

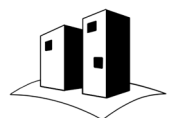
# SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared for:  
Homes First Nicholas Corp.

Medium Density Residential Development

0 Nicholas Street  
Picton, ON K0K 2T0

May 13, 2026  
Project No.: 23-026



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### Submission History

| Submission | Date          | Issued For | Issued To |
|------------|---------------|------------|-----------|
| 1          | Apr. 5, 2024  | SPA        | Picton    |
| 2          | Oct. 16, 2024 | SPA        | Picton    |
| 3          | May 13, 2026  | SPA        | Picton    |



## **1.0 INTRODUCTION**

### **1.1 Purpose**

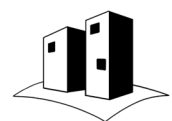
SITEPLANTECH was retained by Homes First Nicholas Corp. to prepare a Functional Servicing Report, in support of an OPA, ZBA and Site Plan application, to investigate water supply, sanitary sewerage and storm drainage for a proposed development located at 0 Nicholas Street, Picton, Ontario.

The purpose of this report is to provide site specific information for the Town of Picton, Prince Edward County and Quinte Conservation's review with respect to the adequacy of the existing infrastructure to support the proposed development. SITEPLANTECH has received and reviewed the comments from the Town and Quinte Conservation dated September 2024 and have updated the following report to address all related comments.

### **1.2 Background Information**

The following documents were requested and made available to SITEPLANTECH for our review and forms the basis of this report:

- Stuart M. Moore, OLS., KRCMAR (2023, December 21), Plan of Survey Showing Topographical Information, Registered Plan 24, Town of Picton. (23-185). [Technical drawing].
- Stormwater Management Submission Guidelines, Quinte Conservation, dated May 2012.
- Bay of Quinte Remedial Action Plan Implementation Area Stormwater Management Design Guidelines, Revised March 2006.
- Design guidelines for Drinking-Water Systems, Ministry of the Environment (2008).
- Author Unknown, Dillon Consulting, (2012, April), Record Drawings of Wastewater Treatment Plant Replacement, Siteworks Pipe Routing Plan (Project No. 09-1910), Drawing No. R100 [Technical drawing].
- Author Unknown, Dillon Consulting, (2012, April), Record Drawings of Wastewater Treatment Plant Replacement, Siteworks Forcemain Plan and Profile (Project No. 09-1910), Drawing No. R150 [Technical drawing].
- Beth Johnson, HSPM Holdings Inc., Nicholas Apartment Building, (ZBA SPA 01 & ZBA SPA 02). [Technical drawings].
- Stuart Baird, M.Eng., P.Eng., Geotechnical Investigation Report Proposed Residential Development – Nicholas Street, Cambium (January 25, 2024)



### 1.3 Site Description

The subject site is approximately 21,932.6m<sup>2</sup> (2.19 Ha) and is currently vacant. The site is bounded by:

- Vacant lands to the north;
- Nicholas Street and Cumberland Street to the east;
- Picton Wastewater treatment plan to the south; and,
- Lalor Street and Delhi Park to the west.

### 1.4 Proposed Development

The proposed development is a medium density multi-building development that has been designed to integrate with the surrounding built form and the natural landscape. It consists of a townhouse block and a semi-detached building which front onto Nicholas Street, and a low-rise apartment building accessed from a new road extension. In total, the proposed development will yield 106 residential units consisting of a mix of studios, one-, two- bedroom units, townhouses and a semi-detached dwelling. Above and at-grade parking for 99 vehicles will be provided from Nicholas Street.

The site is located within the Bay of Quinte Remedial Action Plan Implementation Area as identified by Quinte Conservation. The property is partially located within a regulated area, the boundaries of which are identified on the various plans and reports.

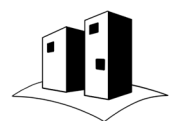
Please refer to the site plan and site statistics in **Appendix A** for additional information.

### 1.5 Easements and Land Conveyances

Although there are no easements registered on title, there are a few unopened road allowances traversing the property. Refer to topographic plan in **Appendix A** for additional details.

The Town or County have not requested any land conveyances and no easements will be necessary to develop the subject lands.

For the purpose of our report and calculations, the net disturbed land area of approximately 16,315m<sup>2</sup> (1.63 Ha) will form basis of all calculations.



## **2.0 SERVICING TERMS OF REFERENCE AND METHODOLOGY**

### **2.1 Terms of Reference**

This report was prepared in accordance with the Town, County and Conservation Authority's terms of reference outlined in **Section 1.2** above.

### **2.2 Methodology: Stormwater Management**

In accordance with the stormwater management guidelines, the modified rational method will be used to calculate runoff rates and target release rates from the site based on Intensity-Duration-Frequency (IDF) rainfall curves obtained from the Ministry of Transportation (MTO) database found in **Appendix B**.

We will provide a detailed account of the pre- and post-development conditions and comment on opportunities to reduce peak flows. Due to the extreme grading of the site and the need to minimize land disturbance, the proposed stormwater management requirements are summarized below:

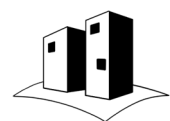
- TSS removal: Long-term average of 80% TSS removal is required.
- Water quantity: The post-development 100-year storm shall be controlled to the 2-year pre-development rates for all impervious surfaces and captured areas while pervious surfaces for areas that cannot be captured will be left draining uncontrolled, such that post-development flows for the entire development do not exceed pre-development run-off conditions.
- Erosion control: Shall be designed as per the Erosion and Sedimentation Control Guidelines for Urban Construction (2006).

Detailed servicing and grading plans will be prepared based on the recommendations of this report.

### **2.3 Methodology: Sanitary Drainage**

The sanitary sewage discharge from the site will be determined using sanitary flow rates that consider the land use and building statistics as supplied by the design team. The calculated values provide peak sanitary flow discharge that considers infiltration.

The proposed sanitary discharge flows from the site will be calculated based on the Prince Edward County's criteria shown in **Table 1** below.



**Table 1: Sanitary Flow Criteria**

| Use             | Population | Flow      |
|-----------------|------------|-----------|
| Studio / 1-BDRM | 1.4        | 320 L/c/d |
| 2-BDRM          | 2.1        | 320 L/c/d |
| 3-BDRM          | 2.4        | 320 L/c/d |
| 3-BDRM Towns    | 2.5        | 320 L/c/d |
| 4-BDRM Semis    | 3.0        | 320 L/c/d |

The proposed site generated flows will be calculated, and recommendations will be made to address capacity issues identified, if applicable.

## 2.4 Methodology: Water Supply

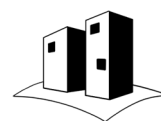
The proposed domestic water demands from the site will be determined using the same criteria as outlined in **Table 1** above. Peak flows from the development will be calculated as per the MOECP Guidelines for Drinking Water, as per **Table 2** below.

**Table 2: Water Demands Criteria**

| Criteria  | P <sub>f</sub> |
|-----------|----------------|
| Min Daily | 0.84           |
| Max Hour  | 0.90           |
| Max Day   | 1.10           |

Given the proposed building class, it is our understand through the architect that the development will not require to be sprinklered in accordance with the OBC.

Pressure and flow testing will be conducted at hydrants within the vicinity of the site when it will be permissible to do so to obtain existing flows, residual and static pressure. Fire suppression calculations, in accordance with the Fire Underwriters Survey (FUS) Guidelines, will be undertaken to determine the minimum flow required at 140 KPa for fire protection, the results of which will be compared to the results of hydrant flow tests to confirm adequate supply.



### 3.0 STORMWATER MANAGEMENT

All calculations and figures pertaining to the information summarized in the following sections are found in **Appendix B**.

#### 3.1 Existing Drainage System

The following storm sewer infrastructure is located within the vicinity of the subject site:

- A 250 mm diameter storm sewer located on the east side of the road centre line of Nicholas Street which picks up drainage from the road side ditch of Cumberland Street;
- A road side ditch on the west side of Nicholas Street.

All captured flows drain north to a headwall at the intersection of Nicholas Street and Richmond Street which then drains west towards the Delhi Park Creek and subsequently to Picton Harbour.

Surface drainage from the property currently flows in a westerly direction towards Lalor Street and Delhi Park.

Based on the survey reviewed, the property receives drainage from external sources emanating from the east. Refer to **Figure 201** for existing drainage conditions.

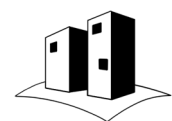
Boreholes were advanced as part of the geotechnical review of the soil conditions from which groundwater elevations were noted as indicated in **Table 3** below:

**Table 3: Groundwater Elevations**

| BH No.   | Highwater GW Elev. (MASL) | Ex. Ground Elev. (MASL) | Depth below grade (m) |
|----------|---------------------------|-------------------------|-----------------------|
| BH101-23 | 87.53                     | 90.13                   | 2.6                   |
| BH102-23 | -                         | 94.72                   | -                     |
| BH103-23 | -                         | 93.27                   | -                     |
| BH104-23 | -                         | 95.26                   | -                     |
| BH105-23 | 85.24                     | 85.84                   | 0.6                   |
| BH106-23 | -                         | 94.44                   | -                     |
| BH107-23 | 87.95                     | 90.55                   | 2.6                   |
| BH108-23 | 87.15                     | 90.15                   | 3.0                   |
| BH109-23 | 83.68                     | 88.68                   | 5.0                   |

#### 3.2 Existing Runoff

The pre-development runoff conditions were calculated based on the County's and Quinte Conservation's criteria and will be used to determine net flow reduction from the site. The pre-development runoff from the site is summarized in **Table 4** below:



**Table 4: Pre-Development Runoff**

| Return Period | Drainage Area (Ha) | Runoff C | Q (L/s) |
|---------------|--------------------|----------|---------|
| 2-Year        | 1.631              | 0.417    | 103.1   |
| 5-Year        | 1.631              | 0.417    | 137.2   |
| 10-Year       | 1.631              | 0.417    | 159.6   |
| 25-Year       | 1.631              | 0.417    | 187.3   |
| 50-Year       | 1.631              | 0.417    | 208.2   |
| 100-Year      | 1.631              | 0.417    | 228.6   |

### 3.3 Allowable Release Rate

The release rate from all captured areas will be the 2-year return period with a runoff coefficient of 0.417. The calculated allowable release rate summarized in **Table 5** below:

**Table 5: Controlled Release Rate**

| Drainage ID | Area (Ha) | Runoff C | 2-Yr Release Rate (L/s) |
|-------------|-----------|----------|-------------------------|
| SITE        | 1.631     | 0.417    | 103.1                   |

### 3.4 Proposed Stormwater Management Strategy

The post-development storm drainage will generally follow pre-development conditions.

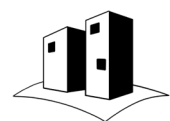
Except for areas which cannot be captured within reasonable means, grading has been designed to be self-contained during the 100-year storm event. An emergency overland flow outlet via the access driveway, will be provided to limit surface ponding to a maximum of 0.30m and direct emergency flows to Nicholas Street.

The grading has been designed such that all external flows coming from lands to the east will be cut-off by an interceptor swale and redirected around the property.

All captured flows will be directed to two separate underground stormwater management facilities. Drainage from the tank will drain by gravity to a lift station where it will be pumped to the proposed outlet elevation. The on-site storm sewers leading to the lift station were sized to convey the 2-year release rate from the SWM facility. Drainage from the lower parking areas and building courtyard will drain by gravity and outlet to a rip-rap outlet at grade

### 3.5 Quantity Control

As shown in **Table 6** below, the 100-year post-development discharge rate from the subject development will be controlled such that the total release rate does not exceed the pre-development flows from the site. Refer to **Figure 202**.



**Table 6: Post-Development Release Rates**

| <b>Storm Event</b> | <b>Pre-Dev. Flow (L/s)</b> | <b>Controlled Flow (L/s)<sup>1</sup></b> | <b>Uncontrolled Flow (L/s)<sup>2</sup></b> | <b>Proposed Site Flow (L/s)</b> | <b>Required Storage (m<sup>3</sup>)<sup>1</sup></b> |
|--------------------|----------------------------|--|--|---------------------------------|---|
| 2-Year             | 103.1                      | 30.1                                     | 9.8  | 39.8                            | 79.6  |
| 5-Year             | 137.2                      | 35.8                                     | 13.0                                       | 48.9                            | 111.4   |
| 10-Year            | 159.6                      | 39.4                                     | 15.2                                       | 54.6                            | 133.2   |
| 25-Year            | 187.3                      | 45.9                                     | 19.6                                       | 65.5                            | 179.8   |
| 50-Year            | 208.2                      | 55.7                                     | 23.7                                       | 79.4                            | 233.6   |
| 100-Year           | 228.6                      | 59.9                                     | 27.1                                       | 87.0                            | 271.1   |

Note: the sums outlined in the table above may not be exact due to significant digit rounding.

In total, 271.1 m<sup>3</sup> of active storage is required to meet the allowable release rate this volume is split between drainage ID 210 and 211. Quantity controls for ID 210 will be provided by a cast-in-place stormwater management (SWM) chamber located below grade. The 2- through the 100-year storm event will controlled by a 100mm diameter tamper-proof orifice plate located at the outlet of the SWM chamber (upstream of the control manhole). The SWM chamber was upsized to ensure that the 100-year flow to the tank is conveyed without surcharging, and also to reduce the outlet flow to minimize the lift-station infrastructure. As such approximately 294m<sup>3</sup> is available for storage purposes.

Quantity controls for ID 211 will be provided by underground storage units consisting of 16 DC-780 chambers. The 2- through the 100-year storm event will controlled by a 125mm diameter tamper-proof orifice plate located at the outlet of storm MH5. Approximately 44.7m<sup>3</sup> is available for storage purposes.

Details and sections of the SWM chamber, underground storage units and orifice controls are provided on **Plan 002** and **Plan 101**, found in **Appendix E**.

To protect the building against a complete system failure, the stormwater management chamber will be equipped with a perforated manhole lid accessible at grade to provide an emergency overland release point that also provides inspection and maintenance access to the SWM chamber. The site will be graded in such a way that overland flow relief (emergency) will be directed north to Nicholas Street. Refer to **Plan 401** for grading details.

<sup>1</sup> Sum of ID 210 and ID 211 released rate

<sup>2</sup> Excludes ID 220 which cannot be reasonably captured



### 3.6 Quality Control

As per the MOE requirements, quality controls must achieve a minimum of 80% total suspended solids (TSS) removal. The development will mostly consist of rooftop and parking surfaces with perimeter controlled landscaped surfaces each having an effective removal rate as outlined in **Table 7** below:

**Table 7: Effective TSS Removal Rate**

| Surface Type       | Effective Removal Rate |
|--------------------|------------------------|
| Hardscaped/Asphalt | 0%                     |
| Roof               | 90%                    |
| Landscaped areas   | 100%                   |

Based on the Effective TSS removal calculations, the proposed development will achieve a net TSS removal of 63% and 12% for drainage areas 210 and 211 respectively. It is therefore proposed to treat run-off from each drainage areas with an oil grit separator (model no. FD-5Optimum). This runoff will be treated by the OGS prior to entering the active storage components of the SWM tank or underground storage chambers such that the volume of water release from the site will have been treated.

Understanding that an OGS can only be credited with a maximum TSS removal of 50%, based on our calculations the proposed quality treatment system will achieve an overall net TSS removal of 82% and 68% from drainage areas 210 and 211 respectively. Refer to **Plan 101** for further information.

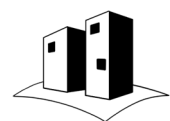
### 3.7 Erosion Control

Please refer to **Section 7.0** below for details related to the proposed temporary erosion and sedimentation controls to be implemented during construction.

### 3.8 100-Year Capture

To ensure that the 100-year flows are captured from the grassed areas around the perimeter areas of the building susceptible to overland flow, all area drains were modelled as horizontal orifice plates assuming a 50% blockage.

The total maximum flow contributing to an area drain ( $Q_{100AD}$ ) is equivalent to 20.6L/s, based on the maximum individual AD catchment area of 500m<sup>2</sup>. A summary of the design flows and inlet capacity is summarized in **Table 8** below:



**Table 8: 100-Year Capture Points**

| Drainage ID | Area (m <sup>2</sup> ) | 100-Year Flow (L/s) | Max Head (m) | ½ inlet Capacity (L/s) |
|-------------|------------------------|---------------------|--------------|------------------------|
| AD (TYP.)   | 500                    | 20.6                | 0.3          | 50.0                   |

Considering a 50% blockage of the 100-year capture points, area drains such as Zurn Z662-HF (or approved equivalent) at all AD locations are sufficient to ensure total capture from the designed drainage areas.

### 3.9 External Drainage

The proposed development receives external drainage from areas beyond the eastern side of the property due to the sloped terrain. Therefore, cut-off swales were designed to convey this existing flow without having a negative impact on the proposed development. There are 2 external drainage areas identified; drainage ID EXT-1 and drainage ID EXT-2, as noted on **Figure EXT** in **Appendix B**. The flows from EXT-1 will flow into the cut-off swale along the southern property line and drain towards the west while the flows from EXT-2 will flow into the cut-off swale along the eastern property line and drain towards the north.

The time of concentration was calculated separately for each drainage area, where EXT-1 has a Tc of 18 minutes and EXT-2 has a Tc of 19.7 minutes. Refer to the **Initial Tc Calculations** in **Appendix B**.

The external runoff flow for **EXT-1** is calculated in **Table 9** below:

**Table 9: EXT-1 Runoff**

| Return Period | Drainage Area (Ha) | Runoff C | Q (L/s) |
|---------------|--------------------|----------|---------|
| 2-Year        | 0.80               | 0.30     | 32.7    |
| 5-Year        | 0.80               | 0.30     | 43.6    |
| 100-Year      | 0.80               | 0.38     | 90.8    |

The external runoff flow for **EXT-2** is calculated in **Table 9** below:

**Table 10: EXT-2 Runoff**

| Return Period | Drainage Area (Ha) | Runoff C | Q (L/s) |
|---------------|--------------------|----------|---------|
| 2-Year        | 1.01               | 0.30     | 38.9    |
| 5-Year        | 1.01               | 0.30     | 51.7    |
| 100-Year      | 1.01               | 0.38     | 107.7   |



These flows were calculated for each cut-off swale and have been determined to have enough capacity to convey these external flows. The cut-off swale for EXT-1 has a capacity of 232.4 L/s at the most conservative segment, whereas the cut-off swale for EXT-2 has a capacity of 146.6 L/s at the most conservative segment. Refer to the **Flow Depth Calculations** for EXT-1 and EXT-2 in **Appendix B**.

### **3.10 Proposed Drainage System**

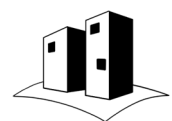
Due to the challenges related to the grading of the site and the local bedrock elevation, it is proposed to outlet stormwater from the development in two manners: the first (ID 210) will outlet to the existing roadside ditch on the west side of Nicholas Street and the second outlet (ID 211) will discharge at grade through a headwall and rip-rap outlet.

As the invert of the roadside ditch outlet will be higher than the bottom of the SWM tank, it will be necessary to lift/pump the released stormwater flows. The lift station will consist of a manhole with a 1.0m deep sump equipped with duplex pumps, the details of which will be provided by Neiva Engineering.

The driveway culverts downstream of the outlet were sized to convey the storm sewers downstream of the SWM structure were sized to safely convey the Nicholas Street road drainage as well as the peak release rate from the lift station. A 300mm diameter culverts, the slope of which will match the existing roadside ditch grade, will be adequate to convey the estimated peak flow of 104.5L/s (34.3 from the right-of-way drainage and 70.2 from the SWM Tank outlet). The outlet to the existing ditch will be made through a proposed retaining/headwall which will connect to the proposed lift station.

A control manhole, providing inspection and access to the SWM infrastructure, will be installed near the property line forming part of the stormwater management tank described above.

Refer to **Drawing 101** found in **Appendix E** for the details related to the service connection.



## 4.0 SANITARY DRAINAGE

All calculations pertaining to the information summarized in the following sections are found in **Appendix C**.

### 4.1 Existing Sanitary Drainage System

The following sanitary sewer infrastructure is located within the vicinity of the subject site:

- An existing 250 mm diameter gravity sanitary sewer located west side of the Nicholas Street right of way. This sewer drains north to the local pump station.
- Two existing 350 mm diameter forcemains located immediately east of the 250mm gravity sewer. These forcemains flow from the pumping station to the wastewater treatment plant located south of the subject site.
- A 500mm diameter outfall gravity sewer located immediately east of the 250mm gravity sewer. This sewer drains north towards the local pump station and ultimately outlets to the creek at Delhi Park.

### 4.2 Existing Sanitary Flows

The existing property does not contribute sanitary flows.

### 4.3 Proposed Sanitary Flows

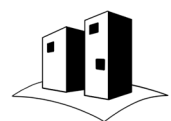
The proposed sanitary discharge flows from the site were calculated based on the criteria outlined in **Section 2.3**, the proposed building and site information. A total peak design flow of 2.9 L/s was calculated for the subject property.

### 4.4 Proposed Sanitary Connection

The sanitary effluent from the proposed development can generally be discharge by gravity, although a portion of the development including lower units and drainage fixtures from the portion covered of the parking structure will need to be pumped to the sanitary building service.

All sanitary flow from the proposed development will outlet to the existing 250mm sanitary sewer referenced above. A 200 mm sanitary sewer service connection with a grade of 1.0% will be adequate to convey the calculated design flow of 2.9 L/s. This diameter and slope will ensure that the minimum self-cleaning velocity of 0.6 m/s is achieved. Connection at the municipal main will be made at an existing manhole, which will serve as the control/inspection manhole for the property.

Refer to **Drawing 101** found in **Appendix E** for the details related to the service connection.



#### **4.5 Sanitary Sewer Capacity Review**

A sanitary capacity review was prepared based on record drawings to determine the adequacy of the sanitary sewers downstream of the proposed development. This review considers the flows upstream of MH1 which includes flows from an existing development west of the proposed site. A sanitary design sheet was prepared based on the proposed and existing population estimates. According to our calculations, the total flow within the sanitary sewer infrastructure will flow at a maximum of 10.0% full post development. Therefore, the existing infrastructure thus has adequate capacity to safely convey effluent from the proposed development to the local pump station. Refer to the **Sanitary Design Sheet** in **Appendix C**.



## 5.0 WATER SUPPLY

All calculations pertaining to the information summarized in the following sections are found in **Appendix D**.

### 5.1 Existing System

The following water infrastructure is located within the vicinity of the subject site:

- An existing 200 mm diameter watermain located within the east boulevard of Nicholas street.

A hydrant flow test will be carried out when it will be permissible to do so to confirm the available watermain pressure and flow.

### 5.2 Existing Water Demands

The existing property does not draw water from the local infrastructure.

### 5.3 Proposed Water Supply Requirements

The estimated water consumption was calculated as per the criteria outlined in **Section 2.4** above. The proposed average day domestic water consumption rate is estimated to be 0.7 L/s (maximum day demand of approximately 61,846 L/day).

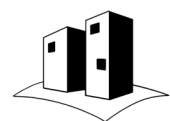
Water Supply for Public Fire Protection calculations, as provided by the Fire Underwriters Survey (FUS), were undertaken to determine the minimum requirement to provide adequate fire suppression. According to our calculations, a minimum fire suppression flow of approximately 6,749 L/min (1,783 USGPM) at a pressure of 140 KPa (20 PSI) will be required for the subject development. According to the flow test referenced above, the Max Day + Fire Flow rate of approximately 6,795 L/min (1,795 USGPM) is available at a pressure which exceeds the minimum FUS requirements.

The municipal water system therefore has adequate flow and pressure to satisfy the water demands of the proposed development.

### 5.4 Proposed Water Connection

As the proposed building will not be sprinklered, the development will be serviced with a domestic supply from which hydrants will be connected to provide the required fire protection coverage. may be serviced by single fire/domestic supply lines. Therefore, the proposed building will be serviced with a 150mm domestic water supply connected to the existing 200mm diameter watermain on Nicholas Street with tapping sleeve and valves. It is proposed to equip the service line with a combined meter and backflow preventor such as an OMNI + Fireline (F<sup>2</sup>) water meter (or approved equal) located within a meter chamber.

Refer to **Drawing 101** found in **Appendix E** for additional details.



## 6.0 SITE GRADING

### 6.1 Existing Grades

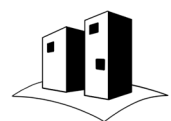
The in-situ conditions can be described as grassed surfaces. Existing drainage flows overland and is directed to the west towards Lalor Street and Dehli Park as shown on **Figure 201** found in **Appendix B**. The topography of the surrounding areas suggests that the site receives drainage from external sources located to the east. The site has an approximate 32.0m grade difference from high to low point.

### 6.2 Proposed Grades

Based on the development concept and the review of the perimeter site grades, the finished floor elevation of the various proposed buildings will vary. The proposed townhouse's finished floor elevation fronting Nicholas Street will vary between 89.73 and 91.92, while the main building's first floor elevation will be 92.15.

The proposed finished floor elevations and grading of the site perimeter will be compatible with the existing developments. Perimeter grades will be designed to produce grades in the range of 2.0% to 5.0% throughout the site and towards the adjacent municipal right-of-way where existing grades will be met at the bottom of curb as the boulevards will be reconstructed. In order to match existing grades along the eastern slope, a 2:1 maximum grade is proposed and is to be constructed per the geotechnical recommendation.

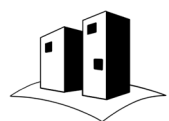
The development of this site and will not adversely impact adjacent lands. Please refer to **Drawing 401** found in **Appendix E** for additional information.



## 7.0 EROSION AND SEDIMENT CONTROL

To ensure stormwater runoff during the construction phase does not transport sediment to the existing municipal infrastructure, temporary catchbasin sediment control devices are proposed along the site frontages of Nicholas Street. In addition, a temporary sediment control fence will be erected around the site perimeter and a temporary construction access (mud mat) will be built at the construction entrance proposed on Nicholas Street.

These measures will be designed and constructed in accordance with the "Erosion and Sediment Control Guideline for Urban Construction" document (December 2006). These measures, as well as any additional information pertaining to ESC Controls, are detailed on **Drawing 601** found in **Appendix E**. All reasonable measures will be taken to ensure sediment loading to the adjacent properties and municipal right-of-way is minimized both during and following construction.



## **8.0 CONCLUSIONS AND RECOMMENDATIONS**

This report is to be read in conjunction with the application submission material for the project proposal known as Homes First Nicholas Corp development. We conclude and recommend the following:

### **8.1 STORMWATER MANAGEMENT**

Peak runoff rates for the proposed development were designed to be less than or equal to the existing condition by implementing onsite SWM controls. Stormwater storage for each drainage areas will be implemented to achieve this and will be provided by on-site storage and orifice plates. A total storage volume of 271.1m<sup>3</sup> is required to meet quantity controls.

Quality controls will be provided by an oil-grit separator located upstream of the SWM tank's active storage area. An overall TSS removal efficiency of approximately 82% will be achieved.

### **8.2 SANITARY DRAINAGE**

The sanitary discharge from the proposed development will be directed to the existing infrastructure on Nicholas Street. According to our calculations, the total flow within the sanitary sewer infrastructure will flow at a maximum of 10.0% full post development. Therefore, the existing infrastructure thus has adequate capacity to safely convey effluent from the proposed development to the local pump station.

### **8.3 WATER SUPPLY**

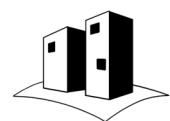
The existing 200mm watermain will provide service to the proposed building. According to the hydrant flow test, the municipal infrastructure is adequate to support the Max Day + Fire Flow from the proposed development.

### **8.4 SITE GRADING**

The proposed grading is compatible with existing elevations at the property limits.

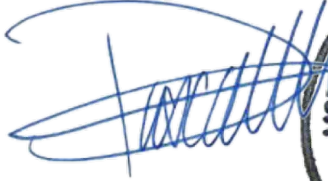
### **8.5 EROSION AND SEDIMENT CONTROL**

ESC measures were designed as per the "Erosion and Sediment Control Guideline for Urban Construction" document (December 2006). Provided that these measures are well maintained during construction, these will be adequate to keep sediments from entering the municipal infrastructure during construction.



Respectfully submitted,

**SITEPLANTECH INC.**



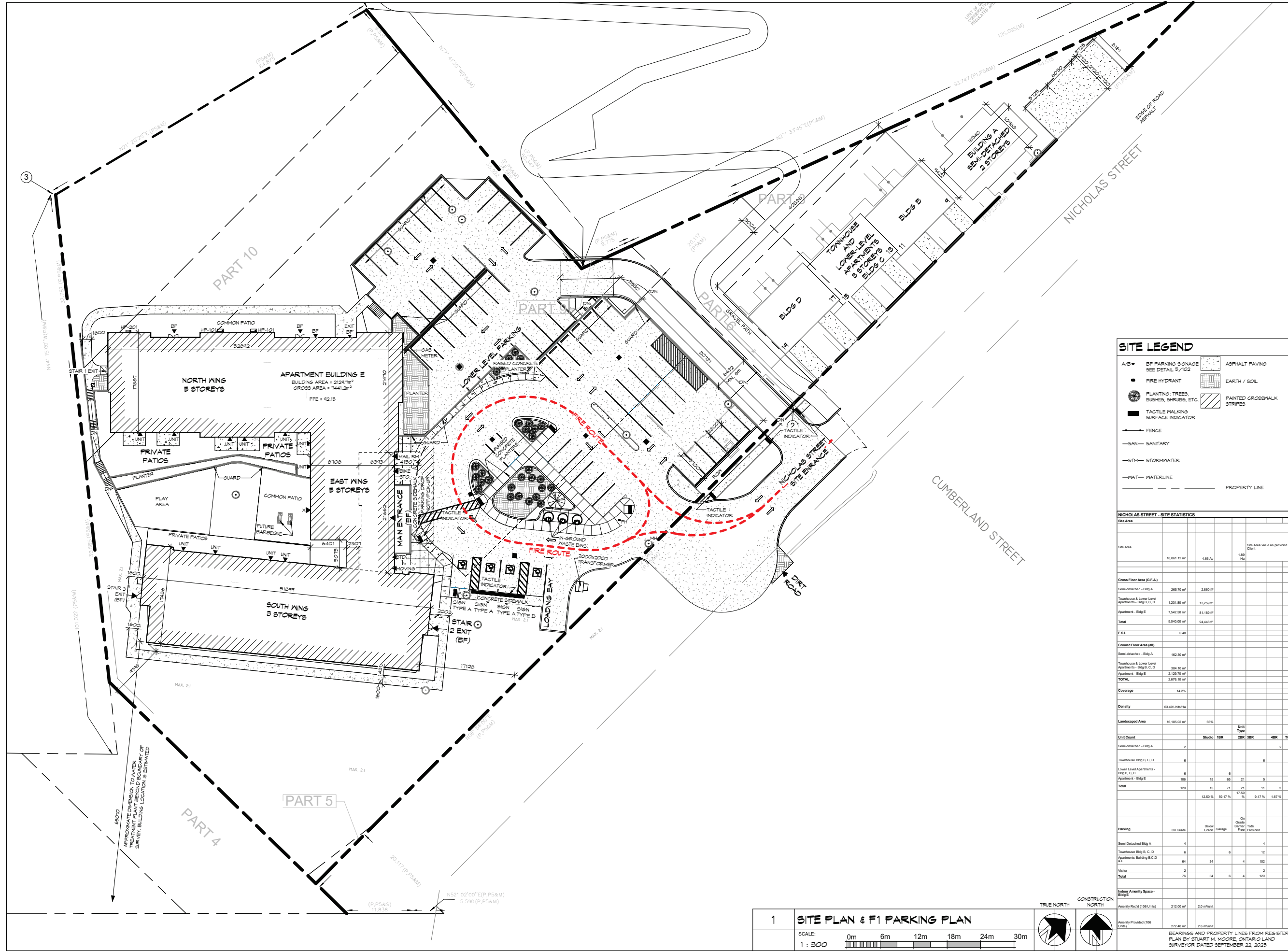
Pascal Monat, P.Eng.  
Principal

P:\23-026 - 0 Nicholas St. - Picton\Reports and Drawings\Reports\23-026 - FSR Current.docx



## **Appendix A**

### **Background Information**



NOTES:  
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 DRAWINGS MUST NOT BE SCALED. VERIFY DIMENSIONS ON SITE.

