SIDE         *          0.65
 NO       0

[XSECTIONS]
;;Link            Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;--------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
3                CIRCULAR     0.60             0          0          0          1

4                CIRCULAR     0.60             0          0          0          1

5                CIRCULAR     0.30             0          0          0          1

6                CIRCULAR     0.45             0          0          0          1

7                CIRCULAR     0.45             0          0          0          1

8                CIRCULAR     0.45             0          0          0          1

9                CIRCULAR     0.3              0          0          0          1

10               CIRCULAR     0.3              0          0          0          1

11               CIRCULAR     0.3              0          0          0          1

17               IRREGULAR    OVERLAND         0          0          0          1

18               IRREGULAR    OVERLAND         0          0          0          1

19               IRREGULAR    OVERLAND         0          0          0          1

20               IRREGULAR    OVERLAND         0          0          0          1

21               RECT_OPEN    0.3              1          0          0          1

22               IRREGULAR    OVERLAND         0          0          0          1

23               IRREGULAR    OVERLAND         0          0          0          1

24               IRREGULAR    OVERLAND         0          0          0          1
```

```
25               IRREGULAR    OVERLAND         0          0          0          1

26               IRREGULAR    OVERLAND         0          0          0          1

27               IRREGULAR    OVERLAND         0          0          0          1

1                CIRCULAR     0.15             0          0          0
2                CIRCULAR     0.1              0          0          0
12               CIRCULAR     0.1              0          0          0
13               CIRCULAR     0.10             0          0          0
14               CIRCULAR     0.15             0          0          0
15               CIRCULAR     0.1              0          0          0
16               CIRCULAR     0.15             0          0          0
28               CIRCULAR     0.10             0          0          0

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.013    0.013    0.013
X1 OVERLAND          4        0.0      0.0      0.0      0.0      0.0      0.0
0.0
GR 100      0        99.85    0.1      99.661   6.3      99.81    6.31

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
3                0          1          0          NO         0
4                1.3        1          0          NO         0
5                0          1          0          NO         0
6                0.4        1          0          NO         0
7                0.40       1          0          NO         0
8                0.4        1          0          NO         0
9                0.4        1          0          NO         0
10               0          1          0          NO         0
11               0          1          0          NO         0

[CURVES]
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CB103b-Capture              0.15       409
CB103b-Capture              0.20       409
;
CB103B-UG-Storage Storage    0          0
CB103B-UG-Storage            0.07       37.7
CB103B-UG-Storage            1.21       37.7
CB103B-UG-Storage            1.2101     0
CB103B-UG-Storage            2.41       0
;
CB103a-Capture   Storage    0          0
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```
CB103a-Capture              0.15       448
CB103a-Capture              0.20       448
;
CB103a-UG-Storage Storage    0          0
CB103a-UG-Storage            0.07       31
CB103a-UG-Storage            1.21       31
CB103a-UG-Storage            1.2101     0
CB103a-UG-Storage            2.41       0
;
CB102-Capture    Storage    0          0
CB102-Capture               0.12       74
CB102-Capture               0.17       74
;
CB102-UG-Storage Storage    0          0
CB102-UG-Storage            0.07       25
CB102-UG-Storage            1.21       25
CB102-UG-Storage            1.2101     0
CB102-UG-Storage            2.17       0

[TIMESERIES]
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Plan\EPASWMM Template\rainfall\CH6H100.dat"
;
CH6H100x         FILE "P:\General Administrative\5 - DSEL Templates\Site
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;
CH6H002          FILE "P:\General Administrative\5 - DSEL Templates\Site
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;
CH6H005          FILE "P:\General Administrative\5 - DSEL Templates\Site
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15\B_Design\B1_Analysis\B1-4_SWM\Rainfall\CH4H10mm.dat"
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15\B_Design\B1_Analysis\B1-4_SWM\Rainfall\CH4H15mm.dat"

[REPORT]
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INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units   None

[COORDINATES]
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MH108   2894.675   7082.291
MH106   2909.986   4994.890
MH105   3088.614   4719.291
MH104   4701.374   4035.399
MH102   4910.625   4224.235
STM101   4895.314   6413.710
MH107   8534.231   7087.395
MH103   6788.776   3300.471
CB107A   6936.782   7414.030
CB107B   5130.083   7408.926
CB108A   1674.898   7414.030
CB107C   3328.487   7408.926
CB105B   2440.448   4632.529
CB104B   3374.420   4928.542
CB103B   5946.670   3749.594
CB103A   7023.545   3570.965
OVRLN101   5033.113   6250.393
OVRLND102   7243.002   6418.814
OVERLAND106   2797.705   5142.896
MINOR-OUTLET   684.785   7087.395
OVERLANDFLOWOUT 6459.333   6978.922
MAJOR-OUTLET   674.578   7250.712

[VERTICES]
;;Link   X-Coord   Y-Coord
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17   5303.607   4729.499
17   4726.893   3866.978
18   7595.156   4744.810
19   4599.301   3800.631
20   3165.169   4994.890
21   2736.461   4918.334
21   2792.601   5117.378
22   2761.979   6903.662
23   6717.324   3397.441
24   6094.676   7470.170
25   4058.312   7546.725
26   2210.783   7556.932
27   1480.958   7255.816

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[Polygons]
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103B-1           7508.393           4421.577
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103B-1           6941.886           4401.163
103A-1           7227.691           3438.270
103A-1           7850.339           3438.270
103A-1           7513.497           3821.045
103A-1           7191.966           3443.374
103B-2           5788.456           2938.110
103B-2           6523.385           2861.555
103B-2           6186.543           3315.782
103B-2           5798.664           2984.043
CB104A-1         6104.884           5209.244
CB104A-1         6084.469           5255.177
CB104A-1         5762.938           5760.440
CB104A-1         5477.132           5224.555
104A-2           2955.919           4117.058
104A-2           3849.061           4045.607
104A-2           3461.182           4479.419
104A-2           2935.504           4091.540
105B-1           1649.379           4076.229
105B-1           2353.686           4096.643
105B-1           1981.118           4438.589
105B-1           1618.757           4009.881
108A-1           3721.470           5949.276
108A-1           3466.286           6423.917
108A-1           3078.407           5939.069
107C-1           4221.629           7699.835
107C-1           3833.750           8235.721
107C-1           3297.865           7684.524
107B-1           6232.476           7791.701
107B-1           5834.389           8337.794
107B-1           5364.852           7786.598
107A-1           8166.767           7755.975
107A-1           7687.022           8363.312
107A-1           7202.173           7786.598

[SYMBOLS]
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1                -682.998           7689.628


[BACKDROP]
FILE       "Z:\Projects\17-946-Wateridge_Block
15\B_Design\B1_Analysis\B1-4_SWM\2019-09-26_946_spa_ggg-SWM-2.bmp"
DIMENSIONS -2500.000 0.000 12500.000 10000.000
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[PROFILES]
;;Name           Links
;;-------------- ----------
"                " 14
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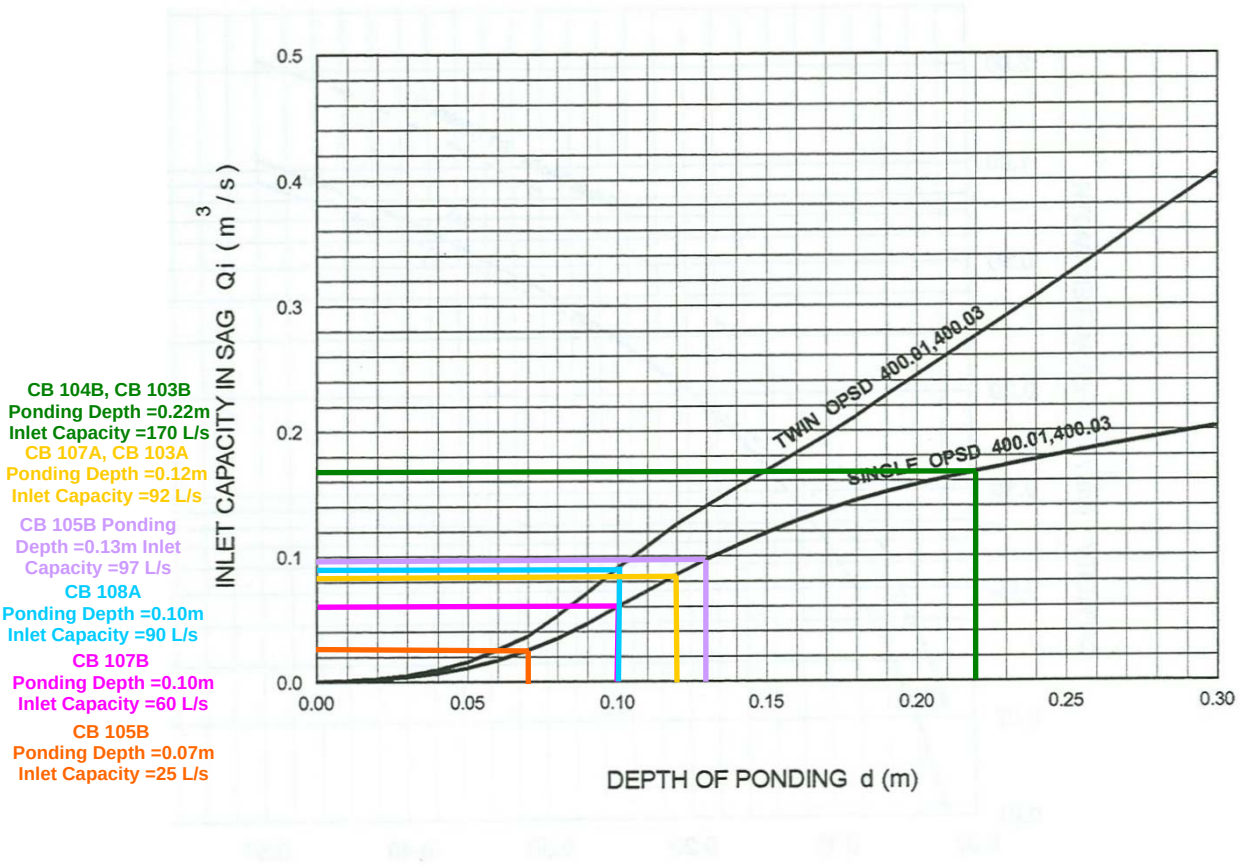
Design Chart 4.19: Inlet Capacity at Road Sag



