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- Environmental Restoration

Block 213 Meadow Ridge
Town of Carleton Place

Serviceability Report

SERVICEABILITY REPORT

BLOCK 213 MEADOW RIDGE
TOWN OF CARLETON PLACE

Prepared by:

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

Prepared: October 10, 2024

Novatech File: 122041
Ref No. R-2024-079

NOVATECH
Engineers, Planners & Landscape Architects

October 10,2024

Planning and Protection Committee
Town of Carleton Place
175 Bridge Street
Carleton Place, Ontario, K7C 2V8

Attention: Niki Dwyer, Director of Development Services

Dear Ms. Dwyer:

Reference: Block 213 Meadow Ridge, Town of Carleton Place
Serviceability Report
Our File No.: 122041

Please find enclosed the 'Serviceability Report' for the above noted project. This report is being submitted in support of Draft Plan of Condo for the proposed development.

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

Yours truly,

NOVATECH

Anthony Mestwarp, P.Eng.
Project Manager, Land Development Engineering

cc: John Angelosante, Olympia Homes

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

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICIES

1.0 INTRODUCTION

Novatech has been retained to prepare a Serviceability Report for the proposed condo development located within Block 213 of the Meadow Ridge Subdivision in the Town of Carleton Place, Ontario. The proposed development is denoted as Block 213 on Plan 27M-81. This report will support the Draft Plan of Condo Application for the subject development. **Figure 1** Key Plan shows the site location. A copy of the legal plan is included for reference.

2.0 EXISTING CONDITIONS

The total site area is approximately 1.39 hectares and is currently undeveloped. The site was cleared and grubbed during the development of the Meadow Ridge Subdivision.

The site is bounded by existing townhouse residences, and Hurdis Way to the North, existing semi-detached residential units and Antonakos Drive to the East and South, and Hooper Drive to the West. The topography of the site is generally flat with a gradual slope from west to east. Due to the recent construction of the Meadow Ridge Subdivision the current site grades are +/- 1.0-2.0m below the surrounding development. **Figure 2** shows the existing site conditions.

The subject site is part of Phase 2 of the Meadow Ridge Subdivision and was denoted as Block 213. The subdivision was designed by Novatech and design information is provided in a report entitled 'Carleton Place Subdivision, Stormwater Management and Servicing Report' prepared By Novatech, dated March 10th, 2017 (Meadow Ridge Report). This Novatech Report was referenced to design the subject development as discussed in this report. Excerpts of the Meadow Ridge Report are provided within the appropriate Appendices for reference.

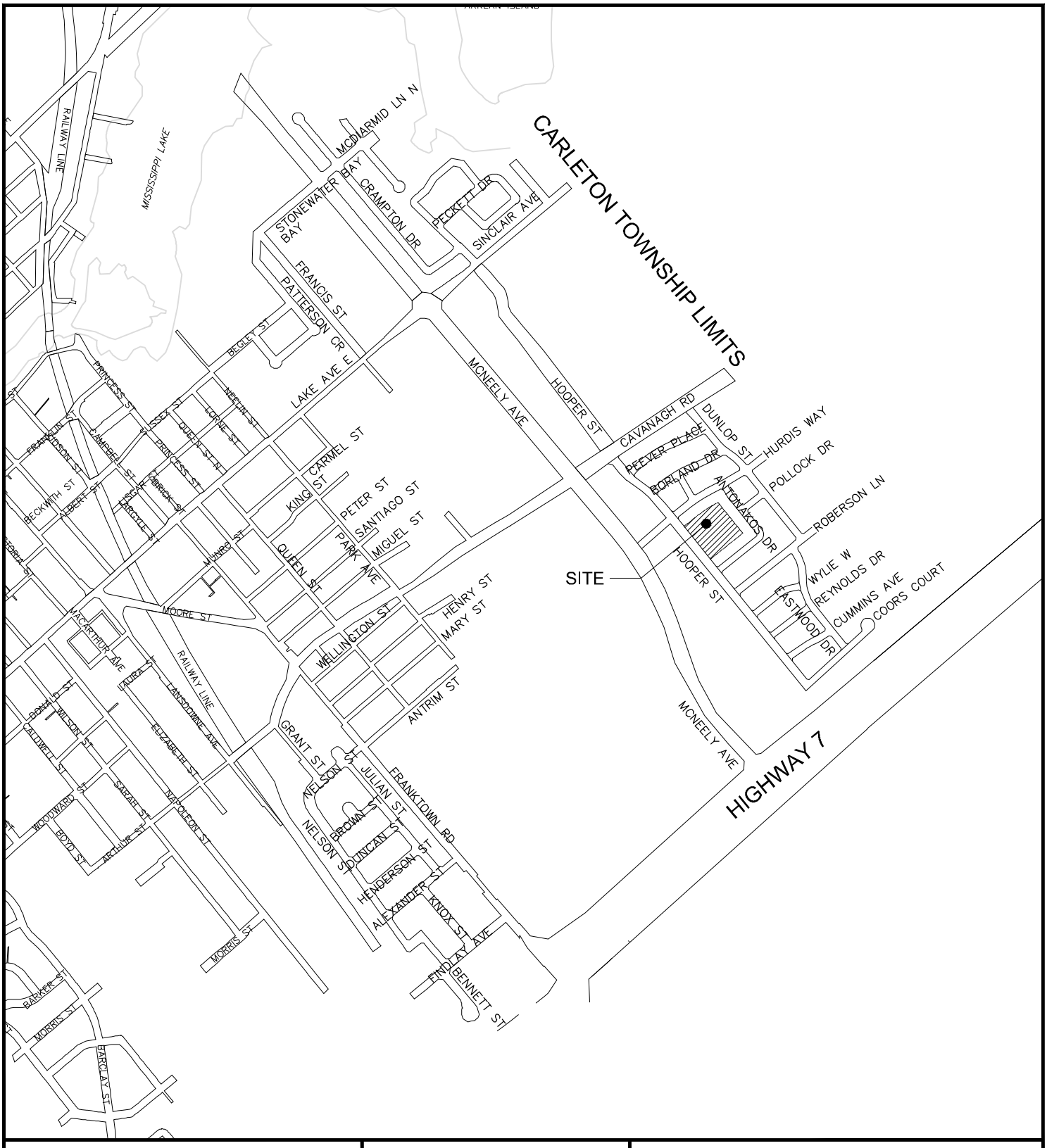
3.0 PROPOSED DEVELOPMENT

It is proposed to develop the site with seventy-seven (77) single unit condos, complete with 2 private roads presently named Private Road No.1, and Private Road No. 2. Access to the site will be provided from two (2) locations on Hooper Street by proposed Private Street No. 1. **Figure 3** shows the proposed development.

4.0 SITE CONSTRAINTS

A geotechnical investigation was completed for the Meadow Ridge Subdivision and a report prepared entitled 'Final Geotechnical Investigation Report, Residential Development, Coleman Street, Carleton Place, Ontario, prepared by Stantec dated July, 2010. The following is a summary of the findings of the report:

- Inferred bedrock within the site varies between 2.44m-4.58m BGS
- A grade raise restriction of 2.0m is recommended for this site. Any grade raises above 2.0m should be reviewed by a professional Geotechnical Engineer.
- Groundwater was observed ranging from 0.9-1.9m BGS across the Meadow Ridge Subdivision.
- A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP. If ground or surface water volumes being pumped ranges between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR).



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TOWN OF CARLETON PLACE

BLOCK 213 - PEGASUS

KEY PLAN

DATE	JOB	FIGURE
SEPT 2023	122041	KP-1

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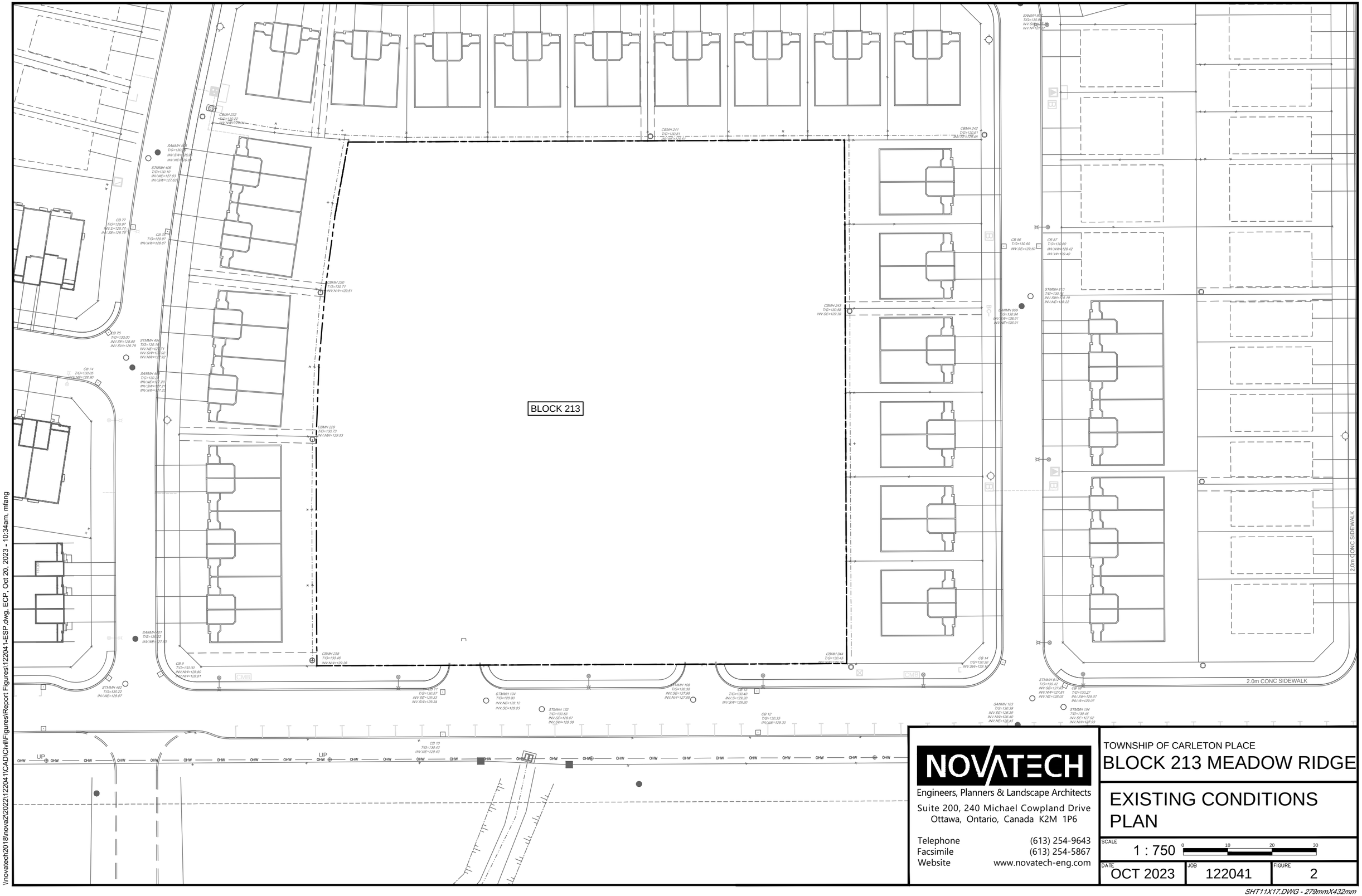

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TOWNSHIP OF CARLETON PLACE

BLOCK 213 MEADOW RIDGE

EXISTING CONDITIONS PLAN

SCALE 1 : 750 (0, 10, 20, 30)

DATE OCT 2023 | JOB 122041 | FIGURE 2

SHT11X17.DWG - 279mmX432mm

BLK 83
BLK 84
BLK 85
BLK 86
BLK 87
BLK 88
BLK 89
BLK 90
BLK 91
BLK 92
BLK 93
BLK 94
BLK 95
BLK 96
BLK 97
BLK 182
BLK 183
BLK 184
BLK 188
BLK 189
PRIVATE STREET NO.1
PRIVATE STREET NO.2
1.5m CONC. SIDEWALK
2.0m CONC. SIDEWALK
HOOPER STREET
CSL
OHW
UP

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TOWNSHIP OF CARLETON PLACE

BLOCK 213 MEADOW RIDGE

PROPOSED SITE PLAN

SCALE 1 : 750 (0, 10, 20, 30)

DATE JUNE 2024 | JOB 122041 | FIGURE 3

SHT11X17.DWG - 279mmX432mm

- Service trenches within the clay should be provided with water stops as per City of Ottawa Detail S8 to minimize the potential long-term groundwater lowering in the area. Water stops should be constructed at a nominal spacing of 200m and at utility trench junctions. The water stops should be constructed full width from the trench bottom to 1.5m from finished grade. The water stops should consist of compactable silty clay material placed in lifts no thicker than 300mm and compacted to at least 95% SPMDD.