**SITE LEGEND**

|       |                                       |                           |
|-------|---------------------------------------|---------------------------|
| A/B   | BF PARKING SIGNAGE SEE DETAIL 5/102   | ASPHALT PAVING            |
| ●     | FIRE HYDRANT                          | EARTH / SOIL              |
| ⊙     | PLANTING: TREES, BUSHES, SHRUBS, ETC. | PAINTED CROSSWALK STRIPES |
| ■     | TACTILE WALKING SURFACE INDICATOR     |                           |
| —     | FENCE                                 |                           |
| —SAN— | SANITARY                              |                           |
| —STM— | STORMWATER                            |                           |
| —WAT— | WATERLINE                             |                           |
| ---   | PROPERTY LINE                         |                           |

**NICHOLAS STREET - SITE STATISTICS**

| Site Area   | Site Area       | Site Area value as provided by Client |
|---|-----------------|---------------------------------------|
| 18,961.12 sq ft                                   | 4.68 Ac         | 1.89 Ha                               |
| <b>Gross Floor Area (G.F.A.)</b>                  |                 |                                       |
| Semi-detached - Bldg A                            | 265.70 sq ft    | 2,860 sq ft                           |
| Townhouse & Lower Level Apartments - Bldg B, C, D | 1,231.80 sq ft  | 13,250 sq ft                          |
| Apartment - Bldg E                                | 7,542.80 sq ft  | 81,189 sq ft                          |
| <b>TOTAL</b>                                      | 9,040.30 sq ft  | 94,448 sq ft                          |
| <b>F.S.I.</b>                                     | 0.48            |                                       |
| <b>Ground Floor Area (G.F.A.)</b>                 |                 |                                       |
| Semi-detached - Bldg A                            | 142.30 sq ft    |                                       |
| Townhouse & Lower Level Apartments - Bldg B, C, D | 354.10 sq ft    |                                       |
| Apartment - Bldg E                                | 2,129.70 sq ft  |                                       |
| <b>TOTAL</b>                                      | 2,626.10 sq ft  |                                       |
| <b>Coverage</b>                                   | 14.2%           |                                       |
| <b>Density</b>                                    | 63.49 Units/Ha  |                                       |
| <b>Landscaped Area</b>                            | 16,185.02 sq ft | 65%                                   |

|     |     |                           |            |
|-----|-----|---------------------------|------------|
| 6   | RHM | ISSUED FOR MINOR VARIANCE | 2025-11-12 |
| No. | BY  | REVISIONS/SUBMISSIONS     | YYYY-MM-DD |

**COLBOURNE & KEMBEL, ARCHITECTS INC.**  
 1910 WILMINGTON PARK PLACE  
 KNOXSTON, ONTARIO, K4M 6M8  
 TEL: 613-294-2240  
 INFO@CKA.CA WWW.CKA.CA

**PROJECT**  
 NICHOLAS APARTMENTS  
 31 NICHOLAS STREET, PICTON ON, K0K 2T0

**DRAWING**  
 OVERALL SITE PLAN & STATISTICS

**SCALE**  
 As indicated

|                   |        |             |
|-------------------|--------|-------------|
| PROFESSIONAL SEAL | DRAWN  | DATE        |
|                   | CBB/ZB | OCT. 2024   |
| CHECKED           | TB     | PRINTED     |
|                   |        | 2025-10-21  |
| REVIEWED          | RHM    | DRAWING No. |
|                   |        | PROJECT No. |
|                   |        | 24012       |

**1 SITE PLAN & F1 PARKING PLAN**

SCALE: 1 : 300

0m 6m 12m 18m 24m 30m

TRUE NORTH CONSTRUCTION NORTH

BEARINGS AND PROPERTY LINES FROM REGISTERED PLAN BY STUART M. MOORE, ONTARIO LAND SURVEYOR, DATED SEPTEMBER 22, 2025

**INTEGRATION DATA**

6° UTM ZONE 18 COORDINATES  
NAD 83 (CSRS/2011) (CENTRAL MERIDIAN 810° WEST LONGITUDE)  
THE PIN COORDINATES LISTED BELOW ARE TO BE USED TO VERIFY THE SURVEY ACT.  
SUBSECTION 14(2) OF THE SURVEY ACT, 1990.

| OBSERVED REFERENCE POINTS |              |            |
|---------------------------|--------------|------------|
| MONUMENT ID               | NORTHING     | EASTING    |
| (A) CO(U)                 | 4 879 746.44 | 809 644.75 |
| (B) CO(U)                 | 4 879 605.10 | 809 739.45 |

| REFERENCE POINTS |              |            |
|------------------|--------------|------------|
| POINT            | NORTHING     | EASTING    |
| 1                | 4 879 552.12 | 809 812.77 |
| 2                | 4 879 320.98 | 809 450.08 |
| 3                | 4 879 537.84 | 809 501.38 |
| 4                | 4 879 599.61 | 809 521.39 |
| 5                | 4 879 704.69 | 809 432.33 |

COORDINATE VALUES SHOWN ARE FOR GEODETIC INFORMATION SYSTEM INTEGRATION ONLY.  
COORDINATE VALUES IN THIS PLAN ARE TO BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

PLAN OF SURVEY  
SHOWING TOPOGRAPHICAL INFORMATION OF  
PART OF LOTS 1364, 1365, 1368,  
1369, 1370, 1415, 1416, 1421,  
1427, 1428, 1429, 1430, 1435,  
1437, 1438, 1441, 1442, 1444,  
1445, 1446, 1447, 1456, 1457,  
1458, 1469, 1470, 1471, 1472,  
1473, 1474, 1492, 1493, 1494,  
1496, 1497, 1498  
AND  
ALL OF LOTS 1422, 1436, 1439,  
1440, 1443  
REGISTERED PLAN 24  
TOWN OF PICTON  
COUNTY OF PRINCE EDWARD

SCALE 1:400  
METRIC: DISTANCES AND COORDINATES SHOWN HEREON ARE IN METRES  
AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

KRCMAR SURVEYORS LTD. 2023

BEARING  
BEARINGS SHOWN HEREON ARE GRID BEARINGS DERIVED FROM GPS OBSERVATIONS OF  
OBSERVED REFERENCE POINTS 1 AND 2 USING THE LEICA SMARTNET RTN  
NETWORK AND ARE REFERRED TO THE 6° UTM COORDINATE SYSTEM, ZONE  
18, CENTRAL MERIDIAN 810° WEST LONGITUDE.  
(NAD 83 (CSRS/2011)).

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE  
CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A CORRECTED SCALE  
FACTOR OF 1.000900.

TO OBTAIN GRID BEARINGS APPLY A COUNTER-CLOCKWISE ROTATION OF  
0°02'30" TO THE BEARINGS SHOWN.

ELEVATION  
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO THE TOWN  
OF PICTON BENCHMARK 871010, HAVING AN ELEVATION OF 76.430 METRES.  
VERTICAL DATUM: CANADIAN NATIONAL DATUM (CNDA83/2011)  
(VERTICAL DATUM: CVD02011)

- LEGEND**
- DENOTES SURVEY MONUMENT FOUND
  - DENOTES SURVEY MONUMENT PLANTED
  - SSB DENOTES SHORT STANDARD IRON BAR
  - RSB DENOTES ROAD STANDARD IRON BAR
  - IB DENOTES IRON BAR
  - CC DENOTES CONCRETE PIN
  - CC DENOTES CUT CROSS
  - M DENOTES MEASURED
  - (U) DENOTES UNKNOWN
  - (S) DENOTES SET
  - (W) DENOTES WITNESS
  - (RP1) DENOTES REGISTERED PLAN 24
  - (RP2) DENOTES REGISTERED PLAN 113
  - (P1) DENOTES PLAN 47R-4667
  - (P2) DENOTES PLAN 47R-4668
  - (P3) DENOTES PLAN 47R-3042
  - (P4) DENOTES PLAN 47R-3043
  - (1370) DENOTES KRCMAR SURVEYORS LTD. O.L.S.
  - (1025) DENOTES CAD FREDERICK FLEISHMANN, O.L.S.
  - (1214) DENOTES GERALD FRANCIS STEELE, O.L.S.
  - (1363) DENOTES BARRY ROSE FICARDI, O.L.S.
  - (778) DENOTES MICHAEL JOSEPH MCALPINE, O.L.S.
  - (1099) DENOTES SORVANA FLEISHMANN PETROCH LIMITED, O.L.S.
  - (12) DENOTES BOTTOM OF CURB
  - (14) DENOTES TOP OF WALL
  - DENOTES EXISTING GRADE ELEVATION
  - DENOTES CATCH BASIN
  - DENOTES CONIFEROUS TREE WITH TRUNK DIAMETER
  - DENOTES DECAIDUOUS TREE WITH TRUNK DIAMETER
  - DENOTES BELL POLE
  - DENOTES DOWN GUY ANCHOR
  - DENOTES FIRE HYDRANT
  - DENOTES HYDRO POLE
  - DENOTES HYDRO POLE WITH LAMP STANDARD
  - DENOTES LAMP STANDARD
  - DENOTES MANHOLE
  - DENOTES SIGN
  - DENOTES WATER VALVE
  - DENOTES EDGE OF BUSH
  - DENOTES FENCE
  - DENOTES CHAIN LINK FENCE
  - DENOTES CONCRETE OVERHEAD
  - DENOTES CONCRETE PAD
  - DENOTES CONCRETE RETAINING WALL
  - DENOTES CONCRETE PAD
  - DENOTES NO FENCE
  - DENOTES WOODEN RETAINING WALL
  - (M) DENOTES INVERT

- SURVEY REPORT**
- THE RE-ESTABLISHMENT OF THE SUBJECT PROPERTY BOUNDARIES IS BASED ON INFORMATION OBTAINED IN THE RELEVANT TITLE DOCUMENTS, REGISTERED PLANS AND ON THE EVIDENCE OF PRIOR SURVEYS FOUND DURING THE COURSE OF PREPARING THIS SURVEY PLAN.
  - THE TYPE AND LOCATION OF THE EXISTING BUILDINGS AND OTHER IMPROVEMENTS, FENCES, ETC., ON OR NEAR THE SUBJECT PROPERTY ARE AS SHOWN ON THE SURVEY PLAN.
  - COMPLIANCE WITH MUNICIPAL ZONING REQUIREMENTS IS NOT CERTIFIED BY THIS REPORT.
  - LAND COMPRISES ALL OF PIN 55065-0221(LT), 55065-0221(LT), 55065-0241(LT), 55065-0241(LT), 55065-0241(LT), 55065-0321(LT) AND 55065-0321(LT).

| PARCEL             | AREA (m <sup>2</sup> ) |
|--------------------|------------------------|
| PIN 55065 0321(LT) | 3317.2                 |
| PIN 55065 0221(LT) | 2001.8                 |
| PIN 55065 0241(LT) | 1359.9                 |
| PIN 55065 0241(LT) | 9342.5                 |
| PIN 55065 0271(LT) | 2032.4                 |
| PIN 55065 0271(LT) | 2432.5                 |
| PIN 55065 0271(LT) | 1443.0                 |

TOTAL SITE AREA = 21932.6m<sup>2</sup>

**SURVEYOR'S CERTIFICATE**

I CERTIFY THAT:

- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEY ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
- THE SURVEY WAS COMPLETED ON THE 14th DAY OF DECEMBER, 2023.

DATE December 21, 2023

STUART M. MOORE  
CHIEF LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-65471

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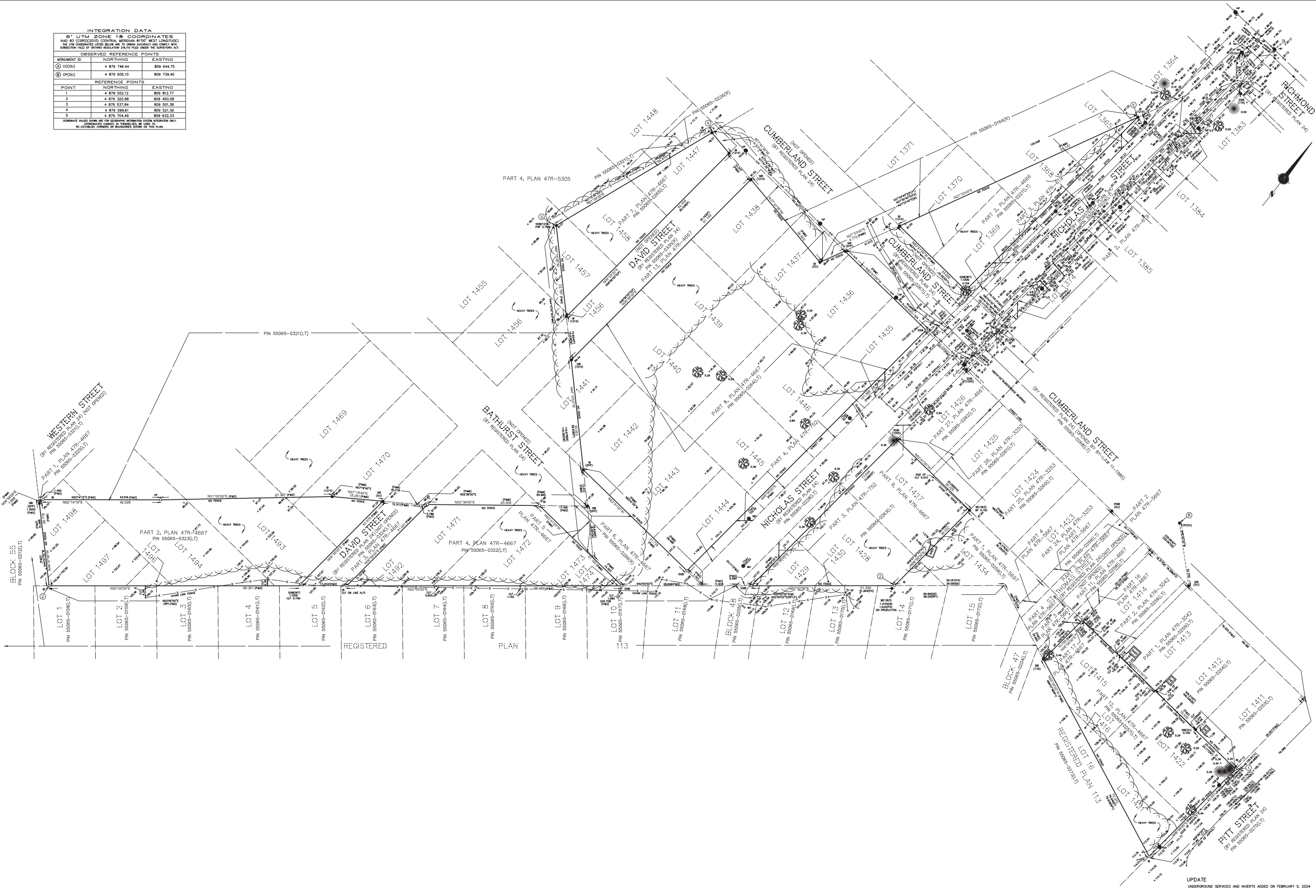
MUNICIPAL ADDRESS:

FIELD: D.L. DRAWN: S.D. CHECKED: JOB NO: 23-185

DWG NAME: 23-185(01) PLOT INFO: 08-24-21(02)2023 WORK ORDER NO: 28663

1137 Centre Street, Thorburn ON L4J 3W8 905.738.0553 F 905.738.9221 www.krcmar.ca

PLAN AVAILABLE AT www.ProtectYourBoundaries.ca



UPDATE  
UNDERGROUND SERVICES AND INVERTS ADDED ON FEBRUARY 5, 2024

**GENERAL NOTES**

ALL EXISTING UNDERGROUND PLANT (HYDRO, TELEPHONE, GAS MAINS, WATERMANS, SEWERS) WHICH WILL BE CROSSED UNDER DURING THE INSTALLATION OF THE SERVICES SHALL BE SUPPORTED BY A SUPPORT BEAM OR BY OTHER METHODS, AS MAY BE REQUIRED BY THE OWNERS OF THE PLANT BEING CROSSED UNDER.

PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION, ALL SEWER OUTLET INFORMATION, BENCHMARKS, ELEVATIONS, AND DIMENSIONS MUST BE CHECKED AND VERIFIED, AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.

PRIOR TO COMMENCING ANY WORK ON THE INSTALLATION OF SERVICES, AN APPROVED SET TO PLANS MUST BE AVAILABLE ON THE SITE, AND REMAIN THERE WHILE WORK IS BEING DONE.

PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES THAT WILL BE AFFECTED BY CONSTRUCTION SHALL BE LOCATED AND MARKED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE GOVERNING BODY AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.

THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS UNDER THE OCCUPATIONAL HEALTH AND SAFETY ACT WHILE WORKING IN THE VICINITY OF OVERHEAD POWER LINES.

ALL FILL MATERIAL PLACED WITHIN THE RIGHT-OF-WAY SHALL BE PLACED IN ACCORDANCE WITH OPSS 206. IN AREAS TO BE FILLED, THE SUBGRADE SHALL BE PROFFEROLLED TO OBTAIN 98% STANDARD PROCTOR DENSITY. ONLY ACCEPTABLE EARTHEN OR GRANULAR MATERIALS SHALL BE USED WITH THE ROAD ALLOWANCES.

EXISTING TOPOGRAPHICAL INFORMATION WAS OBTAINED IN THE FIELD BY B. ROGER PICKARD SURVEYING LTD.

TYPE II BEDDING SHALL BE IN ACCORDANCE WITH OPSS 802.010 FOR FLEXIBLE SEWER PIPES. THE TYPE II BEDDING MATERIAL SHALL CONSIST OF APPROVED OPSS FORM 1010 GRANULAR 'M' MATERIAL OR GRANULAR 'A' MATERIAL HAVING A MAXIMUM AGGREGATE SIZE OF 20MM. THE COVER MATERIAL SHALL CONSIST OF A TYPE II GRANULAR 'B' HAVING A MAXIMUM AGGREGATE SIZE OF 20MM.

CLASS 'B' BEDDING SHALL BE IN ACCORDANCE WITH OPSS 802.03 FOR RIGID SEWER PIPE.

ALL BEDDING MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 98% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BACKFILL SHALL BE SELECT NATIVE EXCAVATED MATERIAL PLACED IN THIN LAYERS COMPACTED TO AT LEAST 98% STANDARD PROCTOR MAXIMUM DRY DENSITY

ALL EXISTING BOULEVARDS AND ROAD SURFACES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO A CONDITION AT LEAST AS GOOD AS ORIGINAL, ALL TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.

**NOTES:**

1. ALL SERVICES ARE TO BE MAINTAINED DURING CONSTRUCTION WITH MINIMAL INTERRUPTION.
2. ALL LANDSCAPED AREAS DISTURBED DURING CONSTRUCTION TO BE RESTORED WITH 100mm TOPSOIL, SEED AND MULCH.
3. ALL UNDERGROUND PIPE JOINTS, FITTINGS AND COUPLINGS SHALL BE RESTRAINED IN ACCORDANCE WITH THE PIPE MANUFACTURER'S REQUIREMENTS.

**BENCHMARK**  
LOCATED AT THE HWY. 401 OVERPASS FOR QUEEN ST., 1.1km NORTH OF POST OFFICE, TABLET IN WEST FACE OF EAST ABUTMENT AT STREET LEVEL (48cm NORTH OF SOUTH END AND 18cm ABOVE SIDEWALK) HAVING A GEODETIC ELEVATION OF 177.335 METRES. SITE BENCHMARK LOCATED ON TOP OF OPERATING NUT OF FIRE HYDRANT IN FRONT OF THE PUMPING STATION PROPERTY HAVING A ELEVATION OF 177.651 METRES.

**BENCHMARKS**

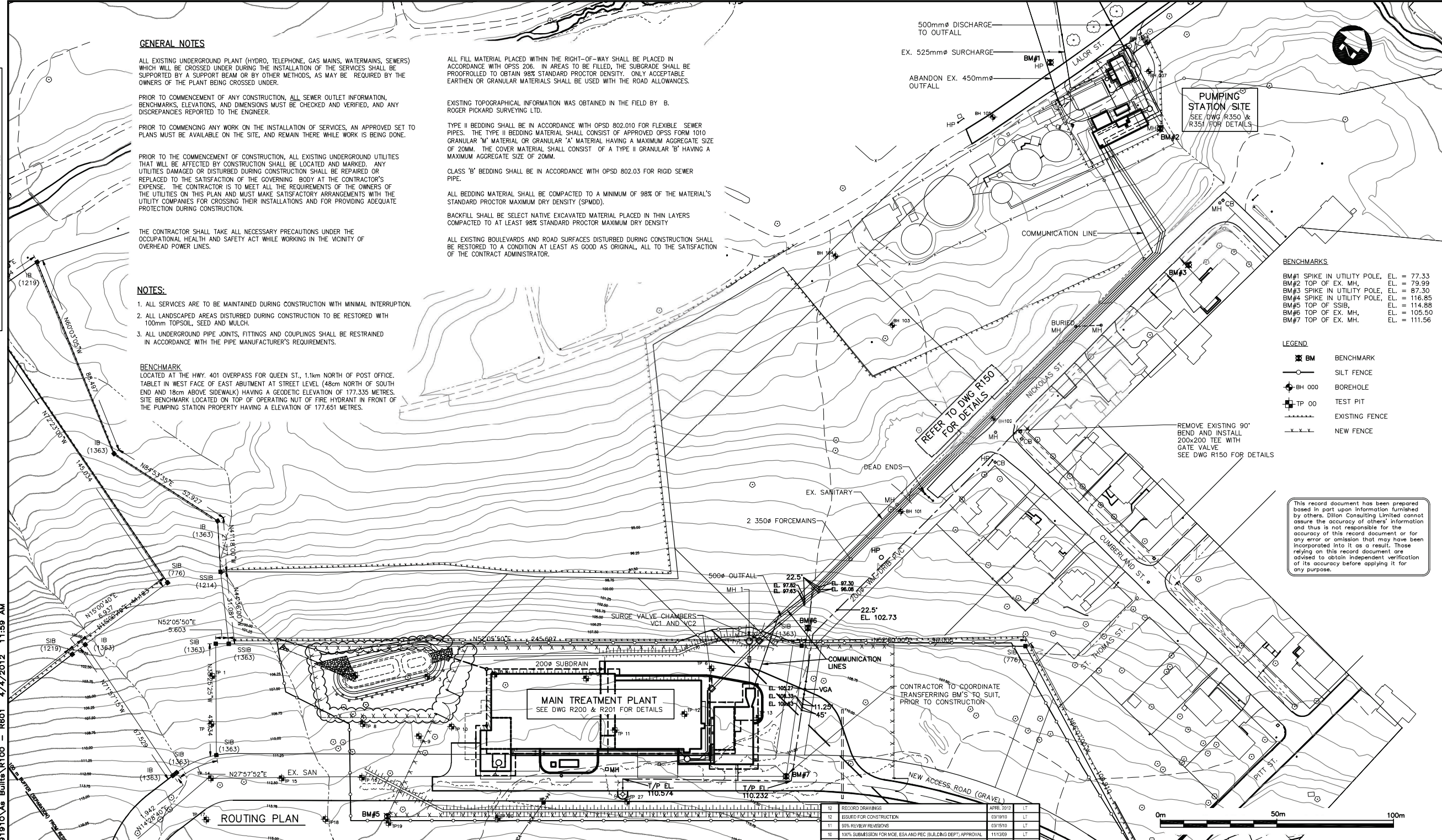
|                             |              |
|-----------------------------|--------------|
| BM#1 SPIKE IN UTILITY POLE, | EL. = 77.33  |
| BM#2 TOP OF EX. MH,         | EL. = 79.99  |
| BM#3 SPIKE IN UTILITY POLE, | EL. = 87.30  |
| BM#4 SPIKE IN UTILITY POLE, | EL. = 116.85 |
| BM#5 TOP OF SSIB,           | EL. = 114.88 |
| BM#6 TOP OF EX. MH,         | EL. = 105.50 |
| BM#7 TOP OF EX. MH,         | EL. = 111.56 |

**LEGEND**

|                |                |
|----------------|----------------|
| BM             | BENCHMARK      |
| SILT FENCE     | SILT FENCE     |
| BH 000         | BOREHOLE       |
| TP 00          | TEST PIT       |
| EXISTING FENCE | EXISTING FENCE |
| NEW FENCE      | NEW FENCE      |

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FILE PATH: G:\CAD\091910\As Builts\R100 - R601 4/4/2012 11:59 AM



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ENGINEER'S STAMP

**Maple Reinders**

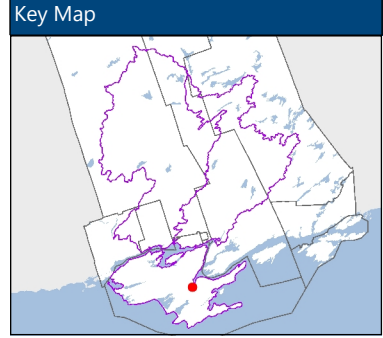
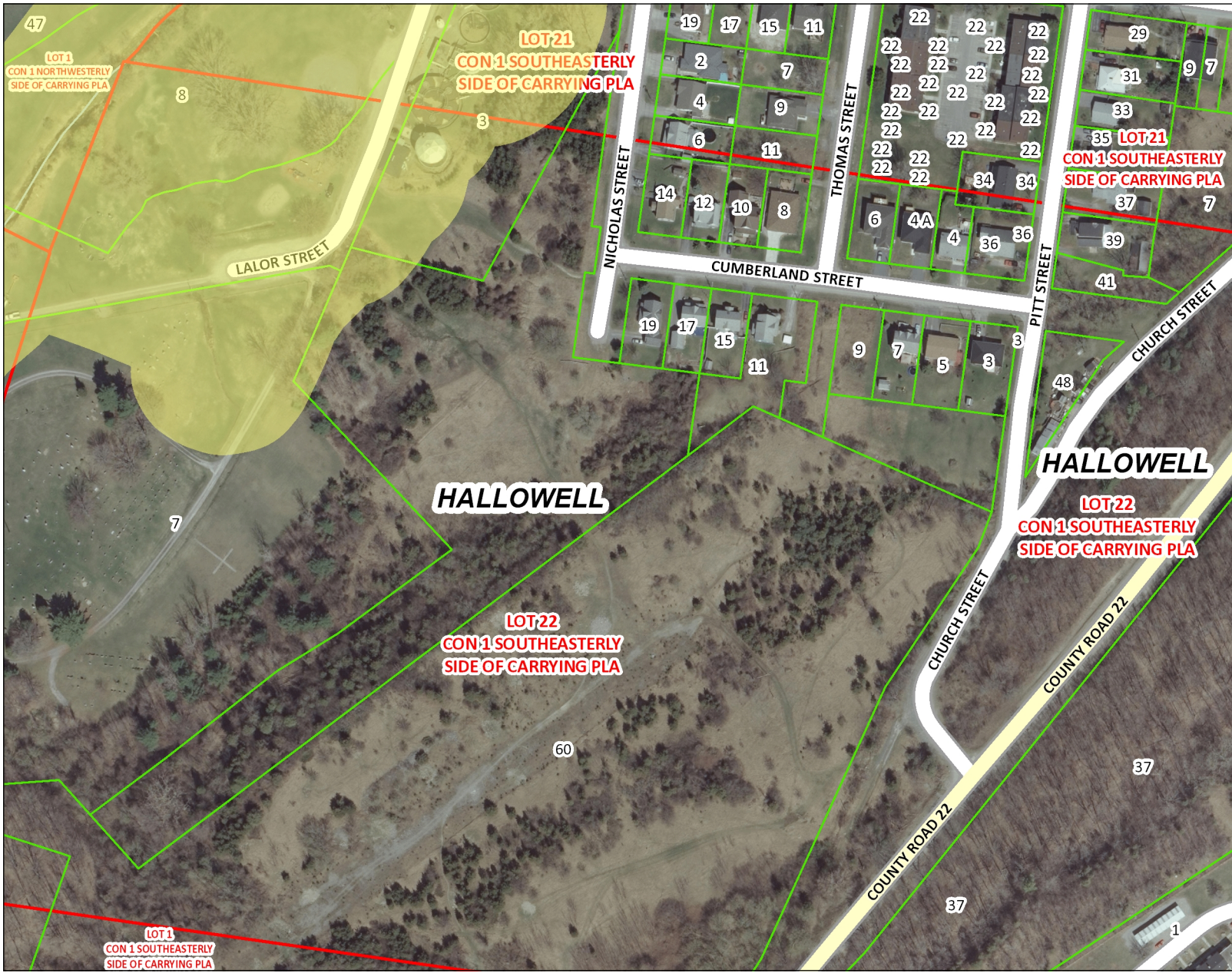
**THE COUNTY**  
 Peterborough County, Ontario  
 a beautiful island adventure

|    |   |          |    |     |    |
|----|---|----------|----|-----|----|
| 12 | RECORD DRAWINGS   | APR 2010 | LT |     |    |
| 12 | ISSUED FOR CONSTRUCTION                                       | 03/19/10 | LT |     |    |
| 11 | 50% REVIEW REVISIONS  | 03/19/10 | LT |     |    |
| 10 | 100% SUBMISSION FOR AEC, ESA AND PEC (BUILDING DEPT) APPROVAL | 11/13/09 | LT |     |    |
| 9  | 50% COMPLETE DESIGN FOR OWNER REVIEW                          | 10/19/09 | LT |     |    |
| 8  | 50% COMPLETE DESIGN FOR MAPLE REVIEW                          | 10/03/09 | LT |     |    |
| 7  | ISSUED FOR BUILDING PERMIT (SECOND SUBMISSION)                | 09/11/09 | LT | LTU | TM |
| 6  | ISSUED FOR FOUNDATION CONSTRUCTION                            | 08/26/09 | LT |     |    |
| 5  | 50% COMPLETE DESIGN FOR OWNER REVIEW                          | 07/29/09 | LT |     |    |
| 4  | ISSUED FOR BUILDING PERMIT (FOUNDATION ONLY)                  | 07/27/09 | LT |     |    |
| 3  | CONSERVATION AUTHORITY AND SITE PLAN APPROVAL                 | 07/15/09 | LT |     |    |
| 2  | ISSUED FOR CERTIFICATE OF APPROVAL APPLICATION (SEWAGE)       | 06/18/09 | LT |     |    |
| 1  | REVISED VALUE ENGINEERING DESIGN                              | 06/05/09 | LT |     |    |
| 0  | REVISED VALUE ENGINEERING DESIGN                              | 06/02/09 | LT |     |    |

**PICTON**  
**WASTEWATER TREATMENT PLANT REPLACEMENT**  
**SITWORKS**  
**PIPE ROUTING PLAN**

PROJECT NO. **09-1910**  
 SHEET NO. **R100**





- Legend**
- Conceptual Regulated Area\*
  - Assessment Parcel
  - Lot Line
  - Quinte Conservation Jurisdiction
  - Lower and Single Tier Municipality
  - Watercourse

\*Conceptual Regulated Area: The Regulated Area includes one or more of the following hazards: Great Lakes, Inland Lakes, Watercourses, Wetlands, Floodplains, Unstable Bedrock, Dynamic Beaches and Areas Subject to Erosion. Development activity is prohibited in these areas without a permit from Quinte Conservation.

Air Photo Capture Year(s):  
2008

**Notes**

Note: As per Sec. 4. (5) of O. Reg. 41/24, in case of conflict regarding the boundaries of the areas where development activities are prohibited under paragraph 2 of subsection 21 (1) of the Conservation Authorities Act, the description of those areas in that paragraph and in section 2 of this Regulation prevail over the depiction of the areas in the maps referred to in subsection (1) of this section.



Projection: NAD\_1983\_UTM\_Zone\_18N  
Generated: April 02, 2024 @ 11:52 AM  
1: 2,500  
Original Document: 8.5" x 11"



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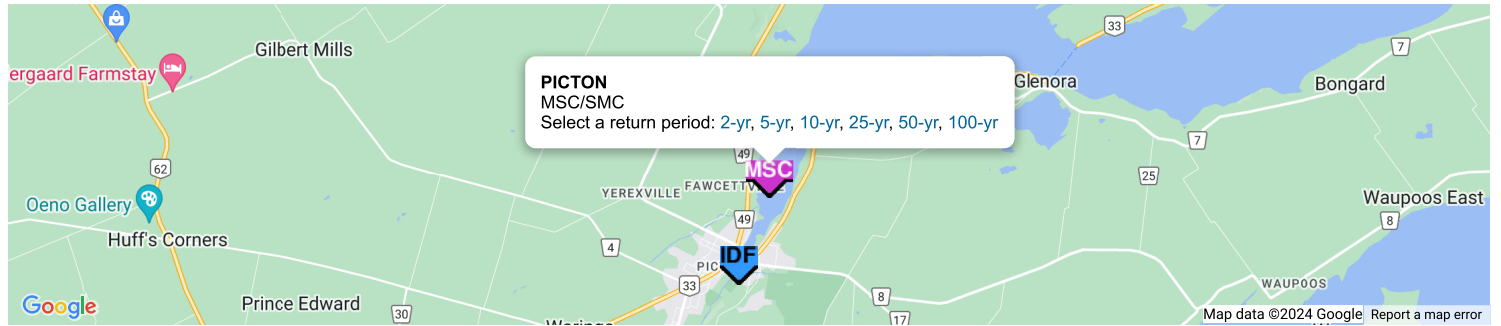
## **Appendix B**

### **Storm Data**

### Active coordinate

44° 0' 15" N, 77° 8' 15" W (44.004167,-77.137500)

Retrieved: Wed, 20 Mar 2024 15:54:12 GMT



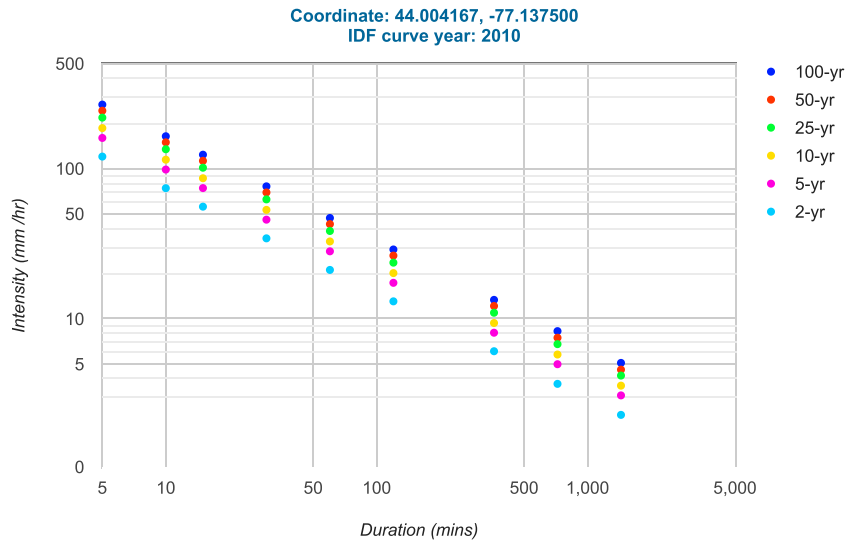
### Location summary

These are the locations in the selection.