DRAWINGS / FIGURES



SITE STATISTICS AND DEVELOPMENT DATA

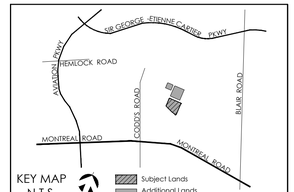
SITE AREA	19,588.25m² (1.96 ha)
PAVED AREA	5,426.98m² (28%)
LANDSCAPED AREA	5,829.33m² (30%)
TOTAL BUILDING COVERAGE	8,331.94m² (42%)
TOTAL GROSS FLOOR AREA	22,746.76m²
STACKED TOWNS TYPE A UPPER MODEL (34@114m²)	3,876m²
STACKED TOWNS TYPE B LOWER MODEL (34@85m²)	2,890m²
STACKED TOWNS TYPE C UPPER MODEL (24@116.93m²)	2,806.32m²
STACKED TOWNS TYPE D LOWER MODEL (24@87.26m²)	2,094.24m²
STACKED TOWNS TYPE E UPPER MODEL (4@117.20m²)	468.80m²
STACKED TOWNS TYPE F LOWER MODEL (4@89.97m²)	359.88m²
B2B TOWNHOUSE TYPE A MODEL (20@126.72m²)	2,525.20m²
B2B TOWNHOUSE TYPE B MODEL (6@139.82m²)	838.92m²
B2B TOWNHOUSE TYPE C MODEL (14@159.24m²)	2,229.36m²
B2B TOWNHOUSE TYPE D MODEL (2@172.06m²)	344.12m²
B2B TOWNHOUSE TYPE F MODEL (26@165.92m²)	4,313.92m²
HYDRO VAULT (1)	116m²
DENSITY (UPH)	98 UPH
ZONE CATEGORY	R4Y[2456]

DWELLING BLOCK	DWELLING TYPE	GROUND FLOOR AREA (m2)	UNITS
BLOCK 1	STACKED TOWNS	502.57	20
BLOCK 2	STACKED TOWNS	500.72	20
BLOCK 3	STACKED TOWNS	500.72	20
BLOCK 4	STACKED TOWNS	502.57	20
BLOCK 5	STACKED TOWNS	401.53	16
BLOCK 6	STACKED TOWNS	399.93	16
BLOCK 7	STACKED TOWNS	301.14	12
BLOCK 8	BACK TO BACK TOWNHOUSES	571.00	10
BLOCK 9	BACK TO BACK TOWNHOUSES	591.81	10
BLOCK 10	BACK TO BACK TOWNHOUSES	575.07	10
BLOCK 11	BACK TO BACK TOWNHOUSES	480.28	8
BLOCK 12	BACK TO BACK TOWNHOUSES	469.87	8
BLOCK 13	BACK TO BACK TOWNHOUSES	571.00	10
BLOCK 14	BACK TO BACK TOWNHOUSES	689.68	12
	TOTAL	7,057.89	192

SECTION	ZONE PROVISION - PLANNED UNIT DEVELOPMENT	REQUIRED	PROPOSED
162A (Table)	MIN. LOT WIDTH (m)	N/A	N/A
162A (Table)	MIN. LOT AREA (m²)	1,400m²	19,588m²
162A (Table)	MAX. BUILDING HEIGHT (m)	11.0m	10.0m
162A (Table)	MIN. FRONT YARD SETBACK (m)	3.0m	3.05m
162A (Table)	MIN. CORNER SIDE YARD SETBACK (m)	3.0m	3.05m
57 (2)	MIN. CORNER SIDE YARD SIGHT TRIANGLE SETBACK (m)	0.5m	2.07m
162A (Table)	MIN. REAR YARD SETBACK (m)	3.0m	3.05m
162A (Table)	MIN. INTERIOR YARD SETBACK (m)	3.0m	N/A
101 (Table)	RESIDENT PARKING - B2B TOWNS (68)	51 (68@0.75/unit)	68
	- STACKED TOWNS (124) 5.2m x 2.6m 5.2m x 2.4m	62 (124@0.5/unit)	124 (124@1/unit): 99 (Regular stalls) 25 (Small car stalls)*
2018-124	VISITOR PARKING - B2B TOWNS	0	0
	- STACKED TOWNS	0	5
111A (Table)	MIN. BICYCLE PARKING (STACKED TOWNS)	62 (124@0.5/unit)	62
131 (Table)	MIN. WIDTH OF PRIVATE WAY (m)	6.0m	6.0m
2018-124	MIN. SETBACK OF ANY WALL OF A RESIDENTIAL BUILDING TO A PRIVATE WAY (m)	0.2m	1.3m
2018-124	MIN. SETBACK OF GARAGE DOOR TO PRIVATE WAY (m)	1.0m	5.2m
131 (Table)	MIN. SEPARATION DISTANCE BETWEEN BUILDINGS WITHIN A PLANNED UNIT DEVELOPMENT (m)	1.2m	3.0m
137 (Table)(7)	MIN. STACKED TOTAL AMENITY AREA (6m² per unit)	744m²	1,989m²
	MIN. B2B TOTAL AMENITY AREA	N/A	N/A
137 (Table)(7)	MIN. OF 50% AS COMMUNAL, AT LEAST 1 AGGREGATED AREA MIN. 54m²	372m²	373m²

• Section 106 (3a)- Up to 40% of the required parking spaces may be reduced in size to 2.4m x 4.6m for small cars only. Proposed 25 spaces for small car parking.

SECTION	ADDITIONAL PROVISIONS	REQUIRED	PROPOSED
65	PERMITTED PROJECTIONS INTO YARDS:		
65 (6)	COVERED OR UNCOVERED BALCONY, PORCH, DECK (m)	2.0m (Max)	1.75m
		>1.0m to lot line	1.25m
65 (5)	FIRE ESCAPES, OPEN STAIRWAYS, WINDOW WELLS (m)	>0.6m to lot line	1.71m
106 (1)(a)	MIN. PERPENDICULAR PARKING SPACE SIZE (m)	2.6m x 5.2m	2.6m x 5.2m
106 (1)(b)	MIN. PARALLEL PARKING SPACE SIZE (m)	2.6m x 6.7m	2.6m x 6.7m
106 (3)(a)	MIN. REDUCED PARKING SPACE SIZE (m)	2.4m x 4.6m	2.4m x 5.2m
107 (2)	MIN. DRIVEWAY WIDTH TO GARAGE (m)	2.6m	3.2m
109 (3)(b)	MAX. WALKWAY WIDTH PERMITTED IN YARD (m)	1.8m	1.8m
110 (Table)	MIN. LANDSCAPED AREA SURROUNDING PARKING LOT-ABUTTING A STREET (m)	3.0m	3.0m
111B (Table)	MIN. BICYCLE PARKING SPACE DIMENSIONS (m)	Width: 0.6m Length: 1.8m	0.6m 1.8m
111 (9)	MIN. BICYCLE PARKING SPACE ACCESS WIDTH AISLE (m)	1.5m	1.5m
2018-124	MAX. PROJECTION HEIGHT (m)	3.2m	0.96m
91	UTILITY INSTALLATION MIN. CORNER SIDE YARD SETBACK (m)	0.5m	1.95m



SCALE 1:400 (0 4 8 12 16 20 24)

LEGEND

- BACK TO BACK TOWNHOUSE
- STACKED TOWNHOUSE
- PATHWAY (PAVERS)
- WALKWAY TO ENTRY (PAVERS)
- CROSSWALK (PAVERS)
- RAISED CROSSWALK
- DRIVEWAY (PAVERS)
- DRIVEWAY (ASPHALT)
- CURB (0.2m)
- MOUNTABLE CURB
- DEPRESSED CURB
- PORCH
- PROJECTION (STAIRS)
- WINDOW WELL
- TWO FRAMED WINDOW WELL
- BALCONY
- S.S SNOW STORAGE AREA
- L/A LANDSCAPED AREA
- BLOCK BOUNDARY
- HYDRO METERS
- GAS METERS
- GARAGE
- R RISERS
- REDUCED WIDTH PARKING STALLS
- CONCRETE SIDEWALK
- ENTRANCE
- # UNIT NUMBER
- BENCH
- R.W.L RAIN WATER LEADER
- HYD FIRE HYDRANT
- CMB CANADA POST MAIL BOX
- LIGHT DUTY PAVING
- R12 STOP SIGN
- BIKE RACKS
- BIKE SHELTER
- V VISITOR PARKING
- EV ELECTRIC VEHICLE PARKING
- TREE GRATE
- ENTRY FEATURE
- ART FEATURE
- TACTILE WALKING SURFACE INDICATOR
- LIGHTING (R=0.5m)
- POLE MOUNT LIGHT
- BOLLARD LIGHT
- WASTE STORAGE 1.2m HEIGHT
- STREET TREES