5.0 WATER SERVICING

There is an existing 300mm diameter PVC watermain fronting the development within an easement running along the west side of the Hooper Street right-of-way (ROW). There are also existing 200mm watermains within the right-of-way of the neighboring Hurdis Way and Antonakos Drive. During the construction of the Meadow Ridge Subdivision a 200mm dia. stub was installed near the north-west corner of the property to provide a future service connection for the development lands.

It is proposed to provide water service to the development with a private 200mm diameter watermain within the proposed private roads. The private water main will connect to the existing 200mm diameter stub in the north-west property corner, and the existing 200mm watermain within Antonakos Drive to provide redundancy. It is also proposed to install a 200mm watermain along the east side of the Hooper Street right-of-way along the frontage of the proposed development to provide service to the lots fronting Hooper Street. Five (5) private fire hydrants will be installed along the proposed private roads, and one (1) public hydrant will be installed within the Hooper Street right-of-way to provide fire protection for the proposed development. The conceptual watermain network is shown on **Figure 4**.

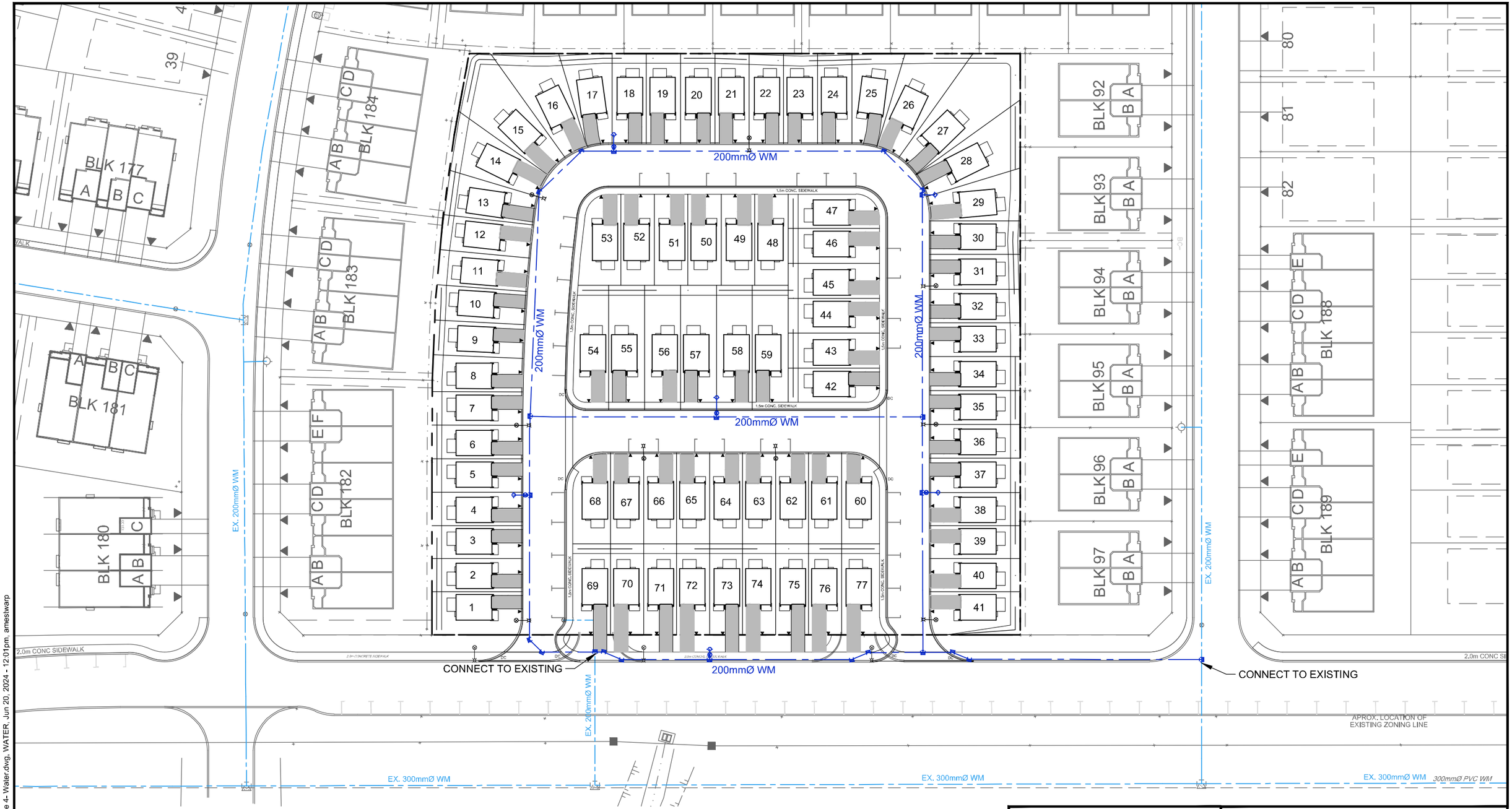
The Meadow Ridge Report provided design criteria for the watermain design of the subdivision development. The water demands for the proposed site were calculated for a total population 208 people based on the following criteria:

- Population
    - Single Unit Condo (2 Br) = 2.7 person/unit

- Average Domestic Flow
    - 350 L/per/day

- Peaking Factor
    - Max Day = 2.5 x average day (L/c/day)
    - Peak Hour = 2.2 x max day (L/c/day)

The domestic water demands for the proposed development are summarized in **Table 5.1** below.



LEGEND

- PROPERTY LINE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED SERVICING LOCATION

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TOWN OF CARLETON PLACE

BLOCK 213 MEADOW RIDGE

CONCEPTUAL WATER SERVICING PLAN

SCALE	JOB	FIGURE
1 : 750 (0, 10, 20, 30)	122041	4
DATE: JUNE 2024		

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SHT11X17.DWG - 279mmX432mm

Table 5.1: Water Demand Summary

Use	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)
Residential	0.84	2.11	4.63

The detailed fire flow calculations are provided in **Appendix B**, with the results summarized in **Table 5.2** below.

5.1 Fire Demands

The Fire demands for the site are calculated with the Fire Underwriters Survey 2020 (FUS). The proposed buildings are to be composed of wood frame construction and will be three (3) storeys in height complete with an attached garage on the ground floor.

The calculated fire demand for a single unit is 100L/s (6,000L/min). Although as noted within the FUS guidelines in high density developments with minimal building separations consideration should be given for the potential for fire to spread beyond the building of origin.

To assess such situations the City of Ottawa has issued ITSB-2014-02 which outlines the following:

- Where there is a potential for less than 3m of separation between the single family, semi-detached, and row townhome wood-framed buildings, the FUS estimate would require the fire area for multiple buildings to be treated as a contiguous block area and would results in a high fire flow demand which is difficult to attain from existing systems;
- Moreover, to meet the high fire flow demand it would trigger larger diameter watermain size, creating system vulnerabilities such as water age issues;
- As such, fire flows may be capped at 167 L/s (10,000 L/min) for single family, semi-detached, and row townhome, provided certain site criteria are met. The criteria are:
    - For singles: a min separation of 10 m between the backs of adjacent units.
    - Traditional side-by-side semi-detached or row townhomes:
        a. Firewalls with a min two-hour rating to separate the block into fire areas of no more than the lesser of 7 dwelling units, or 600 m2 of building area; and
        b. Min. separation of 10 m between the backs of adjacent units.

Thus, it is proposed to apply the 166 L/s (10,000 L/min) cap to the proposed development.

Table 5.2: Fire Demand Summary

Unit Group	Description	FUS Design Fire Flow
Cap as per ITSB 2014-02	3-storey, wood frame	167 L/s

5.1 Water Model Analysis

The above demands were inserted into the EPANET hydraulic model for the Meadow Ridge Subdivision for analyzing the performance of the proposed watermain system for three theoretical conditions: 1) High Pressure check under Average Day conditions, 2) Peak Hour demand, 3) Maximum Day + Fire Flow Demand. The following **Table 5.3** summarizes the results from the hydraulic water model for Block 213.

Table 5.3: Water Analysis Results Summary

Condition	Demand (Block 213) (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	0.84 L/s	80psi (Max)	79.86psi (Overall Subdivision) 72.34 (Block 213)
Maximum Daily Demand and Fire Flow	168.78 L/s	20psi (Min)	44.71psi (Block 213)
Peak Hour	4.63 L/s	40psi (Min)	67.97psi (Block 213)

Based on the preceding analysis it can be concluded that the existing watermain system will provide adequate system pressures and flows to service the proposed development. Refer to **Appendix A** for detailed model results, schematics of the model and boundary conditions.

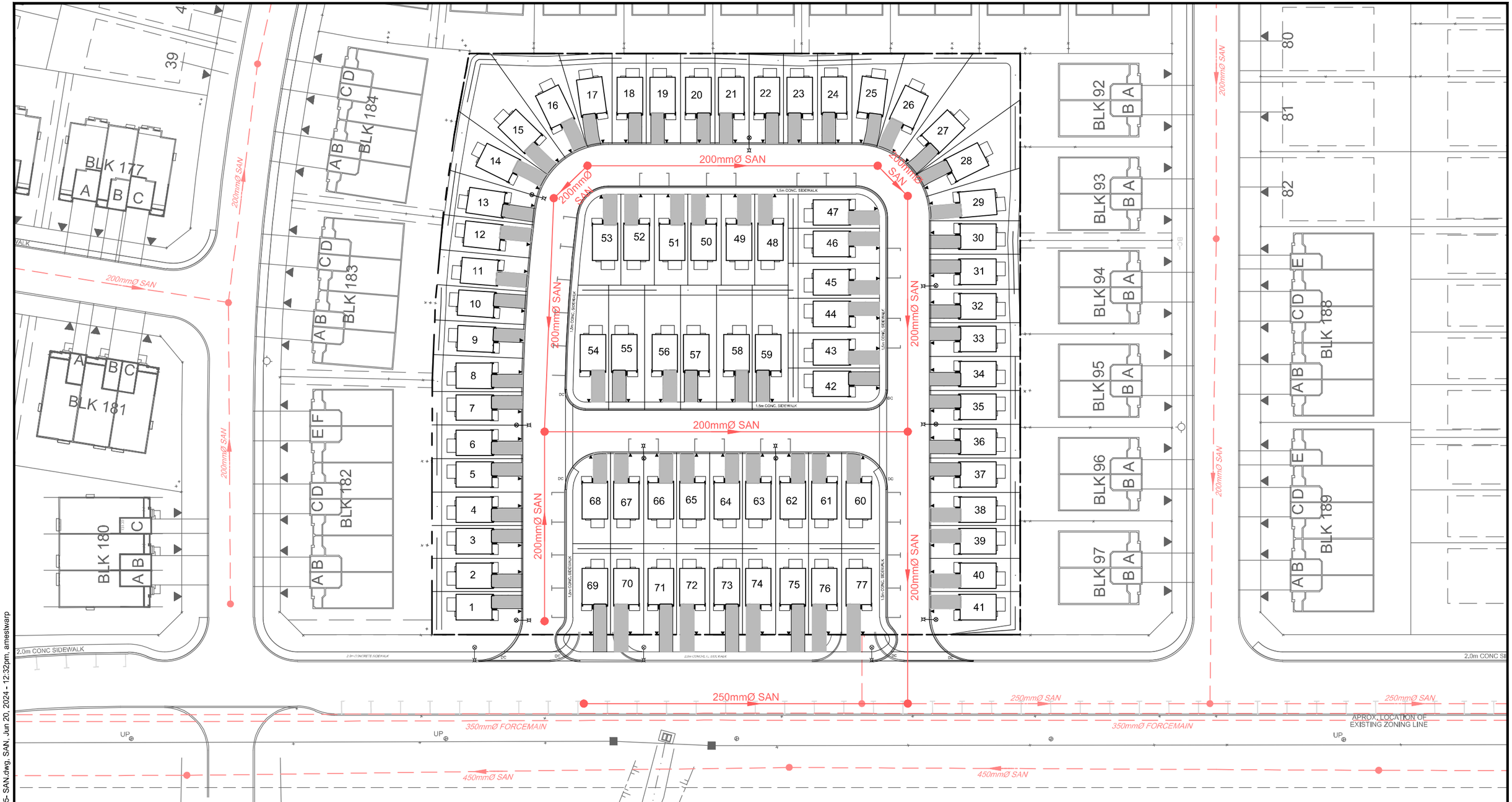
6.0 SANITARY SERVICING

There is an existing 250mm diameter sanitary sewer, and a twin 350mm diameter sanitary forcemain in the Hooper St. right-of-way. There is also an existing 200mm diameter sanitary stub in the south-east corner of the site that was installed as part of the Meadow Ridge Subdivision to provide a future sanitary connection to Block 213.