IDF Curve: 44° 0' 15" N, 77° 8' 15" W (44.004167,-77.137500)

### Results

An IDF curve was found.



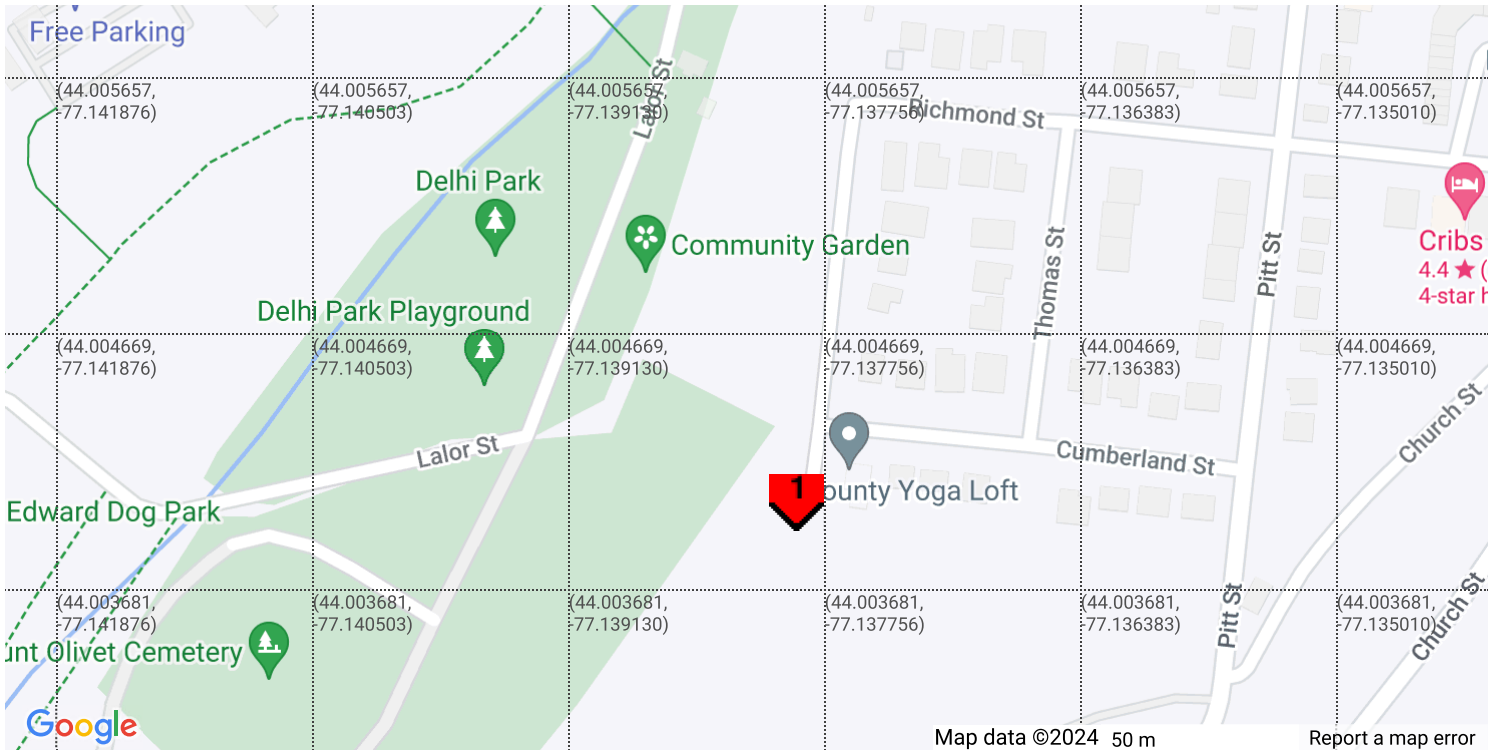
## Coordinate Selection

Current selection:

[Show Instructions](#) | [Show/hide gauging stations](#) | [Re-center selection](#) | [Upload a basin outline](#)

Latitude:  Longitude:  Return period:   -yr  
IDF curve year:  (2010 is the reference year for present day IDF curves)

[Hide Options](#)



### Coefficient summary

IDF Curve: 44° 0' 15" N, 77° 8' 15" W (44.004167,-77.137500)

Retrieved: Wed, 20 Mar 2024 15:54:12 GMT

Data year: 2010

IDF curve year: 2010

| Return period | 2-yr   | 5-yr   | 10-yr  | 25-yr  | 50-yr  | 100-yr |
|---------------|--------|--------|--------|--------|--------|--------|
| A             | 21.2   | 28.2   | 32.8   | 38.5   | 42.8   | 47.0   |
| B             | -0.699 | -0.699 | -0.699 | -0.699 | -0.699 | -0.699 |

### Statistics

#### Rainfall intensity (mm hr<sup>-1</sup>)

| Duration | 5-min | 10-min | 15-min | 30-min | 1-hr | 2-hr | 6-hr | 12-hr | 24-hr |
|----------|-------|--------|--------|--------|------|------|------|-------|-------|
| 2-yr     | 120.4 | 74.2   | 55.9   | 34.4   | 21.2 | 13.1 | 6.1  | 3.7   | 2.3   |
| 5-yr     | 160.2 | 98.7   | 74.3   | 45.8   | 28.2 | 17.4 | 8.1  | 5.0   | 3.1   |
| 10-yr    | 186.3 | 114.8  | 86.4   | 53.2   | 32.8 | 20.2 | 9.4  | 5.8   | 3.6   |
| 25-yr    | 218.7 | 134.7  | 101.5  | 62.5   | 38.5 | 23.7 | 11.0 | 6.8   | 4.2   |
| 50-yr    | 243.1 | 149.8  | 112.8  | 69.5   | 42.8 | 26.4 | 12.2 | 7.5   | 4.6   |
| 100-yr   | 267.0 | 164.4  | 123.9  | 76.3   | 47.0 | 29.0 | 13.4 | 8.3   | 5.1   |

#### Rainfall depth (mm)

| Duration | 5-min | 10-min | 15-min | 30-min | 1-hr | 2-hr | 6-hr | 12-hr | 24-hr |
|----------|-------|--------|--------|--------|------|------|------|-------|-------|
| 2-yr     | 10.0  | 12.4   | 14.0   | 17.2   | 21.2 | 26.1 | 36.4 | 44.8  | 55.2  |
| 5-yr     | 13.3  | 16.4   | 18.6   | 22.9   | 28.2 | 34.7 | 48.4 | 59.6  | 73.4  |
| 10-yr    | 15.5  | 19.1   | 21.6   | 26.6   | 32.8 | 40.4 | 56.2 | 69.3  | 85.4  |
| 25-yr    | 18.2  | 22.5   | 25.4   | 31.3   | 38.5 | 47.4 | 66.0 | 81.3  | 100.2 |
| 50-yr    | 20.3  | 25.0   | 28.2   | 34.7   | 42.8 | 52.7 | 73.4 | 90.4  | 111.4 |
| 100-yr   | 22.2  | 27.4   | 31.0   | 38.1   | 47.0 | 57.9 | 80.6 | 99.3  | 122.3 |

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Last Modified: September 2016



**PRE-DEVELOPMENT  
RUNOFF COEFFICIENT**

**Drainage Area 101 (To Delhi Park)**

| Surface Type | C    | A (Ha) | A*C   |
|--------------|------|--------|-------|
| Grass        | 0.30 | 1.612  | 0.483 |
| Composite C  |      | 1.612  | 0.300 |

**Drainage Area 102 (To Nicholas)**

| Surface Type | C    | A (Ha) | A*C   |
|--------------|------|--------|-------|
| Asphalt      | 0.90 | 0.019  | 0.017 |
| Composite C  |      | 0.019  | 0.900 |

**Summary**

| Drainage Area       | C    | A (Ha) | A*C   |
|---------------------|------|--------|-------|
| 101 (To Delhi Park) | 0.30 | 1.612  | 0.483 |
| 102 (To Nicholas)   | 0.90 | 0.019  | 0.017 |
| TOTAL               |      | 1.631  | 0.307 |



**ALLOWABLE RELEASE  
RATE CALCULATION**

**IDF set: Picton**

| <b>Return Period</b> | <b>a</b> | <b>T<sub>c</sub></b> | <b>b</b> | <b>c</b> |
|----------------------|----------|----------------------|----------|----------|
| 2-year               | 21.200   | 10                   | 0.000    | 0.699    |
| 5-year               | 28.200   | 10                   | 0.000    | 0.699    |
| 10-year              | 32.800   | 10                   | 0.000    | 0.699    |
| 25-year              | 38.500   | 10                   | 0.000    | 0.699    |
| 50-year              | 42.800   | 10                   | 0.000    | 0.699    |
| 100-year             | 47.000   | 10                   | 0.000    | 0.699    |

Where: 
$$I = \frac{a}{(t_c + b)^c}$$

**Pre-Development ID 101 Runoff Volume<sup>1</sup>**

| <b>Return Period</b> | <b>Area (Ha)</b> | <b>Composite C</b> | <b>I (mm/hr)*</b> | <b>Q (L/s)</b> |
|----------------------|------------------|--------------------|-------------------|----------------|
| 2-year               | 1.612            | 0.300              | 74.18             | 99.6           |
| 5-year               | 1.612            | 0.300              | 98.67             | 132.5          |
| 10-year              | 1.612            | 0.300              | 114.76            | 154.1          |
| 25-year              | 1.612            | 0.300              | 134.71            | 180.9          |
| 50-year              | 1.612            | 0.300              | 149.75            | 201.1          |
| 100-year             | 1.612            | 0.300              | 164.45            | 220.8          |

**Pre-Development ID 102 Runoff Volume**

| <b>Return Period</b> | <b>Area (Ha)</b> | <b>Composite C</b> | <b>I (mm/hr)*</b> | <b>Q (L/s)</b> |
|----------------------|------------------|--------------------|-------------------|----------------|
| 2-year               | 0.019            | 0.900              | 74.18             | 3.5            |
| 5-year               | 0.019            | 0.900              | 98.67             | 4.7            |
| 10-year              | 0.019            | 0.900              | 114.76            | 5.5            |
| 25-year              | 0.019            | 0.900              | 134.71            | 6.4            |
| 50-year              | 0.019            | 0.900              | 149.75            | 7.1            |
| 100-year             | 0.019            | 0.900              | 164.45            | 7.8            |

Control Storm 2-year

**Allowable Release Rate Calculation**

| <b>Drainage Area</b> | <b>Area (Ha)</b> | <b>Composite C</b> | <b>I (mm/hr)*</b> | <b>Q (L/s)</b> |
|----------------------|------------------|--------------------|-------------------|----------------|
| 101                  | 1.612            | 0.300              | 74.18             | 99.6           |
| 102                  | 0.019            | 0.900              | 74.18             | 3.5            |
| <b>TOTAL</b>         |                  |                    |                   | <b>103.1</b>   |

Where: 
$$Q = \frac{CIA}{360}$$





**POST-DEVELOPMENT  
RUNOFF COEFFICIENT**

**Drainage Area 210**

| Surface Type      | C     | A (Ha) | A*C   |
|-------------------|-------|--------|-------|
| Roof              | 0.900 | 0.210  | 0.189 |
| Asphalt/Hardscape | 0.900 | 0.289  | 0.260 |
| Grass             | 0.300 | 0.339  | 0.102 |
| Composite C       |       | 0.837  | 0.657 |

**Drainage Area 211**

| Surface Type       | C     | A (Ha) | A*C   |
|--------------------|-------|--------|-------|
| Roof               | 0.90  | 0.000  | 0.00  |
| Asphalt            | 0.900 | 0.146  | 0.132 |
| Permeable Pavement | 0.55  | 0.000  | 0.000 |
| Grass              | 0.30  | 0.000  | 0.000 |
| Gravel             | 0.40  | 0.000  | 0.000 |
| Grass              | 0.30  | 0.083  | 0.025 |
| Composite C        |       | 0.229  | 0.683 |

**Drainage Area 220**

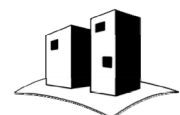
| Surface Type | C     | A (Ha) | A*C   |
|--------------|-------|--------|-------|
| Roof         | 0.900 | 0.051  | 0.046 |
| Grass        | 0.300 | 0.432  | 0.130 |
| Composite C  |       | 0.483  | 0.363 |

**Drainage Area 221**

| Surface Type | C     | A (Ha) | A*C   |
|--------------|-------|--------|-------|
| Asphalt      | 0.900 | 0.038  | 0.03  |
| Grass        | 0.300 | 0.044  | 0.013 |
| Composite C  |       | 0.082  | 0.577 |

**Summary**

| Drainage Area | C     | A (Ha) | A*C   |
|---------------|-------|--------|-------|
| 210           | 0.657 | 0.837  | 0.550 |
| 211           | 0.683 | 0.229  | 0.156 |
| 220           | 0.363 | 0.483  | 0.175 |
| 221           | 0.577 | 0.082  | 0.047 |
| <b>TOTAL</b>  |       | 1.631  | 0.570 |



**STORMWATER MANAGEMENT  
QUANTITY CONTROL SUMMARY**

**2-year Summary Matrix**

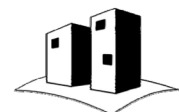
| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>2</sub></b>               | 0.657      | 0.683      | 0.363        | 0.577        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 14.0       | 16.1       | 36.1         | 9.8          | 39.8         |
| <b>Storage (m<sup>3</sup>)</b>     | 69.9       | 9.7        | 0.0          | 0.0          | 79.6         |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 14.0       | 16.1       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 36.1         | 9.8          | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |

**5-year Summary Matrix**

| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>5</sub></b>               | 0.657      | 0.683      | 0.363        | 0.577        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 16.8       | 19.0       | 48.1         | 13.0         | 48.9         |
| <b>Storage (m<sup>3</sup>)</b>     | 97.0       | 14.3       | 0.0          | 0.0          | 111.4        |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 16.8       | 19.0       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 48.1         | 13.0         | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |

**10-Year Summary Matrix**

| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>10</sub></b>              | 0.657      | 0.683      | 0.363        | 0.577        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 18.4       | 21.0       | 55.9         | 15.2         | 54.6         |
| <b>Storage (m<sup>3</sup>)</b>     | 115.9      | 17.3       | 0.0          | 0.0          | 133.2        |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 18.4       | 21.0       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 55.9         | 15.2         | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |



**STORMWATER MANAGEMENT  
QUANTITY CONTROL SUMMARY**

**25-Year Summary Matrix**

| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>25</sub></b>              | 0.723      | 0.752      | 0.399        | 0.635        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 21.7       | 24.2       | 72.2         | 19.6         | 65.5         |
| <b>Storage (m<sup>3</sup>)</b>     | 155.7      | 24.1       | 0.0          | 0.0          | 179.8        |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 21.7       | 24.2       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 72.2         | 19.6         | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |

**50-Year Summary**

| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>50</sub></b>              | 0.789      | 1.000      | 0.436        | 0.692        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 24.3       | 31.4       | 87.5         | 23.7         | 79.4         |
| <b>Storage (m<sup>3</sup>)</b>     | 195.3      | 38.3       | 0.0          | 0.0          | 233.6        |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 24.3       | 31.4       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 87.5         | 23.7         | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |

**100-Year Summary**

| <b>Drainage Area</b>               | <b>210</b> | <b>211</b> | <b>220</b>   | <b>221</b>   | <b>Total</b> |
|------------------------------------|------------|------------|--------------|--------------|--------------|
| <b>Bldg ID</b>                     |            |            |              |              |              |
| <b>C<sub>100</sub></b>             | 0.822      | 1.000      | 0.454        | 0.721        | -            |
| <b>A (Ha)</b>                      | 0.837      | 0.229      | 0.483        | 0.082        | 1.63         |
| <b>Q<sub>Release</sub> (L/s)</b>   | 26.4       | 33.5       | 100.1        | 27.1         | 87.0         |
| <b>Storage (m<sup>3</sup>)</b>     | 228.4      | 42.7       | 0.0          | 0.0          | 271.1        |
| <b>Vol. Avail. (m<sup>3</sup>)</b> | 294.0      | 32.1       | -            | -            | 326.1        |
| <b>Orifice</b>                     | 100        | 125        | Uncontrolled | Uncontrolled | -            |
| <b>Q<sub>Orifice</sub> (L/s)</b>   | 26.4       | 33.5       | -            | -            | -            |
| <b>Unctrl'd Q (L/s)</b>            | -          | -          | 100.1        | 27.1         | -            |
| <b>Orifice type</b>                | PLATE      | PLATE      | -            | -            | -            |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.84 |
| C <sub>2</sub>              | 0.66 |
| AC                          | 0.55 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 14.0 |
| Req. vol. (m <sup>3</sup> ) | 69.9 |

| <b>Picton</b> | <b>2-year</b> |
|---------------|---------------|
| a=            | 21.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 74.2             | 113.5          | 68.1              | 0.0                              | 8.4                              | 59.7                           |
| 15             | 55.9             | 85.5           | 76.9              | 0.0                              | 12.6                             | 64.3                           |
| 20             | 45.7             | 69.9           | 83.9              | 0.0                              | 16.8                             | 67.1                           |
| 25             | 39.1             | 59.8           | 89.7              | 0.0                              | 21.0                             | 68.7                           |
| 30             | 34.4             | 52.6           | 94.8              | 0.0                              | 25.2                             | 69.6                           |
| <b>35</b>      | <b>30.9</b>      | <b>47.3</b>    | <b>99.3</b>       | <b>0.0</b>                       | <b>29.4</b>                      | <b>69.9</b>                    |
| 40             | 28.1             | 43.1           | 103.3             | 0.0                              | 33.5                             | 69.8                           |
| 45             | 25.9             | 39.7           | 107.1             | 0.0                              | 37.7                             | 69.3                           |
| 50             | 24.1             | 36.8           | 110.5             | 0.0                              | 41.9                             | 68.6                           |
| 55             | 22.5             | 34.5           | 113.7             | 0.0                              | 46.1                             | 67.6                           |
| 60             | 21.2             | 32.4           | 116.7             | 0.0                              | 50.3                             | 66.4                           |
| 65             | 20.0             | 30.7           | 119.6             | 0.0                              | 54.5                             | 65.1                           |
| 70             | 19.0             | 29.1           | 122.3             | 0.0                              | 58.7                             | 63.6                           |
| 75             | 18.1             | 27.7           | 124.9             | 0.0                              | 62.9                             | 61.9                           |
| 80             | 17.3             | 26.5           | 127.3             | 0.0                              | 67.1                             | 60.2                           |
| 85             | 16.6             | 25.4           | 129.6             | 0.0                              | 71.3                             | 58.4                           |
| 90             | 16.0             | 24.4           | 131.9             | 0.0                              | 75.5                             | 56.4                           |
| 95             | 15.4             | 23.5           | 134.1             | 0.0                              | 79.7                             | 54.4                           |
| 100            | 14.8             | 22.7           | 136.1             | 0.0                              | 83.9                             | 52.3                           |
| 105            | 14.3             | 21.9           | 138.2             | 0.0                              | 88.1                             | 50.1                           |
| 110            | 13.9             | 21.2           | 140.1             | 0.0                              | 92.3                             | 47.9                           |
| 115            | 13.5             | 20.6           | 142.0             | 0.0                              | 96.5                             | 45.5                           |
| 120            | 13.1             | 20.0           | 143.8             | 0.0                              | 100.6                            | 43.2                           |
| 125            | 12.7             | 19.4           | 145.6             | 0.0                              | 104.8                            | 40.8                           |
| 130            | 12.3             | 18.9           | 147.3             | 0.0                              | 109.0                            | 38.3                           |
| 135            | 12.0             | 18.4           | 149.0             | 0.0                              | 113.2                            | 35.8                           |
| 140            | 11.7             | 17.9           | 150.7             | 0.0                              | 117.4                            | 33.2                           |
| 145            | 11.4             | 17.5           | 152.3             | 0.0                              | 121.6                            | 30.6                           |
| 150            | 11.2             | 17.1           | 153.8             | 0.0                              | 125.8                            | 28.0                           |
| 155            | 10.9             | 16.7           | 155.3             | 0.0                              | 130.0                            | 25.3                           |
| 160            | 10.7             | 16.3           | 156.8             | 0.0                              | 134.2                            | 22.6                           |
| 165            | 10.5             | 16.0           | 158.3             | 0.0                              | 138.4                            | 19.9                           |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.84 |
| C <sub>5</sub>              | 0.66 |
| AC                          | 0.55 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 16.8 |
| Req. vol. (m <sup>3</sup> ) | 97.0 |

| <b>Picton</b> | <b>5-year</b> |
|---------------|---------------|
| a=            | 28.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 98.7             | 150.9          | 90.6              | 0.0                              | 10.1                             | 80.4                           |
| 15             | 74.3             | 113.7          | 102.3             | 0.0                              | 15.2                             | 87.1                           |
| 20             | 60.8             | 93.0           | 111.6             | 0.0                              | 20.2                             | 91.3                           |
| 25             | 52.0             | 79.5           | 119.3             | 0.0                              | 25.3                             | 94.0                           |
| 30             | 45.8             | 70.0           | 126.0             | 0.0                              | 30.3                             | 95.7                           |
| 35             | 41.1             | 62.9           | 132.0             | 0.0                              | 35.4                             | 96.7                           |
| <b>40</b>      | <b>37.4</b>      | <b>57.3</b>    | <b>137.4</b>      | <b>0.0</b>                       | <b>40.4</b>                      | <b>97.0</b>                    |
| 45             | 34.5             | 52.7           | 142.4             | 0.0                              | 45.5                             | 96.9                           |
| 50             | 32.0             | 49.0           | 147.0             | 0.0                              | 50.5                             | 96.5                           |
| 55             | 30.0             | 45.8           | 151.3             | 0.0                              | 55.6                             | 95.7                           |
| 60             | 28.2             | 43.1           | 155.3             | 0.0                              | 60.6                             | 94.6                           |
| 65             | 26.7             | 40.8           | 159.1             | 0.0                              | 65.7                             | 93.4                           |
| 70             | 25.3             | 38.7           | 162.7             | 0.0                              | 70.8                             | 91.9                           |
| 75             | 24.1             | 36.9           | 166.1             | 0.0                              | 75.8                             | 90.3                           |
| 80             | 23.1             | 35.3           | 169.3             | 0.0                              | 80.9                             | 88.5                           |
| 85             | 22.1             | 33.8           | 172.5             | 0.0                              | 85.9                             | 86.5                           |
| 90             | 21.2             | 32.5           | 175.4             | 0.0                              | 91.0                             | 84.5                           |
| 95             | 20.5             | 31.3           | 178.3             | 0.0                              | 96.0                             | 82.3                           |
| 100            | 19.7             | 30.2           | 181.1             | 0.0                              | 101.1                            | 80.0                           |
| 105            | 19.1             | 29.2           | 183.8             | 0.0                              | 106.1                            | 77.6                           |
| 110            | 18.5             | 28.2           | 186.4             | 0.0                              | 111.2                            | 75.2                           |
| 115            | 17.9             | 27.4           | 188.9             | 0.0                              | 116.2                            | 72.6                           |
| 120            | 17.4             | 26.6           | 191.3             | 0.0                              | 121.3                            | 70.0                           |
| 125            | 16.9             | 25.8           | 193.7             | 0.0                              | 126.3                            | 67.3                           |
| 130            | 16.4             | 25.1           | 196.0             | 0.0                              | 131.4                            | 64.6                           |
| 135            | 16.0             | 24.5           | 198.2             | 0.0                              | 136.5                            | 61.8                           |
| 140            | 15.6             | 23.9           | 200.4             | 0.0                              | 141.5                            | 58.9                           |
| 145            | 15.2             | 23.3           | 202.5             | 0.0                              | 146.6                            | 56.0                           |
| 150            | 14.9             | 22.7           | 204.6             | 0.0                              | 151.6                            | 53.0                           |
| 155            | 14.5             | 22.2           | 206.6             | 0.0                              | 156.7                            | 50.0                           |
| 160            | 14.2             | 21.7           | 208.6             | 0.0                              | 161.7                            | 46.9                           |
| 165            | 13.9             | 21.3           | 210.6             | 0.0                              | 166.8                            | 43.8                           |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

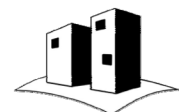
| <b>Drainage Area 210</b>         |              |
|----------------------------------|--------------|
| Area (Ha)                        | 0.84         |
| C <sub>10</sub>                  | 0.66         |
| AC                               | 0.55         |
| T <sub>c</sub> (min)             | 10.0         |
| T incr. (min)                    | 5            |
| Q <sub>1</sub> (l/s)             | 18.4         |
| <b>Req. vol. (m<sup>3</sup>)</b> | <b>115.9</b> |

| <b>Picton</b> | <b>10-year</b> |
|---------------|----------------|
| a=            | 32.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 114.8            | 175.5          | 105.3             | 0.0                              | 11.1                             | 94.3                           |
| 15             | 86.4             | 132.2          | 119.0             | 0.0                              | 16.6                             | 102.4                          |
| 20             | 70.7             | 108.1          | 129.8             | 0.0                              | 22.1                             | 107.6                          |
| 25             | 60.5             | 92.5           | 138.8             | 0.0                              | 27.6                             | 111.1                          |
| 30             | 53.2             | 81.4           | 146.6             | 0.0                              | 33.2                             | 113.4                          |
| 35             | 47.8             | 73.1           | 153.6             | 0.0                              | 38.7                             | 114.9                          |
| 40             | 43.5             | 66.6           | 159.9             | 0.0                              | 44.2                             | 115.6                          |
| <b>45</b>      | <b>40.1</b>      | <b>61.3</b>    | <b>165.6</b>      | <b>0.0</b>                       | <b>49.8</b>                      | <b>115.9</b>                   |
| 50             | 37.3             | 57.0           | 171.0             | 0.0                              | 55.3                             | 115.7                          |
| 55             | 34.9             | 53.3           | 176.0             | 0.0                              | 60.8                             | 115.1                          |
| 60             | 32.8             | 50.2           | 180.6             | 0.0                              | 66.3                             | 114.3                          |
| 65             | 31.0             | 47.4           | 185.0             | 0.0                              | 71.9                             | 113.2                          |
| 70             | 29.4             | 45.0           | 189.2             | 0.0                              | 77.4                             | 111.8                          |
| 75             | 28.1             | 42.9           | 193.2             | 0.0                              | 82.9                             | 110.2                          |
| 80             | 26.8             | 41.0           | 197.0             | 0.0                              | 88.5                             | 108.5                          |
| 85             | 25.7             | 39.3           | 200.6             | 0.0                              | 94.0                             | 106.6                          |
| 90             | 24.7             | 37.8           | 204.1             | 0.0                              | 99.5                             | 104.6                          |
| 95             | 23.8             | 36.4           | 207.4             | 0.0                              | 105.0                            | 102.4                          |
| 100            | 23.0             | 35.1           | 210.6             | 0.0                              | 110.6                            | 100.1                          |
| 105            | 22.2             | 33.9           | 213.8             | 0.0                              | 116.1                            | 97.7                           |
| 110            | 21.5             | 32.8           | 216.8             | 0.0                              | 121.6                            | 95.1                           |
| 115            | 20.8             | 31.8           | 219.7             | 0.0                              | 127.2                            | 92.5                           |
| 120            | 20.2             | 30.9           | 222.5             | 0.0                              | 132.7                            | 89.8                           |
| 125            | 19.6             | 30.0           | 225.3             | 0.0                              | 138.2                            | 87.1                           |
| 130            | 19.1             | 29.2           | 227.9             | 0.0                              | 143.7                            | 84.2                           |
| 135            | 18.6             | 28.5           | 230.6             | 0.0                              | 149.3                            | 81.3                           |
| 140            | 18.1             | 27.7           | 233.1             | 0.0                              | 154.8                            | 78.3                           |
| 145            | 17.7             | 27.1           | 235.6             | 0.0                              | 160.3                            | 75.2                           |
| 150            | 17.3             | 26.4           | 238.0             | 0.0                              | 165.9                            | 72.1                           |
| 155            | 16.9             | 25.8           | 240.3             | 0.0                              | 171.4                            | 69.0                           |
| 160            | 16.5             | 25.3           | 242.7             | 0.0                              | 176.9                            | 65.7                           |
| 165            | 16.2             | 24.7           | 244.9             | 0.0                              | 182.4                            | 62.5                           |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