19/12/19	Insert new street tree locations	SP
21/11/19	New building templates and shift buildings 4.5m away from tree	SP
05/11/19	Insert bike shelters	SP
04/10/19	Issued for Site Plan Third Submission	SP
26/09/19	General Revisions- fire hydrant and light poles	SP
16/09/19	General Revisions- 2' paver apron along driveways	SP
10/09/19	Insert landscape plan and meter locations	SP
09/09/19	General Revisions- reduced size parking stalls	SP
03/09/19	General Revisions- Update window wells and statistic chart	SP
06/08/19	General Revisions- Update labels BVHE to BVHF	SP
09/07/19	Landscaped area summary	SP
26/06/19	Issued for Site Plan Second Submission	CR
19/06/19	General Revisions- Update with new landscape plan	SP
04/06/19	General Revisions- Update site statistic chart	SP
27/05/19	General Revisions- Update Block 9 & 6 and hydro vault	SP
10/05/19	General Revisions- Update Block 10	SP
16/04/19	General Revisions- Add light duty paving b/w stacked TH	SP
04/04/19	General Revisions- New street names	SP
31/01/19	Issue for Site Plan Amendment Application	SP
DATE (D.M.Y)	REVISION	BY

GENERAL NOTES

1. DO NOT SCALE DRAWINGS FOR PRINT.
2. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF KORSIAK URBAN PLANNING AND MATTAMY HOMES. COPYRIGHT RESERVED.
3. SITE PLAN PREPARED IN ACCORDANCE WITH PLAN 4M-1581AND PLAN 4R-30196, PREPARED BY ANNS O'SULLIVAN, VOLLEBEKK LTD.
4. TOWNHOUSE DWELLING UNITS ARE DESIGNED TO ACCOMMODATE CURBSIDE GARBAGE PICK-UP.
5. STACKED TOWNS ARE DESIGNED TO ACCOMMODATE BIN-PICKUP (MOLOK).
6. WALKWAYS AND CURBS TO BE TIED INTO PUBLIC ROW WHERE APPLICABLE.
7. REFERENCES CITY OF OTTAWA T.W.S.I. DETAIL SC7.3
8. TO BE RAISED 8cm PER CITY OF OTTAWA TYPICAL RAISED CROSSWALK STANDARD DRAWING R15.

PROJECT TEAM

SITE PLAN DESIGN: KORSIAK Urban Planning
LANDSCAPE ARCHITECTURE: NAK design strategies
MECHANICAL/ ELECTRICAL: LRJ
PLANNING: Stantec
TRANSPORTATION: NOVATECH Engineers, Planners & Landscape Architects
ARCHITECTURE: Q4A
NOISE: VALCOUSTICS Canada Ltd. consulting acoustical engineers
ENVIRONMENTAL: KILGOUR & Associates
CIVIL ENGINEER: DSEL david schaeffer engineering ltd
GEOTECHNICAL & STRUCTURAL: paterson group consulting engineers

mattamyHOMES

WATERIDGE VILLAGE: PHASE 1B
245 SQUADRON CRES.
BLOCK 15
PART OF LOT 22
CONCESSION 1 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
REGISTERED PLAN 4M-1559
CITY OF OTTAWA

TITLE: BLOCK 15 SITE PLAN

DATE: December 19, 2019	DRAWN BY: SP CHECKED BY: CR		DRAWING NO. A1
FILE NO.: D07-12-19-0020			
JOB NO.: Mattamy - Wateridge			

D07-12-19-0020

DWG #17978

X:\Korsiak & Company\MATTAMY\Ottawa\Wateridge\Site Plan\Dec 19\Block 15 site plan 2019 Dec 19.dwg

CURVE SCHEDULE

NUM.	LOCATION	RADIUS	ARC	CHORD	BEARING
C1	chemin Hemlock Road	60.00	22.56	22.42	N 79°13'50" E
C2	croissant Squadron Crescent	22.00	25.36	23.98	N 33°01'50" W

Lots 1, 2, 3, 4 and 5, Blocks 6, 7 and 8, part of Block 9, Blocks 10, 11, 12, 13, 14 and 15, part of Block 16, Blocks 17 to 28, both inclusive, Block 31, chemin Cobb's Road, chemin Hemlock Road, rue Bareille-Snow Street, rue Michael Stoqua Street, rue Moses Tennisco Street, croissant Squadron Crescent and part of chemin Wanaki Road are subject to easement Inst. OC1771382.

Part of Block 20 and part of chemin Hemlock Road are subject to easement Inst. OC1756037.

Lots 1, 2, 3, 4 and 5, Blocks 6, 7 and 8, part of Blocks 9, 10, and 11, Blocks 12, 13 and 14, part of Blocks 15 and 16, Block 17, part of Blocks 18, 19, 20, and 21, Block 22, part of Blocks 23, 24, 25 and 26, Blocks 27 and 28, part of chemin Cobb's Road, part of chemin Hemlock Road, part of rue Bareille-Snow Street, part of rue Michael Stoqua Street, part of rue Moses Tennisco Street, part of croissant Squadron Crescent and part of chemin Wanaki Road are subject to easement Inst. OC1755039.

Part of Block 10 is subject to easement Inst. OC1772805.

Part of Blocks 9 and 16 are subject to easement Inst. OC1772902.

Block 31 and Part of Blocks 10, 11, 15, 17, 18, 19, 21, 23, 24, 25, 26, 27 and part of chemin Cobb's Road, part of chemin Hemlock Road, part of rue Bareille-Snow Street, part of rue Michael Stoqua Street, part of rue Moses Tennisco Street, part of croissant Squadron Crescent and part of chemin Wanaki Road are subject to easement Inst. OC1874459.

APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA.

THIS 16th DAY OF March, 2017

STEPHEN WILLIS, GENERAL MANAGER PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT CITY OF OTTAWA

PLAN 4M- 1581

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4 AT 15:55 O'CLOCK ON THE 17 DAY OF March 2017 AND ENTERED IN THE PARCEL REGISTER FOR PROPERTY IDENTIFIERS 04273-0561, 04273-0562, 04273-0563, 04273-0564, 04273-0565, 04273-0566, 04273-0567, 04273-0568, 04273-0569, 04273-0570, 04273-0580, 04273-0581, 04273-0586 and 04273-0587 AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NO. OC1874890

Representative for LAND REGISTRAR

This plan comprises all of the land identified by PIN's 04273-0561, 04273-0562, 04273-0563, 04273-0564, 04273-0565, 04273-0566, 04273-0567, 04273-0568, 04273-0569, 04273-0570, 04273-0580, 04273-0586 and 04273-0587 and part of the land identified by PIN 04273-0581.

PLAN OF SUBDIVISION OF

PART OF LOTS 21, 22 And 23
CONCESSION 1 (OTTAWA FRONT)
Geographic Township of Gloucester
And
BLOCKS 118, 119, 120, 121, 122, 123, 124, 125, 126 And 127
REGISTERED PLAN 4M-1559
CITY OF OTTAWA

Surveyed by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 1250

50 37.5 25 12.5 0 25 50 Metres

Metric
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the 22nd day of February, 2017.

Feb 22, 2017 — Date

E. H. Herweyer — Ontario Land Surveyor

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT :

1. Lots 1, 2, 3, 4, 5, Blocks 6 to 26, both inclusive, Blocks 29, 30, the Streets, namely, rue Bareille-Snow Street, rue Michael Stoqua Street, rue Moses Tennisco Street, croissant Squadron Crescent, chemin Cobb's Road, chemin Hemlock Road, avenue Provender Avenue and chemin Wanaki Road, the Street Widenings, namely, Blocks 33 and 34 and the Reserves, namely, Blocks 27, 28, 31 and 32 have been laid out in accordance with our instructions.
2. The Streets and Street Widenings are dedicated as public highways.

Dated the 16th day of March, 2017

Rodger Martin, Vice President, Real Estate Ontario & Atlantic
Canada Lands Company CLC Limited
I have the authority to bind the corporation.

Dated the 16th day of March, 2017

Jean Lachance, Senior Director Real Estate (Ottawa)
Canada Lands Company CLC Limited
I have the authority to bind the corporation.

NOTES AND LEGEND

—○—	denotes	Survey Monument Planted.
—■—	denotes	Survey Monument Found
SSB	-	Standard Iron Bar.
SSIB	-	Short Standard Iron Bar.
CC	-	Cut Cross.
IB	-	Iron Bar.
IBØ	-	Round Iron Bar.
IB	-	Iron Bar.
•	-	Survey Monument (0.3 long)
(WIT)	-	Witness
NT	-	Nontangential
CLF	-	Chain Link Fence
BF	-	Board Fence
R/W	-	Right-of-Way
(AOG)	-	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	-	Registered Plan 4M-1559
(P2)	-	Plan 4R-26142
(P3)	-	Plan 4R-29484
(P4)	-	Plan 4R-29367
(P5)	-	Plan 4R-30067

Distances shown on curved limits are Arc distances unless otherwise noted.

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999947.

Bearings are grid, derived from the southerly limit of chemin Mikinak Road, shown to be N90°00'00" W on Registered Plan 4M-1559, and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinates are derived from Can-Net 2016 Real Time Network GPS observations referenced to Specified Control Points 01919680105 and 01983434761, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. 01919834761	Northing	5036178.12	Easting 372436.11
. 01919680146	Northing	5035456.42	Easting 372208.81
. Point A	Northing	5034986.54	Easting 373170.44
. Point B	Northing	5034986.54	Easting 372556.54

Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

ELEVATION NOTES

1. Elevations are geodetic, referred to City of Ottawa Vertical Bench Mark No. 398 (01919680138), having an elevation of 98.06 metres.