It is proposed to service the development with a 200mm diameter private sanitary sewer within private roadways that will discharge to the existing sanitary sewer within Hooper St. It is also proposed to extend the existing sanitary sewer within the Hooper Street right-of-way along the frontage of the proposed development to provide service to the proposed lots fronting Hooper Street. The conceptual layout of the proposed sanitary sewer system is shown on **Figure 5**.

The proposed development lands were denoted as Block 213 within the Meadow Ridge Phase 2 Subdivision and are tributary to the Meadow Ridge Subdivision Sanitary sewer, and ultimately the Highway 7 pump station. The Meadow Ridge Report provides design parameters as follows:

- Residential Average Flow = 350 L/capita/day
- Population:
  - Single Family = 3.4 Person/unit
  - Townhouse = 2.7 Person/unit
- Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Harmon Formula Correction Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.28L/s/ha



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER c/w FLOW DIRECTION
- EXISTING SANITARY SEWER c/w FLOW DIRECTION
- PROPOSED SERVICING LOCATION

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TOWN OF CARLETON PLACE
BLOCK 213 MEADOW RIDGE

CONCEPTUAL SANITARY SERVICING PLAN

SCALE 1 : 750 (0, 10, 20, 30)
DATE JUNE 2024
JOB 122041
FIGURE 5

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The subject development lands were identified as drainage area 101 in the Meadow Ridge Phase 2 Subdivision sanitary sewer design. The drainage area was allocated flow based on an assumed development of 39 townhomes for a total equivalent population of 105 people. The allocated flow was assumed to be tributary to the Hooper Street Sanitary Sewer system (SANMH 101), and ultimately the highway 7 pumpstation. The allocated flow to the sewer outlet was calculated to be **2.16 L/s** (SANMH 101). The total peak design flow from the Meadow Ridge subdivision, including allowances for the future development of Phase 4, the Gibson Lands, and vacant lands to the west were calculated to be **129.53 L/s**.

To be consistent with the existing design the sanitary flows for the proposed development were calculated using the above criteria. The proposed development consists of seventy-seven (77) single unit Condos (2Br), with a design population of 208 persons. For design purposes it was assumed that the single dwelling condos would have similar occupancy to a townhome unit as they are proposed to have 2-bedrooms, and a footprint similar to townhome units. The total theoretical sanitary flow for the proposed development is calculated to be **3.79 L/s**.

The sanitary design sheet from the Meadow Ridge Report was reproduced to include flows from the proposed development and is provided in **Appendix B** for reference. The proposed development will result in a peak design flow to the highway 7 pump station of **130.80 L/s** compared to the previously designed **129.53L/s** (a **1.27L/s** increase). The updated design sheet shows that the downstream sewer system has capacity for the proposed development.

It should be noted that the above calculations are conservative since actual development flows tend to be lower than theoretical flows. As such the actual full build-out flows to the Highway 7 pump station are lower than noted above and the 1% (1.27L/s) increase in theoretical flow to the pump station is considered negligible.

Based on the above, no negative impacts are anticipated in the downstream system. Detailed sanitary flow design sheets and drainage area plans are provided in **Appendix B** for reference.

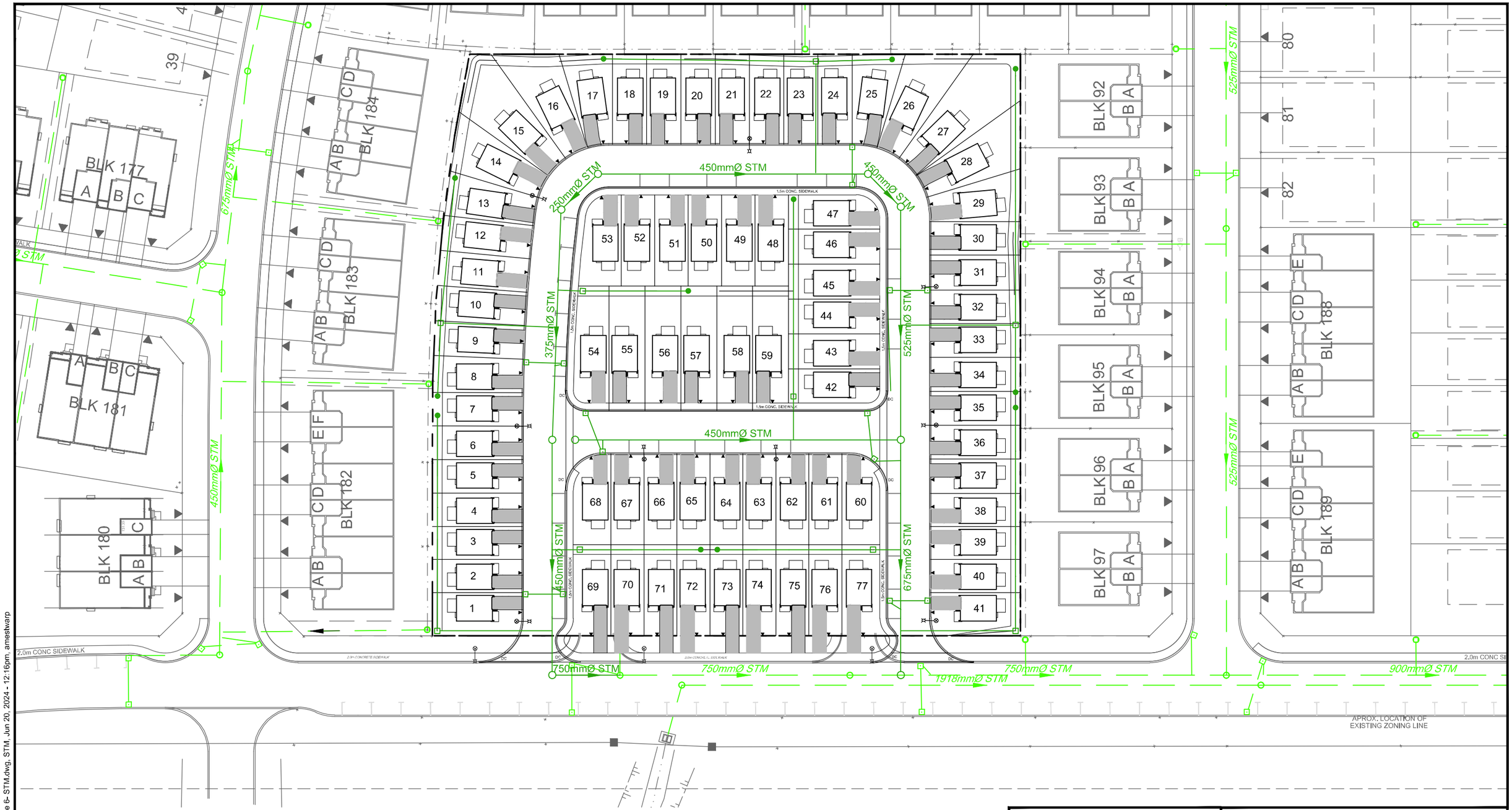
7.0 Storm Servicing & Stormwater Management

The topography of the site is relatively flat and slopes from the west to east. There are existing 750mm diameter storm sewers located within the Hooper Street right-of way along the frontage of the subject property. The existing storm sewer outlets to the Lavallee Creek SWM Facility. The existing storm sewers are shown on **Figure 6**.

There is one (1) storm sewer stub (675mm diameter) located near the south-west corner of the development. It is proposed to provide storm sewers within the proposed private rights-of-way and connect to the existing storm sewer within Hooper Street at two (2) locations. The proposed storm sewers will vary in sizes ranging from 250mm to 675mm in diameter. The conceptual layout of the proposed storm sewer system is shown on **Figure 6**.

Stormwater management design criteria for the proposed development is provided in the Meadow Ridge Report. The stormwater management criteria provided in the Report is as follows:

- Storm sewers are to be designed to convey the 1:5 year post-development peak flow for the proposed development.
- Overland flows are to be confined within the rights-of-way and/or defined drainage easements for all storms up to and including the 1:100-year event.



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER c/w FLOW DIRECTION
- EXISTING STORM SEWER c/w FLOW DIRECTION
- PROPOSED SERVICING LOCATION

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TOWN OF CARLETON PLACE
BLOCK 213 MEADOW RIDGE

CONCEPTUAL STORM SERVICING PLAN

SCALE 1 : 750 (0, 10, 20, 30)
DATE JUNE 2024
JOB 122041
FIGURE 6

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SHT11X17.DWG - 279mmX432mm

- ICD flow rates for roadways and rear yards are to be calculated for each drainage area to ensure that the following stormwater management (SWM) objectives are satisfied:
    - No surface ponding in road sags and rear yards following a 5-year rainfall event (some ponding is permissible during the storm peak).
    - Maximum 100-year flow depths and elevations on streets and rear yards shall not exceed 300 mm and shall be confined to the road right-of-way.
    - The 100-year hydraulic grade line within the storm sewers shall not be within 300 mm (vertical) to adjacent building underside of footing.
    - Major system overland flow routes will be established to ensure there is no flooding threat to residents.
- Provide quality control storage corresponding to a *Normal* level of treatment (70% TSS removal). The subject property is within the drainage area serviced by the existing Lavallee Creek SWM facility;

7.1 Major Overland Flow Route

The site will be graded to provide an overland flow route following the proposed private roadways. The roadway design will conform to Ontario Provincial Standards, and the maximum total (dynamic + static) flow depth will be restricted to 0.30m. The site is to be graded to provide an overland flow route that directs overland flows to Hooper Street and ultimately the existing SWMF pond.

7.2 Stormwater Quantity Control & Storage Requirements

The existing SWMF pond was designed to provide quantity control up to and including the 100-yr storm event for Block 213 assuming a run-off coefficient of 0.65. The proposed development will have a coefficient of 0.61, and as-such no additional onsite control measures are required beyond catchbasin ICDs sized for the 5-year storm event. Runoff from storms exceeding the 5-year peak flow can be provided within road sags within the right-of-way.

To determine preliminary peak flows and storage requirements, the previously approved Storm and Sanitary Analysis (SSA) model of the Meadow Ridge Subdivision has been imported into PCSWMM and the model parameters for Block 213 have been updated with the new runoff coefficient of 0.61 and an orifice has been added to control flows for the 5-year event. Preliminary peak flows and required road-sag storage are outlined in the following table.

Table 7.1: Peak flows and Required Storage

Storm Distribution->	**4hr Chicago**				**12hr SCS**		
Return Period->	**25mm**	**2yr**	**5yr**	**100yr**	**2yr**	**5yr**	**100yr**
Peak Flow (L/s)	128	174	244	265*	83	126	249*
Storage Req'd (m^3)	0	0	0	91	0	0	6

**Controlled peak flows*

Controlling peak flows to the 5-year storm event will require an on-site storage volume of 91m^3. The required storage will be provided within the road sags, and the proposed rear yards. The rear yard storage will be provided by a perforated pipe / clearstone trench system. The perforated pipe will be 250mm and surrounded by 25-50mm dia. clearstone that will be wrapped in geotextile.

The primary purpose of the perforated pipe / trench system is to store runoff from the rear yards and rear building rooftops. Any runoff which exceeds the capacity of the storage systems will flow overland onto Hooper Street.

7.3 Water Quality Control

The proposed development is within the catchment area of the Lavallee Creek SWM Facility, and the facility was designed to provide quality treatment for Block 213. As such no on-site quality control measures are required.