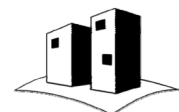
| <b>Drainage Area 210</b>         |              |
|----------------------------------|--------------|
| Area (Ha)                        | 0.84         |
| C <sub>25</sub>                  | 0.72         |
| AC                               | 0.61         |
| T <sub>c</sub> (min)             | 10.0         |
| T incr. (min)                    | 5            |
| Q <sub>1</sub> (l/s)             | 21.7         |
| <b>Req. vol. (m<sup>3</sup>)</b> | <b>155.7</b> |

| <b>Picton</b> | <b>25-year</b> |
|---------------|----------------|
| a=            | 38.5           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 134.7            | 226.7          | 136.0             | 0.0                              | 13.0                             | 123.0                          |
| 15             | 101.5            | 170.7          | 153.6             | 0.0                              | 19.5                             | 134.1                          |
| 20             | 83.0             | 139.6          | 167.5             | 0.0                              | 26.0                             | 141.5                          |
| 25             | 71.0             | 119.5          | 179.2             | 0.0                              | 32.5                             | 146.7                          |
| 30             | 62.5             | 105.2          | 189.3             | 0.0                              | 39.0                             | 150.3                          |
| 35             | 56.1             | 94.4           | 198.3             | 0.0                              | 45.5                             | 152.8                          |
| 40             | 51.1             | 86.0           | 206.4             | 0.0                              | 52.0                             | 154.4                          |
| 45             | 47.1             | 79.2           | 213.9             | 0.0                              | 58.5                             | 155.3                          |
| <b>50</b>      | <b>43.7</b>      | <b>73.6</b>    | <b>220.8</b>      | <b>0.0</b>                       | <b>65.0</b>                      | <b>155.7</b>                   |
| 55             | 40.9             | 68.8           | 227.2             | 0.0                              | 71.5                             | 155.6                          |
| 60             | 38.5             | 64.8           | 233.2             | 0.0                              | 78.0                             | 155.2                          |
| 65             | 36.4             | 61.3           | 238.9             | 0.0                              | 84.5                             | 154.4                          |
| 70             | 34.6             | 58.2           | 244.3             | 0.0                              | 91.0                             | 153.2                          |
| 75             | 32.9             | 55.4           | 249.4             | 0.0                              | 97.5                             | 151.9                          |
| 80             | 31.5             | 53.0           | 254.3             | 0.0                              | 104.0                            | 150.3                          |
| 85             | 30.2             | 50.8           | 259.0             | 0.0                              | 110.6                            | 148.4                          |
| 90             | 29.0             | 48.8           | 263.5             | 0.0                              | 117.1                            | 146.4                          |
| 95             | 27.9             | 47.0           | 267.8             | 0.0                              | 123.6                            | 144.2                          |
| 100            | 26.9             | 45.3           | 272.0             | 0.0                              | 130.1                            | 141.9                          |
| 105            | 26.0             | 43.8           | 276.0             | 0.0                              | 136.6                            | 139.4                          |
| 110            | 25.2             | 42.4           | 279.9             | 0.0                              | 143.1                            | 136.8                          |
| 115            | 24.4             | 41.1           | 283.7             | 0.0                              | 149.6                            | 134.1                          |
| 120            | 23.7             | 39.9           | 287.3             | 0.0                              | 156.1                            | 131.2                          |
| 125            | 23.0             | 38.8           | 290.9             | 0.0                              | 162.6                            | 128.3                          |
| 130            | 22.4             | 37.7           | 294.3             | 0.0                              | 169.1                            | 125.2                          |
| 135            | 21.8             | 36.8           | 297.7             | 0.0                              | 175.6                            | 122.1                          |
| 140            | 21.3             | 35.8           | 301.0             | 0.0                              | 182.1                            | 118.9                          |
| 145            | 20.8             | 35.0           | 304.2             | 0.0                              | 188.6                            | 115.6                          |
| 150            | 20.3             | 34.1           | 307.3             | 0.0                              | 195.1                            | 112.2                          |
| 155            | 19.8             | 33.4           | 310.3             | 0.0                              | 201.6                            | 108.7                          |
| 160            | 19.4             | 32.6           | 313.3             | 0.0                              | 208.1                            | 105.2                          |
| 165            | 19.0             | 31.9           | 316.2             | 0.0                              | 214.6                            | 101.6                          |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>         |              |
|----------------------------------|--------------|
| Area (Ha)                        | 0.84         |
| C <sub>50</sub>                  | 0.79         |
| AC                               | 0.66         |
| T <sub>c</sub> (min)             | 10.0         |
| T incr. (min)                    | 5            |
| Q <sub>1</sub> (l/s)             | 24.3         |
| <b>Req. vol. (m<sup>3</sup>)</b> | <b>195.3</b> |

| <b>Picton</b> | <b>50-year</b> |
|---------------|----------------|
| a=            | 42.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 149.8            | 274.9          | 164.9             | 0.0                              | 14.6                             | 150.3                          |
| 15             | 112.8            | 207.0          | 186.3             | 0.0                              | 21.9                             | 164.5                          |
| 20             | 92.2             | 169.3          | 203.2             | 0.0                              | 29.2                             | 174.0                          |
| 25             | 78.9             | 144.9          | 217.3             | 0.0                              | 36.5                             | 180.8                          |
| 30             | 69.5             | 127.5          | 229.6             | 0.0                              | 43.8                             | 185.8                          |
| 35             | 62.4             | 114.5          | 240.5             | 0.0                              | 51.0                             | 189.4                          |
| 40             | 56.8             | 104.3          | 250.3             | 0.0                              | 58.3                             | 192.0                          |
| 45             | 52.3             | 96.1           | 259.4             | 0.0                              | 65.6                             | 193.7                          |
| 50             | 48.6             | 89.2           | 267.7             | 0.0                              | 72.9                             | 194.8                          |
| 55             | 45.5             | 83.5           | 275.5             | 0.0                              | 80.2                             | 195.3                          |
| <b>60</b>      | <b>42.8</b>      | <b>78.6</b>    | <b>282.8</b>      | <b>0.0</b>                       | <b>87.5</b>                      | <b>195.3</b>                   |
| 65             | 40.5             | 74.3           | 289.7             | 0.0                              | 94.8                             | 194.9                          |
| 70             | 38.4             | 70.5           | 296.3             | 0.0                              | 102.1                            | 194.2                          |
| 75             | 36.6             | 67.2           | 302.5             | 0.0                              | 109.4                            | 193.1                          |
| 80             | 35.0             | 64.3           | 308.4             | 0.0                              | 116.7                            | 191.7                          |
| 85             | 33.6             | 61.6           | 314.1             | 0.0                              | 124.0                            | 190.1                          |
| 90             | 32.2             | 59.2           | 319.5             | 0.0                              | 131.3                            | 188.3                          |
| 95             | 31.0             | 57.0           | 324.8             | 0.0                              | 138.6                            | 186.2                          |
| 100            | 29.9             | 55.0           | 329.8             | 0.0                              | 145.8                            | 184.0                          |
| 105            | 28.9             | 53.1           | 334.7             | 0.0                              | 153.1                            | 181.6                          |
| 110            | 28.0             | 51.4           | 339.4             | 0.0                              | 160.4                            | 179.0                          |
| 115            | 27.2             | 49.9           | 344.0             | 0.0                              | 167.7                            | 176.3                          |
| 120            | 26.4             | 48.4           | 348.4             | 0.0                              | 175.0                            | 173.4                          |
| 125            | 25.6             | 47.0           | 352.7             | 0.0                              | 182.3                            | 170.4                          |
| 130            | 24.9             | 45.8           | 356.9             | 0.0                              | 189.6                            | 167.3                          |
| 135            | 24.3             | 44.6           | 361.0             | 0.0                              | 196.9                            | 164.1                          |
| 140            | 23.7             | 43.5           | 365.0             | 0.0                              | 204.2                            | 160.8                          |
| 145            | 23.1             | 42.4           | 368.9             | 0.0                              | 211.5                            | 157.4                          |
| 150            | 22.6             | 41.4           | 372.6             | 0.0                              | 218.8                            | 153.9                          |
| 155            | 22.0             | 40.5           | 376.3             | 0.0                              | 226.1                            | 150.3                          |
| 160            | 21.6             | 39.6           | 380.0             | 0.0                              | 233.3                            | 146.6                          |
| 165            | 21.1             | 38.7           | 383.5             | 0.0                              | 240.6                            | 142.9                          |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

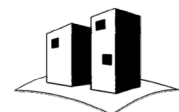
| <b>Drainage Area 210</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.84  |
| C <sub>100</sub>            | 0.82  |
| AC                          | 0.69  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 26.4  |
| Req. vol. (m <sup>3</sup> ) | 228.4 |

| <b>Picton 100-year</b> |       |
|------------------------|-------|
| a=                     | 47    |
| b=                     | 0     |
| c=                     | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| 10             | 164.4            | 314.4          | 188.7             | 0.0                              | 15.8                             | 172.8                          |
| 15             | 123.9            | 236.8          | 213.1             | 0.0                              | 23.8                             | 189.4                          |
| 20             | 101.3            | 193.7          | 232.4             | 0.0                              | 31.7                             | 200.7                          |
| 25             | 86.7             | 165.7          | 248.6             | 0.0                              | 39.6                             | 208.9                          |
| 30             | 76.3             | 145.9          | 262.6             | 0.0                              | 47.5                             | 215.0                          |
| 35             | 68.5             | 131.0          | 275.1             | 0.0                              | 55.5                             | 219.6                          |
| 40             | 62.4             | 119.3          | 286.3             | 0.0                              | 63.4                             | 222.9                          |
| 45             | 57.5             | 109.9          | 296.7             | 0.0                              | 71.3                             | 225.4                          |
| 50             | 53.4             | 102.1          | 306.2             | 0.0                              | 79.2                             | 227.0                          |
| 55             | 49.9             | 95.5           | 315.2             | 0.0                              | 87.2                             | 228.0                          |
| <b>60</b>      | <b>47.0</b>      | <b>89.9</b>    | <b>323.5</b>      | <b>0.0</b>                       | <b>95.1</b>                      | <b>228.4</b>                   |
| 65             | 44.4             | 85.0           | 331.4             | 0.0                              | 103.0                            | 228.4                          |
| 70             | 42.2             | 80.7           | 338.9             | 0.0                              | 110.9                            | 227.9                          |
| 75             | 40.2             | 76.9           | 346.0             | 0.0                              | 118.9                            | 227.1                          |
| 80             | 38.4             | 73.5           | 352.8             | 0.0                              | 126.8                            | 226.0                          |
| 85             | 36.8             | 70.4           | 359.3             | 0.0                              | 134.7                            | 224.6                          |
| 90             | 35.4             | 67.7           | 365.5             | 0.0                              | 142.6                            | 222.9                          |
| 95             | 34.1             | 65.2           | 371.5             | 0.0                              | 150.6                            | 220.9                          |
| 100            | 32.9             | 62.9           | 377.3             | 0.0                              | 158.5                            | 218.8                          |
| 105            | 31.8             | 60.8           | 382.9             | 0.0                              | 166.4                            | 216.4                          |
| 110            | 30.8             | 58.8           | 388.3             | 0.0                              | 174.3                            | 213.9                          |
| 115            | 29.8             | 57.0           | 393.5             | 0.0                              | 182.3                            | 211.2                          |
| 120            | 29.0             | 55.4           | 398.6             | 0.0                              | 190.2                            | 208.4                          |
| 125            | 28.1             | 53.8           | 403.5             | 0.0                              | 198.1                            | 205.4                          |
| 130            | 27.4             | 52.3           | 408.3             | 0.0                              | 206.0                            | 202.2                          |
| 135            | 26.7             | 51.0           | 413.0             | 0.0                              | 214.0                            | 199.0                          |
| 140            | 26.0             | 49.7           | 417.5             | 0.0                              | 221.9                            | 195.6                          |
| 145            | 25.4             | 48.5           | 421.9             | 0.0                              | 229.8                            | 192.1                          |
| 150            | 24.8             | 47.4           | 426.3             | 0.0                              | 237.7                            | 188.5                          |
| 155            | 24.2             | 46.3           | 430.5             | 0.0                              | 245.7                            | 184.8                          |
| 160            | 23.7             | 45.3           | 434.6             | 0.0                              | 253.6                            | 181.0                          |
| 165            | 23.2             | 44.3           | 438.7             | 0.0                              | 261.5                            | 177.1                          |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>2</sub>              | 0.68 |
| AC                          | 0.16 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 16.1 |
| Req. vol. (m <sup>3</sup> ) | 9.7  |

| <b>Picton</b> | <b>2-year</b> |
|---------------|---------------|
| a=            | 21.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>74.2</b>      | <b>32.2</b>    | <b>19.3</b>       | <b>0.0</b>                       | <b>9.6</b>                       | <b>9.7</b>                     |
| 15             | 55.9             | 24.3           | 21.9              | 0.0                              | 14.5                             | 7.4                            |
| 20             | 45.7             | 19.9           | 23.8              | 0.0                              | 19.3                             | 4.5                            |
| 25             | 39.1             | 17.0           | 25.5              | 0.0                              | 24.1                             | 1.4                            |
| 30             | 34.4             | 15.0           | 26.9              | 0.0                              | 28.9                             | -                              |
| 35             | 30.9             | 13.4           | 28.2              | 0.0                              | 33.8                             | -                              |
| 40             | 28.1             | 12.2           | 29.4              | 0.0                              | 38.6                             | -                              |
| 45             | 25.9             | 11.3           | 30.4              | 0.0                              | 43.4                             | -                              |
| 50             | 24.1             | 10.5           | 31.4              | 0.0                              | 48.2                             | -                              |
| 55             | 22.5             | 9.8            | 32.3              | 0.0                              | 53.0                             | -                              |
| 60             | 21.2             | 9.2            | 33.2              | 0.0                              | 57.9                             | -                              |
| 65             | 20.0             | 8.7            | 34.0              | 0.0                              | 62.7                             | -                              |
| 70             | 19.0             | 8.3            | 34.8              | 0.0                              | 67.5                             | -                              |
| 75             | 18.1             | 7.9            | 35.5              | 0.0                              | 72.3                             | -                              |
| 80             | 17.3             | 7.5            | 36.2              | 0.0                              | 77.2                             | -                              |
| 85             | 16.6             | 7.2            | 36.8              | 0.0                              | 82.0                             | -                              |
| 90             | 16.0             | 6.9            | 37.5              | 0.0                              | 86.8                             | -                              |
| 95             | 15.4             | 6.7            | 38.1              | 0.0                              | 91.6                             | -                              |
| 100            | 14.8             | 6.4            | 38.7              | 0.0                              | 96.4                             | -                              |
| 105            | 14.3             | 6.2            | 39.3              | 0.0                              | 101.3                            | -                              |
| 110            | 13.9             | 6.0            | 39.8              | 0.0                              | 106.1                            | -                              |
| 115            | 13.5             | 5.8            | 40.4              | 0.0                              | 110.9                            | -                              |
| 120            | 13.1             | 5.7            | 40.9              | 0.0                              | 115.7                            | -                              |
| 125            | 12.7             | 5.5            | 41.4              | 0.0                              | 120.6                            | -                              |
| 130            | 12.3             | 5.4            | 41.9              | 0.0                              | 125.4                            | -                              |
| 135            | 12.0             | 5.2            | 42.3              | 0.0                              | 130.2                            | -                              |
| 140            | 11.7             | 5.1            | 42.8              | 0.0                              | 135.0                            | -                              |
| 145            | 11.4             | 5.0            | 43.3              | 0.0                              | 139.8                            | -                              |
| 150            | 11.2             | 4.9            | 43.7              | 0.0                              | 144.7                            | -                              |
| 155            | 10.9             | 4.7            | 44.1              | 0.0                              | 149.5                            | -                              |
| 160            | 10.7             | 4.6            | 44.6              | 0.0                              | 154.3                            | -                              |
| 165            | 10.5             | 4.5            | 45.0              | 0.0                              | 159.1                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

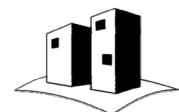
| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>5</sub>              | 0.68 |
| AC                          | 0.16 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 19.0 |
| Req. vol. (m <sup>3</sup> ) | 14.3 |

| <b>Picton</b> | <b>5-year</b> |
|---------------|---------------|
| a=            | 28.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>98.7</b>      | <b>42.9</b>    | <b>25.7</b>       | <b>0.0</b>                       | <b>11.4</b>                      | <b>14.3</b>                    |
| 15             | 74.3             | 32.3           | 29.1              | 0.0                              | 17.1                             | 12.0                           |
| 20             | 60.8             | 26.4           | 31.7              | 0.0                              | 22.8                             | 8.9                            |
| 25             | 52.0             | 22.6           | 33.9              | 0.0                              | 28.5                             | 5.4                            |
| 30             | 45.8             | 19.9           | 35.8              | 0.0                              | 34.2                             | 1.6                            |
| 35             | 41.1             | 17.9           | 37.5              | 0.0                              | 39.9                             | -                              |
| 40             | 37.4             | 16.3           | 39.1              | 0.0                              | 45.6                             | -                              |
| 45             | 34.5             | 15.0           | 40.5              | 0.0                              | 51.3                             | -                              |
| 50             | 32.0             | 13.9           | 41.8              | 0.0                              | 57.0                             | -                              |
| 55             | 30.0             | 13.0           | 43.0              | 0.0                              | 62.7                             | -                              |
| 60             | 28.2             | 12.3           | 44.1              | 0.0                              | 68.4                             | -                              |
| 65             | 26.7             | 11.6           | 45.2              | 0.0                              | 74.1                             | -                              |
| 70             | 25.3             | 11.0           | 46.2              | 0.0                              | 79.8                             | -                              |
| 75             | 24.1             | 10.5           | 47.2              | 0.0                              | 85.5                             | -                              |
| 80             | 23.1             | 10.0           | 48.1              | 0.0                              | 91.2                             | -                              |
| 85             | 22.1             | 9.6            | 49.0              | 0.0                              | 96.8                             | -                              |
| 90             | 21.2             | 9.2            | 49.9              | 0.0                              | 102.5                            | -                              |
| 95             | 20.5             | 8.9            | 50.7              | 0.0                              | 108.2                            | -                              |
| 100            | 19.7             | 8.6            | 51.5              | 0.0                              | 113.9                            | -                              |
| 105            | 19.1             | 8.3            | 52.2              | 0.0                              | 119.6                            | -                              |
| 110            | 18.5             | 8.0            | 53.0              | 0.0                              | 125.3                            | -                              |
| 115            | 17.9             | 7.8            | 53.7              | 0.0                              | 131.0                            | -                              |
| 120            | 17.4             | 7.6            | 54.4              | 0.0                              | 136.7                            | -                              |
| 125            | 16.9             | 7.3            | 55.0              | 0.0                              | 142.4                            | -                              |
| 130            | 16.4             | 7.1            | 55.7              | 0.0                              | 148.1                            | -                              |
| 135            | 16.0             | 7.0            | 56.3              | 0.0                              | 153.8                            | -                              |
| 140            | 15.6             | 6.8            | 56.9              | 0.0                              | 159.5                            | -                              |
| 145            | 15.2             | 6.6            | 57.6              | 0.0                              | 165.2                            | -                              |
| 150            | 14.9             | 6.5            | 58.1              | 0.0                              | 170.9                            | -                              |
| 155            | 14.5             | 6.3            | 58.7              | 0.0                              | 176.6                            | -                              |
| 160            | 14.2             | 6.2            | 59.3              | 0.0                              | 182.3                            | -                              |
| 165            | 13.9             | 6.0            | 59.8              | 0.0                              | 188.0                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>10</sub>             | 0.68 |
| AC                          | 0.16 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 21.0 |
| Req. vol. (m <sup>3</sup> ) | 17.3 |

| <b>Picton 10-year</b> |       |
|-----------------------|-------|
| a=                    | 32.8  |
| b=                    | 0     |
| c=                    | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>114.8</b>     | <b>49.9</b>    | <b>29.9</b>       | <b>0.0</b>                       | <b>12.6</b>                      | <b>17.3</b>                    |
| 15             | 86.4             | 37.6           | 33.8              | 0.0                              | 18.9                             | 14.9                           |
| 20             | 70.7             | 30.7           | 36.9              | 0.0                              | 25.2                             | 11.7                           |
| 25             | 60.5             | 26.3           | 39.4              | 0.0                              | 31.5                             | 8.0                            |
| 30             | 53.2             | 23.1           | 41.7              | 0.0                              | 37.8                             | 3.9                            |
| 35             | 47.8             | 20.8           | 43.6              | 0.0                              | 44.1                             | -                              |
| 40             | 43.5             | 18.9           | 45.4              | 0.0                              | 50.3                             | -                              |
| 45             | 40.1             | 17.4           | 47.1              | 0.0                              | 56.6                             | -                              |
| 50             | 37.3             | 16.2           | 48.6              | 0.0                              | 62.9                             | -                              |
| 55             | 34.9             | 15.2           | 50.0              | 0.0                              | 69.2                             | -                              |
| 60             | 32.8             | 14.3           | 51.3              | 0.0                              | 75.5                             | -                              |
| 65             | 31.0             | 13.5           | 52.6              | 0.0                              | 81.8                             | -                              |
| 70             | 29.4             | 12.8           | 53.8              | 0.0                              | 88.1                             | -                              |
| 75             | 28.1             | 12.2           | 54.9              | 0.0                              | 94.4                             | -                              |
| 80             | 26.8             | 11.7           | 56.0              | 0.0                              | 100.7                            | -                              |
| 85             | 25.7             | 11.2           | 57.0              | 0.0                              | 107.0                            | -                              |
| 90             | 24.7             | 10.7           | 58.0              | 0.0                              | 113.3                            | -                              |
| 95             | 23.8             | 10.3           | 58.9              | 0.0                              | 119.6                            | -                              |
| 100            | 23.0             | 10.0           | 59.9              | 0.0                              | 125.9                            | -                              |
| 105            | 22.2             | 9.6            | 60.7              | 0.0                              | 132.2                            | -                              |
| 110            | 21.5             | 9.3            | 61.6              | 0.0                              | 138.5                            | -                              |
| 115            | 20.8             | 9.0            | 62.4              | 0.0                              | 144.8                            | -                              |
| 120            | 20.2             | 8.8            | 63.2              | 0.0                              | 151.0                            | -                              |
| 125            | 19.6             | 8.5            | 64.0              | 0.0                              | 157.3                            | -                              |
| 130            | 19.1             | 8.3            | 64.8              | 0.0                              | 163.6                            | -                              |
| 135            | 18.6             | 8.1            | 65.5              | 0.0                              | 169.9                            | -                              |
| 140            | 18.1             | 7.9            | 66.2              | 0.0                              | 176.2                            | -                              |
| 145            | 17.7             | 7.7            | 66.9              | 0.0                              | 182.5                            | -                              |
| 150            | 17.3             | 7.5            | 67.6              | 0.0                              | 188.8                            | -                              |
| 155            | 16.9             | 7.3            | 68.3              | 0.0                              | 195.1                            | -                              |
| 160            | 16.5             | 7.2            | 69.0              | 0.0                              | 201.4                            | -                              |
| 165            | 16.2             | 7.0            | 69.6              | 0.0                              | 207.7                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>25</sub>             | 0.75 |
| AC                          | 0.17 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 24.2 |
| Req. vol. (m <sup>3</sup> ) | 24.1 |

| <b>Picton 25-year</b> |       |
|-----------------------|-------|
| a=                    | 38.5  |
| b=                    | 0     |
| c=                    | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>134.7</b>     | <b>64.4</b>    | <b>38.6</b>       | <b>0.0</b>                       | <b>14.5</b>                      | <b>24.1</b>                    |
| 15             | 101.5            | 48.5           | 43.7              | 0.0                              | 21.8                             | 21.8                           |
| 20             | 83.0             | 39.7           | 47.6              | 0.0                              | 29.1                             | 18.5                           |
| 25             | 71.0             | 33.9           | 50.9              | 0.0                              | 36.4                             | 14.6                           |
| 30             | 62.5             | 29.9           | 53.8              | 0.0                              | 43.6                             | 10.2                           |
| 35             | 56.1             | 26.8           | 56.3              | 0.0                              | 50.9                             | 5.4                            |
| 40             | 51.1             | 24.4           | 58.7              | 0.0                              | 58.2                             | 0.5                            |
| 45             | 47.1             | 22.5           | 60.8              | 0.0                              | 65.5                             | -                              |
| 50             | 43.7             | 20.9           | 62.7              | 0.0                              | 72.7                             | -                              |
| 55             | 40.9             | 19.6           | 64.6              | 0.0                              | 80.0                             | -                              |
| 60             | 38.5             | 18.4           | 66.3              | 0.0                              | 87.3                             | -                              |
| 65             | 36.4             | 17.4           | 67.9              | 0.0                              | 94.6                             | -                              |
| 70             | 34.6             | 16.5           | 69.4              | 0.0                              | 101.8                            | -                              |
| 75             | 32.9             | 15.8           | 70.9              | 0.0                              | 109.1                            | -                              |
| 80             | 31.5             | 15.1           | 72.3              | 0.0                              | 116.4                            | -                              |
| 85             | 30.2             | 14.4           | 73.6              | 0.0                              | 123.6                            | -                              |
| 90             | 29.0             | 13.9           | 74.9              | 0.0                              | 130.9                            | -                              |
| 95             | 27.9             | 13.4           | 76.1              | 0.0                              | 138.2                            | -                              |
| 100            | 26.9             | 12.9           | 77.3              | 0.0                              | 145.5                            | -                              |
| 105            | 26.0             | 12.4           | 78.4              | 0.0                              | 152.7                            | -                              |
| 110            | 25.2             | 12.1           | 79.5              | 0.0                              | 160.0                            | -                              |
| 115            | 24.4             | 11.7           | 80.6              | 0.0                              | 167.3                            | -                              |
| 120            | 23.7             | 11.3           | 81.6              | 0.0                              | 174.6                            | -                              |
| 125            | 23.0             | 11.0           | 82.7              | 0.0                              | 181.8                            | -                              |
| 130            | 22.4             | 10.7           | 83.6              | 0.0                              | 189.1                            | -                              |
| 135            | 21.8             | 10.4           | 84.6              | 0.0                              | 196.4                            | -                              |
| 140            | 21.3             | 10.2           | 85.5              | 0.0                              | 203.7                            | -                              |
| 145            | 20.8             | 9.9            | 86.4              | 0.0                              | 210.9                            | -                              |
| 150            | 20.3             | 9.7            | 87.3              | 0.0                              | 218.2                            | -                              |
| 155            | 19.8             | 9.5            | 88.2              | 0.0                              | 225.5                            | -                              |
| 160            | 19.4             | 9.3            | 89.0              | 0.0                              | 232.7                            | -                              |
| 165            | 19.0             | 9.1            | 89.9              | 0.0                              | 240.0                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>50</sub>             | 1.00 |
| AC                          | 0.23 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 31.4 |
| Req. vol. (m <sup>3</sup> ) | 38.3 |

| <b>Picton</b> | <b>50-year</b> |
|---------------|----------------|
| a=            | 42.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>149.8</b>     | <b>95.3</b>    | <b>57.2</b>       | <b>0.0</b>                       | <b>18.8</b>                      | <b>38.3</b>                    |
| 15             | 112.8            | 71.7           | 64.6              | 0.0                              | 28.3                             | 36.3                           |
| 20             | 92.2             | 58.7           | 70.4              | 0.0                              | 37.7                             | 32.7                           |
| 25             | 78.9             | 50.2           | 75.3              | 0.0                              | 47.1                             | 28.2                           |
| 30             | 69.5             | 44.2           | 79.5              | 0.0                              | 56.5                             | 23.0                           |
| 35             | 62.4             | 39.7           | 83.3              | 0.0                              | 65.9                             | 17.4                           |
| 40             | 56.8             | 36.1           | 86.7              | 0.0                              | 75.3                             | 11.4                           |
| 45             | 52.3             | 33.3           | 89.9              | 0.0                              | 84.8                             | 5.1                            |
| 50             | 48.6             | 30.9           | 92.8              | 0.0                              | 94.2                             | -                              |
| 55             | 45.5             | 28.9           | 95.5              | 0.0                              | 103.6                            | -                              |
| 60             | 42.8             | 27.2           | 98.0              | 0.0                              | 113.0                            | -                              |
| 65             | 40.5             | 25.7           | 100.4             | 0.0                              | 122.4                            | -                              |
| 70             | 38.4             | 24.4           | 102.7             | 0.0                              | 131.8                            | -                              |
| 75             | 36.6             | 23.3           | 104.8             | 0.0                              | 141.3                            | -                              |
| 80             | 35.0             | 22.3           | 106.9             | 0.0                              | 150.7                            | -                              |
| 85             | 33.6             | 21.3           | 108.8             | 0.0                              | 160.1                            | -                              |
| 90             | 32.2             | 20.5           | 110.7             | 0.0                              | 169.5                            | -                              |
| 95             | 31.0             | 19.7           | 112.5             | 0.0                              | 178.9                            | -                              |
| 100            | 29.9             | 19.0           | 114.3             | 0.0                              | 188.3                            | -                              |
| 105            | 28.9             | 18.4           | 116.0             | 0.0                              | 197.8                            | -                              |
| 110            | 28.0             | 17.8           | 117.6             | 0.0                              | 207.2                            | -                              |
| 115            | 27.2             | 17.3           | 119.2             | 0.0                              | 216.6                            | -                              |
| 120            | 26.4             | 16.8           | 120.7             | 0.0                              | 226.0                            | -                              |
| 125            | 25.6             | 16.3           | 122.2             | 0.0                              | 235.4                            | -                              |
| 130            | 24.9             | 15.9           | 123.7             | 0.0                              | 244.8                            | -                              |
| 135            | 24.3             | 15.4           | 125.1             | 0.0                              | 254.3                            | -                              |
| 140            | 23.7             | 15.1           | 126.5             | 0.0                              | 263.7                            | -                              |
| 145            | 23.1             | 14.7           | 127.8             | 0.0                              | 273.1                            | -                              |
| 150            | 22.6             | 14.3           | 129.1             | 0.0                              | 282.5                            | -                              |
| 155            | 22.0             | 14.0           | 130.4             | 0.0                              | 291.9                            | -                              |
| 160            | 21.6             | 13.7           | 131.7             | 0.0                              | 301.3                            | -                              |
| 165            | 21.1             | 13.4           | 132.9             | 0.0                              | 310.8                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 210</b>    |      |
|-----------------------------|------|
| Area (Ha)                   | 0.23 |
| C <sub>100</sub>            | 1.00 |
| AC                          | 0.23 |
| T <sub>c</sub> (min)        | 10.0 |
| T incr. (min)               | 5    |
| Q <sub>1</sub> (l/s)        | 33.5 |
| Req. vol. (m <sup>3</sup> ) | 42.7 |

| <b>Picton 100-year</b> |       |
|------------------------|-------|
| a=                     | 47    |
| b=                     | 0     |
| c=                     | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>164.4</b>     | <b>104.6</b>   | <b>62.8</b>       | <b>0.0</b>                       | <b>20.1</b>                      | <b>42.7</b>                    |
| 15             | 123.9            | 78.8           | 70.9              | 0.0                              | 30.1                             | 40.8                           |
| 20             | 101.3            | 64.4           | 77.3              | 0.0                              | 40.2                             | 37.1                           |
| 25             | 86.7             | 55.1           | 82.7              | 0.0                              | 50.2                             | 32.5                           |
| 30             | 76.3             | 48.5           | 87.4              | 0.0                              | 60.3                             | 27.1                           |
| 35             | 68.5             | 43.6           | 91.5              | 0.0                              | 70.3                             | 21.2                           |
| 40             | 62.4             | 39.7           | 95.3              | 0.0                              | 80.4                             | 14.9                           |
| 45             | 57.5             | 36.6           | 98.7              | 0.0                              | 90.4                             | 8.3                            |
| 50             | 53.4             | 34.0           | 101.9             | 0.0                              | 100.5                            | 1.4                            |
| 55             | 49.9             | 31.8           | 104.8             | 0.0                              | 110.5                            | -                              |
| 60             | 47.0             | 29.9           | 107.6             | 0.0                              | 120.6                            | -                              |
| 65             | 44.4             | 28.3           | 110.2             | 0.0                              | 130.6                            | -                              |
| 70             | 42.2             | 26.8           | 112.7             | 0.0                              | 140.7                            | -                              |
| 75             | 40.2             | 25.6           | 115.1             | 0.0                              | 150.7                            | -                              |
| 80             | 38.4             | 24.4           | 117.4             | 0.0                              | 160.8                            | -                              |
| 85             | 36.8             | 23.4           | 119.5             | 0.0                              | 170.8                            | -                              |
| 90             | 35.4             | 22.5           | 121.6             | 0.0                              | 180.8                            | -                              |
| 95             | 34.1             | 21.7           | 123.6             | 0.0                              | 190.9                            | -                              |
| 100            | 32.9             | 20.9           | 125.5             | 0.0                              | 200.9                            | -                              |
| 105            | 31.8             | 20.2           | 127.4             | 0.0                              | 211.0                            | -                              |
| 110            | 30.8             | 19.6           | 129.2             | 0.0                              | 221.0                            | -                              |
| 115            | 29.8             | 19.0           | 130.9             | 0.0                              | 231.1                            | -                              |
| 120            | 29.0             | 18.4           | 132.6             | 0.0                              | 241.1                            | -                              |
| 125            | 28.1             | 17.9           | 134.2             | 0.0                              | 251.2                            | -                              |
| 130            | 27.4             | 17.4           | 135.8             | 0.0                              | 261.2                            | -                              |
| 135            | 26.7             | 17.0           | 137.4             | 0.0                              | 271.3                            | -                              |
| 140            | 26.0             | 16.5           | 138.9             | 0.0                              | 281.3                            | -                              |
| 145            | 25.4             | 16.1           | 140.4             | 0.0                              | 291.4                            | -                              |
| 150            | 24.8             | 15.8           | 141.8             | 0.0                              | 301.4                            | -                              |
| 155            | 24.2             | 15.4           | 143.2             | 0.0                              | 311.5                            | -                              |
| 160            | 23.7             | 15.1           | 144.6             | 0.0                              | 321.5                            | -                              |
| 165            | 23.2             | 14.7           | 145.9             | 0.0                              | 331.6                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>2</sub>              | 0.363 |
| AC                          | 0.18  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 36.1  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>2-year</b> |
|---------------|---------------|
| a=            | 21.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>74.2</b>      | <b>36.1</b>    | <b>21.7</b>       | <b>0.0</b>                       | <b>21.7</b>                      | <b>0.0</b>                     |
| 15             | 55.9             | 27.2           | 24.5              | 0.0                              | 32.5                             | -                              |
| 20             | 45.7             | 22.3           | 26.7              | 0.0                              | 43.3                             | -                              |
| 25             | 39.1             | 19.0           | 28.6              | 0.0                              | 54.2                             | -                              |
| 30             | 34.4             | 16.8           | 30.2              | 0.0                              | 65.0                             | -                              |
| 35             | 30.9             | 15.1           | 31.6              | 0.0                              | 75.9                             | -                              |
| 40             | 28.1             | 13.7           | 32.9              | 0.0                              | 86.7                             | -                              |
| 45             | 25.9             | 12.6           | 34.1              | 0.0                              | 97.5                             | -                              |
| 50             | 24.1             | 11.7           | 35.2              | 0.0                              | 108.4                            | -                              |
| 55             | 22.5             | 11.0           | 36.2              | 0.0                              | 119.2                            | -                              |
| 60             | 21.2             | 10.3           | 37.2              | 0.0                              | 130.0                            | -                              |
| 65             | 20.0             | 9.8            | 38.1              | 0.0                              | 140.9                            | -                              |
| 70             | 19.0             | 9.3            | 38.9              | 0.0                              | 151.7                            | -                              |
| 75             | 18.1             | 8.8            | 39.8              | 0.0                              | 162.5                            | -                              |
| 80             | 17.3             | 8.4            | 40.5              | 0.0                              | 173.4                            | -                              |
| 85             | 16.6             | 8.1            | 41.3              | 0.0                              | 184.2                            | -                              |
| 90             | 16.0             | 7.8            | 42.0              | 0.0                              | 195.0                            | -                              |
| 95             | 15.4             | 7.5            | 42.7              | 0.0                              | 205.9                            | -                              |
| 100            | 14.8             | 7.2            | 43.4              | 0.0                              | 216.7                            | -                              |
| 105            | 14.3             | 7.0            | 44.0              | 0.0                              | 227.6                            | -                              |
| 110            | 13.9             | 6.8            | 44.6              | 0.0                              | 238.4                            | -                              |
| 115            | 13.5             | 6.6            | 45.2              | 0.0                              | 249.2                            | -                              |
| 120            | 13.1             | 6.4            | 45.8              | 0.0                              | 260.1                            | -                              |
| 125            | 12.7             | 6.2            | 46.4              | 0.0                              | 270.9                            | -                              |
| 130            | 12.3             | 6.0            | 46.9              | 0.0                              | 281.7                            | -                              |
| 135            | 12.0             | 5.9            | 47.4              | 0.0                              | 292.6                            | -                              |
| 140            | 11.7             | 5.7            | 48.0              | 0.0                              | 303.4                            | -                              |
| 145            | 11.4             | 5.6            | 48.5              | 0.0                              | 314.2                            | -                              |
| 150            | 11.2             | 5.4            | 49.0              | 0.0                              | 325.1                            | -                              |
| 155            | 10.9             | 5.3            | 49.5              | 0.0                              | 335.9                            | -                              |
| 160            | 10.7             | 5.2            | 49.9              | 0.0                              | 346.8                            | -                              |
| 165            | 10.5             | 5.1            | 50.4              | 0.0                              | 357.6                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