DETAIL "A": SCALE 1:500

DETAIL "B": SCALE 1:500

DETAIL "C": SCALE 1:300

DETAIL "D": SCALE 1:200

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Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@ravenet.com
Ontario Land Surveyors

Job No. 14702-34 CLC Pt Lts 21-23 CI OF GL Pts IB SUB F

MIKINAK ROAD
DEDICATED BY REGISTEED PLAN 4M-1559
PIN 04273-0579(LT)

CROISSANT SQUADRON CRESCENT
DEDICATED BY REGISTEED PLAN 4M-1581
PIN 04273-0631(LT)

CROISSANT SQUADRON CRESCENT
DEDICATED BY REGISTEED PLAN 4M-1581
PIN 04273-0631(LT)

NORTHWEST CORNER OF BLOCK 15 REGISTERED PLAN 4M-1581

BLOCK 121 (0.30 RESERVE)
SUBJECT TO EASEMENTS AS IN INST. Nos. OC1771382 AND OC1874459

PART 104 PART 11 | PART 103 PART 12 | PART 102 PART 13 | PART 100 PART 14 | PART 101 PART 15

PART 16 PART 89 | PART 90 | PART 18 PART 97 | PART 98 | PART 21 PART 99

PART 87 | PART 88 | PART 1 PART 96 | PART 86 4R-XXXXX

PART 17 PART 82 | PART 84 PART 2 | PART 83 | PART 81 PART 3 | PART 80

PART 1 | PART 7 | PART 39 | PART 44
PART 2 | PART 8 | PART 40 | PART 45
PART 3 | PART 9 | PART 41 | PART 46
PART 4 | PART 10 | PART 42 | PART 47
PART 5 | PART 11 | PART 43 | PART 48
PART 6 | PART 12 | PART 49 | PART 54
PART 71 | PART 72 | PART 50 | PART 55
PART 69 PART 7 | PART 51 | PART 56
PART 52 | PART 57
PART 53 | PART 58
PART 59 | PART 64
PART 60 | PART 65
PART 61 | PART 66
PART 62 | PART 67
PART 63 | PART 68

PART 91 PART 4 | PART 92 | PART 19 | PART 95 | PART 79 | PART 22 | PART 85 | PART 8 | PART 78

BLOCK 15

PART 73 PART 5 | PART 74 | PART 93 | PART 94 | PART 76 | PART 23

PART 70 | PART 18 | PART 19 | PART 20 | PART 21 | PART 22 | PART 27 | PART 28 | PART 29 | PART 30 | PART 35 | PART 36 | PART 37 | PART 38 | PART 10 | PART 75 | PART 77 | PART 34 | PART 33 | PART 32 | PART 31 | PART 26 | PART 25 | PART 24 | PART 23 | PART 17 | PART 16 | PART 15 | PART 14 | PART 13

PART 29 | PART 74

SEE DETAIL 'A'
SEE DETAIL 'B'

REGISTERED PLAN 4M-1581

SUBJECT TO EASEMENTS AS IN OC1877247, OC1877276 AND OC1771382

PART 72 | PART 6

PART 11 | PART 82 PART 17 | PART 91 PART 4 | PART 19 | PART 92 | PART 12 | PART 72 | PART 73 PART 5 | PART 93 | PART 71 PART 6 | PART 74 PART 29 | PART 70 | PART 18

DETAIL 'B' (N.T.S)

PART 6 | PART 69 PART 7 | PART 71 | PART 29 | PART 70

DETAIL 'A' (N.T.S)

SCHEDULE				
PARTS	BLOCK	PLAN	PIN	REMARKS
1				
2				
3				
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46				
47				
48				
49	15	4M-1581	04273-0606 (LT)	NONE
50				
51				
52				
53				
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101				
102				
103				
104				

PARTS 1 TO 104, INCLUSIVE, ARE SUBJECT TO EASEMENTS AS IN OC1877247, OC1877276 AND OC1771382.

PARTS 100 TO 104, INCLUSIVE, ARE SUBJECT TO EASEMENT AS IN INST. No. OC1874459

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE _____

GEORGE ZERVOS
ONTARIO LAND SURVEYOR

PLAN 4R-

RECEIVED AND DEPOSITED

DATE _____

REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON (No 4)

PLAN OF SURVEY OF
BLOCK 15
REGISTERED PLAN 4M-1581
CITY OF OTTAWA

SCALE 1 : 250

5 0 5 10 15 metres

J.D. BARNES LIMITED

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

BEARINGS ARE MTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK (RTN) OBSERVATIONS, MTM ZONE 9, NAD83 (ORIGINAL) (2010.0).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999947.

INTEGRATION DATA

OBSERVED REFERENCE POINTS (ORPs): MTM ZONE 9, NAD83 (ORIGINAL) (2010.0).

COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O.REG 216/10.

POINT ID	EASTING	NORTHING
ORP (A)	372 888.63	5 034 986.44
ORP (B)	373 029.39	5 034 986.44

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT SET
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
PB	DENOTES	PLASTIC BAR
WIT	DENOTES	WITNESS
MEAS	DENOTES	MEASURED
JDB	DENOTES	J.D. BARNES LIMITED
N.T.S	DENOTES	NOT TO SCALE

ALL SET SSIB AND PB MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11 (4) OF O.REG. 525/91.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON 201 .

DATE

PRELIMINARY
GEORGE ZERVOS
ONTARIO LAND SURVEYOR

J.D.BARNES LIMITED
SURVEYING MAPPING GIS
LAND INFORMATION SPECIALISTS
2430 DON REID DRIVE, SUITE 204, OTTAWA, ON K1H 1E1
T: (613) 731-7244 F: (613) 731-8955 www.jdbarnes.com

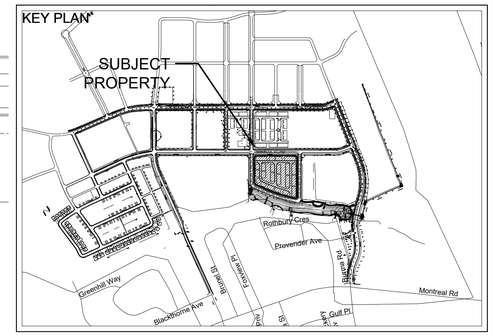
DRAWN BY:	CHECKED BY:	REFERENCE NO.:
NS	XX	18-10-037-00Ppatl r-plan

FILE: G:\18-10-037\01- Block 15\Drawing\POTL\037-0Ppatl r-plan.dwg

2021-12-15 10:20:29

#17978





LEGEND

- PROPERTY LINE
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED AREA DRAIN (PER CITY STD. S30 & S31)
- PROPOSED AREA DRAIN WITH SOLID GRATE(NYLOPLAST 2818AG___X OR APPROVED EQUIVALENT)
- PROPOSED VALVE BOX
- PROPOSED FIRE HYDRANT
- PROPOSED SIAMESE CONNECTION
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED PERFORATED SUBDRAIN
- PROPOSED DITCH CENTER
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING GAS MAIN
- PROPOSED GAS MAIN
- PROPOSED ENTRY FEATURE
- PROPOSED ART FEATURE
- RA–1 PROPOSED STOP SIGN
- PEDESTRIAN CROSSWALK
- TWSI (TACTILE WALKING SURFACE INDICATOR)
- CMB PROPOSED COMMUNITY MAILBOX
- HGBCSL PROPOSED UTILITY TRENCH (H–HYDRO, G–GAS, B–BELL, C–CABLE, SL–STREET LIGHT)
- PROPOSED SWITCHGEAR
- PROPOSED TRANSFORMER
- G PROPOSED GAS METER
- M PROPOSED METER CENTER
- PROPOSED HYDRO MANHOLE
- PROPOSED LIGHTING PULPIT
- PROPOSED HYDRO
- PROPOSED STREETLIGHT POLE
- PROPOSED LIGHTING DUCTS
- PROPOSED LANDSCAPED SWALE RIVERSTONE
- PROPOSED SOD
- PROPOSED TREE
- EXISTING TREE
- PROPOSED ROGERS PEDESTAL AND 1.5mX2m EASEMENT
- GRADE LEVEL BELL BOX PROPOSED AND 1x3m EASEMENT

NOTE: THIS COMPOSITE UTILITY PLAN WAS PREPARED FOR COORDINATION PURPOSES ONLY. UTILITY DESIGN PREPARED BY OTHERS.