7.3.1 Lot Level and Conveyance Best Management Practices

In addition to the treatment provided by the existing SWM facility it is proposed to utilize lot level and best management practices on the site. Lot level and conveyance stormwater best management practices (BMPs) promote water quality treatment by reducing the rate and quantity of storm runoff from the development. The reduction in flow promotes the settling of any suspended solids and lowers the potential for re-mobilization of previously settled material.

In addition to the water quality benefits, the proposed lot level and conveyance BMPs will promote infiltration and help mitigate the reduction in groundwater infiltration / recharge resulting from development.

The storm drainage design for the proposed development will include the following BMPs:

- Rear yard pipe systems are to be perforated pipes to promote infiltration of runoff from rear yard areas.
- Roof leaders will be discharged to the grassed rear yards.
- Construction of swales at minimal slopes where possible;
- 300mm deep sumps in all storm maintenance holes;
- 600mm deep sumps in all catchbasins.

In summary, the existing storm sewer infrastructure can service the proposed development and appropriate stormwater management methods can be used to meet the allowable release rate. Refer to **Appendix D** for report excerpts, and drainage area figures.

8.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The proposed 200mm dia. watermain which connects to the existing 200mm dia. watermains in Hooper Street, and Antonakos Drive can service the proposed development.
- It is anticipated that there are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- It is anticipated that there is adequate flow to meet the Fire demands of the proposed development.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- The proposed 200mm dia. sanitary sewer which connects to the existing 250mm dia. sanitary sewer in Hooper Street can service the proposed development.
- It is anticipated there is adequate capacity within the existing sanitary infrastructure to service the proposed development based on updated sanitary design sheets and calculations.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system is to connect to the existing 750mm diameter storm sewer system in Hooper St.
- Storm flows will be attenuated through the implementation of inlet control devices in the proposed catchbasins.
- As per existing conditions a major overland flow route is provided to Hooper Street.
- Quality, and Quantity control of stormwater will be provided in the downstream SWM facility.

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catchbasin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

10.0 CLOSURE

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

NOVATECH

Prepared by:

Anthony Mestwarp, P.Eng.
Project Manager
Land Development Engineering

APPENDIX A
Water Servicing Information

Adam Lambros

From: Mark Buchanan [mbuchanan@jlrichards.ca]
Sent: May-19-15 11:01 AM
To: Adam Lambros
Cc: dyoung@carletonplace.ca; Greg MacDonald
Subject: RE: 26778-01 Revised Hydraulic Boundary Conditions
Attachments: Sketch & WaterCAD outputs REVISED May19-2015.pdf

Hello Adam,

The proposed residential development located East of McNeely was simulated in the Town of Carleton Place's existing hydraulic water model based on the revised theoretical water demands provided in your May 13, 2015 email below. As requested, hydraulic boundary conditions have been re-calculated at locations 1 and 2 along the existing 300 mm diameter feedermain as shown in the attached Sketch. Locations 1 and 2 correspond to junction nodes J-905 and J-858, respectively (See attached Sketch and WaterCAD results):

Scenario	Location 1 (J-905)		Location 2 (J-858)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Existing Average Day (No Development)	491	181.28	486	181.28
Peak Hour Demand (68.20 L/s)	471	179.23	467	179.27
Max Day (31.00 L/s) + Fire Flow (167 L/s)	407	172.74	404	172.86

Note that the foregoing model results are for current conditions and are based on computer model simulation. No boundary conditions were generated for the high pressure demand since the Town's existing model currently does not include this scenario.

Disclaimer: The model results are based on current operation of the Town's water distribution system. The computer model simulation is based on the best information available at this time. The operation of the water distribution system can change on a regular basis, resulting in a variation in the boundary conditions. It is further noted that the operational characteristics of the water supply system and physical properties of the watermains can change and/or deteriorate over time. These changes may affect the supply characteristics of the system and the assumptions made in developing the model, which in turn could lead to variations in the simulation results. This should be considered by any third party undertaking simulation of system upgrades.

Regards,

Mark Buchanan, P. Eng.
Civil Engineer
J.L. Richards & Associates Limited
2013 Winner of Canada's Best Managed Companies program

864 Lady Ellen Place, Ottawa, ON K1Z 5M2
Tel: 613-728-3571 Fax: 613-728-6012
www.jlrichards.ca

From: Adam Lambros [mailto:a.lambros@novatech-eng.com]
Sent: May 13, 2015 5:09 PM
To: Mark Buchanan
Cc: dyoung@carletonplace.ca; Greg MacDonald
Subject: RE: 26778-01 Hydraulic Boundary Conditions

Hello Mark,

In my original request, I included the demand for our entire build out as well as the future site to the NE (also owned by the client Pegasus). Now that I am working through the design I have realized that we should be accounting for a demand for the property owned by Mr. Gibson as well (two properties over from proposed site) because it would presumably need to connect to Pegasus Lands if ever developed.

Can you please re-run the boundary conditions with the following demands?