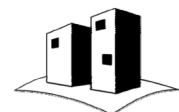
| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>5</sub>              | 0.363 |
| AC                          | 0.18  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 48.1  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>5-year</b> |
|---------------|---------------|
| a=            | 28.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>98.7</b>      | <b>48.1</b>    | <b>28.8</b>       | <b>0.0</b>                       | <b>28.8</b>                      | <b>0.0</b>                     |
| 15             | 74.3             | 36.2           | 32.6              | 0.0                              | 43.2                             | -                              |
| 20             | 60.8             | 29.6           | 35.5              | 0.0                              | 57.7                             | -                              |
| 25             | 52.0             | 25.3           | 38.0              | 0.0                              | 72.1                             | -                              |
| 30             | 45.8             | 22.3           | 40.1              | 0.0                              | 86.5                             | -                              |
| 35             | 41.1             | 20.0           | 42.0              | 0.0                              | 100.9                            | -                              |
| 40             | 37.4             | 18.2           | 43.8              | 0.0                              | 115.3                            | -                              |
| 45             | 34.5             | 16.8           | 45.3              | 0.0                              | 129.7                            | -                              |
| 50             | 32.0             | 15.6           | 46.8              | 0.0                              | 144.2                            | -                              |
| 55             | 30.0             | 14.6           | 48.2              | 0.0                              | 158.6                            | -                              |
| 60             | 28.2             | 13.7           | 49.4              | 0.0                              | 173.0                            | -                              |
| 65             | 26.7             | 13.0           | 50.7              | 0.0                              | 187.4                            | -                              |
| 70             | 25.3             | 12.3           | 51.8              | 0.0                              | 201.8                            | -                              |
| 75             | 24.1             | 11.8           | 52.9              | 0.0                              | 216.2                            | -                              |
| 80             | 23.1             | 11.2           | 53.9              | 0.0                              | 230.6                            | -                              |
| 85             | 22.1             | 10.8           | 54.9              | 0.0                              | 245.1                            | -                              |
| 90             | 21.2             | 10.3           | 55.9              | 0.0                              | 259.5                            | -                              |
| 95             | 20.5             | 10.0           | 56.8              | 0.0                              | 273.9                            | -                              |
| 100            | 19.7             | 9.6            | 57.7              | 0.0                              | 288.3                            | -                              |
| 105            | 19.1             | 9.3            | 58.5              | 0.0                              | 302.7                            | -                              |
| 110            | 18.5             | 9.0            | 59.3              | 0.0                              | 317.1                            | -                              |
| 115            | 17.9             | 8.7            | 60.1              | 0.0                              | 331.5                            | -                              |
| 120            | 17.4             | 8.5            | 60.9              | 0.0                              | 346.0                            | -                              |
| 125            | 16.9             | 8.2            | 61.7              | 0.0                              | 360.4                            | -                              |
| 130            | 16.4             | 8.0            | 62.4              | 0.0                              | 374.8                            | -                              |
| 135            | 16.0             | 7.8            | 63.1              | 0.0                              | 389.2                            | -                              |
| 140            | 15.6             | 7.6            | 63.8              | 0.0                              | 403.6                            | -                              |
| 145            | 15.2             | 7.4            | 64.5              | 0.0                              | 418.0                            | -                              |
| 150            | 14.9             | 7.2            | 65.1              | 0.0                              | 432.5                            | -                              |
| 155            | 14.5             | 7.1            | 65.8              | 0.0                              | 446.9                            | -                              |
| 160            | 14.2             | 6.9            | 66.4              | 0.0                              | 461.3                            | -                              |
| 165            | 13.9             | 6.8            | 67.0              | 0.0                              | 475.7                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

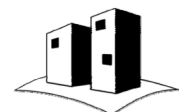
| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>10</sub>             | 0.363 |
| AC                          | 0.18  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 55.9  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton 10-year</b> |       |
|-----------------------|-------|
| a=                    | 32.8  |
| b=                    | 0     |
| c=                    | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>114.8</b>     | <b>55.9</b>    | <b>33.5</b>       | <b>0.0</b>                       | <b>33.5</b>                      | <b>0.0</b>                     |
| 15             | 86.4             | 42.1           | 37.9              | 0.0                              | 50.3                             | -                              |
| 20             | 70.7             | 34.4           | 41.3              | 0.0                              | 67.1                             | -                              |
| 25             | 60.5             | 29.5           | 44.2              | 0.0                              | 83.8                             | -                              |
| 30             | 53.2             | 25.9           | 46.7              | 0.0                              | 100.6                            | -                              |
| 35             | 47.8             | 23.3           | 48.9              | 0.0                              | 117.4                            | -                              |
| 40             | 43.5             | 21.2           | 50.9              | 0.0                              | 134.1                            | -                              |
| 45             | 40.1             | 19.5           | 52.7              | 0.0                              | 150.9                            | -                              |
| 50             | 37.3             | 18.1           | 54.4              | 0.0                              | 167.7                            | -                              |
| 55             | 34.9             | 17.0           | 56.0              | 0.0                              | 184.4                            | -                              |
| 60             | 32.8             | 16.0           | 57.5              | 0.0                              | 201.2                            | -                              |
| 65             | 31.0             | 15.1           | 58.9              | 0.0                              | 218.0                            | -                              |
| 70             | 29.4             | 14.3           | 60.2              | 0.0                              | 234.7                            | -                              |
| 75             | 28.1             | 13.7           | 61.5              | 0.0                              | 251.5                            | -                              |
| 80             | 26.8             | 13.1           | 62.7              | 0.0                              | 268.3                            | -                              |
| 85             | 25.7             | 12.5           | 63.9              | 0.0                              | 285.0                            | -                              |
| 90             | 24.7             | 12.0           | 65.0              | 0.0                              | 301.8                            | -                              |
| 95             | 23.8             | 11.6           | 66.0              | 0.0                              | 318.6                            | -                              |
| 100            | 23.0             | 11.2           | 67.1              | 0.0                              | 335.3                            | -                              |
| 105            | 22.2             | 10.8           | 68.1              | 0.0                              | 352.1                            | -                              |
| 110            | 21.5             | 10.5           | 69.0              | 0.0                              | 368.9                            | -                              |
| 115            | 20.8             | 10.1           | 70.0              | 0.0                              | 385.6                            | -                              |
| 120            | 20.2             | 9.8            | 70.9              | 0.0                              | 402.4                            | -                              |
| 125            | 19.6             | 9.6            | 71.7              | 0.0                              | 419.2                            | -                              |
| 130            | 19.1             | 9.3            | 72.6              | 0.0                              | 435.9                            | -                              |
| 135            | 18.6             | 9.1            | 73.4              | 0.0                              | 452.7                            | -                              |
| 140            | 18.1             | 8.8            | 74.2              | 0.0                              | 469.5                            | -                              |
| 145            | 17.7             | 8.6            | 75.0              | 0.0                              | 486.2                            | -                              |
| 150            | 17.3             | 8.4            | 75.8              | 0.0                              | 503.0                            | -                              |
| 155            | 16.9             | 8.2            | 76.5              | 0.0                              | 519.8                            | -                              |
| 160            | 16.5             | 8.0            | 77.3              | 0.0                              | 536.5                            | -                              |
| 165            | 16.2             | 7.9            | 78.0              | 0.0                              | 553.3                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>25</sub>             | 0.399 |
| AC                          | 0.19  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 72.2  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton 25-year</b> |       |
|-----------------------|-------|
| a=                    | 38.5  |
| b=                    | 0     |
| c=                    | 0.699 |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>134.7</b>     | <b>72.2</b>    | <b>43.3</b>       | <b>0.0</b>                       | <b>43.3</b>                      | <b>0.0</b>                     |
| 15             | 101.5            | 54.4           | 48.9              | 0.0                              | 65.0                             | -                              |
| 20             | 83.0             | 44.5           | 53.3              | 0.0                              | 86.6                             | -                              |
| 25             | 71.0             | 38.0           | 57.1              | 0.0                              | 108.3                            | -                              |
| 30             | 62.5             | 33.5           | 60.3              | 0.0                              | 129.9                            | -                              |
| 35             | 56.1             | 30.1           | 63.1              | 0.0                              | 151.6                            | -                              |
| 40             | 51.1             | 27.4           | 65.7              | 0.0                              | 173.2                            | -                              |
| 45             | 47.1             | 25.2           | 68.1              | 0.0                              | 194.9                            | -                              |
| 50             | 43.7             | 23.4           | 70.3              | 0.0                              | 216.5                            | -                              |
| 55             | 40.9             | 21.9           | 72.3              | 0.0                              | 238.2                            | -                              |
| 60             | 38.5             | 20.6           | 74.3              | 0.0                              | 259.8                            | -                              |
| 65             | 36.4             | 19.5           | 76.1              | 0.0                              | 281.5                            | -                              |
| 70             | 34.6             | 18.5           | 77.8              | 0.0                              | 303.1                            | -                              |
| 75             | 32.9             | 17.6           | 79.4              | 0.0                              | 324.8                            | -                              |
| 80             | 31.5             | 16.9           | 81.0              | 0.0                              | 346.4                            | -                              |
| 85             | 30.2             | 16.2           | 82.5              | 0.0                              | 368.1                            | -                              |
| 90             | 29.0             | 15.5           | 83.9              | 0.0                              | 389.7                            | -                              |
| 95             | 27.9             | 15.0           | 85.3              | 0.0                              | 411.4                            | -                              |
| 100            | 26.9             | 14.4           | 86.6              | 0.0                              | 433.0                            | -                              |
| 105            | 26.0             | 13.9           | 87.9              | 0.0                              | 454.7                            | -                              |
| 110            | 25.2             | 13.5           | 89.1              | 0.0                              | 476.3                            | -                              |
| 115            | 24.4             | 13.1           | 90.3              | 0.0                              | 498.0                            | -                              |
| 120            | 23.7             | 12.7           | 91.5              | 0.0                              | 519.6                            | -                              |
| 125            | 23.0             | 12.3           | 92.6              | 0.0                              | 541.3                            | -                              |
| 130            | 22.4             | 12.0           | 93.7              | 0.0                              | 562.9                            | -                              |
| 135            | 21.8             | 11.7           | 94.8              | 0.0                              | 584.6                            | -                              |
| 140            | 21.3             | 11.4           | 95.8              | 0.0                              | 606.2                            | -                              |
| 145            | 20.8             | 11.1           | 96.8              | 0.0                              | 627.9                            | -                              |
| 150            | 20.3             | 10.9           | 97.8              | 0.0                              | 649.5                            | -                              |
| 155            | 19.8             | 10.6           | 98.8              | 0.0                              | 671.2                            | -                              |
| 160            | 19.4             | 10.4           | 99.8              | 0.0                              | 692.8                            | -                              |
| 165            | 19.0             | 10.2           | 100.7             | 0.0                              | 714.5                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>50</sub>             | 0.436 |
| AC                          | 0.21  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 87.5  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>50-year</b> |
|---------------|----------------|
| a=            | 42.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>149.8</b>     | <b>87.5</b>    | <b>52.5</b>       | <b>0.0</b>                       | <b>52.5</b>                      | <b>0.0</b>                     |
| 15             | 112.8            | 65.9           | 59.3              | 0.0                              | 78.8                             | -                              |
| 20             | 92.2             | 53.9           | 64.7              | 0.0                              | 105.0                            | -                              |
| 25             | 78.9             | 46.1           | 69.2              | 0.0                              | 131.3                            | -                              |
| 30             | 69.5             | 40.6           | 73.1              | 0.0                              | 157.5                            | -                              |
| 35             | 62.4             | 36.5           | 76.6              | 0.0                              | 183.8                            | -                              |
| 40             | 56.8             | 33.2           | 79.7              | 0.0                              | 210.0                            | -                              |
| 45             | 52.3             | 30.6           | 82.6              | 0.0                              | 236.3                            | -                              |
| 50             | 48.6             | 28.4           | 85.2              | 0.0                              | 262.6                            | -                              |
| 55             | 45.5             | 26.6           | 87.7              | 0.0                              | 288.8                            | -                              |
| 60             | 42.8             | 25.0           | 90.1              | 0.0                              | 315.1                            | -                              |
| 65             | 40.5             | 23.7           | 92.3              | 0.0                              | 341.3                            | -                              |
| 70             | 38.4             | 22.5           | 94.3              | 0.0                              | 367.6                            | -                              |
| 75             | 36.6             | 21.4           | 96.3              | 0.0                              | 393.8                            | -                              |
| 80             | 35.0             | 20.5           | 98.2              | 0.0                              | 420.1                            | -                              |
| 85             | 33.6             | 19.6           | 100.0             | 0.0                              | 446.4                            | -                              |
| 90             | 32.2             | 18.8           | 101.7             | 0.0                              | 472.6                            | -                              |
| 95             | 31.0             | 18.1           | 103.4             | 0.0                              | 498.9                            | -                              |
| 100            | 29.9             | 17.5           | 105.0             | 0.0                              | 525.1                            | -                              |
| 105            | 28.9             | 16.9           | 106.6             | 0.0                              | 551.4                            | -                              |
| 110            | 28.0             | 16.4           | 108.1             | 0.0                              | 577.6                            | -                              |
| 115            | 27.2             | 15.9           | 109.5             | 0.0                              | 603.9                            | -                              |
| 120            | 26.4             | 15.4           | 110.9             | 0.0                              | 630.1                            | -                              |
| 125            | 25.6             | 15.0           | 112.3             | 0.0                              | 656.4                            | -                              |
| 130            | 24.9             | 14.6           | 113.7             | 0.0                              | 682.7                            | -                              |
| 135            | 24.3             | 14.2           | 115.0             | 0.0                              | 708.9                            | -                              |
| 140            | 23.7             | 13.8           | 116.2             | 0.0                              | 735.2                            | -                              |
| 145            | 23.1             | 13.5           | 117.5             | 0.0                              | 761.4                            | -                              |
| 150            | 22.6             | 13.2           | 118.7             | 0.0                              | 787.7                            | -                              |
| 155            | 22.0             | 12.9           | 119.8             | 0.0                              | 813.9                            | -                              |
| 160            | 21.6             | 12.6           | 121.0             | 0.0                              | 840.2                            | -                              |
| 165            | 21.1             | 12.3           | 122.1             | 0.0                              | 866.4                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

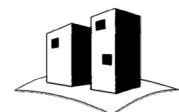
| <b>Drainage Area 220</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.483 |
| C <sub>100</sub>            | 0.454 |
| AC                          | 0.22  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 100.1 |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>100-year</b> |
|---------------|-----------------|
| a=            | 47              |
| b=            | 0               |
| c=            | 0.699           |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>164.4</b>     | <b>100.1</b>   | <b>60.1</b>       | <b>0.0</b>                       | <b>60.1</b>                      | <b>0.0</b>                     |
| 15             | 123.9            | 75.4           | 67.9              | 0.0                              | 90.1                             | -                              |
| 20             | 101.3            | 61.7           | 74.0              | 0.0                              | 120.1                            | -                              |
| 25             | 86.7             | 52.8           | 79.1              | 0.0                              | 150.2                            | -                              |
| 30             | 76.3             | 46.5           | 83.6              | 0.0                              | 180.2                            | -                              |
| 35             | 68.5             | 41.7           | 87.6              | 0.0                              | 210.2                            | -                              |
| 40             | 62.4             | 38.0           | 91.2              | 0.0                              | 240.3                            | -                              |
| 45             | 57.5             | 35.0           | 94.5              | 0.0                              | 270.3                            | -                              |
| 50             | 53.4             | 32.5           | 97.5              | 0.0                              | 300.3                            | -                              |
| 55             | 49.9             | 30.4           | 100.3             | 0.0                              | 330.4                            | -                              |
| 60             | 47.0             | 28.6           | 103.0             | 0.0                              | 360.4                            | -                              |
| 65             | 44.4             | 27.1           | 105.5             | 0.0                              | 390.4                            | -                              |
| 70             | 42.2             | 25.7           | 107.9             | 0.0                              | 420.5                            | -                              |
| 75             | 40.2             | 24.5           | 110.2             | 0.0                              | 450.5                            | -                              |
| 80             | 38.4             | 23.4           | 112.3             | 0.0                              | 480.5                            | -                              |
| 85             | 36.8             | 22.4           | 114.4             | 0.0                              | 510.6                            | -                              |
| 90             | 35.4             | 21.6           | 116.4             | 0.0                              | 540.6                            | -                              |
| 95             | 34.1             | 20.8           | 118.3             | 0.0                              | 570.6                            | -                              |
| 100            | 32.9             | 20.0           | 120.1             | 0.0                              | 600.7                            | -                              |
| 105            | 31.8             | 19.4           | 121.9             | 0.0                              | 630.7                            | -                              |
| 110            | 30.8             | 18.7           | 123.6             | 0.0                              | 660.7                            | -                              |
| 115            | 29.8             | 18.2           | 125.3             | 0.0                              | 690.8                            | -                              |
| 120            | 29.0             | 17.6           | 126.9             | 0.0                              | 720.8                            | -                              |
| 125            | 28.1             | 17.1           | 128.5             | 0.0                              | 750.8                            | -                              |
| 130            | 27.4             | 16.7           | 130.0             | 0.0                              | 780.9                            | -                              |
| 135            | 26.7             | 16.2           | 131.5             | 0.0                              | 810.9                            | -                              |
| 140            | 26.0             | 15.8           | 132.9             | 0.0                              | 840.9                            | -                              |
| 145            | 25.4             | 15.4           | 134.3             | 0.0                              | 871.0                            | -                              |
| 150            | 24.8             | 15.1           | 135.7             | 0.0                              | 901.0                            | -                              |
| 155            | 24.2             | 14.7           | 137.1             | 0.0                              | 931.0                            | -                              |
| 160            | 23.7             | 14.4           | 138.4             | 0.0                              | 961.1                            | -                              |
| 165            | 23.2             | 14.1           | 139.7             | 0.0                              | 991.1                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>2</sub>              | 0.577 |
| AC                          | 0.05  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 9.8   |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>2-year</b> |
|---------------|---------------|
| a=            | 21.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>74.2</b>      | <b>9.8</b>     | <b>5.9</b>        | <b>0.0</b>                       | <b>5.9</b>                       | <b>0.0</b>                     |
| 15             | 55.9             | 7.4            | 6.6               | 0.0                              | 8.8                              | -                              |
| 20             | 45.7             | 6.0            | 7.2               | 0.0                              | 11.7                             | -                              |
| 25             | 39.1             | 5.2            | 7.7               | 0.0                              | 14.7                             | -                              |
| 30             | 34.4             | 4.5            | 8.2               | 0.0                              | 17.6                             | -                              |
| 35             | 30.9             | 4.1            | 8.6               | 0.0                              | 20.6                             | -                              |
| 40             | 28.1             | 3.7            | 8.9               | 0.0                              | 23.5                             | -                              |
| 45             | 25.9             | 3.4            | 9.2               | 0.0                              | 26.4                             | -                              |
| 50             | 24.1             | 3.2            | 9.5               | 0.0                              | 29.4                             | -                              |
| 55             | 22.5             | 3.0            | 9.8               | 0.0                              | 32.3                             | -                              |
| 60             | 21.2             | 2.8            | 10.1              | 0.0                              | 35.2                             | -                              |
| 65             | 20.0             | 2.6            | 10.3              | 0.0                              | 38.2                             | -                              |
| 70             | 19.0             | 2.5            | 10.6              | 0.0                              | 41.1                             | -                              |
| 75             | 18.1             | 2.4            | 10.8              | 0.0                              | 44.1                             | -                              |
| 80             | 17.3             | 2.3            | 11.0              | 0.0                              | 47.0                             | -                              |
| 85             | 16.6             | 2.2            | 11.2              | 0.0                              | 49.9                             | -                              |
| 90             | 16.0             | 2.1            | 11.4              | 0.0                              | 52.9                             | -                              |
| 95             | 15.4             | 2.0            | 11.6              | 0.0                              | 55.8                             | -                              |
| 100            | 14.8             | 2.0            | 11.8              | 0.0                              | 58.7                             | -                              |
| 105            | 14.3             | 1.9            | 11.9              | 0.0                              | 61.7                             | -                              |
| 110            | 13.9             | 1.8            | 12.1              | 0.0                              | 64.6                             | -                              |
| 115            | 13.5             | 1.8            | 12.3              | 0.0                              | 67.6                             | -                              |
| 120            | 13.1             | 1.7            | 12.4              | 0.0                              | 70.5                             | -                              |
| 125            | 12.7             | 1.7            | 12.6              | 0.0                              | 73.4                             | -                              |
| 130            | 12.3             | 1.6            | 12.7              | 0.0                              | 76.4                             | -                              |
| 135            | 12.0             | 1.6            | 12.9              | 0.0                              | 79.3                             | -                              |
| 140            | 11.7             | 1.5            | 13.0              | 0.0                              | 82.2                             | -                              |
| 145            | 11.4             | 1.5            | 13.1              | 0.0                              | 85.2                             | -                              |
| 150            | 11.2             | 1.5            | 13.3              | 0.0                              | 88.1                             | -                              |
| 155            | 10.9             | 1.4            | 13.4              | 0.0                              | 91.0                             | -                              |
| 160            | 10.7             | 1.4            | 13.5              | 0.0                              | 94.0                             | -                              |
| 165            | 10.5             | 1.4            | 13.7              | 0.0                              | 96.9                             | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

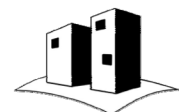
| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>5</sub>              | 0.577 |
| AC                          | 0.05  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 13.0  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>5-year</b> |
|---------------|---------------|
| a=            | 28.2          |
| b=            | 0             |
| c=            | 0.699         |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>98.7</b>      | <b>13.0</b>    | <b>7.8</b>        | <b>0.0</b>                       | <b>7.8</b>                       | <b>0.0</b>                     |
| 15             | 74.3             | 9.8            | 8.8               | 0.0                              | 11.7                             | -                              |
| 20             | 60.8             | 8.0            | 9.6               | 0.0                              | 15.6                             | -                              |
| 25             | 52.0             | 6.9            | 10.3              | 0.0                              | 19.5                             | -                              |
| 30             | 45.8             | 6.0            | 10.9              | 0.0                              | 23.4                             | -                              |
| 35             | 41.1             | 5.4            | 11.4              | 0.0                              | 27.4                             | -                              |
| 40             | 37.4             | 4.9            | 11.9              | 0.0                              | 31.3                             | -                              |
| 45             | 34.5             | 4.6            | 12.3              | 0.0                              | 35.2                             | -                              |
| 50             | 32.0             | 4.2            | 12.7              | 0.0                              | 39.1                             | -                              |
| 55             | 30.0             | 4.0            | 13.1              | 0.0                              | 43.0                             | -                              |
| 60             | 28.2             | 3.7            | 13.4              | 0.0                              | 46.9                             | -                              |
| 65             | 26.7             | 3.5            | 13.7              | 0.0                              | 50.8                             | -                              |
| 70             | 25.3             | 3.3            | 14.0              | 0.0                              | 54.7                             | -                              |
| 75             | 24.1             | 3.2            | 14.3              | 0.0                              | 58.6                             | -                              |
| 80             | 23.1             | 3.0            | 14.6              | 0.0                              | 62.5                             | -                              |
| 85             | 22.1             | 2.9            | 14.9              | 0.0                              | 66.4                             | -                              |
| 90             | 21.2             | 2.8            | 15.1              | 0.0                              | 70.3                             | -                              |
| 95             | 20.5             | 2.7            | 15.4              | 0.0                              | 74.2                             | -                              |
| 100            | 19.7             | 2.6            | 15.6              | 0.0                              | 78.2                             | -                              |
| 105            | 19.1             | 2.5            | 15.9              | 0.0                              | 82.1                             | -                              |
| 110            | 18.5             | 2.4            | 16.1              | 0.0                              | 86.0                             | -                              |
| 115            | 17.9             | 2.4            | 16.3              | 0.0                              | 89.9                             | -                              |
| 120            | 17.4             | 2.3            | 16.5              | 0.0                              | 93.8                             | -                              |
| 125            | 16.9             | 2.2            | 16.7              | 0.0                              | 97.7                             | -                              |
| 130            | 16.4             | 2.2            | 16.9              | 0.0                              | 101.6                            | -                              |
| 135            | 16.0             | 2.1            | 17.1              | 0.0                              | 105.5                            | -                              |
| 140            | 15.6             | 2.1            | 17.3              | 0.0                              | 109.4                            | -                              |
| 145            | 15.2             | 2.0            | 17.5              | 0.0                              | 113.3                            | -                              |
| 150            | 14.9             | 2.0            | 17.7              | 0.0                              | 117.2                            | -                              |
| 155            | 14.5             | 1.9            | 17.8              | 0.0                              | 121.1                            | -                              |
| 160            | 14.2             | 1.9            | 18.0              | 0.0                              | 125.0                            | -                              |
| 165            | 13.9             | 1.8            | 18.2              | 0.0                              | 129.0                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>10</sub>             | 0.577 |
| AC                          | 0.05  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 15.2  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>10-year</b> |
|---------------|----------------|
| a=            | 32.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>114.8</b>     | <b>15.2</b>    | <b>9.1</b>        | <b>0.0</b>                       | <b>9.1</b>                       | <b>0.0</b>                     |
| 15             | 86.4             | 11.4           | 10.3              | 0.0                              | 13.6                             | -                              |
| 20             | 70.7             | 9.3            | 11.2              | 0.0                              | 18.2                             | -                              |
| 25             | 60.5             | 8.0            | 12.0              | 0.0                              | 22.7                             | -                              |
| 30             | 53.2             | 7.0            | 12.7              | 0.0                              | 27.3                             | -                              |
| 35             | 47.8             | 6.3            | 13.3              | 0.0                              | 31.8                             | -                              |
| 40             | 43.5             | 5.7            | 13.8              | 0.0                              | 36.4                             | -                              |
| 45             | 40.1             | 5.3            | 14.3              | 0.0                              | 40.9                             | -                              |
| 50             | 37.3             | 4.9            | 14.8              | 0.0                              | 45.5                             | -                              |
| 55             | 34.9             | 4.6            | 15.2              | 0.0                              | 50.0                             | -                              |
| 60             | 32.8             | 4.3            | 15.6              | 0.0                              | 54.5                             | -                              |
| 65             | 31.0             | 4.1            | 16.0              | 0.0                              | 59.1                             | -                              |
| 70             | 29.4             | 3.9            | 16.3              | 0.0                              | 63.6                             | -                              |
| 75             | 28.1             | 3.7            | 16.7              | 0.0                              | 68.2                             | -                              |
| 80             | 26.8             | 3.5            | 17.0              | 0.0                              | 72.7                             | -                              |
| 85             | 25.7             | 3.4            | 17.3              | 0.0                              | 77.3                             | -                              |
| 90             | 24.7             | 3.3            | 17.6              | 0.0                              | 81.8                             | -                              |
| 95             | 23.8             | 3.1            | 17.9              | 0.0                              | 86.4                             | -                              |
| 100            | 23.0             | 3.0            | 18.2              | 0.0                              | 90.9                             | -                              |
| 105            | 22.2             | 2.9            | 18.4              | 0.0                              | 95.4                             | -                              |
| 110            | 21.5             | 2.8            | 18.7              | 0.0                              | 100.0                            | -                              |
| 115            | 20.8             | 2.7            | 19.0              | 0.0                              | 104.5                            | -                              |
| 120            | 20.2             | 2.7            | 19.2              | 0.0                              | 109.1                            | -                              |
| 125            | 19.6             | 2.6            | 19.4              | 0.0                              | 113.6                            | -                              |
| 130            | 19.1             | 2.5            | 19.7              | 0.0                              | 118.2                            | -                              |
| 135            | 18.6             | 2.5            | 19.9              | 0.0                              | 122.7                            | -                              |
| 140            | 18.1             | 2.4            | 20.1              | 0.0                              | 127.3                            | -                              |
| 145            | 17.7             | 2.3            | 20.3              | 0.0                              | 131.8                            | -                              |
| 150            | 17.3             | 2.3            | 20.5              | 0.0                              | 136.4                            | -                              |
| 155            | 16.9             | 2.2            | 20.7              | 0.0                              | 140.9                            | -                              |
| 160            | 16.5             | 2.2            | 20.9              | 0.0                              | 145.4                            | -                              |
| 165            | 16.2             | 2.1            | 21.1              | 0.0                              | 150.0                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>25</sub>             | 0.635 |
| AC                          | 0.05  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 19.6  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>25-year</b> |
|---------------|----------------|
| a=            | 38.5           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>134.7</b>     | <b>19.6</b>    | <b>11.7</b>       | <b>0.0</b>                       | <b>11.7</b>                      | <b>0.0</b>                     |
| 15             | 101.5            | 14.7           | 13.3              | 0.0                              | 17.6                             | -                              |
| 20             | 83.0             | 12.1           | 14.5              | 0.0                              | 23.5                             | -                              |
| 25             | 71.0             | 10.3           | 15.5              | 0.0                              | 29.3                             | -                              |
| 30             | 62.5             | 9.1            | 16.3              | 0.0                              | 35.2                             | -                              |
| 35             | 56.1             | 8.1            | 17.1              | 0.0                              | 41.1                             | -                              |
| 40             | 51.1             | 7.4            | 17.8              | 0.0                              | 46.9                             | -                              |
| 45             | 47.1             | 6.8            | 18.5              | 0.0                              | 52.8                             | -                              |
| 50             | 43.7             | 6.4            | 19.1              | 0.0                              | 58.7                             | -                              |
| 55             | 40.9             | 5.9            | 19.6              | 0.0                              | 64.5                             | -                              |
| 60             | 38.5             | 5.6            | 20.1              | 0.0                              | 70.4                             | -                              |
| 65             | 36.4             | 5.3            | 20.6              | 0.0                              | 76.3                             | -                              |
| 70             | 34.6             | 5.0            | 21.1              | 0.0                              | 82.2                             | -                              |
| 75             | 32.9             | 4.8            | 21.5              | 0.0                              | 88.0                             | -                              |
| 80             | 31.5             | 4.6            | 21.9              | 0.0                              | 93.9                             | -                              |
| 85             | 30.2             | 4.4            | 22.4              | 0.0                              | 99.8                             | -                              |
| 90             | 29.0             | 4.2            | 22.7              | 0.0                              | 105.6                            | -                              |
| 95             | 27.9             | 4.1            | 23.1              | 0.0                              | 111.5                            | -                              |
| 100            | 26.9             | 3.9            | 23.5              | 0.0                              | 117.4                            | -                              |
| 105            | 26.0             | 3.8            | 23.8              | 0.0                              | 123.2                            | -                              |
| 110            | 25.2             | 3.7            | 24.2              | 0.0                              | 129.1                            | -                              |
| 115            | 24.4             | 3.5            | 24.5              | 0.0                              | 135.0                            | -                              |
| 120            | 23.7             | 3.4            | 24.8              | 0.0                              | 140.8                            | -                              |
| 125            | 23.0             | 3.3            | 25.1              | 0.0                              | 146.7                            | -                              |
| 130            | 22.4             | 3.3            | 25.4              | 0.0                              | 152.6                            | -                              |
| 135            | 21.8             | 3.2            | 25.7              | 0.0                              | 158.4                            | -                              |
| 140            | 21.3             | 3.1            | 26.0              | 0.0                              | 164.3                            | -                              |
| 145            | 20.8             | 3.0            | 26.3              | 0.0                              | 170.2                            | -                              |
| 150            | 20.3             | 2.9            | 26.5              | 0.0                              | 176.0                            | -                              |
| 155            | 19.8             | 2.9            | 26.8              | 0.0                              | 181.9                            | -                              |
| 160            | 19.4             | 2.8            | 27.0              | 0.0                              | 187.8                            | -                              |
| 165            | 19.0             | 2.8            | 27.3              | 0.0                              | 193.6                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>50</sub>             | 0.692 |
| AC                          | 0.06  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 23.7  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>50-year</b> |
|---------------|----------------|
| a=            | 42.8           |
| b=            | 0              |
| c=            | 0.699          |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>149.8</b>     | <b>23.7</b>    | <b>14.2</b>       | <b>0.0</b>                       | <b>14.2</b>                      | <b>0.0</b>                     |
| 15             | 112.8            | 17.9           | 16.1              | 0.0                              | 21.3                             | -                              |
| 20             | 92.2             | 14.6           | 17.5              | 0.0                              | 28.5                             | -                              |
| 25             | 78.9             | 12.5           | 18.8              | 0.0                              | 35.6                             | -                              |
| 30             | 69.5             | 11.0           | 19.8              | 0.0                              | 42.7                             | -                              |
| 35             | 62.4             | 9.9            | 20.8              | 0.0                              | 49.8                             | -                              |
| 40             | 56.8             | 9.0            | 21.6              | 0.0                              | 56.9                             | -                              |
| 45             | 52.3             | 8.3            | 22.4              | 0.0                              | 64.0                             | -                              |
| 50             | 48.6             | 7.7            | 23.1              | 0.0                              | 71.2                             | -                              |
| 55             | 45.5             | 7.2            | 23.8              | 0.0                              | 78.3                             | -                              |
| 60             | 42.8             | 6.8            | 24.4              | 0.0                              | 85.4                             | -                              |
| 65             | 40.5             | 6.4            | 25.0              | 0.0                              | 92.5                             | -                              |
| 70             | 38.4             | 6.1            | 25.6              | 0.0                              | 99.6                             | -                              |
| 75             | 36.6             | 5.8            | 26.1              | 0.0                              | 106.7                            | -                              |
| 80             | 35.0             | 5.5            | 26.6              | 0.0                              | 113.9                            | -                              |
| 85             | 33.6             | 5.3            | 27.1              | 0.0                              | 121.0                            | -                              |
| 90             | 32.2             | 5.1            | 27.6              | 0.0                              | 128.1                            | -                              |
| 95             | 31.0             | 4.9            | 28.0              | 0.0                              | 135.2                            | -                              |
| 100            | 29.9             | 4.7            | 28.5              | 0.0                              | 142.3                            | -                              |
| 105            | 28.9             | 4.6            | 28.9              | 0.0                              | 149.4                            | -                              |
| 110            | 28.0             | 4.4            | 29.3              | 0.0                              | 156.6                            | -                              |
| 115            | 27.2             | 4.3            | 29.7              | 0.0                              | 163.7                            | -                              |
| 120            | 26.4             | 4.2            | 30.1              | 0.0                              | 170.8                            | -                              |
| 125            | 25.6             | 4.1            | 30.4              | 0.0                              | 177.9                            | -                              |
| 130            | 24.9             | 3.9            | 30.8              | 0.0                              | 185.0                            | -                              |
| 135            | 24.3             | 3.8            | 31.2              | 0.0                              | 192.1                            | -                              |
| 140            | 23.7             | 3.8            | 31.5              | 0.0                              | 199.2                            | -                              |
| 145            | 23.1             | 3.7            | 31.8              | 0.0                              | 206.4                            | -                              |
| 150            | 22.6             | 3.6            | 32.2              | 0.0                              | 213.5                            | -                              |
| 155            | 22.0             | 3.5            | 32.5              | 0.0                              | 220.6                            | -                              |
| 160            | 21.6             | 3.4            | 32.8              | 0.0                              | 227.7                            | -                              |
| 165            | 21.1             | 3.3            | 33.1              | 0.0                              | 234.8                            | -                              |