NOT FOR CONSTRUCTION

SITE SERVICING AND STORMWATER MANAGEMENT STUDY
SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 17–946
DATED FEBRUARY 2019

SITE PLAN INFORMATION
SITE PLAN PROVIDED BY KORSIAK URBAN PLANNING
DATED OCTOBER 04, 2019

HYDRO AND SITE LIGHTING SERVICES
DESIGN PREPARED BY LRL ENGINEERING
PROJ. NO. 170548
DATED OCTOBER 04, 2019

BENCH MARK
ELEVATIONS ARE GEODETIC, REFERRED TO CITY OF OTTAWA VERTICAL BENCHMARK NO. 396
ELEV= 95.06 METERS

NATURAL GAS SERVICING
DESIGN PREPARED BY
PROJ. NO.
DATED REV

ROGERS SERVICES
DESIGN PREPARED BY:
PROJ. NO.
DATED REV

BELL SERVICES
DESIGN PREPARED BY:
PROJ. NO.
DATED REV

LANDSCAPE PLAN
DESIGN PREPARED BY: NAK DESIGN STRATEGIES
PROJ. NO. 17–047 Sub 02
DATE RECEIVED OCTOBER 05, 2019

DRAFT

No.	BY	YY.MM.DD	DESCRIPTION
1	S.L.M.	2019.08.02	ISSUED FOR CIRCULATION #1

PROJECT No. 17-946

REVIEWED BY

COMPOSITE UTILITY PLAN
WATERIDGE - BLOCK 15

© DSEL

MATTAMY HOMES
50 Hines Road, Suite 100
Ottawa, Ontario, K2K 2M5
Tel. (613) 831-5144

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

DRAWN BY:	B.N.C.	CHECKED BY:	S.L.M.	DRAWING NO.	SHEET NO.
DESIGNED BY:	B.N.C.	CHECKED BY:	S.L.M.	CUP-1	1 of 1
SCALE:	1:400	DATE:	FEBRUARY 2019		

D07-12-17-0111

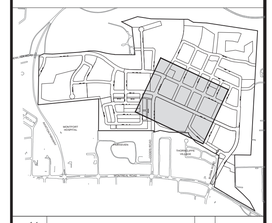
z:\projects\17–946–wateridge_block 15\c_utilities\c2_cup\2019–10–07_946_cup_gas.dwg

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2017

Plan Number _____



No.	REVISIONS	By	Date
14			
13			
12	AS BUILT	J.I.M.	2018:06:15
11	REVISED DITCH INLET LOCATION FOR BLOCKS 15, 18, 22 AND 24	J.I.M.	2018:02:02
10	REVISED CB222C & CB222D LOCATION	J.I.M.	2017:11:13
9	REVISED PER MATTAMY DESIGN FOR BLOCKS 22, 24 AND 15	J.I.M.	2017:09:15
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

CANADA LANDS COMPANY
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Ottawa, On K1P 5L4
613 998 7777

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

PROFESSIONAL ENGINEER
J. I. MOFFATT
18/06/15
PROVINCE OF ONTARIO

N

Drawing Title

GENERAL PLAN OF SERVICES

Scale: 1 : 750

Design	Date
J.I.M.	MAY 2016
Drawn	**Checked**
M.M.	J.I.M.
Project No.	**Drawing No.**
38298	100D

D07-16-15-0003

#17063

J:\38298-CP\Drawings\Civil\Layouts PH1B\1000_GENERAL PLAN.dwg Layout Name: GENERAL PLAN Plot Style: AIA STANDARD-HALF.CTB Plot Scale: 1:50:1 Plotted At: 6/18/2018 11:56 AM Last Saved By: mmiha Last Saved At: Feb. 2, 16

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2017

Plan Number _____



No.	REVISIONS	By	Date
14			
13			
12			
11	REVISED WATER SERVICE ELEVATION TO BLOCK 29	J.I.M.	2018:04:16
10	ADDED WATER SERVICE TO BLOCK 29	J.I.M.	2018:04:13
9	REVISED WANAKI ROAD WATERMAIN NRC, STA 1+210 TO 1+213	J.I.M.	2018:02:15
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

CANADA LANDS COMPANY
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Ottawa, On K1P 5L4
613 998 7777

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
18/04/16
PROVINCE OF ONTARIO

N

Drawing Title

GENERAL PLAN OF SERVICES

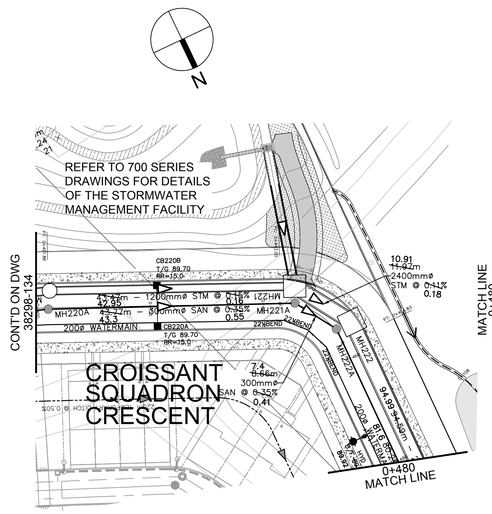
Scale: 1 : 750

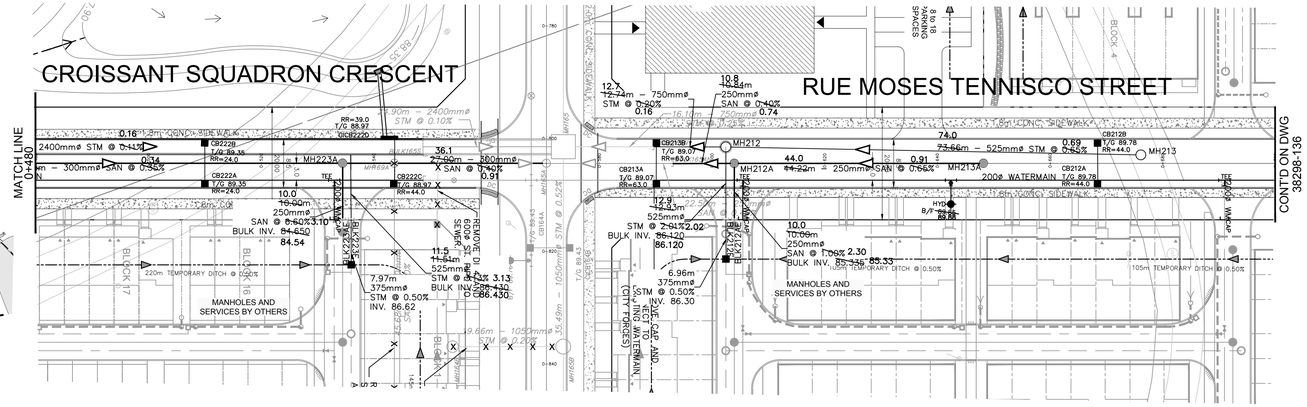
Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No.: 38298	Drawing No.: 100E

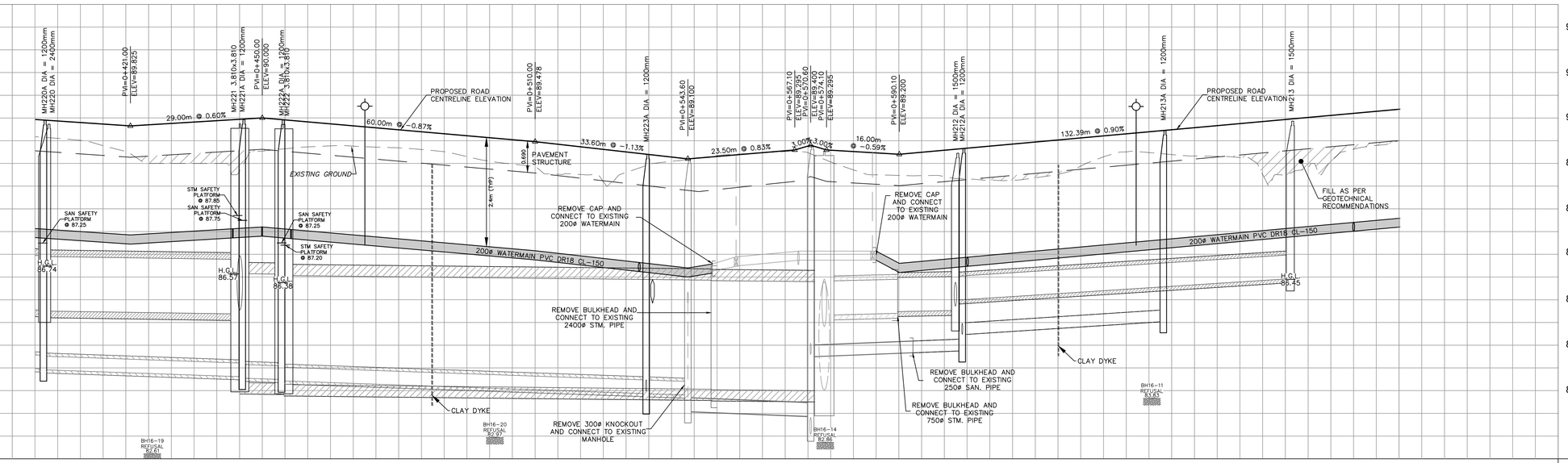
D07-16-15-0003

#17063

\\38298-CPB\acad\wks\5.0 Drawings\Civil\Vistaplots Pln\101\100_GENERAL PLAN.dwg Layout Name: GENERAL PLAN Plot Style: AA_STANDARD-HALF.ctb Plot Scale: 1.00 | Printed At: 4/18/2018 12:24 PM Last Saved By: MatiasKhong Last Saved At: Apr. 15, 18


REFER TO 700 SERIES DRAWINGS FOR DETAILS OF THE STORMWATER MANAGEMENT FACILITY
CONT'D ON DWG 38298-134
CB220B T/G 89.70 RIM=35.0
MH220A
MH220
200ø WATERMAIN
CB220A T/G 89.70 RIM=35.0
MH221
MH221A
MH222
MH222A
CROISSANT SQUADRON CRESCENT
0+480 MATCH LINE


MATCH LINE 0+480
CROISSANT SQUADRON CRESCENT
RUE MOSES TENNISCO STREET
CONT'D ON DWG 38298-136
MH223A
CB222B
CB222A
CB222C
CB222D
MH212
MH212A
MH213
CB213A
CB213B
CB212A
CB212B
MH213A
BLOCK 17
BLOCK 4
MANHOLES AND SERVICES BY OTHERS
CITY FORCES
CAP AND CONNECT TO EXISTING WATERMAIN
220m TEMPORARY DITCH @ 0.50%
105m TEMPORARY DITCH @ 0.50%