Maximum Day Demand = 31.00L/s

Peak Hour Demand = 68.20L/s

Fire Flow Demand = 10,000L/min

Thanks,

Adam Lambros, B.Eng

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x278 | Fax: 613.254.5867

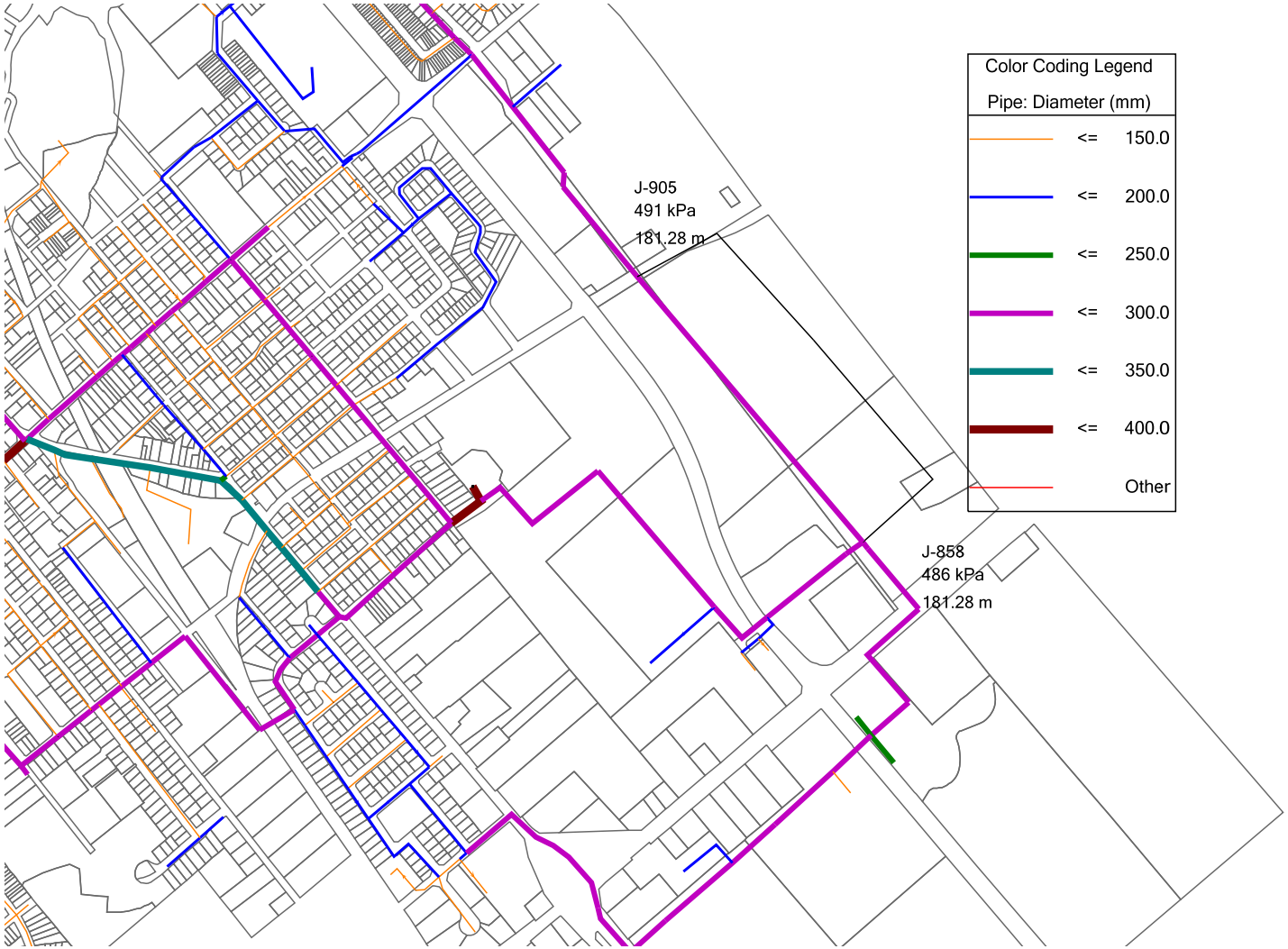
LEGEND

Prop. WM Connection Point

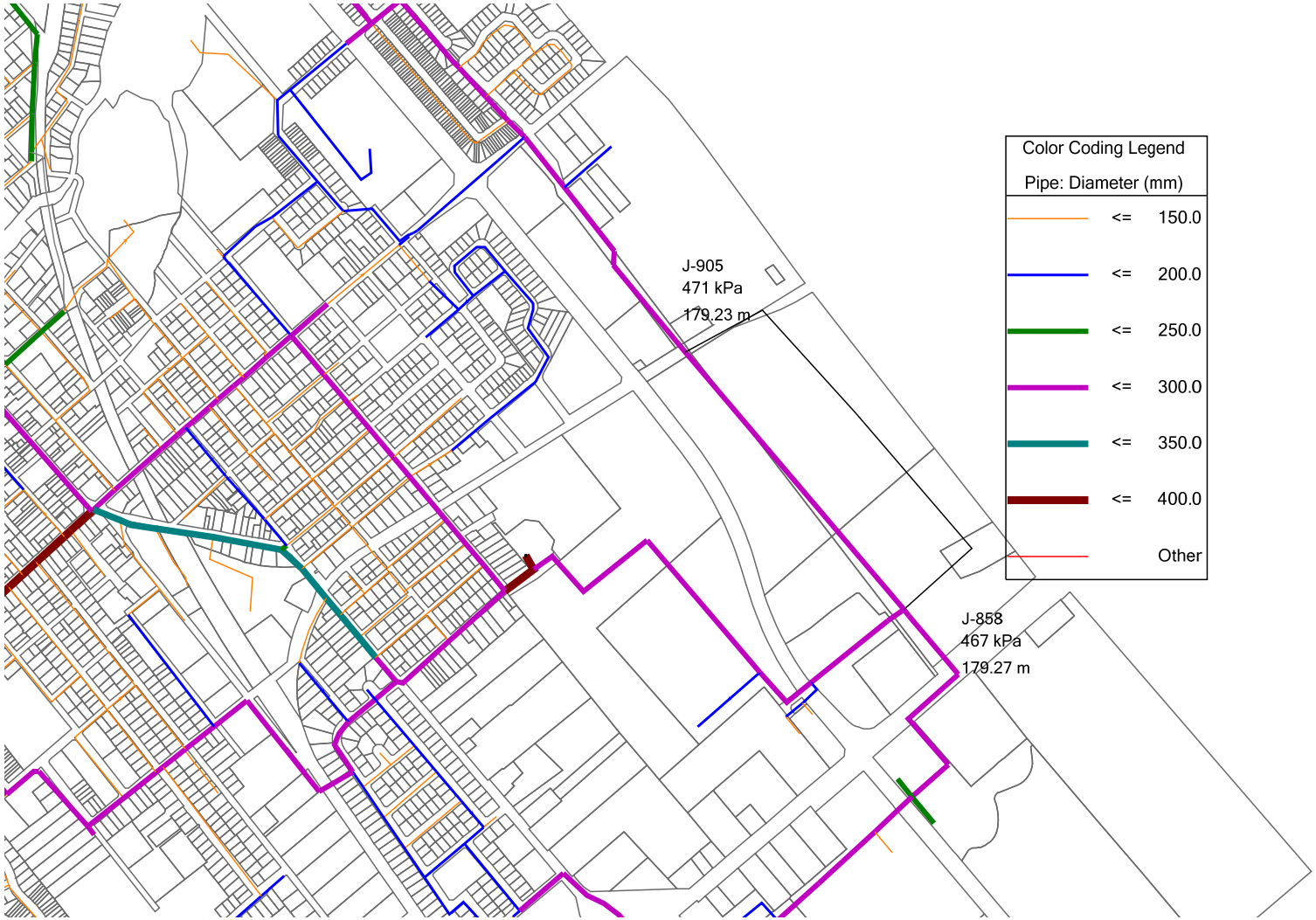
Ex. 300mm WM

1 Connection Label

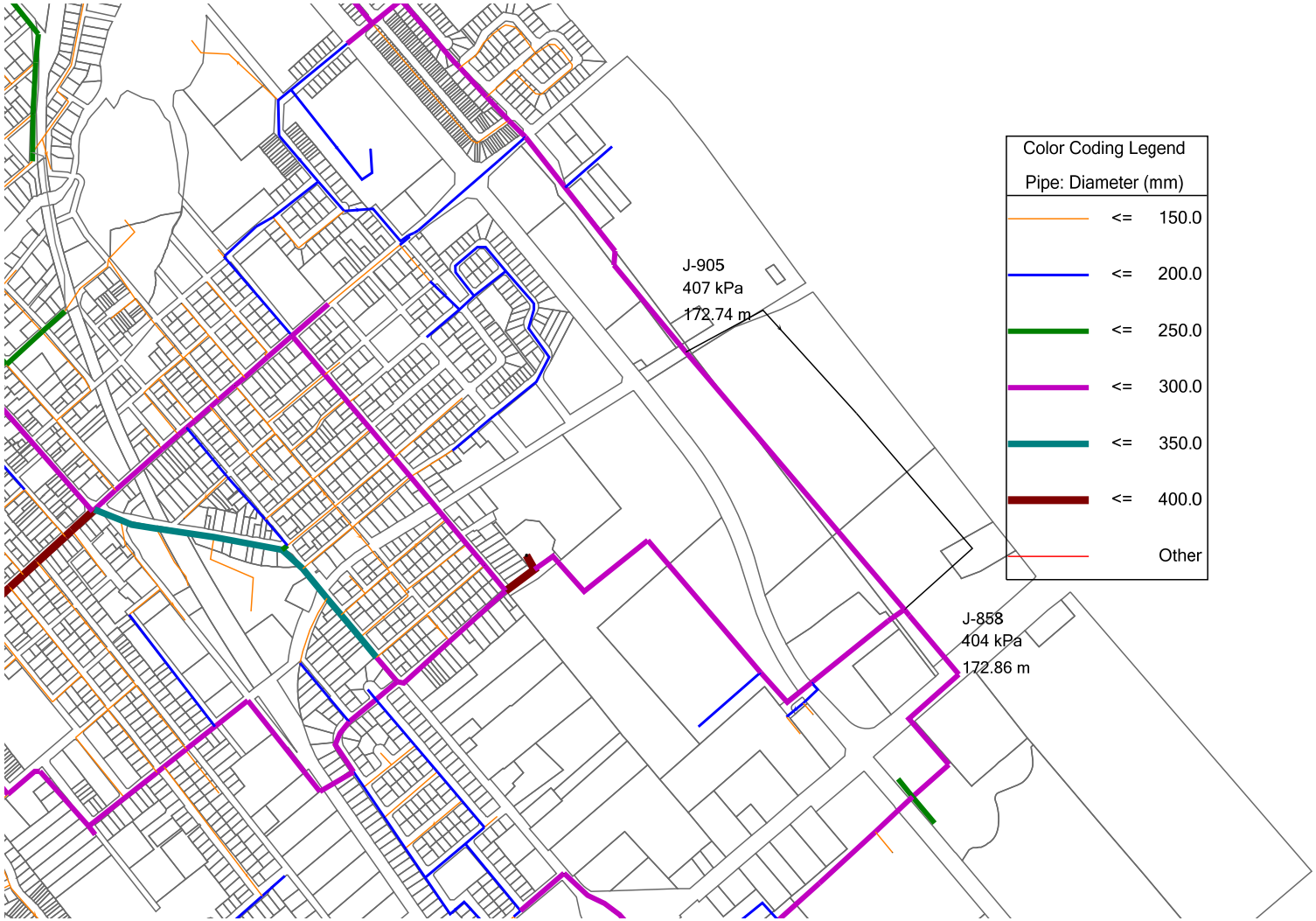
Active Scenario: Avg Day Demand



Active Scenario: Ex. Peak Hour Demand + Development 68.20 L/s



Active Scenario: Ex. Max Day Demand + Development 31.00 L/s + Fire Flow 167 L/s

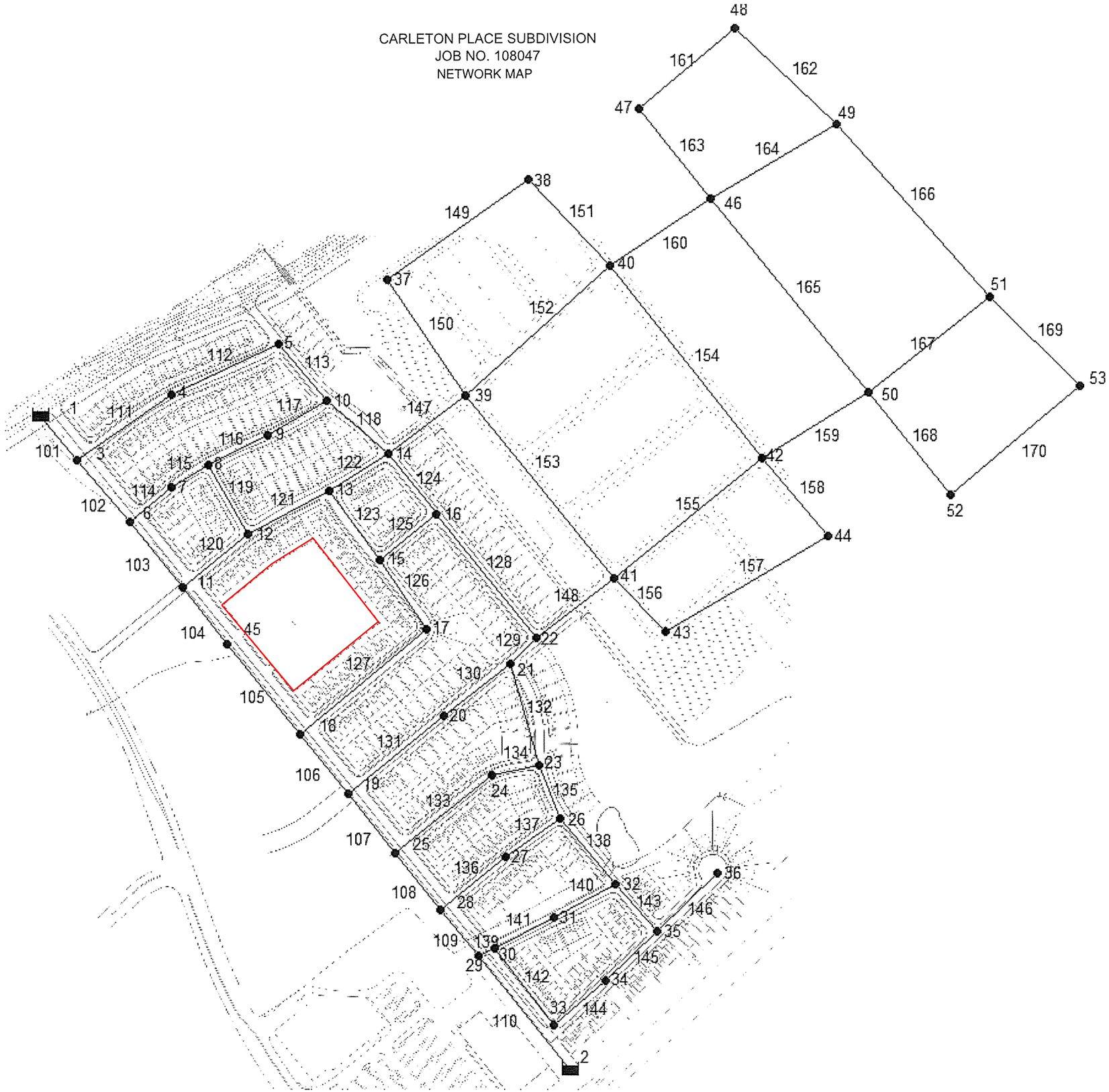


Watermain Demand Calculations

Node		Units		Population	Pop.	Demand (L/s)		
Label	Elev.	Singles	Towns			High Pres.	Max Daily	Peak Hour
1				0.0	0	0.00	0.00	0.00
2				0.0	0	0.00	0.00	0.00
3	128.27			0.0	0	0.00	0.00	0.00
4	128.80		50	135.0	135	0.55	1.37	3.01
5	128.20	6		20.4	21	0.09	0.21	0.47
6	128.35			0.0	0	0.00	0.00	0.00
7	128.50		11	29.7	30	0.12	0.30	0.67
8	128.40	4	10	40.6	41	0.17	0.42	0.91
9	128.35	17		57.8	58	0.23	0.59	1.29
10	128.30			0.0	0	0.00	0.00	0.00
11	128.11			0.0	0	0.00	0.00	0.00
12	128.55		24	64.8	65	0.26	0.66	1.45
13	128.50	10	12	66.4	67	0.27	0.68	1.49
14	128.05			0.0	0	0.00	0.00	0.00
15	128.50		17	45.9	46	0.19	0.47	1.02
16	128.02	12	7	59.7	60	0.24	0.61	1.34
17	128.55	9	26	100.8	101	0.41	1.02	2.25
18	127.73			0.0	0	0.00	0.00	0.00
19	127.79			0.0	0	0.00	0.00	0.00
20	127.85	21	3	79.5	80	0.32	0.81	1.78
21	127.55	9		30.6	31	0.13	0.31	0.69
22	127.75	13		44.2	45	0.18	0.46	1.00
23	127.55	11	4	48.2	49	0.20	0.50	1.09
24	127.70		23	62.1	63	0.26	0.64	1.40
25	128.40			0.0	0	0.00	0.00	0.00
26	127.35	7		23.8	24	0.10	0.24	0.53
27	127.25		22	59.4	60	0.24	0.61	1.34
28	128.30			0.0	0	0.00	0.00	0.00
29	127.62			0.0	0	0.00	0.00	0.00
30	127.43		4	10.8	11	0.04	0.11	0.25
31	127.60		7	18.9	19	0.08	0.19	0.42
32	127.40		7	18.9	19	0.08	0.19	0.42
33	128.05		11	29.7	30	0.12	0.30	0.67
34	127.45		19	51.3	52	0.21	0.53	1.16
35	127.55	4	12	46.0	46	0.19	0.47	1.02
36	127.80	13		44.2	45	0.18	0.46	1.00
37	127.60			110.0	110	0.45	1.11	2.45
38	127.60			110.0	110	0.45	1.11	2.45
39	127.60			110.0	110	0.45	1.11	2.45
40	126.60			110.0	110	0.45	1.11	2.45
41	127.10			110.0	110	0.45	1.11	2.45
42	126.10			110.0	110	0.45	1.11	2.45
43	127.10			110.0	110	0.45	1.11	2.45
44	125.60			110.0	110	0.45	1.11	2.45
45	127.90		39	105.3	106	0.43	1.07	2.36
46	125.60			110.0	110	0.45	1.11	2.45
47	126.60			110.0	110	0.45	1.11	2.45
48	125.10			110.0	110	0.45	1.11	2.45
49	125.10			110.0	110	0.45	1.11	2.45
50	125.60			110.0	110	0.45	1.11	2.45
51	125.10			110.0	110	0.45	1.11	2.45
52	125.60			110.0	110	0.45	1.11	2.45
53	125.10			110.0	110	0.45	1.11	2.45
Subtotal		136	308	3054.0	3064	12.41	31.03	68.27

*Fire Flow = 167 L/s

CARLETON PLACE SUBDIVISION
JOB NO. 108047
NETWORK MAP



Pipe Data			
Pipe	Length (m)	Diameter (mm)	Roughness Coefficient
Pipe 101	65	300	120
Pipe 138	92	200	110
Pipe 140	74	200	110
Pipe 143	63	200	110
Pipe 146	93	200	110
Pipe 145	81	200	110
Pipe 150	144	200	110
Pipe 149	215	200	110
Pipe 151	123	200	110
Pipe 154	263	200	110
Pipe 153	251	200	110
Pipe 156	76	200	110
Pipe 157	218	200	110
Pipe 158	164	200	110
Pipe 114	55	200	110
Pipe 115	55	200	110
Pipe 144	81	200	110
Pipe 141	74	200	110
Pipe 139	23	200	110
Pipe 142	81	200	110
Pipe 110	164	300	120
Pipe 104	70	300	120
Pipe 105	124	300	120
Pipe 160	100	200	110
Pipe 163	125	200	110
Pipe 161	200	200	110
Pipe 162	125	200	110
Pipe 164	200	200	110
Pipe 165	270	200	110
Pipe 169	125	200	110
Pipe 170	200	200	110
Pipe 168	125	200	110
Pipe 159	100	300	120
Pipe 166	270	200	110
Pipe 167	200	300	120