**MODIFIED RATIONAL METHOD  
STORAGE CALCULATIONS**

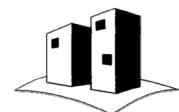
| <b>Drainage Area 221</b>    |       |
|-----------------------------|-------|
| Area (Ha)                   | 0.082 |
| C <sub>100</sub>            | 0.721 |
| AC                          | 0.06  |
| T <sub>c</sub> (min)        | 10.0  |
| T incr. (min)               | 5     |
| Q <sub>1</sub> (l/s)        | 27.1  |
| Req. vol. (m <sup>3</sup> ) | 0.0   |

| <b>Picton</b> | <b>100-year</b> |
|---------------|-----------------|
| a=            | 47              |
| b=            | 0               |
| c=            | 0.699           |

Notes:

**Required Storage Summary**

| <b>T (min)</b> | <b>I (mm/hr)</b> | <b>Q (l/s)</b> | <b>Total Vol.</b> | <b>Ext. Vol. (m<sup>3</sup>)</b> | <b>Rel. Vol. (m<sup>3</sup>)</b> | <b>Storage (m<sup>3</sup>)</b> |
|----------------|------------------|----------------|-------------------|----------------------------------|----------------------------------|--------------------------------|
| <b>10</b>      | <b>164.4</b>     | <b>27.1</b>    | <b>16.3</b>       | <b>0.0</b>                       | <b>16.3</b>                      | <b>0.0</b>                     |
| 15             | 123.9            | 20.4           | 18.4              | 0.0                              | 24.4                             | -                              |
| 20             | 101.3            | 16.7           | 20.1              | 0.0                              | 32.6                             | -                              |
| 25             | 86.7             | 14.3           | 21.5              | 0.0                              | 40.7                             | -                              |
| 30             | 76.3             | 12.6           | 22.7              | 0.0                              | 48.8                             | -                              |
| 35             | 68.5             | 11.3           | 23.7              | 0.0                              | 57.0                             | -                              |
| 40             | 62.4             | 10.3           | 24.7              | 0.0                              | 65.1                             | -                              |
| 45             | 57.5             | 9.5            | 25.6              | 0.0                              | 73.3                             | -                              |
| 50             | 53.4             | 8.8            | 26.4              | 0.0                              | 81.4                             | -                              |
| 55             | 49.9             | 8.2            | 27.2              | 0.0                              | 89.5                             | -                              |
| 60             | 47.0             | 7.8            | 27.9              | 0.0                              | 97.7                             | -                              |
| 65             | 44.4             | 7.3            | 28.6              | 0.0                              | 105.8                            | -                              |
| 70             | 42.2             | 7.0            | 29.2              | 0.0                              | 113.9                            | -                              |
| 75             | 40.2             | 6.6            | 29.9              | 0.0                              | 122.1                            | -                              |
| 80             | 38.4             | 6.3            | 30.4              | 0.0                              | 130.2                            | -                              |
| 85             | 36.8             | 6.1            | 31.0              | 0.0                              | 138.4                            | -                              |
| 90             | 35.4             | 5.8            | 31.5              | 0.0                              | 146.5                            | -                              |
| 95             | 34.1             | 5.6            | 32.1              | 0.0                              | 154.6                            | -                              |
| 100            | 32.9             | 5.4            | 32.6              | 0.0                              | 162.8                            | -                              |
| 105            | 31.8             | 5.2            | 33.0              | 0.0                              | 170.9                            | -                              |
| 110            | 30.8             | 5.1            | 33.5              | 0.0                              | 179.1                            | -                              |
| 115            | 29.8             | 4.9            | 34.0              | 0.0                              | 187.2                            | -                              |
| 120            | 29.0             | 4.8            | 34.4              | 0.0                              | 195.3                            | -                              |
| 125            | 28.1             | 4.6            | 34.8              | 0.0                              | 203.5                            | -                              |
| 130            | 27.4             | 4.5            | 35.2              | 0.0                              | 211.6                            | -                              |
| 135            | 26.7             | 4.4            | 35.6              | 0.0                              | 219.8                            | -                              |
| 140            | 26.0             | 4.3            | 36.0              | 0.0                              | 227.9                            | -                              |
| 145            | 25.4             | 4.2            | 36.4              | 0.0                              | 236.0                            | -                              |
| 150            | 24.8             | 4.1            | 36.8              | 0.0                              | 244.2                            | -                              |
| 155            | 24.2             | 4.0            | 37.2              | 0.0                              | 252.3                            | -                              |
| 160            | 23.7             | 3.9            | 37.5              | 0.0                              | 260.4                            | -                              |
| 165            | 23.2             | 3.8            | 37.9              | 0.0                              | 268.6                            | -                              |



**ORIFICE AND AVAILABLE  
STORAGE CALCULATIONS**

$$Q_{orifice} = C_d A (2gh)^{1/2}$$

Type            PLATE  
 Location        MH1  
 Size            100 mm<sup>1</sup>  
 Area            0.008 m<sup>2</sup>  
 C<sub>d</sub>            0.62

**Drainage Area 210 Orifice Calcs**

|             | <b>Elev. (m)</b> | <b>h (m)</b> | <b>Q (m<sup>3</sup>/s)</b> |
|-------------|------------------|--------------|----------------------------|
| Inv.        | 88.60            | 0.00         | -                          |
| MH TOP      | 92.05            | 3.45         | -                          |
| 1-yr W.L.   | 89.26            | 0.61         | 0.017                      |
| 2-yr W.L.   | 89.07            | 0.42         | 0.014                      |
| 5-yr W.L.   | 89.26            | 0.61         | 0.017                      |
| 10-yr W.L.  | 89.38            | 0.73         | 0.018                      |
| 25-yr W.L.  | 89.66            | 1.01         | 0.022                      |
| 50-yr W.L.  | 89.92            | 1.27         | 0.024                      |
| 100-yr W.L. | 90.15            | 1.50         | 0.026                      |



**ORIFICE AND AVAILABLE  
STORAGE CALCULATIONS**

$$Q_{orifice} = C_d A (2gh)^{1/2}$$

Type PLATE  
 Location MH1  
 Size 125 mm<sup>1</sup>  
 Area 0.012 m<sup>2</sup>  
 C<sub>d</sub> 0.62

**Drainage Area 210 Orifice Calcs**

|             | Elev. (m) | h (m) | Q (m <sup>3</sup> /s) |
|-------------|-----------|-------|-----------------------|
| Inv.        | 83.50     | 0.00  | -                     |
| Max Elev    | 87.60     | 4.10  | -                     |
| 1-yr W.L.   | 84.00     | 0.44  | 0.022                 |
| 2-yr W.L.   | 83.79     | 0.23  | 0.016                 |
| 5-yr W.L.   | 83.88     | 0.32  | 0.019                 |
| 10-yr W.L.  | 83.95     | 0.39  | 0.021                 |
| 25-yr W.L.  | 84.08     | 0.52  | 0.024                 |
| 50-yr W.L.  | 84.43     | 0.87  | 0.031                 |
| 100-yr W.L. | 84.55     | 0.99  | 0.033                 |



**EFFECTIVE TSS REMOVAL  
CALCULATIONS**

**ID 210 - TSS (Untreated) Removal Summary**

| Drainage Area | Surface Type | A (Ha)* | Removal Rate | Net for Treatment | Treatment Type | Rate | Effective Removal |
|---------------|--------------|---------|--------------|-------------------|----------------|------|-------------------|
| <b>210</b>    | Asphalt      | 0.289   | 0%           | 100%              |                |      | 0%                |
|               | Rooftops     | 0.210   | 90%          | 10%               |                |      | 90%               |
|               | Grass        | 0.339   | 100%         | 0%                |                |      | 100%              |
| <b>Total</b>  |              | 0.838   |              |                   |                |      | 63%               |

**ID 210 - TSS (Treated) Removal Summary**

| Drainage Area | Surface Type | A (Ha) | Removal Rate | Net for Treatment | Treatment Type | Rate | Effective Removal |
|---------------|--------------|--------|--------------|-------------------|----------------|------|-------------------|
| <b>210</b>    | Asphalt      | 0.289  | 0%           | 100%              | OGS            | 50%  | 50%               |
|               | Rooftops     | 0.210  | 90%          | 10%               | OGS            | 50%  | 95%               |
|               | Grass        | 0.339  | 100%         | 0%                | -              | 0%   | 100%              |
| <b>Total</b>  |              | 0.838  |              |                   |                |      | 82%               |

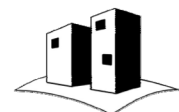
**ID 211 - TSS (Untreated) Removal Summary**

| Drainage Area | Surface Type | A (Ha)* | Removal Rate | Net for Treatment | Treatment Type | Rate | Effective Removal |
|---------------|--------------|---------|--------------|-------------------|----------------|------|-------------------|
| <b>210</b>    | Asphalt      | 0.146   | 0%           | 100%              |                |      | 0%                |
|               | Rooftops     | 0.000   | 90%          |                   |                |      |                   |
|               | Grass        | 0.083   | 100%         | 0%                |                |      | 100%              |
| <b>Total</b>  |              | 0.712   |              |                   |                |      | 12%               |

**ID 211 - TSS (Treated) Removal Summary**

| Drainage Area | Surface Type | A (Ha) | Removal Rate | Net for Treatment | Treatment Type | Rate | Effective Removal |
|---------------|--------------|--------|--------------|-------------------|----------------|------|-------------------|
| <b>210</b>    | Asphalt      | 0.146  | 0%           | 100%              | OGS            | 50%  | 50%               |
|               | Grass        | 0.083  | 100%         | 0%                | -              | 50%  | 100%              |
| <b>Total</b>  |              | 0.229  |              |                   |                |      | 68%               |

\* Captured area only



**STAGE STORAGE  
CALCULATIONS**

| <b>SWM Tank Specs</b> |        |
|-----------------------|--------|
| WB Area               | 0.00   |
| WB Invert             | 88.60  |
| WB Weir Elev.         | 0.00   |
| Area Above WB         | 147.00 |
| Weir Area             | 0.00   |
| Area Below Weir       | 147.00 |
| Elev. Incr. (m)       | 0.01   |

| <b>SWM Tank Specs</b>     |       |
|---------------------------|-------|
| Tank Invert               | 88.60 |
| MH Top                    | 91.60 |
| U/S Slab                  | 1.00  |
| Max W.L.                  | 90.60 |
| WB Vol. (m <sup>3</sup> ) | 0.0   |

Notes:

**Total Volume Calculation**

| <b>Water Elev. (m)</b> | <b>WB Vol. (m<sup>3</sup>)</b> | <b>Active Vol. (m<sup>3</sup>)</b> | <b>Inc. Vol. (m<sup>3</sup>)</b> | <b>Tot. Vol. (m<sup>3</sup>)</b> |
|------------------------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 88.60                  | 0.00                           | 0.00                               | -                                | 0.00                             |
| 88.61                  | 0.00                           | 1.47                               | 1.47                             | 1.47                             |
| 88.62                  | 0.00                           | 2.94                               | 1.47                             | 2.94                             |
| 88.63                  | 0.00                           | 4.41                               | 1.47                             | 4.41                             |
| 88.64                  | 0.00                           | 5.88                               | 1.47                             | 5.88                             |
| 88.65                  | 0.00                           | 7.35                               | 1.47                             | 7.35                             |
| 88.66                  | 0.00                           | 8.82                               | 1.47                             | 8.82                             |
| 88.67                  | 0.00                           | 10.29                              | 1.47                             | 10.29                            |
| 88.68                  | 0.00                           | 11.76                              | 1.47                             | 11.76                            |
| 88.69                  | 0.00                           | 13.23                              | 1.47                             | 13.23                            |
| 88.70                  | 0.00                           | 14.70                              | 1.47                             | 14.70                            |
| 88.71                  | 0.00                           | 16.17                              | 1.47                             | 16.17                            |
| 88.72                  | 0.00                           | 17.64                              | 1.47                             | 17.64                            |
| 88.73                  | 0.00                           | 19.11                              | 1.47                             | 19.11                            |
| 88.74                  | 0.00                           | 20.58                              | 1.47                             | 20.58                            |
| 88.75                  | 0.00                           | 22.05                              | 1.47                             | 22.05                            |
| 88.76                  | 0.00                           | 23.52                              | 1.47                             | 23.52                            |
| 88.77                  | 0.00                           | 24.99                              | 1.47                             | 24.99                            |
| 88.78                  | 0.00                           | 26.46                              | 1.47                             | 26.46                            |
| 88.79                  | 0.00                           | 27.93                              | 1.47                             | 27.93                            |
| 88.80                  | 0.00                           | 29.40                              | 1.47                             | 29.40                            |
| 88.81                  | 0.00                           | 30.87                              | 1.47                             | 30.87                            |
| 88.82                  | 0.00                           | 32.34                              | 1.47                             | 32.34                            |
| 88.83                  | 0.00                           | 33.81                              | 1.47                             | 33.81                            |
| 88.84                  | 0.00                           | 35.28                              | 1.47                             | 35.28                            |
| 88.85                  | 0.00                           | 36.75                              | 1.47                             | 36.75                            |
| 88.86                  | 0.00                           | 38.22                              | 1.47                             | 38.22                            |
| 88.87                  | 0.00                           | 39.69                              | 1.47                             | 39.69                            |
| 88.88                  | 0.00                           | 41.16                              | 1.47                             | 41.16                            |
| 88.89                  | 0.00                           | 42.63                              | 1.47                             | 42.63                            |
| 88.90                  | 0.00                           | 44.10                              | 1.47                             | 44.10                            |
| 88.91                  | 0.00                           | 45.57                              | 1.47                             | 45.57                            |



**STAGE STORAGE  
CALCULATIONS**

**Total Volume Calculation**

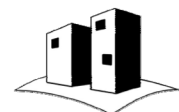
| <b>Water Elev. (m)</b> | <b>WB Vol. (m<sup>3</sup>)</b> | <b>Active Vol. (m<sup>3</sup>)</b> | <b>Inc. Vol. (m<sup>3</sup>)</b> | <b>Tot. Vol. (m<sup>3</sup>)</b> |
|------------------------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 88.92                  | 0.00                           | 47.04                              | 1.47                             | 47.04                            |
| 88.93                  | 0.00                           | 48.51                              | 1.47                             | 48.51                            |
| 88.94                  | 0.00                           | 49.98                              | 1.47                             | 49.98                            |
| 88.95                  | 0.00                           | 51.45                              | 1.47                             | 51.45                            |
| 88.96                  | 0.00                           | 52.92                              | 1.47                             | 52.92                            |
| 88.97                  | 0.00                           | 54.39                              | 1.47                             | 54.39                            |
| 88.98                  | 0.00                           | 55.86                              | 1.47                             | 55.86                            |
| 88.99                  | 0.00                           | 57.33                              | 1.47                             | 57.33                            |
| 89.00                  | 0.00                           | 58.80                              | 1.47                             | 58.80                            |
| 89.01                  | 0.00                           | 60.27                              | 1.47                             | 60.27                            |
| 89.02                  | 0.00                           | 61.74                              | 1.47                             | 61.74                            |
| 89.03                  | 0.00                           | 63.21                              | 1.47                             | 63.21                            |
| 89.04                  | 0.00                           | 64.68                              | 1.47                             | 64.68                            |
| 89.05                  | 0.00                           | 66.15                              | 1.47                             | 66.15                            |
| 89.06                  | 0.00                           | 67.62                              | 1.47                             | 67.62                            |
| 89.07                  | 0.00                           | 69.09                              | 1.47                             | 69.09                            |
| 89.08                  | 0.00                           | 70.56                              | 1.47                             | 70.56                            |
| 89.09                  | 0.00                           | 72.03                              | 1.47                             | 72.03                            |
| 89.10                  | 0.00                           | 73.50                              | 1.47                             | 73.50                            |
| 89.11                  | 0.00                           | 74.97                              | 1.47                             | 74.97                            |
| 89.12                  | 0.00                           | 76.44                              | 1.47                             | 76.44                            |
| 89.13                  | 0.00                           | 77.91                              | 1.47                             | 77.91                            |
| 89.14                  | 0.00                           | 79.38                              | 1.47                             | 79.38                            |
| 89.15                  | 0.00                           | 80.85                              | 1.47                             | 80.85                            |
| 89.16                  | 0.00                           | 82.32                              | 1.47                             | 82.32                            |
| 89.17                  | 0.00                           | 83.79                              | 1.47                             | 83.79                            |
| 89.18                  | 0.00                           | 85.26                              | 1.47                             | 85.26                            |
| 89.19                  | 0.00                           | 86.73                              | 1.47                             | 86.73                            |
| 89.20                  | 0.00                           | 88.20                              | 1.47                             | 88.20                            |
| 89.21                  | 0.00                           | 89.67                              | 1.47                             | 89.67                            |
| 89.22                  | 0.00                           | 91.14                              | 1.47                             | 91.14                            |
| 89.23                  | 0.00                           | 92.61                              | 1.47                             | 92.61                            |
| 89.24                  | 0.00                           | 94.08                              | 1.47                             | 94.08                            |
| 89.25                  | 0.00                           | 95.55                              | 1.47                             | 95.55                            |
| 89.26                  | 0.00                           | 97.02                              | 1.47                             | 97.02                            |
| 89.27                  | 0.00                           | 98.49                              | 1.47                             | 98.49                            |
| 89.28                  | 0.00                           | 99.96                              | 1.47                             | 99.96                            |
| 89.29                  | 0.00                           | 101.43                             | 1.47                             | 101.43                           |
| 89.30                  | 0.00                           | 102.90                             | 1.47                             | 102.90                           |
| 89.31                  | 0.00                           | 104.37                             | 1.47                             | 104.37                           |
| 89.32                  | 0.00                           | 105.84                             | 1.47                             | 105.84                           |
| 89.33                  | 0.00                           | 107.31                             | 1.47                             | 107.31                           |
| 89.34                  | 0.00                           | 108.78                             | 1.47                             | 108.78                           |



**STAGE STORAGE  
CALCULATIONS**

**Total Volume Calculation**

| <b>Water Elev. (m)</b> | <b>WB Vol. (m<sup>3</sup>)</b> | <b>Active Vol. (m<sup>3</sup>)</b> | <b>Inc. Vol. (m<sup>3</sup>)</b> | <b>Tot. Vol. (m<sup>3</sup>)</b> |
|------------------------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 89.35                  | 0.00                           | 110.25                             | 1.47                             | 110.25                           |
| 89.36                  | 0.00                           | 111.72                             | 1.47                             | 111.72                           |
| 89.37                  | 0.00                           | 113.19                             | 1.47                             | 113.19                           |
| 89.38                  | 0.00                           | 114.66                             | 1.47                             | 114.66                           |
| 89.39                  | 0.00                           | 116.13                             | 1.47                             | 116.13                           |
| 89.40                  | 0.00                           | 117.60                             | 1.47                             | 117.60                           |
| 89.41                  | 0.00                           | 119.07                             | 1.47                             | 119.07                           |
| 89.42                  | 0.00                           | 120.54                             | 1.47                             | 120.54                           |
| 89.43                  | 0.00                           | 122.01                             | 1.47                             | 122.01                           |
| 89.44                  | 0.00                           | 123.48                             | 1.47                             | 123.48                           |
| 89.45                  | 0.00                           | 124.95                             | 1.47                             | 124.95                           |
| 89.46                  | 0.00                           | 126.42                             | 1.47                             | 126.42                           |
| 89.47                  | 0.00                           | 127.89                             | 1.47                             | 127.89                           |
| 89.48                  | 0.00                           | 129.36                             | 1.47                             | 129.36                           |
| 89.49                  | 0.00                           | 130.83                             | 1.47                             | 130.83                           |
| 89.50                  | 0.00                           | 132.30                             | 1.47                             | 132.30                           |
| 89.51                  | 0.00                           | 133.77                             | 1.47                             | 133.77                           |
| 89.52                  | 0.00                           | 135.24                             | 1.47                             | 135.24                           |
| 89.53                  | 0.00                           | 136.71                             | 1.47                             | 136.71                           |
| 89.54                  | 0.00                           | 138.18                             | 1.47                             | 138.18                           |
| 89.55                  | 0.00                           | 139.65                             | 1.47                             | 139.65                           |
| 89.56                  | 0.00                           | 141.12                             | 1.47                             | 141.12                           |
| 89.57                  | 0.00                           | 142.59                             | 1.47                             | 142.59                           |
| 89.58                  | 0.00                           | 144.06                             | 1.47                             | 144.06                           |
| 89.59                  | 0.00                           | 145.53                             | 1.47                             | 145.53                           |
| 89.60                  | 0.00                           | 147.00                             | 1.47                             | 147.00                           |
| 89.61                  | 0.00                           | 148.47                             | 1.47                             | 148.47                           |
| 89.62                  | 0.00                           | 149.94                             | 1.47                             | 149.94                           |
| 89.63                  | 0.00                           | 151.41                             | 1.47                             | 151.41                           |
| 89.64                  | 0.00                           | 152.88                             | 1.47                             | 152.88                           |
| 89.65                  | 0.00                           | 154.35                             | 1.47                             | 154.35                           |
| 89.66                  | 0.00                           | 155.82                             | 1.47                             | 155.82                           |
| 89.67                  | 0.00                           | 157.29                             | 1.47                             | 157.29                           |
| 89.68                  | 0.00                           | 158.76                             | 1.47                             | 158.76                           |
| 89.69                  | 0.00                           | 160.23                             | 1.47                             | 160.23                           |
| 89.70                  | 0.00                           | 161.70                             | 1.47                             | 161.70                           |
| 89.71                  | 0.00                           | 163.17                             | 1.47                             | 163.17                           |
| 89.72                  | 0.00                           | 164.64                             | 1.47                             | 164.64                           |
| 89.73                  | 0.00                           | 166.11                             | 1.47                             | 166.11                           |
| 89.74                  | 0.00                           | 167.58                             | 1.47                             | 167.58                           |
| 89.75                  | 0.00                           | 169.05                             | 1.47                             | 169.05                           |
| 89.76                  | 0.00                           | 170.52                             | 1.47                             | 170.52                           |
| 89.77                  | 0.00                           | 171.99                             | 1.47                             | 171.99                           |



**STAGE STORAGE  
CALCULATIONS**

**Total Volume Calculation**

| <b>Water Elev. (m)</b> | <b>WB Vol. (m<sup>3</sup>)</b> | <b>Active Vol. (m<sup>3</sup>)</b> | <b>Inc. Vol. (m<sup>3</sup>)</b> | <b>Tot. Vol. (m<sup>3</sup>)</b> |
|------------------------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 89.78                  | 0.00                           | 173.46                             | 1.47                             | 173.46                           |
| 89.79                  | 0.00                           | 174.93                             | 1.47                             | 174.93                           |
| 89.80                  | 0.00                           | 176.40                             | 1.47                             | 176.40                           |
| 89.81                  | 0.00                           | 177.87                             | 1.47                             | 177.87                           |
| 89.82                  | 0.00                           | 179.34                             | 1.47                             | 179.34                           |
| 89.83                  | 0.00                           | 180.81                             | 1.47                             | 180.81                           |
| 89.84                  | 0.00                           | 182.28                             | 1.47                             | 182.28                           |
| 89.85                  | 0.00                           | 183.75                             | 1.47                             | 183.75                           |
| 89.86                  | 0.00                           | 185.22                             | 1.47                             | 185.22                           |
| 89.87                  | 0.00                           | 186.69                             | 1.47                             | 186.69                           |
| 89.88                  | 0.00                           | 188.16                             | 1.47                             | 188.16                           |
| 89.89                  | 0.00                           | 189.63                             | 1.47                             | 189.63                           |
| 89.90                  | 0.00                           | 191.10                             | 1.47                             | 191.10                           |
| 89.91                  | 0.00                           | 192.57                             | 1.47                             | 192.57                           |
| 89.92                  | 0.00                           | 194.04                             | 1.47                             | 194.04                           |
| 89.93                  | 0.00                           | 195.51                             | 1.47                             | 195.51                           |
| 89.94                  | 0.00                           | 196.98                             | 1.47                             | 196.98                           |
| 89.95                  | 0.00                           | 198.45                             | 1.47                             | 198.45                           |
| 89.96                  | 0.00                           | 199.92                             | 1.47                             | 199.92                           |
| 89.97                  | 0.00                           | 201.39                             | 1.47                             | 201.39                           |
| 89.98                  | 0.00                           | 202.86                             | 1.47                             | 202.86                           |
| 89.99                  | 0.00                           | 204.33                             | 1.47                             | 204.33                           |
| 90.00                  | 0.00                           | 205.80                             | 1.47                             | 205.80                           |
| 90.01                  | 0.00                           | 207.27                             | 1.47                             | 207.27                           |
| 90.02                  | 0.00                           | 208.74                             | 1.47                             | 208.74                           |
| 90.03                  | 0.00                           | 210.21                             | 1.47                             | 210.21                           |
| 90.04                  | 0.00                           | 211.68                             | 1.47                             | 211.68                           |
| 90.05                  | 0.00                           | 213.15                             | 1.47                             | 213.15                           |
| 90.06                  | 0.00                           | 214.62                             | 1.47                             | 214.62                           |
| 90.07                  | 0.00                           | 216.09                             | 1.47                             | 216.09                           |
| 90.08                  | 0.00                           | 217.56                             | 1.47                             | 217.56                           |
| 90.09                  | 0.00                           | 219.03                             | 1.47                             | 219.03                           |
| 90.10                  | 0.00                           | 220.50                             | 1.47                             | 220.50                           |
| 90.11                  | 0.00                           | 221.97                             | 1.47                             | 221.97                           |
| 90.12                  | 0.00                           | 223.44                             | 1.47                             | 223.44                           |
| 90.13                  | 0.00                           | 224.91                             | 1.47                             | 224.91                           |
| 90.14                  | 0.00                           | 226.38                             | 1.47                             | 226.38                           |
| 90.15                  | 0.00                           | 227.85                             | 1.47                             | 227.85                           |
| 90.16                  | 0.00                           | 229.32                             | 1.47                             | 229.32                           |
| 90.17                  | 0.00                           | 230.79                             | 1.47                             | 230.79                           |
| 90.18                  | 0.00                           | 232.26                             | 1.47                             | 232.26                           |
| 90.19                  | 0.00                           | 233.73                             | 1.47                             | 233.73                           |
| 90.20                  | 0.00                           | 235.20                             | 1.47                             | 235.20                           |



**STAGE STORAGE  
CALCULATIONS**

**Total Volume Calculation**

| <b>Water Elev. (m)</b> | <b>WB Vol. (m<sup>3</sup>)</b> | <b>Active Vol. (m<sup>3</sup>)</b> | <b>Inc. Vol. (m<sup>3</sup>)</b> | <b>Tot. Vol. (m<sup>3</sup>)</b> |
|------------------------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 90.21                  | 0.00                           | 236.67                             | 1.47                             | 236.67                           |
| 90.22                  | 0.00                           | 238.14                             | 1.47                             | 238.14                           |
| 90.23                  | 0.00                           | 239.61                             | 1.47                             | 239.61                           |
| 90.24                  | 0.00                           | 241.08                             | 1.47                             | 241.08                           |
| 90.25                  | 0.00                           | 242.55                             | 1.47                             | 242.55                           |
| 90.26                  | 0.00                           | 244.02                             | 1.47                             | 244.02                           |
| 90.27                  | 0.00                           | 245.49                             | 1.47                             | 245.49                           |
| 90.28                  | 0.00                           | 246.96                             | 1.47                             | 246.96                           |
| 90.29                  | 0.00                           | 248.43                             | 1.47                             | 248.43                           |
| 90.30                  | 0.00                           | 249.90                             | 1.47                             | 249.90                           |
| 90.31                  | 0.00                           | 251.37                             | 1.47                             | 251.37                           |
| 90.32                  | 0.00                           | 252.84                             | 1.47                             | 252.84                           |
| 90.33                  | 0.00                           | 254.31                             | 1.47                             | 254.31                           |
| 90.34                  | 0.00                           | 255.78                             | 1.47                             | 255.78                           |
| 90.35                  | 0.00                           | 257.25                             | 1.47                             | 257.25                           |
| 90.36                  | 0.00                           | 258.72                             | 1.47                             | 258.72                           |
| 90.37                  | 0.00                           | 260.19                             | 1.47                             | 260.19                           |
| 90.38                  | 0.00                           | 261.66                             | 1.47                             | 261.66                           |
| 90.39                  | 0.00                           | 263.13                             | 1.47                             | 263.13                           |
| 90.40                  | 0.00                           | 264.60                             | 1.47                             | 264.60                           |
| 90.41                  | 0.00                           | 266.07                             | 1.47                             | 266.07                           |
| 90.42                  | 0.00                           | 267.54                             | 1.47                             | 267.54                           |
| 90.43                  | 0.00                           | 269.01                             | 1.47                             | 269.01                           |
| 90.44                  | 0.00                           | 270.48                             | 1.47                             | 270.48                           |
| 90.45                  | 0.00                           | 271.95                             | 1.47                             | 271.95                           |
| 90.46                  | 0.00                           | 273.42                             | 1.47                             | 273.42                           |
| 90.47                  | 0.00                           | 274.89                             | 1.47                             | 274.89                           |
| 90.48                  | 0.00                           | 276.36                             | 1.47                             | 276.36                           |
| 90.49                  | 0.00                           | 277.83                             | 1.47                             | 277.83                           |
| 90.50                  | 0.00                           | 279.30                             | 1.47                             | 279.30                           |
| 90.51                  | 0.00                           | 280.77                             | 1.47                             | 280.77                           |
| 90.52                  | 0.00                           | 282.24                             | 1.47                             | 282.24                           |
| 90.53                  | 0.00                           | 283.71                             | 1.47                             | 283.71                           |
| 90.54                  | 0.00                           | 285.18                             | 1.47                             | 285.18                           |
| 90.55                  | 0.00                           | 286.65                             | 1.47                             | 286.65                           |
| 90.56                  | 0.00                           | 288.12                             | 1.47                             | 288.12                           |
| 90.57                  | 0.00                           | 289.59                             | 1.47                             | 289.59                           |
| 90.58                  | 0.00                           | 291.06                             | 1.47                             | 291.06                           |
| 90.59                  | 0.00                           | 292.53                             | 1.47                             | 292.53                           |
| 90.60                  | 0.00                           | 294.00                             | 1.47                             | 294.00                           |