PROPOSED ROAD CENTRELINE ELEVATION
EXISTING GROUND
PAVEMENT STRUCTURE
2.4m (TYP)
STM SAFETY PLATFORM @ 87.85
SAN SAFETY PLATFORM @ 87.75
SAN SAFETY PLATFORM @ 87.25
STM SAFETY PLATFORM @ 87.20
200ø WATERMAIN PVC DR18 CL-150
REMOVE CAP AND CONNECT TO EXISTING 200ø WATERMAIN
REMOVE BULKHEAD AND CONNECT TO EXISTING 2400ø STM. PIPE
REMOVE BULKHEAD AND CONNECT TO EXISTING 250ø SAN. PIPE
REMOVE BULKHEAD AND CONNECT TO EXISTING 750ø STM. PIPE
REMOVE 300ø KNOCKOUT AND CONNECT TO EXISTING MANHOLE
CLAY DYKE
FILL AS PER GEOTECHNICAL RECOMMENDATIONS
BH16-19 REFUSAL 82.61
BH16-20 REFUSAL 82.67
BH16-14 REFUSAL 82.86
BH16-11 REFUSAL 83.83

| | | |

GRADING & DRAINAGE
APPROVED

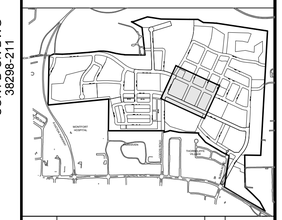
Signed _____

Date _____ 2017

NOTES:

FOR GRADING LEGEND, DETAILS AND CROSS SECTIONS REFER TO DRAWINGS 38298-015 & 38298-016.

THE PROPOSED PARK BLOCK GRADING IS TEMPORARY AND ENSURES THE PROPERTY WILL HAVE POSITIVE DRAINAGE UNTIL THE FINAL PARK GRADING DESIGN IS IMPLEMENTED.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	REVISED GRADING FOR BLOCKS 15, 18, 22 AND 24	J.I.M.	2018:02:02
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
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Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

PROFESSIONAL ENGINEER
J. I. MOFFATT
18/02/02
PROVINCE OF ONTARIO

N

Drawing Title

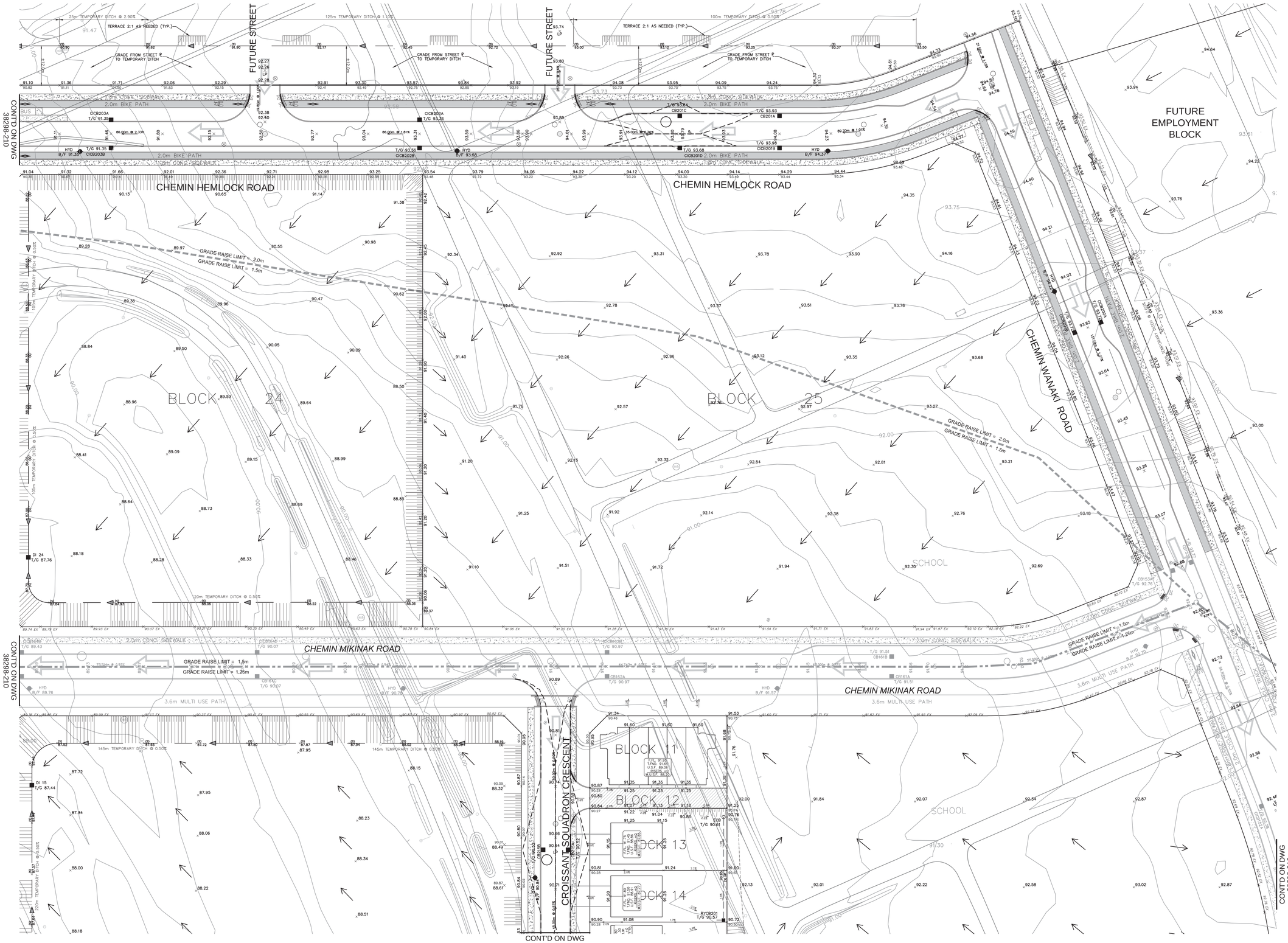
GRADING PLAN

Scale: 1 : 500

Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No.: 38298	Drawing No.: 210

D07-16-15-0003

#17063



GRADING & DRAINAGE APPROVED

Signed _____

Date _____ 2017

NOTES:

1. FOR GRADING LEGEND, DETAILS AND CROSS SECTIONS REFER TO DRAWINGS 38298-015 & 38298-016

2. THE PROPOSED PARK BLOCK GRADING IS TEMPORARY AND ENSURES THE PROPERTY WILL HAVE POSITIVE DRAINAGE UNTIL THE FINAL PARK GRADING DESIGN IS IMPLEMENTED.

3. TEMPORARY DRAINAGE DITCHES ON FUTURE EMPLOYMENT BLOCKS ARE TO BE REMOVED WHEN THOSE BLOCKS ARE DEVELOPED.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	REVISED GRADING FOR BLOCKS 15, 16, 22 AND 24	J.I.M.	2018:02:02
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

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Ottawa, On K1P 5L4
613 998 7777

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
18/02/02
PROVINCE OF ONTARIO

N

Drawing Title

GRADING PLAN

Scale: 1 : 500

Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No.: 38298	Drawing No.: 211

D07-16-15-0003

#17063

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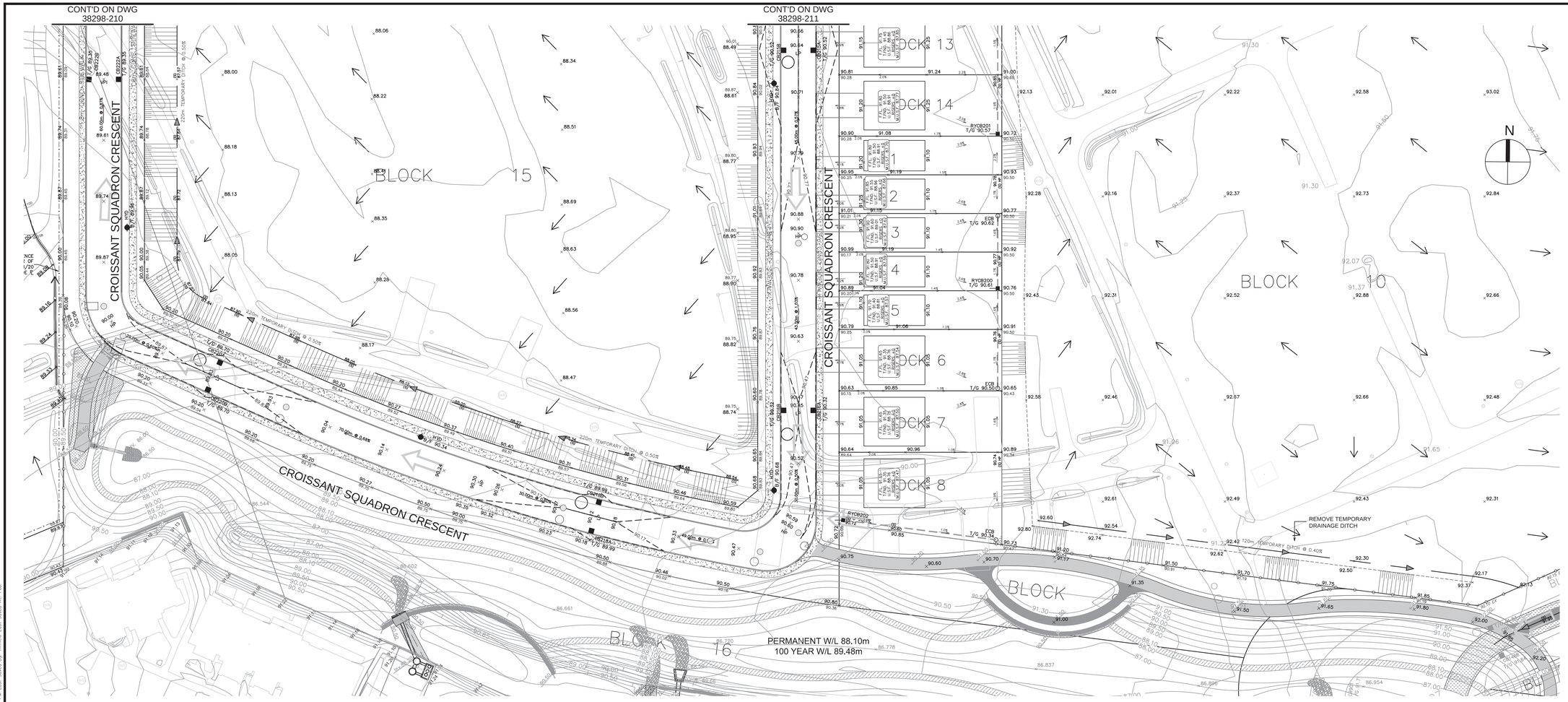