Pipe Data			
Pipe	Length (m)	Diameter (mm)	Roughness Coefficient
Pipe 101	65	300	120
Pipe 102	84	300	120
Pipe 103	91	300	120
Pipe 106	80	300	120
Pipe 107	86	300	120
Pipe 108	79	300	120
Pipe 109	65	300	120
Pipe 120	95	200	110
Pipe 121	97	200	110
Pipe 122	76	200	110
Pipe 147	104	200	110
Pipe 152	207	200	110
Pipe 131	114	300	120
Pipe 130	114	300	120
Pipe 129	37	300	120
Pipe 148	108	300	120
Pipe 155	203	300	120
Pipe 111	127	200	110
Pipe 112	127	200	110
Pipe 113	80	200	110
Pipe 117	74	200	110
Pipe 116	74	200	110
Pipe 119	88	200	110
Pipe 118	87	200	110
Pipe 123	94	200	110
Pipe 124	83	200	110
Pipe 125	80	200	110
Pipe 126	89	200	110
Pipe 127	177	200	110
Pipe 128	165	200	110
Pipe 132	121	200	110
Pipe 134	47	200	110
Pipe 133	143	200	110
Pipe 135	62	200	110
Pipe 137	80	200	110
Pipe 136	80	200	110

High Pressure Demand

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	Age (hours)
29	0.00	181.27	53.65	77	0.57
31	0.08	181.27	53.67	77	1.49
32	0.08	181.27	53.87	77	3.18
34	0.21	181.27	53.82	77	2.83
35	0.19	181.27	53.72	77	4.61
36	0.18	181.27	53.47	76	9.12
37	0.45	181.26	53.66	77	6.24
38	0.45	181.26	53.66	77	9.8
39	0.45	181.26	53.66	77	4.96
40	0.45	181.26	54.66	78	9.42
41	0.45	181.26	54.16	77	5.34
42	0.45	181.26	55.16	79	7.14
43	0.45	181.26	54.16	77	5.94
44	0.45	181.26	55.66	80	8.77
30	0.04	181.27	53.84	77	0.7
33	0.12	181.27	53.22	76	1.67
45	0.43	181.27	53.37	76	1.53
46	0.45	181.26	55.66	80	11.29
47	0.45	181.26	54.66	78	13.21
48	0.45	181.26	56.16	80	21.92
49	0.45	181.26	56.16	80	16.46
50	0.45	181.26	55.66	80	7.89
51	0.45	181.26	56.16	80	11.17
52	0.45	181.26	55.66	80	9.79
53	0.45	181.26	56.16	80	17.1
Resvr 1	-6.84	181.28			
Resvr 2	-5.65	181.28			

High Pressure Demand

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	Age (hours)
3	0.00	181.28	53.01	76	0.19
4	0.55	181.27	52.47	75	0.88
5	0.09	181.27	53.07	76	1.95
6	0.00	181.27	52.92	76	0.5
7	0.12	181.27	52.77	75	0.81
8	0.17	181.27	52.87	76	1.15
9	0.23	181.27	52.92	76	1.99
10	0.00	181.27	52.97	76	2.86
11	0.00	181.27	53.16	76	0.98
12	0.26	181.27	52.72	75	2
13	0.27	181.27	52.77	75	2.6
14	0.00	181.27	53.22	76	3.39
15	0.19	181.27	52.77	75	5.38
16	0.24	181.27	53.25	76	6.37
17	0.41	181.27	52.72	75	4.21
18	0.00	181.27	53.54	76	2.69
19	0.00	181.27	53.48	76	2.66
20	0.32	181.27	53.42	76	3.29
21	0.13	181.27	53.72	77	4.23
22	0.18	181.27	53.52	76	4.93
23	0.20	181.27	53.72	77	4.1
24	0.26	181.27	53.57	77	3.1
25	0.00	181.27	52.87	76	1.36
26	0.10	181.27	53.92	77	3.68
27	0.24	181.27	54.02	77	1.72
28	0.00	181.27	52.97	76	0.88

Peak Hour Demand

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3.00	0.00	179.16	50.89	73
4.00	3.01	179.07	50.27	72
5.00	0.47	179.04	50.84	73
6.00	0.00	179.10	50.75	73
7.00	0.67	179.07	50.57	72
8.00	0.91	179.04	50.64	72
9.00	1.29	179.02	50.67	72
10.00	0.00	179.02	50.72	72
11.00	0.00	179.07	50.96	73
12.00	1.45	179.03	50.48	72
13.00	1.49	178.98	50.48	72
14.00	0.00	178.97	50.92	73
15.00	1.02	178.98	50.48	72
16.00	1.34	178.97	50.95	73
17.00	2.25	178.99	50.44	72
18.00	0.00	179.04	51.31	73
19.00	0.00	179.04	51.25	73
20.00	1.78	179.00	51.15	73
21.00	0.69	178.96	51.41	73
22.00	1.00	178.94	51.19	73
23.00	1.09	179.03	51.48	74
24.00	1.40	179.04	51.34	73
25.00	0.00	179.06	50.66	72
26.00	0.53	179.06	51.71	74
27.00	1.34	179.07	51.82	74
28.00	0.00	179.09	50.79	73

Peak Hour Demand

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29.00	0.00	179.12	51.50	74
31.00	0.42	179.09	51.49	74
32.00	0.42	179.08	51.68	74
34.00	1.16	179.08	51.63	74
35.00	1.02	179.08	51.53	74
36.00	1.00	179.07	51.27	73
37.00	2.45	178.81	51.21	73
38.00	2.45	178.80	51.20	73
39.00	2.45	178.85	51.25	73
40.00	2.45	178.80	52.20	75
41.00	2.45	178.87	51.77	74
42.00	2.45	178.81	52.71	75
43.00	2.45	178.84	51.74	74
44.00	2.45	178.81	53.21	76
30.00	0.25	179.10	51.67	74
33.00	0.67	179.09	51.04	73
45.00	2.36	179.06	51.16	73
46.00	2.45	178.77	53.17	76
47.00	2.45	178.76	52.16	75
48.00	2.45	178.76	53.66	77
49.00	2.45	178.76	53.66	77
50.00	2.45	178.78	53.18	76
51.00	2.45	178.78	53.68	77
52.00	2.45	178.77	53.17	76
53.00	2.45	178.77	53.67	77
Resvr 1	-35.94	179.23		
Resvr 2	-32.29	179.27		

Maximum Daily Demand and Fire Flow (Node 4)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	171.92	43.65	62
4	168.37	163.93	35.13	50
5	0.21	167.91	39.71	57
6	0.00	171.84	43.49	62
7	0.30	171.65	43.15	62
8	0.42	171.46	43.06	62
9	0.59	170.94	42.59	61
10	0.00	170.43	42.13	60
11	0.00	171.83	43.72	62
12	0.66	171.55	43	61
13	0.68	171.49	42.99	61
14	0.00	171.38	43.33	62
15	0.47	171.53	43.03	61
16	0.61	171.52	43.5	62
17	1.02	171.62	43.07	62
18	0.00	171.84	44.11	63
19	0.00	171.87	44.08	63
20	0.81	171.8	43.95	63
21	0.31	171.74	44.19	63
22	0.46	171.69	43.94	63
23	0.50	172	44.45	64
24	0.64	172.01	44.31	63
25	0.00	172.01	43.61	62
26	0.24	172.12	44.77	64
27	0.61	172.14	44.89	64
28	0.00	172.16	43.86	63

Maximum Daily Demand and Fire Flow (Node 4)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	172.31	44.69	64
31	0.19	172.24	44.64	64
32	0.19	172.21	44.81	64
34	0.53	172.23	44.78	64
35	0.47	172.22	44.67	64
36	0.46	172.22	44.42	63
37	1.11	171.48	43.88	63
38	1.11	171.49	43.89	63
39	1.11	171.48	43.88	63
40	1.11	171.51	44.91	64
41	1.11	171.61	44.51	64
42	1.11	171.57	45.47	65
43	1.11	171.6	44.5	64
44	1.11	171.58	45.98	66
30	0.11	172.28	44.85	64
33	0.30	172.25	44.2	63
45	1.07	171.83	43.93	63
46	1.11	171.51	45.91	66
47	1.11	171.51	44.91	64
48	1.11	171.51	46.41	66
49	1.11	171.52	46.42	66
50	1.11	171.55	45.95	66
51	1.11	171.55	46.45	66
52	1.11	171.55	45.95	66
53	1.11	171.55	46.45	66
Resvr 1	-132.82	172.74		
Resvr 2	-65.16	172.86		

Maximum Daily Demand and Fire Flow (Node 5)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	171.98	43.71	62
4	1.37	167.92	39.12	56
5	167.21	164.01	35.81	51
6	0.00	171.76	43.41	62
7	0.30	171.38	42.88	61
8	0.42	171.02	42.62	61
9	0.59	169.99	41.64	59
10	0.00	168.99	40.69	58
11	0.00	171.69	43.58	62
12	0.66	171.18	42.63	61
13	0.68	171.08	42.58	61
14	0.00	170.86	42.81	61
15	0.47	171.15	42.65	61
16	0.61	171.12	43.1	62
17	1.02	171.32	42.77	61
18	0.00	171.69	43.96	63
19	0.00	171.71	43.92	63
20	0.81	171.61	43.76	63
21	0.31	171.51	43.96	63
22	0.46	171.43	43.68	62
23	0.50	171.85	44.3	63
24	0.64	171.86	44.16	63
25	0.00	171.87	43.47	62
26	0.24	171.99	44.64	64
27	0.61	172.02	44.77	64
28	0.00	172.04	43.74	62

Maximum Daily Demand and Fire Flow (Node 5)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	172.22	44.6	64
31	0.19	172.14	44.54	64
32	0.19	172.1	44.7	64
34	0.53	172.13	44.68	64
35	0.47	172.11	44.56	64
36	0.46	172.11	44.31	63
37	1.11	171.1	43.5	62
38	1.11	171.13	43.53	62
39	1.11	171.09	43.49	62
40	1.11	171.15	44.55	64
41	1.11	171.32	44.22	63
42	1.11	171.26	45.15	65
43	1.11	171.3	44.2	63
44	1.11	171.27	45.67	65
30	0.11	172.18	44.75	64
33	0.30	172.15	44.1	63
45	1.07	171.69	43.79	63
46	1.11	171.17	45.57	65
47	1.11	171.17	44.57	64
48	1.11	171.18	46.08	66
49	1.11	171.18	46.08	66
50	1.11	171.24	45.64	65
51	1.11	171.23	46.13	66
52	1.11	171.23	45.63	65
53	1.11	171.23	46.13	66
Resvr 1	-127.19	172.74		
Resvr 2	-70.79	172.86		

Maximum Daily Demand and Fire Flow (Node 7)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.04	43.77	63
4	1.37	171.61	42.81	61
5	0.21	171.24	43.04	61
6	0.00	171.39	43.04	61
7	167.30	168.11	39.61	57
8	0.42	169.92	41.52	59
9	0.59	170.46	42.11	60
10	0.00	171.01	42.71	61
11	0.00	171.38	43.27	62
12	0.66	170.92	42.37	61
13	0.68	171.11	42.61	61
14	0.00	171.14	43.09	62
15	0.47	171.2	42.7	61
16	0.61	171.21	43.19	62
17	1.02	171.28	42.73	61
18	0.00	171.46	43.73	62
19	0.00	171.53	43.74	62
20	0.81	171.48	43.63	62
21	0.31	171.44	43.89	63
22	0.46	171.39	43.64	62
23	0.50	171.74	44.19	63
24	0.64	171.74	44.04	63
25	0.00	171.74	43.34	62
26	0.24	171.89	44.54	64
27	0.61	171.91	44.66	64
28	0.00	171.94	43.64	62