## 100-YEAR CAPTURE CALCULATIONS

IDF set: Bradford

| Return Period | <i>a</i> | <i>T<sub>c</sub></i> | <i>b</i> | <i>c</i> |
|---------------|----------|----------------------|----------|----------|
| 100-Year      | 47.000   | 10                   | 0.000    | 0.699    |

Where: 
$$I = \frac{a}{(t_c + b)^c}$$

Area 210 100-year flow

| Drainage ID | Area (m <sup>2</sup> ) | Composite C | I (mm/hr)* | Q (L/s) |
|-------------|------------------------|-------------|------------|---------|
| AD1 (TYP)   | 500                    | 0.90        | 164.45     | 20.6    |

Where: 
$$Q = \frac{CIA}{360}$$

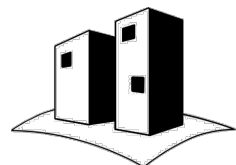
$$Q_{orifice} = C_d A (2gh)^{1/2}$$

|                                    |              |
|------------------------------------|--------------|
| Type                               | PLATE        |
| Model                              | Zurn Z662-HF |
| Grate Open Area (cm <sup>2</sup> ) | 665          |
| 1/2 Area* (m <sup>2</sup> )        | 0.033        |
| C <sub>d</sub>                     | 0.62         |

| Drainage ID        | AD Elev. (m) | Max W.L. | h (m) | Q <sub>in</sub> (L/s) |
|--------------------|--------------|----------|-------|-----------------------|
| AD1 (Zurn Z662-HF) | 91.60        | 91.90    | 0.30  | 50.0                  |

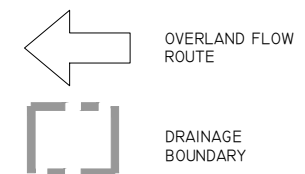
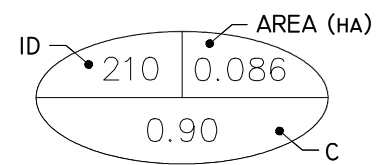
\* Assumes 50% blockage





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HOMES FIRST NICHOLAS CORP  
NICHOLAS APARTMENT BUILDING  
NICHOLAS STREET



### EXTERNAL DRAINAGE AREA PLAN

FIGURE: EXT

PROJECT No.: 23-026

SCALE = 1:1000

OCTOBER 2024

**EXTERNAL RUN-OFF  
CALCULATIONS**

-

**EXT-1**

**IDF set: Picton**

| <b>Return Period</b> | <b>a</b> | <b>T<sub>c</sub> *</b> | <b>b</b> | <b>c</b> |
|----------------------|----------|------------------------|----------|----------|
| 2-Year               | 21.2     | 18.0                   | 0.00     | 0.699    |
| 5-Year               | 28.2     | 18.0                   | 0.00     | 0.699    |
| 100-Year             | 47.0     | 18.0                   | 0.00     | 0.699    |

Where: 
$$I = \frac{a}{(t_c + b)^c}$$

\* Refer to Ext. I<sub>c</sub> calculations

**External Runoff Volume**

| <b>Return Period</b> | <b>Area (Ha)</b> | <b>Composite C</b> | <b>I (mm/hr)*</b> | <b>Q (L/s)</b> |
|----------------------|------------------|--------------------|-------------------|----------------|
| 2-Year               | 0.80             | 0.30               | 49.18             | 32.7           |
| 5-Year               | 0.80             | 0.30               | 65.42             | 43.6           |
| 100-Year             | 0.80             | 0.38               | 109.04            | 90.8           |

Where: 
$$Q = \frac{CIA}{360}$$



**EXTERNAL RUN-OFF  
CALCULATIONS**

-

**EXT-2**

**IDF set: Picton**

| <b>Return Period</b> | <b>a</b> | <b>T<sub>c</sub> *</b> | <b>b</b> | <b>c</b> |
|----------------------|----------|------------------------|----------|----------|
| 2-Year               | 21.2     | 19.7                   | 0.00     | 0.699    |
| 5-Year               | 28.2     | 19.7                   | 0.00     | 0.699    |
| 100-Year             | 47.0     | 19.7                   | 0.00     | 0.699    |

Where: 
$$I = \frac{a}{(t_c + b)^c}$$

\* Refer to Ext. I<sub>c</sub> calculations

**External Runoff Volume**

| <b>Return Period</b> | <b>Area (Ha)</b> | <b>Composite C</b> | <b>I (mm/hr)*</b> | <b>Q (L/s)</b> |
|----------------------|------------------|--------------------|-------------------|----------------|
| 2-Year               | 1.01             | 0.30               | 46.18             | 38.9           |
| 5-Year               | 1.01             | 0.30               | 61.42             | 51.7           |
| 100-Year             | 1.01             | 0.38               | 102.37            | 107.7          |

Where: 
$$Q = \frac{CIA}{360}$$



## FLOW DEPTH CALCULATION

-

### EXT-1 DRAINAGE SWALE

#### CHANNEL CAPACITY CALCULATIONS

|                       |                                      |                                  |           |
|-----------------------|--------------------------------------|----------------------------------|-----------|
| Flow Depth            | 0.17 m                               | Top width                        | 1.3 m     |
| Side Slope Ratio      | 3.0 /1                               |                                  |           |
| Bottom width          | 0.30 m                               |                                  |           |
| Area (A)              | 0.14 m <sup>2</sup>                  | Hydraulic Radius (R)             | 0.100 m   |
| Wetted Perimeter (Wp) | 1.38 m                               | Friction Slope (S <sub>f</sub> ) | 0.098 m/m |
| Slope (S)             | 9.80 %                               |                                  |           |
| Manning (n)*          | 0.04                                 |                                  |           |
| Channel capacity (Q)  | 0.232 m <sup>3</sup> /s<br>232.4 L/s | Velocity (V)                     | 1.7 m/s   |

Where:  $Q = \frac{A * R^{2/3} * S^{1/2}}{n}$



## FLOW DEPTH CALCULATION

-

### EXT-2 DRAINAGE SWALE

#### CHANNEL CAPACITY CALCULATIONS

|                       |                                      |                                  |           |
|-----------------------|--------------------------------------|----------------------------------|-----------|
| Flow Depth            | 0.17 m                               | Top width                        | 0.8 m     |
| Side Slope Ratio      | 3.0 /1                               |                                  |           |
| Bottom width          | 0.30 m                               |                                  |           |
| Area (A)              | 0.14 m <sup>2</sup>                  | Hydraulic Radius (R)             | 0.100 m   |
| Wetted Perimeter (Wp) | 1.38 m                               | Friction Slope (S <sub>f</sub> ) | 0.039 m/m |
| Slope (S)             | 3.90 %                               |                                  |           |
| Manning (n)*          | 0.04                                 |                                  |           |
| Channel capacity (Q)  | 0.147 m <sup>3</sup> /s<br>146.6 L/s | Velocity (V)                     | 1.1 m/s   |

Where:  $Q = \frac{A * R^{2/3} * S^{1/2}}{n}$



**INITIAL T<sub>c</sub> CALCULATIONS  
(AIRPORT METHOD)**

| Drainage ID              | EXT-1 |
|--------------------------|-------|
| k                        | 3.26  |
| Length (L)               | 244   |
| Runoff coefficient (C)   | 0.3   |
| Upstream elevation (m)   | 125.0 |
| downstream elevation (m) | 96.0  |
| Elevation change (m)     | 29.0  |
| Slope (S)                | 11.9% |
| T <sub>c</sub> (min.)    | 18.0  |

| Drainage ID              | EXT-2 |
|--------------------------|-------|
| k                        | 3.26  |
| Length (L)               | 280   |
| Runoff coefficient (C)   | 0.3   |
| Upstream elevation (m)   | 125.0 |
| downstream elevation (m) | 94.0  |
| Elevation change (m)     | 31.0  |
| Slope (S)                | 11.1% |
| T <sub>c</sub> (min.)    | 19.7  |

Where: 
$$t_c = \frac{k(1.1 - C)L^{0.5}}{S^{0.33}}$$



| PROJECT INFORMATION        |  |
|----------------------------|--|
| ENGINEERED PRODUCT MANAGER |  |
| ADS SALES REP              |  |
| PROJECT NO.                |  |



# 0 NICHOLAS

## PICTON, ON, CANADA

### DC-780 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH DC-780.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
10. MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE DC-780 CHAMBER SYSTEM

1. STORMTECH DC-780 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH DC-780 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH DC-780 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER DC-780 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER Tired LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.



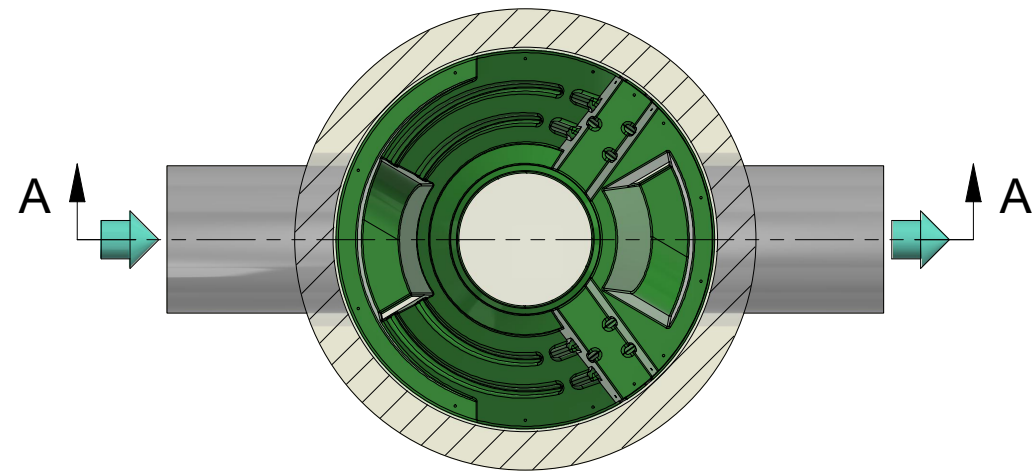




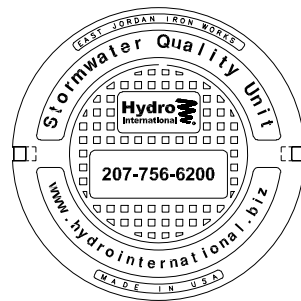




**NOT FOR CONSTRUCTION**  
**CONTACT HYDRO FOR A SITE SPECIFIC DRAWING**



**PLAN VIEW**

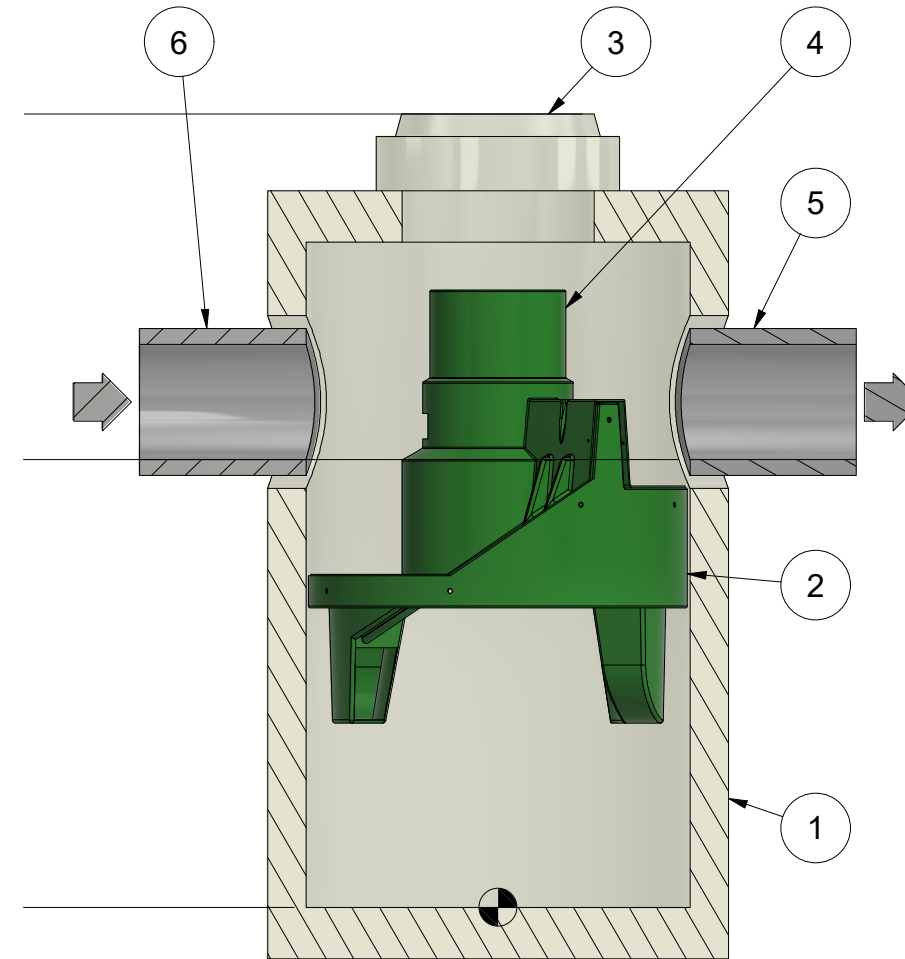


**HYDRO FRAME AND COVER (INCLUDED)**  
 GRADE RINGS BY OTHERS  
 AS REQUIRED

RIM: 3.15 M

OUTLET 1.78 M

SUMP: 0 M



**SECTION A-A**

- CONTRACTOR NOTES:**
1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
  2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
  3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE Ø AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.
  4. CONTRACTOR IS RESPONSIBLE FOR MATERIALS AND LABOR TO BRING CASTINGS TO FINISHED GRADE.
  5. ACTUAL DEPTH OF STRUCTURE MAY VARY DEPENDING ON AVAILABLE PRECAST FORMS. CONTRACTOR TO MEASURE HEIGHT OF STRUCTURE TO ENSURE THAT DEPTH OF EXCAVATION IS CORRECT.



**IF IN DOUBT ASK**

DATE: 4/4/2024 SCALE: 1:30

DRAWN BY: WCS CHECKED BY: MJ APPROVED BY: PT

Title  
 5-ft DIAMETER  
 FIRST DEFENSE  
 Site  
 Nicholas Street  
 Structure Number  
 MH2  
 Patent: www.hydro-int.com/patents



WEIGHT: MATERIAL:

REFERENCE NUMBER:

DRAWING NO.: 5ft FD GA

SHEET SIZE: B SHEET: 1 OF 1 Rev: -

**PRODUCT NOTES:**

1. GENERAL ARRANGEMENT DRAWING ONLY. CONTACT HYDRO INTERNATIONAL FOR SITE SPECIFIC DRAWINGS.
2. PEAK HYDRAULIC FLOW: 566.337 l/s
3. MIN SEDIMENT STORAGE CAPACITY: 1.1 cu. yd. (0.8 cu. m.)
4. MAXIMUM INLET/OUTLET PIPE DIAMETERS: 24 in. (600 mm)
5. THE TREATMENT SYSTEM SHALL USE AN INDUCED VORTEX TO SEPARATE POLLUTANTS FROM STORMWATER RUNOFF.
6. MULTIPLE INLET PIPES POSSIBLE.
7. INLET/OUTLET PIPE ANGLE CAN VARY TO ALIGN WITH DRAINAGE NETWORK.
8. PEAK FLOW RATE AND MINIMUM HEIGHT LIMITED BY AVAILABLE COVER AND PIPE DIAMETER.
9. LARGER SEDIMENT STORAGE CAPACITY CAN BE PROVIDED WITH A DEEPER SUMP DEPTH.
10. UNIT SHALL CONFORM TO HS20-44 LOAD RATINGS.
11. FOR MORE PRODUCT INFORMATION INCLUDING REGULATORY ACCEPTANCES, PLEASE VISIT: <https://hydro-int.com/en/products/first-defense>

**PARTS LIST**

| ITEM | QTY | SIZE (in) | SIZE (mm) | DESCRIPTION             |
|------|-----|-----------|-----------|-------------------------|
| 1    | 1   | 60        | 1500      | I.D. PRECAST MANHOLE    |
| 2    | 1   |           |           | LEDGER SUPPORT          |
| 3    | 1   | 30        | 750       | FRAME AND COVER (ROUND) |
| 4    | 1   |           |           | SEPARATION MODULE       |
| 5    | 1   | 610       |           | OUTLET PIPE (BY OTHERS) |
| 6    | 1   | 610       |           | INLET PIPE (BY OTHERS)  |

## PROJECT INFORMATION

|           |                   |
|-----------|-------------------|
| Reference | MH2               |
| Site      | Nicholas Street   |
| Designer  | Pascal Monat      |
| Date      | 4/4/2024 12:06 PM |

## DESIGN INPUTS

|                               |                         |
|-------------------------------|-------------------------|
| Regulatory Agency             | NJDEP Certified 50% TSS |
| Water Quality Flow Rate (l/s) | 70.9                    |

## DESIGN OUTPUTS

|   |             |
|---|-------------|
| Product                                       |             |
| Unit Reference                                | FD-5Optimum |
| * Approved for use in NJDEP Certified 50% TSS |             |

## UNIT WEIGHTS AND DIMENSIONS

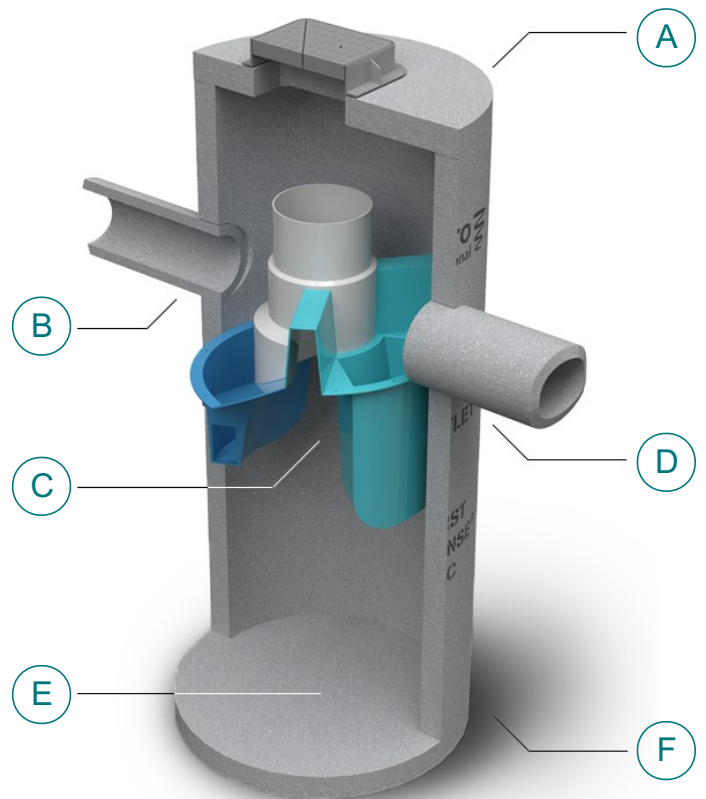
|                           |      |
|---------------------------|------|
| (A) Unit Size (m)         | 1.52 |
| (B) Inlet Pipe Size (mm)  | 610  |
| (D) Outlet Pipe Size (mm) | 610  |
| (F) Unit Depth (m)        | 3.15 |
| Inlet Invert Height (m)   | 1.78 |
| Outlet Invert Height (m)  | 1.78 |

## PERFORMANCE AND HYDRAULICS

|                                    |         |
|------------------------------------|---------|
| Max. Treatment Flow Rate (l/s)     | 80.137  |
| Hydraulic Capacity Flow Rate (l/s) | 566.337 |
| Typical Operating Headloss (mm)    |         |
| Maximum Headloss (mm)              |         |

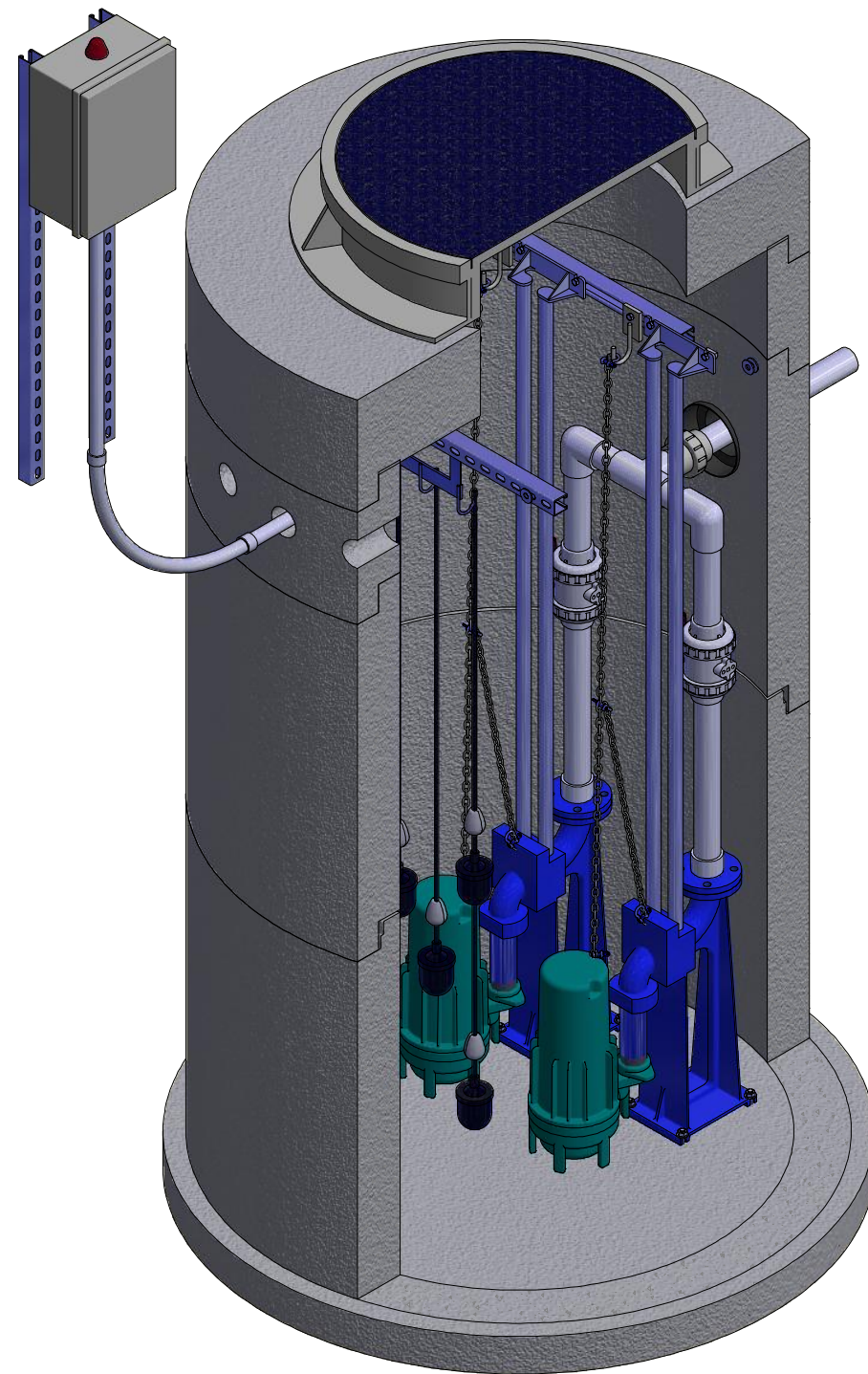
## STORAGE

|  |         |
|--|---------|
| (C) Min. Oil Storage Capacity (l)                    | 1135.62 |
| (E) Min. Sediment Storage Capacity (m <sup>3</sup> ) | 0.84    |

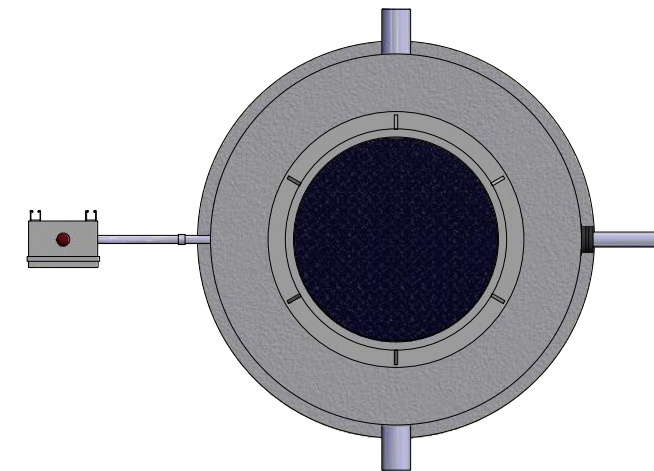


# MINI-MUNI 2IN DUPLEX STORMWATER PUMP STATION

MM-248-DN-1



TOP LEFT ISOMETRIC VIEW w/ SECTION  
NOT TO SCALE



PLAN VIEW  
NOT TO SCALE



PROFILE VIEW  
NOT TO SCALE

MM-248-DN-1.dwg

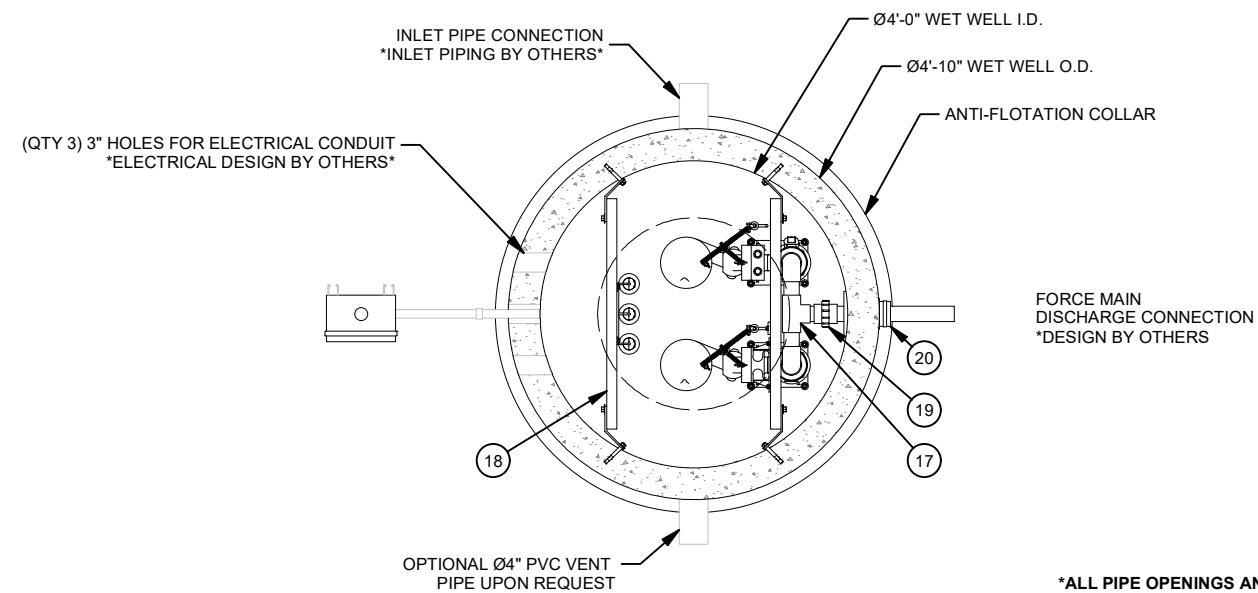
**DISCLAIMERS, INCLUDING BUT NOT LIMITED TO:**

- 1.) All elevations have been provided by others, and have not been verified by Jensen Precast. Contractor to verify all dimensions and elevations in field prior to installation.
- 2.) These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint orientations may vary across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
- 3.) System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
- 4.) Foundation, subgrade, and backfill to be designed by others.

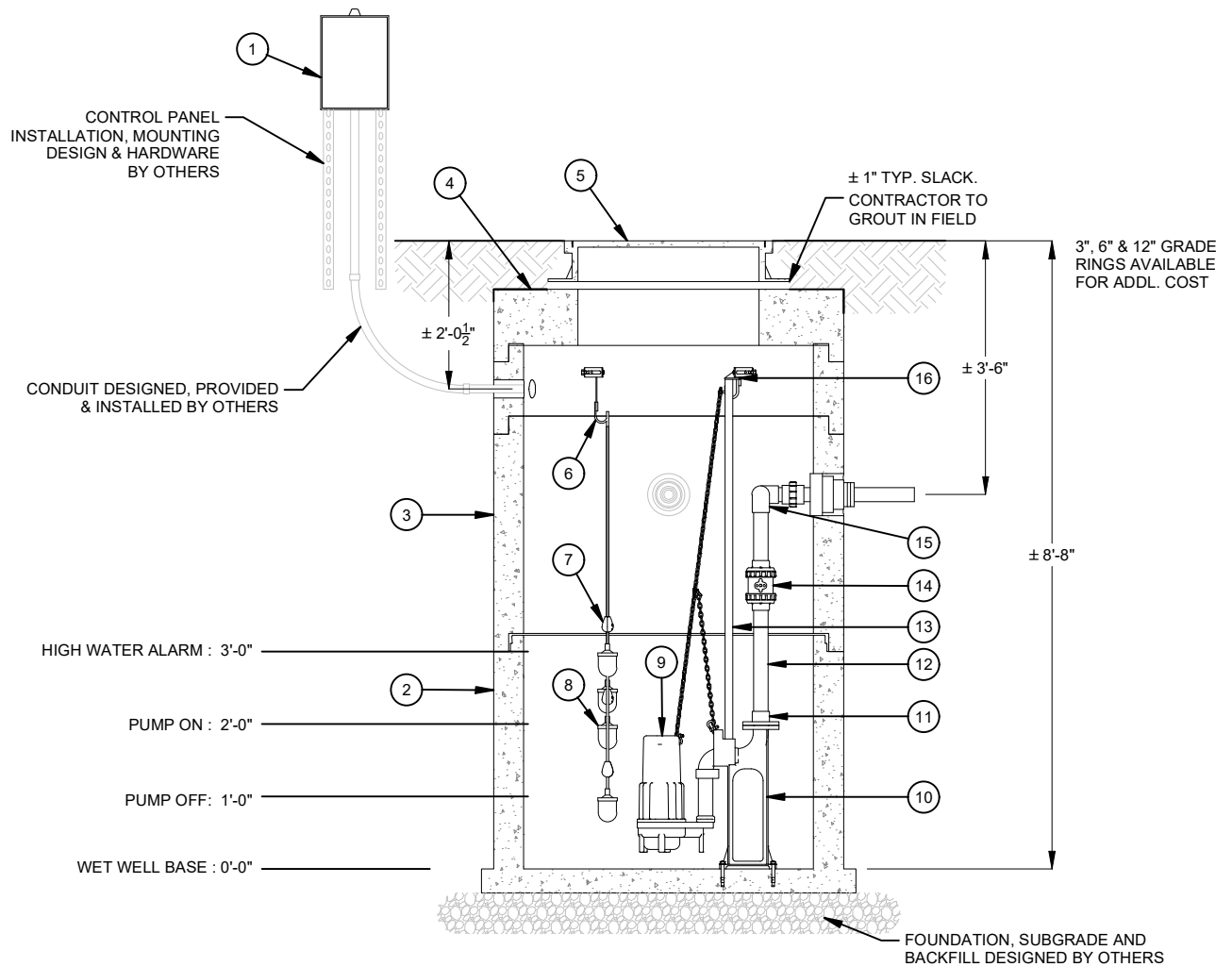
**JENSEN**  PUMP STATIONS  
521 DUNN CIRCLE, SPARKS, NV 89431  
www.jensenwaterresources.com  
(855) 468-5600

 **MINIMUNI**  
MUNICIPAL GRADE RESIDENTIAL & COMMERCIAL LIFT STATIONS

|   |                        |                  |
|---|------------------------|------------------|
| DESCRIPTION:<br><b>MINI-MUNI 2IN DUPLEX STORMWATER PUMP STATION</b> |                        | REV:<br>1        |
| TITLE PAGE  |                        |                  |
| PART NUMBER:<br>MM-248-DN-1   | DRAWN BY:<br>J. Salo   | SHEET:<br>1 of 2 |
| CREATED:<br>2/18/2020   | MODIFIED:<br>5/12/2020 |                  |



**PLAN VIEW**  
NOT TO SCALE



**PROFILE VIEW**  
NOT TO SCALE

| BILL OF MATERIALS |     |  |
|-------------------|-----|--|
| ITEM              | QTY | DESCRIPTION  |
| 1                 | 1   | DUPLEX ALTERNATING CONTROL PANEL FOR 0.5HP MOTORS                      |
| 2                 | 1   | 48IN DIA. JENSEN PRECAST CONCRETE MANHOLE BASE                         |
| 3                 | 1   | 48IN MANHOLE BARREL *HEIGHT VARIES*                                    |
| 4                 | 1   | 48IN DIA. JENSEN PRECAST CONCRETE MANHOLE FLAT TOP                     |
| 5                 | 1   | 30IN DIA. CAST IRON RING AND COVER WITH GASKET                         |
| 6                 | 1   | SS 3-HOOK FLOAT BRACKET  |
| 7                 | 4   | CORD WEIGHT  |
| 8                 | 4   | UNIMAX FLOAT CONTROL SWITCH  |
| 9                 | 2   | SUBMERSIBLE PUMP WITH 2" NPT DISCHARGE AND 20' POWER CABLE             |
| 10                | 2   | STANDARD 2" AUTOCOUPLING WITH CHECK VALVE & SS ANCHORS                 |
| 11                | 2   | ADAPTER 2IN MA THRD X SLIP SCH 80 PVC                                  |
| 12                | 10  | LF 2IN. DIA. PVC SCH80 PIPE *CUT TO LENGTH AS NEEDED                   |
| 13                | 20  | LF 304SS 1IN. DIA SCH40 PIPE *CUT TO LENGTH AS NEEDED                  |
| 14                | 2   | BALL VALVE 2IN SCH 80 PVC SLIP TRUE UNION                              |
| 15                | 2   | 2IN SCH80 PVC 90-DEG SLIP ELBOW  |
| 16                | 2   | UPPER GUIDE RAIL BRACKET 2IN   |
| 17                | 1   | FITTING PVC TEE 2IN SCH 80 SLIP  |
| 18                | 10  | LF 316SS STRUT C-CHANNEL W/ SS INSTALL HARDWARE *CUT AS NEEDED*        |
| 19                | 1   | UNION 2IN SCH 80 PVC   |
| 20                | 3   | FLEXIBLE BOOT TYPE PIPE CONNECTOR MEETS ASTM C-923 1.5-4.8IN PIPE O.D. |

| PUMP CHARACTERISTICS |                                |
|----------------------|--------------------------------|
| DESCRIPTION          | VALUE                          |
| DUTY POINT RANGE     | UP TO 80 GPM OR 30.0' TDH      |
| MANUFACTURER         | BARNES                         |
| MODEL NUMBER         | SERIES 2SEV-L                  |
| PUMP TYPE            | SUBMERSIBLE 2" SOLIDS HANDLING |
| MOTOR SIZE           | 0.5 HP                         |
| POWER SUPPLY         | 115V+ SINGLE PHASE             |

**Abbreviated Specifications:**

Basis of Design: Provide site assembled precast drainage pump station, including specified controls, pumps, valves, internal piping, and precast concrete well to be manufactured and furnished by **Jensen Pump Stations**, (855) 468-5600, [PumpStations@jensenprecast.com](mailto:PumpStations@jensenprecast.com), [www.JensenEngineeredSystems.com](http://www.JensenEngineeredSystems.com).