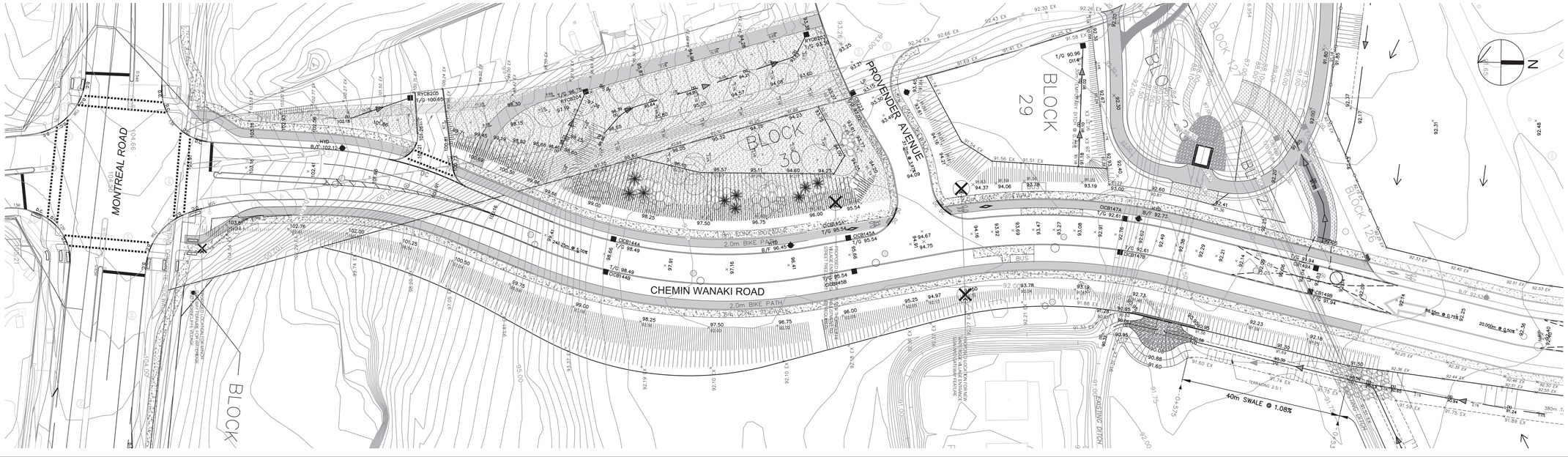

GRADING & DRAINAGE APPROVED

Signed _____

Date _____ 2016

NOTES:

FOR GRADING LEGEND, DETAILS AND CROSS SECTIONS REFER TO DRAWINGS 38298-015 & 38298-016.

THE PROPOSED PARK BLOCK GRADING IS TEMPORARY AND ENSURES THE PROPERTY WILL HAVE POSITIVE DRAINAGE UNTIL THE FINAL PARK GRADING DESIGN IS IMPLEMENTED.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	REVISED GRADING FOR BLOCKS 15, 18, 22 AND 24	J.I.M.	2018:02:02
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

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Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
18/02/02
PROVINCE OF ONTARIO

Drawing Title

GRADING PLAN

Scale 1 : 500

Design J.I.M.	Date MAY 2016
Drawn M.M.	Checked J.I.M.
Project No. 38298	Drawing No. 212

D07-16-15-0003

#17063

GRADE RAISE LIMIT = 1.5m
GRADE RAISE LIMIT = 1.25m

CHEMIN MIKINAK ROAD

3.6m MULTI USE PATH

PARK

BLOCK 18

BLOCK 17

BLOCK 113

BLOCK 114

BLOCK 112

BLOCK 101

BLOCK 109

CHEMIN CODDS ROAD

RUE MOSES TENNISCO STREET

INSTALL SNOW FENCE AROUND PERIMETER OF PARK BLOCK 18/20 1.0m INSIDE P.L.

2.0m ASPHALT WALK

CONTD ON DWG 38298-212

GRADING & DRAINAGE APPROVED

Signed _____

Date _____ 2017

NOTES:

FOR GRADING LEGEND, DETAILS AND CROSS SECTIONS REFER TO DRAWINGS 38298-015 & 38298-016.

THE PROPOSED PARK BLOCK GRADING IS TEMPORARY AND ENSURES THE PROPERTY WILL HAVE POSITIVE DRAINAGE UNTIL THE FINAL PARK GRADING DESIGN IS IMPLEMENTED.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	REVISED CB222C & CB222D LOCATION	J.I.M.	2017:11:13
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

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ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
17/11/13
PROVINCE OF ONTARIO

N

Drawing Title

GRADING PLAN

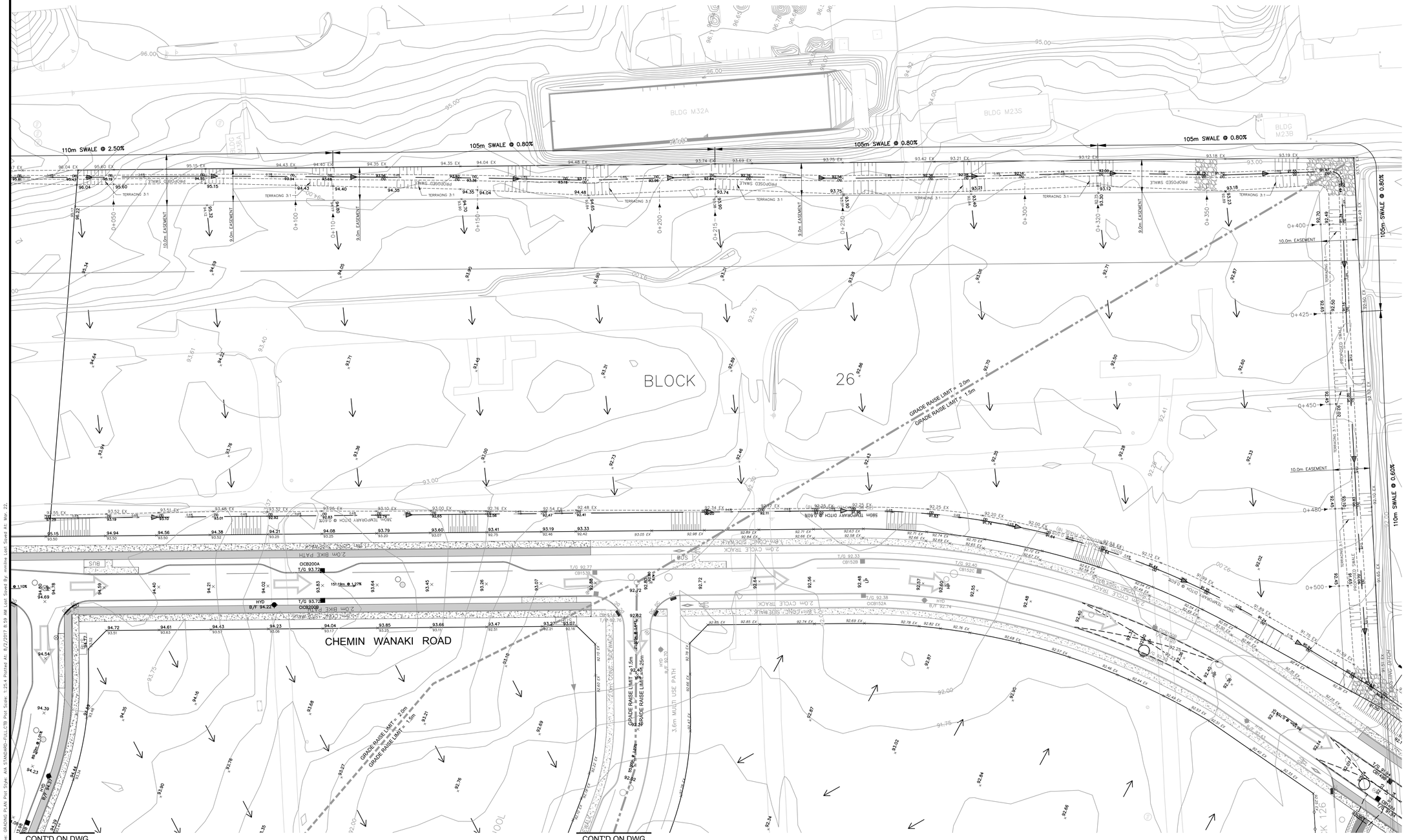
Scale
1 : 500

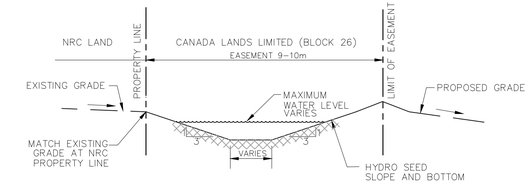
Design	Date
J.I.M.	MAY 2016
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
38298	213

D07-16-15-0003

#17063

X:\38298-CEB\Cadd\Plans\Sheets\Layouts\GRADING PLAN.dwg, Layout Name: GRADING PLAN Plot Style: AIA STANDARD.ctb, Plot Scale: 1:25.4 Printed At: 7/20/2018 4:30 PM Last Saved By: emorse Last Saved At: Nov. 13, 17





TYPICAL DITCH SECTION
N.T.S.