Maximum Daily Demand and Fire Flow (Node 7)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	172.13	44.51	64
31	0.19	172.05	44.45	64
32	0.19	172	44.6	64
34	0.53	172.04	44.59	64
35	0.47	172.01	44.46	64
36	0.46	172.01	44.21	63
37	1.11	171.21	43.61	62
38	1.11	171.22	43.62	62
39	1.11	171.21	43.61	62
40	1.11	171.23	44.63	64
41	1.11	171.32	44.22	63
42	1.11	171.28	45.18	65
43	1.11	171.31	44.21	63
44	1.11	171.28	45.68	65
30	0.11	172.09	44.66	64
33	0.30	172.06	44.01	63
45	1.07	171.41	43.51	62
46	1.11	171.23	45.63	65
47	1.11	171.23	44.63	64
48	1.11	171.23	46.13	66
49	1.11	171.23	46.13	66
50	1.11	171.26	45.66	65
51	1.11	171.26	46.16	66
52	1.11	171.26	45.66	65
53	1.11	171.26	46.16	66
Resvr 1	-122.35	172.74		
Resvr 2	-75.63	172.86		

Maximum Daily Demand and Fire Flow (Node 10)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.04	43.77	63
4	1.37	170.25	41.45	59
5	0.21	168.56	40.36	58
6	0.00	171.66	43.31	62
7	0.30	171.1	42.6	61
8	0.42	170.55	42.15	60
9	0.59	169.01	40.66	58
10	167.00	167.51	39.21	56
11	0.00	171.54	43.43	62
12	0.66	170.79	42.24	60
13	0.68	170.65	42.15	60
14	0.00	170.32	42.27	60
15	0.47	170.75	42.25	60
16	0.61	170.71	42.69	61
17	1.02	170.99	42.44	61
18	0.00	171.53	43.8	63
19	0.00	171.54	43.75	63
20	0.81	171.4	43.55	62
21	0.31	171.26	43.71	62
22	0.46	171.16	43.41	62
23	0.50	171.69	44.14	63
24	0.64	171.7	44	63
25	0.00	171.72	43.32	62
26	0.24	171.86	44.51	64
27	0.61	171.89	44.64	64
28	0.00	171.92	43.62	62

Maximum Daily Demand and Fire Flow (Node 10)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	172.12	44.5	64
31	0.19	172.03	44.43	63
32	0.19	171.98	44.58	64
34	0.53	172.02	44.57	64
35	0.47	172	44.45	64
36	0.46	171.99	44.19	63
37	1.11	170.72	43.12	62
38	1.11	170.76	43.16	62
39	1.11	170.7	43.1	62
40	1.11	170.8	44.2	63
41	1.11	171.02	43.92	63
42	1.11	170.94	44.84	64
43	1.11	171	43.9	63
44	1.11	170.96	45.36	65
30	0.11	172.08	44.65	64
33	0.30	172.05	44	63
45	1.07	171.53	43.63	62
46	1.11	170.83	45.23	65
47	1.11	170.83	44.23	63
48	1.11	170.84	45.74	65
49	1.11	170.84	45.74	65
50	1.11	170.92	45.32	65
51	1.11	170.91	45.81	65
52	1.11	170.91	45.31	65
53	1.11	170.91	45.81	65
Resvr 1	-121.56	172.74		
Resvr 2	-76.42	172.86		

Maximum Daily Demand and Fire Flow (Node 12)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.09	43.82	63
4	1.37	171.53	42.73	61
5	0.21	171.04	42.84	61
6	0.00	171.53	43.18	62
7	0.30	170.96	42.46	61
8	0.42	170.39	41.99	60
9	0.59	170.55	42.2	60
10	0.00	170.73	42.43	61
11	0.00	171.3	43.19	62
12	167.66	168.64	40.09	57
13	0.68	170.3	41.8	60
14	0.00	170.71	42.66	61
15	0.47	170.71	42.21	60
16	0.61	170.76	42.74	61
17	1.02	170.90	42.35	61
18	0.00	171.32	43.59	62
19	0.00	171.38	43.59	62
20	0.81	171.29	43.44	62
21	0.31	171.2	43.65	62
22	0.46	171.13	43.38	62
23	0.50	171.59	44.04	63
24	0.64	171.59	43.89	63
25	0.00	171.6	43.2	62
26	0.24	171.76	44.41	63
27	0.61	171.79	44.54	64
28	0.00	171.82	43.52	62

Maximum Daily Demand and Fire Flow (Node 12)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	172.04	44.42	63
31	0.19	171.94	44.34	63
32	0.19	171.89	44.49	64
34	0.53	171.93	44.48	64
35	0.47	171.91	44.36	63
36	0.46	171.91	44.11	63
37	1.11	170.87	43.27	62
38	1.11	170.89	43.29	62
39	1.11	170.87	43.27	62
40	1.11	170.9	44.3	63
41	1.11	171.04	43.94	63
42	1.11	170.98	44.88	64
43	1.11	171.02	43.92	63
44	1.11	170.99	45.39	65
30	0.11	171.99	44.56	64
33	0.30	171.96	43.91	63
45	1.07	171.31	43.41	62
46	1.11	170.92	45.32	65
47	1.11	170.92	44.32	63
48	1.11	170.92	45.82	65
49	1.11	170.92	45.82	65
50	1.11	170.97	45.37	65
51	1.11	170.96	45.86	66
52	1.11	170.96	45.36	65
53	1.11	170.96	45.86	66
Resvr 1	-117.34	172.74	0	
Resvr 2	-80.64	172.86	0	

Maximum Daily Demand and Fire Flow (Node 14)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.12	43.85	63
4	1.37	171.38	42.58	61
5	0.21	170.69	42.49	61
6	0.00	171.65	43.3	62
7	0.30	171.25	42.75	61
8	0.42	170.86	42.46	61
9	0.59	170.56	42.21	60
10	0.00	170.27	41.97	60
11	0.00	171.42	43.31	62
12	0.66	170.82	42.27	60
13	0.68	169.9	41.4	59
14	167.00	168.84	40.79	58
15	0.47	169.97	41.47	59
16	0.61	169.81	41.79	60
17	1.02	170.39	41.84	60
18	0.00	171.31	43.58	62
19	0.00	171.31	43.52	62
20	0.81	171.05	43.2	62
21	0.31	170.8	43.25	62
22	0.46	170.62	42.87	61
23	0.50	171.44	43.89	63
24	0.64	171.45	43.75	63
25	0.00	171.51	43.11	62
26	0.24	171.66	44.31	63
27	0.61	171.69	44.44	63
28	0.00	171.74	43.44	62

Maximum Daily Demand and Fire Flow (Node 14)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.97	44.35	63
31	0.19	171.87	44.27	63
32	0.19	171.81	44.41	63
34	0.53	171.85	44.4	63
35	0.47	171.83	44.28	63
36	0.46	171.83	44.03	63
37	1.11	169.8	42.2	60
38	1.11	169.9	42.3	60
39	1.11	169.74	42.14	60
40	1.11	169.98	43.38	62
41	1.11	170.38	43.28	62
42	1.11	170.25	44.15	63
43	1.11	170.35	43.25	62
44	1.11	170.29	44.69	64
30	0.11	171.92	44.49	64
33	0.30	171.89	43.84	63
45	1.07	171.38	43.48	62
46	1.11	170.07	44.47	64
47	1.11	170.07	43.47	62
48	1.11	170.08	44.98	64
49	1.11	170.09	44.99	64
50	1.11	170.22	44.62	64
51	1.11	170.21	45.11	64
52	1.11	170.21	44.61	64
53	1.11	170.21	45.11	64
Resvr 1	-113.93	172.74	0	
Resvr 2	-84.05	172.86	0	

Maximum Daily Demand and Fire Flow (Node 16)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.15	43.88	63
4	1.37	171.58	42.78	61
5	0.21	171.07	42.87	61
6	0.00	171.66	43.31	62
7	0.30	171.34	42.84	61
8	0.42	171.02	42.62	61
9	0.59	170.88	42.53	61
10	0.00	170.75	42.45	61
11	0.00	171.41	43.3	62
12	0.66	170.91	42.36	61
13	0.68	169.94	41.44	59
14	0.00	169.88	41.83	60
15	0.47	169.41	40.91	58
16	167.61	167.67	39.65	57
17	1.02	169.99	41.44	59
18	0.00	171.22	43.49	62
19	0.00	171.22	43.43	62
20	0.81	170.92	43.07	62
21	0.31	170.63	43.08	62
22	0.46	170.44	42.69	61
23	0.50	171.35	43.8	63
24	0.64	171.36	43.66	62
25	0.00	171.43	43.03	61
26	0.24	171.58	44.23	63
27	0.61	171.62	44.37	63
28	0.00	171.67	43.37	62

Maximum Daily Demand and Fire Flow (Node 16)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.92	44.3	63
31	0.19	171.81	44.21	63
32	0.19	171.75	44.35	63
34	0.53	171.79	44.34	63
35	0.47	171.76	44.21	63
36	0.46	171.76	43.96	63
37	1.11	170.11	42.51	61
38	1.11	170.14	42.54	61
39	1.11	170.11	42.51	61
40	1.11	170.16	43.56	62
41	1.11	170.33	43.23	62
42	1.11	170.26	44.16	63
43	1.11	170.31	43.21	62
44	1.11	170.28	44.68	64
30	0.11	171.87	44.44	63
33	0.30	171.83	43.78	63
45	1.07	171.34	43.44	62
46	1.11	170.18	44.58	64
47	1.11	170.18	43.58	62
48	1.11	170.18	45.08	64
49	1.11	170.19	45.09	64
50	1.11	170.24	44.64	64
51	1.11	170.24	45.14	64
52	1.11	170.24	44.64	64
53	1.11	170.24	45.14	64
Resvr 1	-111.24	172.74	0	
Resvr 2	-86.74	172.86	0	

Maximum Daily Demand and Fire Flow (Node 17)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
3	0.00	172.17	43.9	63
4	1.37	171.72	42.92	61
5	0.21	171.32	43.12	62
6	0.00	171.67	43.32	62
7	0.30	171.43	42.93	61
8	0.42	171.2	42.8	61
9	0.59	171.13	42.78	61
10	0.00	171.08	42.78	61
11	0.00	171.36	43.25	62
12	0.66	171.08	42.53	61
13	0.68	170.37	41.87	60
14	0.00	170.52	42.47	61
15	0.47	168.96	40.46	58
16	0.61	170.16	42.14	60
17	168.02	164.21	35.66	51
18	0.00	171.02	43.29	62
19	0.00	171.1	43.31	62
20	0.81	171	43.15	62
21	0.31	170.91	43.36	62
22	0.46	170.83	43.08	62
23	0.50	171.35	43.8	63
24	0.64	171.36	43.66	62
25	0.00	171.36	42.96	61
26	0.24	171.56	44.21	63
27	0.61	171.59	44.34	63
28	0.00	171.63	43.33	62

Maximum Daily Demand and Fire Flow (Node 17)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.89	44.27	63
31	0.19	171.78	44.18	63
32	0.19	171.72	44.32	63
34	0.53	171.77	44.32	63
35	0.47	171.74	44.19	63
36	0.46	171.74	43.94	63
37	1.11	170.62	43.02	61
38	1.11	170.63	43.03	61
39	1.11	170.62	43.02	61
40	1.11	170.64	44.04	63
41	1.11	170.75	43.65	62
42	1.11	170.7	44.6	64
43	1.11	170.74	43.64	62
44	1.11	170.71	45.11	64
30	0.11	171.84	44.41	63
33	0.30	171.8	43.75	63
45	1.07	171.23	43.33	62
46	1.11	170.65	45.05	64
47	1.11	170.65	44.05	63
48	1.11	170.65	45.55	65
49	1.11	170.65	45.55	65
50	1.11	170.69	45.09	64
51	1.11	170.68	45.58	65
52	1.11	170.69	45.09	64
53	1.11	170.68	45.58	65
Resvr 1	-109.66	172.74		
Resvr 2	-88.32	172.86		