**Concrete**

- Precast concrete manufacturer must be NPCA-certified. Design shall be according to ACI 318/318R. Mix design shall be: 4,000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Wet well designed per ASTM C 478, precast, reinforced concrete.

**Pumps**

- Furnish and install 2 (qty) Barnes single phase submersible (2" spherical) solids handling type centrifugal pump with a self-engaging lift out assembly, designed to handle pumping of unscreened drainage water.
- The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump impeller shall be of the non-clog/vortex design with pump out vanes on the back side. The unit shall utilize a single mechanical shaft seal arrangement and shall operate in an oil atmosphere. Single phase motors shall be of the capacitor start, capacitor run design.
- The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel. The single phase models shall provide protection against excessive temperature through the use of an in-line heat/current sensor. The lower bearing shall be of the single ball type to accept radial and thrust loads, and the upper bearing of the single ball design, for radial loads. Bearings shall operate in an oil bath atmosphere.
- The pump shall utilize the Barnes break-away fitting which includes an integral check valve. The pump shall be equipped with 20 ft. of type SOW power cord and connected to the motor via quick disconnect pin terminals.

**Control Panel**

- Provide Alderon single phase *Check It* series pump control panel. *Check It* panel is float switch operated and includes: NEMA 4X enclosure, lockable hasp, beacon and alarm buzzer, test & silence switches, HOA switches, pump run indicators and float switch indicators.
- Control Sequence of Operation: Cycle each pump on and off automatically to maintain well wastewater level. Automatic control operates both pumps in parallel if well level rises above starting point of low-level pump, until shutoff level is reached. Automatic alternator, with manual disconnect switch, changes sequence of lead-lag sewage pumps at completion of each pumping cycle.
- Minimum 4 qty mechanical float control switches shall be provided with control panel.

**Piping & Hardware**

- All piping, fittings, and valves shall be Schedule 80 and conforming to ASTM Standard D 1784.
- All hardware provided and used within wet well shall be 316SS quality.

**Commissioning**

- The pumps and station integration shall be tested and confirmed at start-up by a qualified Jensen Pump Stations representative. On-site and remote commissioning options are available.

**Disclaimer**

- All materials appearing as Jensen Precast documents and the like are proprietary work product and are protected under U.S. copyright and other laws.
- Unless in conjunction with business conducted with Jensen Precast, any use of Jensen Precast work product without express, written consent is prohibited, and recipient is prohibited from distributing any and all work product to non-approved third parties under penalty of civil action.

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**JENSEN** PUMP STATIONS  
 521 DUNN CIRCLE, SPARKS, NV 89431  
[www.jensenwaterresources.com](http://www.jensenwaterresources.com)  
 (855) 468-5600

**MINIMUNI**  
 MUNICIPAL GRADE RESIDENTIAL & COMMERCIAL LIFT STATIONS

|              |  |           |           |        |
|--------------|--|-----------|-----------|--------|
| DESCRIPTION: | MINI-MUNI 2IN DUPLEX STORMWATER PUMP STATION |           | REV:      | 1      |
|              | MECHANICAL DETAIL                            |           | SHEET:    | 2 OF 2 |
| PART NUMBER: | MM-248-DN-1                                  | DRAWN BY: | J. Salo   |        |
| CREATED:     | 2/18/2020                                    | MODIFIED: | 5/12/2020 |        |

## **Appendix C**

### **Sanitary Data**

## SANITARY FLOW CALCULATIONS

### Proposed Development

#### Residential Flow Determination

|                                | <u>Unit type</u> | <u>No. Unit</u> | <u>Pop. / Unit</u> | <u>Population</u> |
|--------------------------------|------------------|-----------------|--------------------|-------------------|
|                                | Studio           | 2               | 1.4                | 3                 |
|                                | 1-Bdrm           | 71              | 1.4                | 99                |
|                                | 2-Bdrm           | 25              | 2.1                | 53                |
|                                | 3-Bdrm           | 0               | 2.4                | 0                 |
|                                | 3-Bdrm Towns     | 6               | 2.5                | 15                |
|                                | 4-Bdrm Semis     | 2               | 3.0                | 6                 |
|                                | Total            | 98              |                    | 155 persons       |
| Harmon Peaking Factor          |                  |                 |                    | 4.2               |
| Average flow                   |                  |                 |                    | 320 L/c/d         |
| Proposed Residential Peak Flow |                  |                 |                    | 2.4 L/s           |

#### I/I Flow Determination

|   |          |
|---|----------|
| Site Area                                     | 1.63 ha  |
| Infiltration (24,192 L/day/ha or 0.28 L/s/ha) | 0.46 L/s |
| Long-term dewatering contribution             | 0.00 L/s |

|                                 |                |
|---------------------------------|----------------|
| <b>Total Proposed Peak Flow</b> | <b>2.9 L/s</b> |
|---------------------------------|----------------|

### Pipe Data

| LENGTH (m) | PIPE DIA. (mm) | SLOPE (%) | FULL FLOW CAP.<br>(L/s) | FULL FLOW VEL.<br>(m/s) | ACTUAL VEL.<br>(m/s) | % Full |
|------------|----------------|-----------|-------------------------|-------------------------|----------------------|--------|
| -          | 200            | 1.0%      | 34.2                    | 1.1                     | 0.6                  | 8%     |



# SITEPLANTECH INC.

## Sanitary Design Sheet Proposed Sanitary Conditions 0 Nicholas Street Picton, Ontario

Project No. 23-026  
Date: 9-Oct-24  
Designed By: KH  
Reviewed By: LPM

Min. Sewer Diameter (mm) = 200      Avg. Domestic Flow (l/cap/day) = 320  
Mannings n = 0.013      Infiltration Rate (l/s/ha) = 0.28  
Minimum Velocity (m/s) = 0.60      Max. Harmon Peaking Factor = 3.8  
Maximum Velocity (m/s) = 5      Min. Harmon Peaking Factor = 1.5  
Minimum Pipe Size (%) = 0.50      **NOMINAL PIPE SIZE USED**

| LOCATION    |         |        | RESIDENTIAL  |                     |              |                      |                  |           | INDUSTRIAL/COMMERCIAL/INSTITUTIONAL |              |                     |     |                       | FLOW CALCULATIONS |                 |                   |                         |                                |                |                           | PIPE DATA                |                     |               |                   |              |                                       |                         |                     |
|-------------|---------|--------|--------------|---------------------|--------------|----------------------|------------------|-----------|-------------------------------------|--------------|---------------------|-----|-----------------------|-------------------|-----------------|-------------------|-------------------------|--------------------------------|----------------|---------------------------|--------------------------|---------------------|---------------|-------------------|--------------|---------------------------------------|-------------------------|---------------------|
| STREET      | MANHOLE |        | AREA<br>(ha) | ACCUM. AREA<br>(ha) | UNITS<br>(#) | DENSITY              |                  | RES. POP. | ACCUM. RES. POP.                    | AREA<br>(ha) | ACCUM. AREA<br>(ha) | FSI | FLOW RATE<br>(l/s/ha) | GFA<br>(ha)       | INFIL.<br>(L/s) | TOTAL ACCUM. POP. | AVG. DOM. FLOW<br>(L/s) | ACCUM. AVG. DOM. FLOW<br>(L/s) | PEAKING FACTOR | PEAKED RES. FLOW<br>(L/s) | ACCUM. ICI FLOW<br>(L/s) | TOTAL FLOW<br>(L/s) | LENGTH<br>(m) | PIPE DIA.<br>(mm) | SLOPE<br>(%) | FULL FLOW CAP.<br>(m <sup>3</sup> /s) | FULL FLOW VEL.<br>(m/s) | % FULL<br>Qcap/Qdes |
|             | FROM    | TO     |              |                     |              | PER UNIT<br>(p/unit) | PER HA<br>(p/ha) |           |                                     |              |                     |     |                       |                   |                 |                   |                         |                                |                |                           |                          |                     |               |                   |              |                                       |                         |                     |
| From MH1    | MH-1    | MH-2   | 0.51         | 0.51                | 247          | 2.5                  |                  | 618       | 618                                 | 0.32         | 0.32                | 0   | 0.66                  | 0.00              | 0.2             | 618               | 2.3                     | 2.3                            | 3.80           | 8.7                       | 0.0                      | 8.9                 | 15.8          | 250               | 5.3          | 136.8                                 | 2.79                    | 6.5%                |
| NICHOLAS ST | MH-2    | MH-964 | 0.33         | 0.84                | 0            |                      |                  | 0         | 618                                 | 0.00         | 0.32                | 0   | 0.00                  | 0.00              | 0.3             | 618               | 0.0                     | 2.3                            | 3.80           | 8.7                       | 0.0                      | 9.0                 | 9.4           | 250               | 8.2          | 170.2                                 | 3.47                    | 5.3%                |
| SITE        | MH-964  | MH-998 | 0.45         | 1.29                | 111          | 2.1                  |                  | 236       | 854                                 | 0.00         | 0.32                | 0   | 0.00                  | 0.00              | 0.4             | 854               | 0.9                     | 3.2                            | 3.80           | 12.0                      | 0.0                      | 12.5                | 88.8          | 250               | 4.4          | 124.7                                 | 2.54                    | 10.0%               |
| NICHOLAS ST | MH-998  | MH-5   | 0.00         | 1.29                | 0            |                      |                  | 0         | 854                                 | 0.00         | 0.32                | 0   | 0.00                  | 0.00              | 0.4             | 854               | 0.0                     | 3.2                            | 3.80           | 12.0                      | 0.0                      | 12.5                | 45.0          | 250               | 9.9          | 187.0                                 | 3.81                    | 6.7%                |

## **Appendix D**

### **Water Data**

**PROPOSED DOMESTIC FLOW  
CALCULATION WORKSHEET**

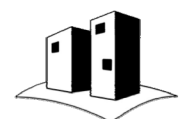
**Residential Use**

| <b>Unit Type</b>               | <b>No. of Units</b> | <b>PPU</b> | <b>L/c/d</b> | <b>Avg. Day (L/d)</b> |
|--------------------------------|---------------------|------------|--------------|-----------------------|
| Studios                        | 2                   | 1.4        | 320          | 896                   |
| 1B/1B+D                        | 71                  | 1.4        | 320          | 31,808                |
| 2B/2B+D                        | 25                  | 2.1        | 320          | 16,800                |
| 3B/3B+D                        | 0                   | 3.1        | 320          | 0                     |
| Semis                          | 2                   | 3.0        | 320          | 1,920                 |
| Towns                          | 6                   | 2.5        | 320          | 4,800                 |
| Residential Use Avg. Day (L/d) |                     |            |              | 56,224                |

**Peak Flows\***

| <b>Criteria</b> | <b>Peaking Factor</b> | <b>Flow</b> |
|-----------------|-----------------------|-------------|
| Avg. day (L/s)  | 1.00                  | 0.7         |
| Min (L/s)       | 0.84                  | 0.5         |
| Max Hr (L/hr)   | 0.90                  | 2,108       |
| Max Day (L/d)   | 1.10                  | 61,846      |

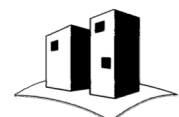
\* Peaking factors per Table 3.1 of the MOE Guidelines for Drinking-Water



**FIRE FLOW  
CALCULATION WORKSHEET**

| PROJECT INFORMATION |                                 |  |
|---------------------|---------------------------------|--|
| Address             | 0 Nicholas Street<br>Picton, ON | Notes: Based on ICF walls and precast<br>concrete foors (4hr rating) |
| NBC Occupancy       |                                 | A=Floor2 + (1/4 Floor1 + 1/4 Floor3)                                 |
| Building Footprint  |                                 |  |
| No. of Storeys      | 3-storey building               |  |

| BASE FLOW CALCULATION                   |                              |                  |                      | CREDITS | CHARGES | Q (L/min)    |
|---|------------------------------|------------------|----------------------|---------|---------|--------------|
| A=                                      | Effective area               |                  | 3,300 m <sup>2</sup> |         |         |              |
| C=                                      | Non-combustible              |                  | 0.8                  |         |         |              |
| F=                                      | Required fire flow           | $F=220C\sqrt{A}$ | 10,110 L/min.        |         |         |              |
|   | "F" Rounded to nearest 1,000 |                  | 10,000 L/min.        |         |         | 10,000       |
| FLOW 'F' ADJUSTMENTS                    |                              |                  |                      | CREDITS | CHARGES | Q (L/min)    |
| Occupancy Adjustments (F')              |                              | %                |                      |         |         |              |
|   | Non-combustible              | -25%             | -2,500               | -2,500  |         | 7,500        |
| Exposure Adjustments (E)                |                              |                  |                      |         |         |              |
|   | Exposure                     | Sep. (m)         | Charge               |         |         |              |
|   | N                            | >50              | 0%                   |         |         |              |
|   | E                            | >50              | 0%                   |         |         |              |
|   | S                            | >50              | 0%                   |         |         |              |
|   | W                            | >50              | 0%                   |         |         |              |
| E = Total Exposure Charge               |                              |                  | 0                    |         |         | 7,500        |
| Sprinkler Adjusments (S)                |                              |                  |                      |         |         |              |
|   | Sprinklered as per NFPA 13   |                  | 0                    |         |         | 7,500        |
|   | Standard Water Supply        | Yes              | -750                 | -750    |         | 6,750        |
|   | Fully supervised watersupply | No               | 0                    |         |         | 6,750        |
| <b>REQUIRED FLOW (F'' = F' + E + S)</b> |                              |                  | <b>(L/min)</b>       |         |         | <b>6,750</b> |
|   |                              |                  | <b>(USGPM)</b>       |         |         | <b>1,783</b> |



**MUNICIPAL SUPPLY  
CALCULATION WORKSHEET**

**Hydrant Flow Test Input**

| Location                      | Test No. | P <sub>s</sub> (PSI) | P <sub>r</sub> (PSI) | Q <sub>r</sub> (USGPM) |
|-------------------------------|----------|----------------------|----------------------|------------------------|
| Nicholas St. & Cumberland St. | 1        | 71.1                 | 61.98                | 832                    |
|                               | 2        | 71.1                 | 48.82                | 1328.2                 |

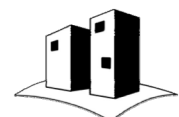
**Theoretical Flow Calculation**



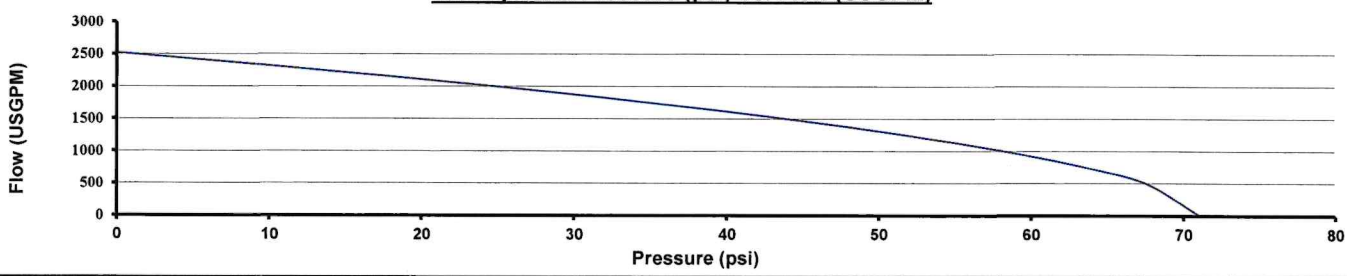

| Location                      | Test No. | P <sub>f</sub> (PSI) | Q <sub>f</sub> (USGPM) |
|-------------------------------|----------|----------------------|------------------------|
| Nicholas St. & Cumberland St. | 1        | 20                   | 2,110                  |
|                               | 2        | 20                   | 2,079                  |

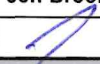

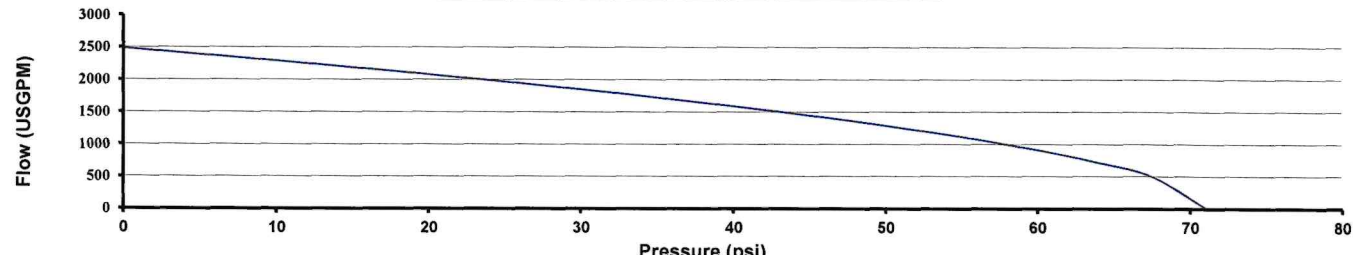

Where  $Q_f = Q_r \left[ \frac{P_s - P_f}{P_s - P_r} \right]^{0.54}$

**Max Day + Fire Check**

| Max Day (USGPM) | F'' (USGPM) Max Day | F'' (USGPM) Max Day + F'' | Q <sub>20</sub> (USGPM) | Check |
|-----------------|---------------------|---------------------------|-------------------------|-------|
| 11              | 1,783               | 1,795                     | 2,079                   | OK    |



| DS4: Fire Flow Testing   |                  |                         |  |                        |   |  |
|--|------------------|-------------------------|--|------------------------|---|--|
| Document Type:   |                  | Datasheet               |  |                        |   |  |
| Category:  |                  | Drinking Water          |  |                        |   |  |
| Date of Fire Flow Testing  |                  | May 05 2024             |  |                        |   |  |
| Field Operator(s)  |                  | Jeff Brooks             |  |                        |   |  |
| Facility Operator(s)   |                  | Jeff Brooks             |  |                        |   |  |
| Notification to Facility Operator:   |                  | Y - X                   | Y  | Initial:               |  | Signature:  |
| DWS Information  |                  |                         |  |                        |   |  |
| High Lift Pump (HLP) On or Off?:   |                  | On X                    | Off <input type="checkbox"/>   | Verified By (Initial): |   | JB   |
| High Level Reservoir (HLR) Level (m):  |                  | 3.08                    |  | Verified By (Initial): |   | JB   |
| Bloomfield Tower Level (m):  |                  | 4.43                    |  | Verified By (Initial): |   | JB   |
| Test Hydrant Information   |                  |                         |  |                        |   |  |
| Hydrant Number:  |                  | 1190                    |  |                        |   |  |
| Location:  |                  | Nicholas and Cumberland |  |                        |   |  |
| Test Number:   |                  | 1                       |  |                        |   |  |
| N.F.P.A. Colour Code:  |                  | Blue                    |  |                        |   |  |
| Static Pressure:   |                  | 71.1                    |  |                        |   |  |
| Residual Pressure:   |                  | 61.98                   |  |                        |   |  |
| Validation: Pressure Drop Greater Than 25%?  |                  | Y/N:                    | 12.8   | Actual Value:          |   | 62.0   |
| Logger S/N:  |                  | 206632                  |  |                        |   |  |
| Flow Hydrant Information   |                  |                         |  |                        |   |  |
| Hydrant No.  | Ports Flowed No. | Logger No.              | Outlet Dia. (in.)  | Coefficient (~0.9)     | Pitot Gauge Reading (psi)   | Flow (USGPM)   |
| 1191   | 1                | 43180737                | 2.5  | 0.9                    | 35.07   | 832  |
|  |                  |                         |  |                        | Total Flow (USGPM)  | 832  |
| Test Hydrant Available Flow  |                  |                         |  |                        |   |  |
| Test Hydrant at 20 psi   |                  |                         | 2110   | USGPM                  | 1743  | IGPM   |
| Test Hydrant at 10 psi   |                  |                         | 2324   | USGPM                  | 1920  | IGPM   |
| Test Hydrant: Pressure (psi) Vs. Flow (USGPM)  |                  |                         |  |                        |   |  |
|  |                  |                         |  |                        |   |  |
| Comments/Discrepancies/Diagram   |                  |                         |  |                        |   |  |
|  |                  |                         |  |                        |   |  |
| Existing Colour Coding:  |                  | GREEN                   |  |                        |   |  |
| Recommended Colour Coding  |                  | BLUE                    |  |                        |   |  |
| Acknowledgement  |                  |                         |  |                        |   |  |
| Operator Overseeing Fire Flow Testing (Print):                                       |                  |                         | Jeff Brooks  |                        |   |  |
| Signature:   |                  |                         |  |                        |   |  |
| Date:  |                  |                         | MAY 14 2024  |                        |   |  |

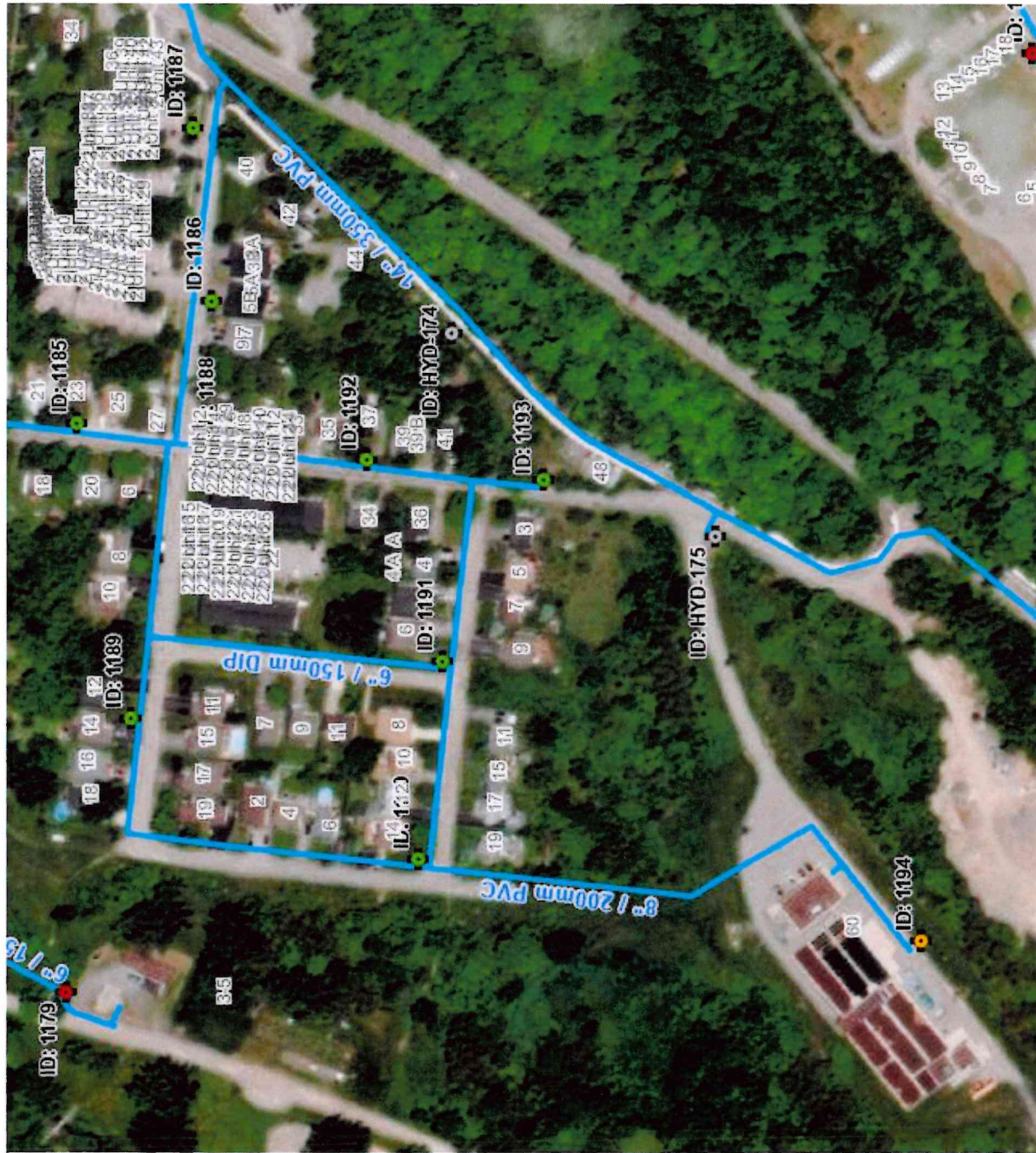
| DS4: Fire Flow Testing   |                  |                         |                              |  |   |  |
|--|------------------|-------------------------|------------------------------|--|---|--|
| Document Type:   |                  | Datasheet               |                              |  |   |  |
| Category:  |                  | Drinking Water          |                              |  |   |  |
| Date of Fire Flow Testing  |                  | May 14 2024             |                              |  |   |  |
| Field Operator(s)  |                  | Jeff Brooks             |                              |  |   |  |
| Facility Operator(s)   |                  | Jeff Brooks             |                              |  |   |  |
| Notification to Facility Operator:   |                  | Y - X                   | N <input type="checkbox"/>   | Initial:   |  | Signature:  |
| DWS Information  |                  |                         |                              |  |   |  |
| High Lift Pump (HLP) On or Off?:   |                  | On X                    | Off <input type="checkbox"/> | Verified By (Initial):   | JB  |  |
| High Level Reservoir (HLR) Level (m):  |                  | 3.08                    |                              | Verified By (Initial):   | JB  |  |
| Bloomfield Tower Level (m):  |                  | 4.43                    |                              | Verified By (Initial):   | JB  |  |
| Test Hydrant Information   |                  |                         |                              |  |   |  |
| Hydrant Number:  |                  | 1190                    |                              |  |   |  |
| Location:  |                  | Nicholas and Cumberland |                              |  |   |  |
| Test Number:   |                  | 2                       |                              |  |   |  |
| N.F.P.A. Colour Code:  |                  | Blue                    |                              |  |   |  |
| Static Pressure:   |                  | 71.1                    |                              |  |   |  |
| Residual Pressure:   |                  | 48.82                   |                              |  |   |  |
| Validation: Pressure Drop Greater Than 25%?  |                  | Y/N:                    | Y                            | Actual Value:  | 31.3  |  |
| Logger S/N:  |                  | 206632                  |                              |  |   |  |
| Flow Hydrant Information   |                  |                         |                              |  |   |  |
| Hydrant No.  | Ports Flowed No. | Logger No.              | Outlet Dia. (in.)            | Coefficient (~0.9)   | Pitot Gauge Reading (psi)   | Flow (USGPM)   |
| 1191   | 2                | 43180737                | 2.5                          | 0.9  | 22.35   | 1328   |
| Total Flow (USGPM)   |                  |                         |                              |  |   | 1328   |
| Test Hydrant Available Flow  |                  |                         |                              |  |   |  |
| Test Hydrant at 20 psi   |                  |                         | 2079                         | USGPM  | 1719  | IGPM   |
| Test Hydrant at 10 psi   |                  |                         | 2290                         | USGPM  | 1893  | IGPM   |
| Test Hydrant: Pressure (psi) Vs. Flow (USGPM)  |                  |                         |                              |  |   |  |
|  |                  |                         |                              |  |   |  |
| Comments/Discrepancies/Diagram   |                  |                         |                              |  |   |  |
|  |                  |                         |                              |  |   |  |
| Existing Colour Coding:  |                  | GREEN                   |                              |  |   |  |
| Recommended Colour Coding  |                  | BLUE                    |                              |  |   |  |
| Acknowledgement  |                  |                         |                              |  |   |  |
| Operator Overseeing Fire Flow Testing (Print):                                       |                  |                         |                              | Jeff Brooks  |   |  |
| Signature:   |                  |                         |                              |  |   |  |
| Date:  |                  |                         |                              | May 14 2024  |   |  |

| TEST INFORMATION |       |        |       |     | TEST HYDRANT INFORMATION |        |          |        |          |        | FLOW HYDRANT(S) INFORMATION |       |       |         |     |       |       | TOTAL   |            |          |  |  |  |
|------------------|-------|--------|-------|-----|--------------------------|--------|----------|--------|----------|--------|-----------------------------|-------|-------|---------|-----|-------|-------|---------|------------|----------|--|--|--|
| Date             | Time  | Test # | Map # | WO# | TEST                     | Static | Residual | % Drop | @ 20 PSI | Colour | Hyd                         | Ports | Pitot | (USGPM) | Hyd | Ports | Pitot | (USGPM) | Total(GPM) | Comments |  |  |  |
| 14-May-24        | 14:04 | 1      | WPX   | 1   | 1190                     | 71.1   | 61.98    | 12.8   | 2109.6   | BLUE   | 1191                        | 1     | 35.07 | 831.9   |     |       |       | 0.0     | 831.9      |          |  |  |  |
| 14-May-24        | 14:05 | 2      | WPX   | 1   | 1190                     | 71.1   | 48.82    | 31.3   | 2079.3   | BLUE   | 1191                        | 2     | 22.35 | 1328.2  |     |       |       | 0.0     | 1328.2     |          |  |  |  |



Resourse →

Flowing



## **Appendix E**

### **Engineering Drawings**

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PLEASE REFER TO ENGINEERING DRAWINGS SUBMITTED UNDER SEPARATE COVER.