GRADING & DRAINAGE APPROVED

Signed _____

Date _____ 2017

NOTES:

FOR GRADING LEGEND, DETAILS AND CROSS SECTIONS REFER TO DRAWINGS 38298-015 & 38298-016.

THE PROPOSED PARK BLOCK GRADING IS TEMPORARY AND ENSURES THE PROPERTY WILL HAVE POSITIVE DRAINAGE UNTIL THE FINAL PARK GRADING DESIGN IS IMPLEMENTED.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
7	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
6	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08

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ibigroup.com

Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
17/08/02
PROVINCE OF ONTARIO

Drawing Title

GRADING PLAN

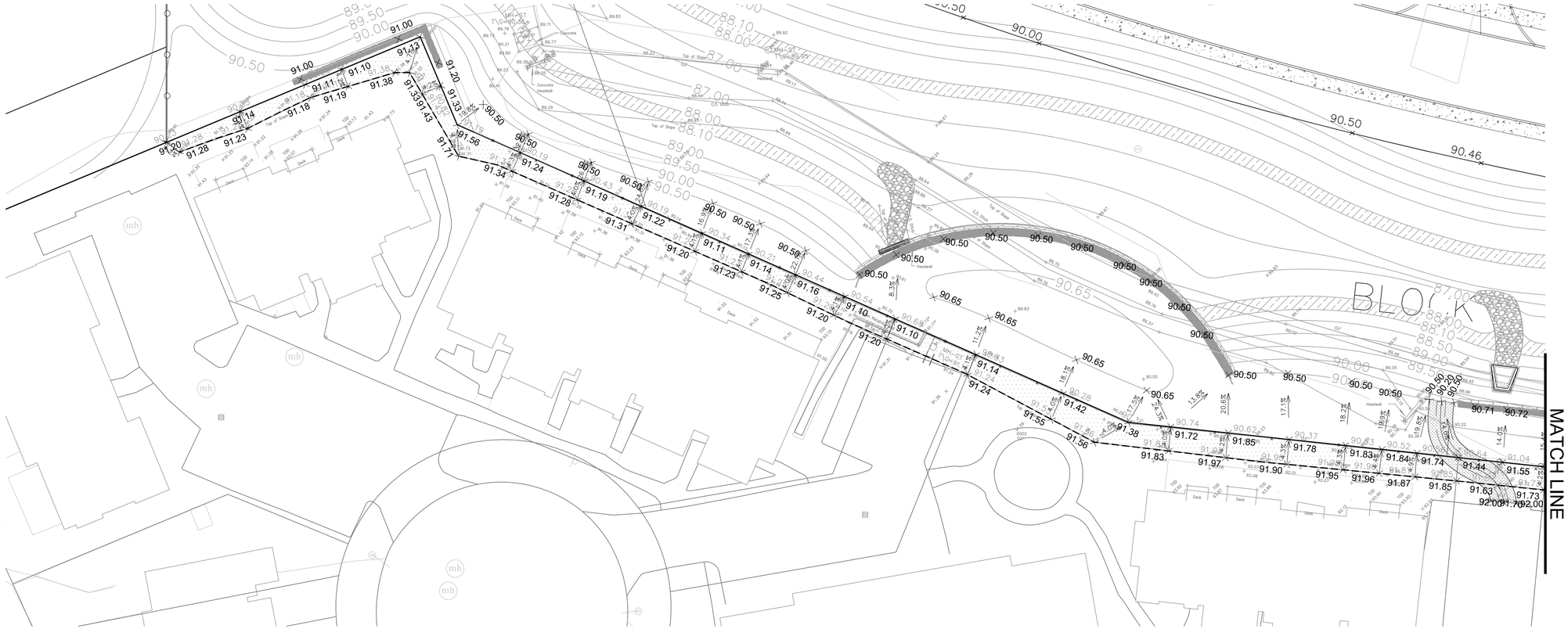
Scale: 1 : 500

Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No. 38298	Drawing No. 214

D07-16-15-0003

#17063

J:\38298-ckrocuvilla\3.0 drawings\Civil\Layouts prints\214 GRADING PLAN.dwg Layout Name: GRADING PLAN Plot Style: AIA STANDARD_FULL.CTB Plot Scale: 1:25.4 Plotted At: 8/2/2017 8:59 AM Last Saved By: mmiex Last Saved At: Mar. 22,





TYPICAL SECTION FOR BACKYARD RE-GRADE
N.T.S.

GRADING & DRAINAGE APPROVED

Signed _____

Date _____ 2017

LEGEND:

- PROPOSED CHAIN LINK FENCE
- 91.96 PROPOSED GRADE
- 91.96 EXISTING GRADE
- EXISTING PICKUP ELEVATION
- x x x x REMOVE EXISTING
- PROPOSED AREA TO BE FILLED AND RE-GRADED
- LIMIT OF CONTRUCTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED GRADING AS PER REVISED BURMA POND DESIGN	J.I.M.	2017:12:05
4	ISSUED FOR CONSTRUCTION	J.I.M.	2017:08:02
3	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
2	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
1	ISSUED FOR TENDER	J.I.M.	2017:03:23

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Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
17/12/05
PROVINCE OF ONTARIO

N

Drawing Title

GRADING PLAN

Scale: 1 : 250

Design	Date
J.I.M.	MAY 2016
Drawn: M.M.	Checked: J.I.M.
Project No.: 38298	Drawing No.: 215

D07-16-15-0003

#17063

J:\38298-CP\Docs\Mkrs\3.0 Drawings\Grdng\Layouts Pre\B\215 GRADING PLAN.dwg Layout: Name: GRADING PLAN Print Style: AIA STANDARD-FULL.CTB Print Scale: 1:1 Plotted At: 12/5/2017 3:24 PM Last Saved By: ewinton.iqmp Last Saved At: Dec. 5, 17

PONDING AREA TABLE

PONDING AREA ID	MAXIMUM PONDING ELEVATION (m)	TOP OF GRATE ELEVATION (m)	MAXIMUM PONDING DEPTH (m)	MAXIMUM PONDING VOLUME (m^3)	MAXIMUM PONDING AREA (m^2)
PA149	92.05	91.94	0.11	9.76	221.26
PA150	92.30	92.20	0.10	2.45	71.02
	92.30	92.20	0.10	2.54	72.71
PA165	88.71	88.60	0.11	5.65	109.20
PA167A	88.17	88.05	0.12	5.23	123.49
PA167B	87.99	87.85	0.14	5.22	98.76
	88.00	87.90	0.10	2.00	43.27
PA201B	93.85	93.64	0.21	15.63	206.06
	93.85	93.68	0.17	5.61	94.06
PA208	88.62	88.39	0.23	33.02	433.66
PA209	88.25	88.12	0.13	3.80	100.23
PA210	89.11	88.88	0.23	39.50	518.67
PA211	88.75	88.62	0.13	4.74	107.37
PA213	89.17	89.07	0.10	1.45	45.93
	89.20	89.07	0.13	3.15	72.69
PA215	90.77	90.52	0.25	67.41	819.67
PA216	90.47	90.32	0.15	10.54	211.20
PA218	90.17	89.99	0.18	16.42	272.58
PA220	89.87	89.70	0.17	17.62	299.78
PA222	89.13	88.94	0.19	12.95	201.47

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2016

Plan Number _____

LEGEND:

- PHASE 1B DRAINAGE AREA
- PHASE 1A DRAINAGE AREA
- EXTERNAL DRAINAGE AREA
- PA116 — POND ID
- MAJOR FLOW
- TOTAL FLOW
- MAJOR FLOW TO PARK DRY POND
- MAJOR FLOW TO BURMA SWMF
- EMERGENCY OVERLAND FLOW
- MH136 — MANHOLE ID

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6	REVISED PER CITY COMMENTS	J.I.M.	2017:06:16
5	REVISED PER MOECC COMMENTS	J.I.M.	2017:06:07
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	P.S.	2016:07:11

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Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 1B

J. I. MOFFATT
17/06/16
PROVINCE OF ONTARIO

N

Drawing Title

PONDING PLAN

Scale: 1:2000

Design	Scale
P.S.	JULY 2016
Drawn: S.V.	Checked: P.S.
Project No.: 38298	Drawing No.: 751

D07-16-15-0003

#17063

J:\38298-CIBBrouwhis\5.0 Drawings\Odot\CIVIL Ph1B\38298 -Save= CIVIL_Ph--1B--751.dwg Layout Name= 751 Plot Style= ---- Plot Scale= 1:8.704 Plotted At: 6/16/2017 8:33 AM Last Saved By: mmilne Last Saved At: Jun 16, 17