Maximum Daily Demand and Fire Flow (Node 21)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
3	0.00	172.23	43.96	63
4	1.37	171.83	43.03	61
5	0.21	171.49	43.29	62
6	0.00	171.78	43.43	62
7	0.30	171.59	43.09	62
8	0.42	171.4	43	61
9	0.59	171.34	42.99	61
10	0.00	171.28	42.98	61
11	0.00	171.49	43.38	62
12	0.66	171.33	42.78	61
13	0.68	170.92	42.42	61
14	0.00	170.77	42.72	61
15	0.47	170.86	42.36	61
16	0.61	170.68	42.66	61
17	1.02	170.94	42.39	61
18	0.00	171.11	43.38	62
19	0.00	171.02	43.23	62
20	0.81	170.33	42.48	61
21	167.31	169.66	42.11	60
22	0.46	169.71	41.96	60
23	0.50	170.96	43.41	62
24	0.64	171.02	43.32	62
25	0.00	171.21	42.81	61
26	0.24	171.31	43.96	63
27	0.61	171.38	44.13	63
28	0.00	171.47	43.17	62

Maximum Daily Demand and Fire Flow (Node 21)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.76	44.14	63
31	0.19	171.61	44.01	63
32	0.19	171.53	44.13	63
34	0.53	171.59	44.14	63
35	0.47	171.55	44	63
36	0.46	171.55	43.75	63
37	1.11	169.95	42.35	61
38	1.11	169.86	42.26	60
39	1.11	170.02	42.42	61
40	1.11	169.82	43.22	62
41	1.11	169.73	42.63	61
42	1.11	169.73	43.63	62
43	1.11	169.73	42.63	61
44	1.11	169.73	44.13	63
30	0.11	171.69	44.26	63
33	0.30	171.64	43.59	62
45	1.07	171.35	43.45	62
46	1.11	169.75	44.15	63
47	1.11	169.74	43.14	62
48	1.11	169.74	44.64	64
49	1.11	169.74	44.64	64
50	1.11	169.73	44.13	63
51	1.11	169.73	44.63	64
52	1.11	169.73	44.13	63
53	1.11	169.73	44.63	64
Resvr 1	-103.31	172.74	0	
Resvr 2	-94.67	172.86	0	

Maximum Daily Demand and Fire Flow (Node 23)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.32	44.05	63
4	1.37	172.04	43.24	62
5	0.21	171.79	43.59	62
6	0.00	171.95	43.6	62
7	0.30	171.82	43.32	62
8	0.42	171.7	43.3	62
9	0.59	171.67	43.32	62
10	0.00	171.64	43.34	62
11	0.00	171.7	43.59	62
12	0.66	171.63	43.08	62
13	0.68	171.38	42.88	61
14	0.00	171.33	43.28	62
15	0.47	171.31	42.81	61
16	0.61	171.27	43.25	62
17	1.02	171.31	42.76	61
18	0.00	171.31	43.58	62
19	0.00	171.16	43.37	62
20	0.81	171.01	43.16	62
21	0.31	170.87	43.32	62
22	0.46	170.88	43.13	62
23	167.50	168.24	40.69	58
24	0.64	168.95	41.25	59
25	0.00	171.15	42.75	61
26	0.24	170.01	42.66	61
27	0.61	170.62	43.37	62
28	0.00	171.25	42.95	61

Maximum Daily Demand and Fire Flow (Node 23)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	171.5	43.88	63
31	0.19	171.03	43.43	62
32	0.19	170.78	43.38	62
34	0.53	171	43.55	62
35	0.47	170.87	43.32	62
36	0.46	170.87	43.07	62
37	1.11	170.96	43.36	62
38	1.11	170.92	43.32	62
39	1.11	171	43.4	62
40	1.11	170.91	44.31	63
41	1.11	170.89	43.79	63
42	1.11	170.88	44.78	64
43	1.11	170.88	43.78	63
44	1.11	170.88	45.28	65
30	0.11	171.29	43.86	63
33	0.30	171.14	43.09	62
45	1.07	171.56	43.66	62
46	1.11	170.89	45.29	65
47	1.11	170.88	44.28	63
48	1.11	170.88	45.78	65
49	1.11	170.88	45.78	65
50	1.11	170.88	45.28	65
51	1.11	170.88	45.78	65
52	1.11	170.88	45.28	65
53	1.11	170.88	45.78	65
Resvr 1	-92.10	172.74	0	
Resvr 2	-105.88	172.86	0	

Maximum Daily Demand and Fire Flow (Node 27)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
3	0.00	172.36	44.09	63
4	1.37	172.1	43.3	62
5	0.21	171.89	43.69	62
6	0.00	172.02	43.67	62
7	0.30	171.91	43.41	62
8	0.42	171.8	43.4	62
9	0.59	171.77	43.42	62
10	0.00	171.76	43.46	62
11	0.00	171.78	43.67	62
12	0.66	171.73	43.18	62
13	0.68	171.52	43.02	61
14	0.00	171.5	43.45	62
15	0.47	171.45	42.95	61
16	0.61	171.43	43.41	62
17	1.02	171.43	42.88	61
18	0.00	171.41	43.68	62
19	0.00	171.24	43.45	62
20	0.81	171.22	43.37	62
21	0.31	171.19	43.64	62
22	0.46	171.2	43.45	62
23	0.50	170.63	43.08	62
24	0.64	170.75	43.05	62
25	0.00	171.14	42.74	61
26	0.24	169.84	42.49	61
27	167.61	166.82	39.57	57
28	0.00	171.12	42.82	61

Maximum Daily Demand and Fire Flow (Node 27)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	171.39	43.77	63
31	0.19	170.9	43.3	62
32	0.19	170.64	43.24	62
34	0.53	170.87	43.42	62
35	0.47	170.73	43.18	62
36	0.46	170.73	42.93	61
37	1.11	171.24	43.64	62
38	1.11	171.22	43.62	62
39	1.11	171.27	43.67	62
40	1.11	171.21	44.61	64
41	1.11	171.2	44.1	63
42	1.11	171.19	45.09	64
43	1.11	171.2	44.1	63
44	1.11	171.19	45.59	65
30	0.11	171.17	43.74	62
33	0.30	171.02	42.97	61
45	1.07	171.65	43.75	63
46	1.11	171.19	45.59	65
47	1.11	171.19	44.59	64
48	1.11	171.19	46.09	66
49	1.11	171.19	46.09	66
50	1.11	171.19	45.59	65
51	1.11	171.19	46.09	66
52	1.11	171.19	45.59	65
53	1.11	171.19	46.09	66
Resvr 1	-87.67	172.74	0	
Resvr 2	-110.31	172.86	0	

Maximum Daily Demand and Fire Flow (Node 31)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.4	44.13	63
4	1.37	172.17	43.37	62
5	0.21	171.98	43.78	63
6	0.00	172.09	43.74	62
7	0.30	171.99	43.49	62
8	0.42	171.9	43.5	62
9	0.59	171.88	43.53	62
10	0.00	171.86	43.56	62
11	0.00	171.88	43.77	63
12	0.66	171.84	43.29	62
13	0.68	171.65	43.15	62
14	0.00	171.63	43.58	62
15	0.47	171.59	43.09	62
16	0.61	171.57	43.55	62
17	1.02	171.57	43.02	61
18	0.00	171.55	43.82	63
19	0.00	171.4	43.61	62
20	0.81	171.38	43.53	62
21	0.31	171.37	43.82	63
22	0.46	171.37	43.62	62
23	0.50	170.99	43.44	62
24	0.64	171.06	43.36	62
25	0.00	171.3	42.9	61
26	0.24	170.49	43.14	62
27	0.61	170.87	43.62	62
28	0.00	171.27	42.97	61

Maximum Daily Demand and Fire Flow (Node 31)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.27	43.65	62
31	167.19	165.58	37.98	54
32	0.19	168.43	41.03	59
34	0.53	168.9	41.45	59
35	0.47	168.63	41.08	59
36	0.46	168.62	40.82	58
37	1.11	171.4	43.8	63
38	1.11	171.38	43.78	63
39	1.11	171.43	43.83	63
40	1.11	171.38	44.78	64
41	1.11	171.37	44.27	63
42	1.11	171.36	45.26	65
43	1.11	171.37	44.27	63
44	1.11	171.36	45.76	65
30	0.11	169.47	42.04	60
33	0.30	169.18	41.13	59
45	1.07	171.76	43.86	63
46	1.11	171.36	45.76	65
47	1.11	171.36	44.76	64
48	1.11	171.36	46.26	66
49	1.11	171.36	46.26	66
50	1.11	171.36	45.76	65
51	1.11	171.36	46.26	66
52	1.11	171.36	45.76	65
53	1.11	171.36	46.26	66
Resvr 1	-82.60	172.74	0	
Resvr 2	-115.38	172.86	0	

Maximum Daily Demand and Fire Flow (Node 33)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.4	44.13	63
4	1.37	172.17	43.37	62
5	0.21	171.98	43.78	63
6	0.00	172.1	43.75	63
7	0.30	172	43.5	62
8	0.42	171.91	43.51	62
9	0.59	171.88	43.53	62
10	0.00	171.87	43.57	62
11	0.00	171.89	43.78	63
12	0.66	171.85	43.3	62
13	0.68	171.66	43.16	62
14	0.00	171.64	43.59	62
15	0.47	171.6	43.1	62
16	0.61	171.59	43.57	62
17	1.02	171.58	43.03	61
18	0.00	171.56	43.83	63
19	0.00	171.41	43.62	62
20	0.81	171.4	43.55	62
21	0.31	171.38	43.83	63
22	0.46	171.39	43.64	62
23	0.50	171.07	43.52	62
24	0.64	171.12	43.42	62
25	0.00	171.3	42.9	61
26	0.24	170.67	43.32	62
27	0.61	170.96	43.71	62
28	0.00	171.26	42.96	61

Maximum Daily Demand and Fire Flow (Node 33)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.26	43.64	62
31	0.19	169.15	41.55	59
32	0.19	169.06	41.66	60
34	0.53	165.42	37.97	54
35	0.47	167.45	39.9	57
36	0.46	167.45	39.65	57
37	1.11	171.42	43.82	63
38	1.11	171.4	43.8	63
39	1.11	171.44	43.84	63
40	1.11	171.39	44.79	64
41	1.11	171.39	44.29	63
42	1.11	171.38	45.28	65
43	1.11	171.38	44.28	63
44	1.11	171.38	45.78	65
30	0.11	169.25	41.82	60
33	167.30	163.43	35.38	51
45	1.07	171.77	43.87	63
46	1.11	171.38	45.78	65
47	1.11	171.37	44.77	64
48	1.11	171.37	46.27	66
49	1.11	171.38	46.28	66
50	1.11	171.38	45.78	65
51	1.11	171.38	46.28	66
52	1.11	171.38	45.78	65
53	1.11	171.38	46.28	66
Resvr 1	-82.21	172.74	0	
Resvr 2	-115.77	172.86	0	

Maximum Daily Demand and Fire Flow (Node 35)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.4	44.13	63
4	1.37	172.16	43.36	62
5	0.21	171.97	43.77	63
6	0.00	172.09	43.74	62
7	0.30	171.99	43.49	62
8	0.42	171.89	43.49	62
9	0.59	171.87	43.52	62
10	0.00	171.85	43.55	62
11	0.00	171.88	43.77	63
12	0.66	171.83	43.28	62
13	0.68	171.64	43.14	62
14	0.00	171.62	43.57	62
15	0.47	171.58	43.08	62
16	0.61	171.56	43.54	62
17	1.02	171.56	43.01	61
18	0.00	171.54	43.81	63
19	0.00	171.39	43.6	62
20	0.81	171.37	43.52	62
21	0.31	171.35	43.8	63
22	0.46	171.35	43.6	62
23	0.50	170.9	43.35	62
24	0.64	171	43.3	62
25	0.00	171.3	42.9	61
26	0.24	170.3	42.95	61
27	0.61	170.78	43.53	62
28	0.00	171.27	42.97	61

Maximum Daily Demand and Fire Flow (Node 35)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.28	43.66	62
31	0.19	168.72	41.12	59
32	0.19	167.77	40.37	58
34	0.53	165.41	37.96	54
35	167.47	163.32	35.77	51
36	0.46	163.32	35.52	51
37	1.11	171.39	43.79	63
38	1.11	171.37	43.77	63
39	1.11	171.41	43.81	63
40	1.11	171.36	44.76	64
41	1.11	171.35	44.25	63
42	1.11	171.35	45.25	65
43	1.11	171.35	44.25	63
44	1.11	171.35	45.75	65
30	0.11	169.68	42.25	60
33	0.30	167.54	39.49	56
45	1.07	171.75	43.85	63
46	1.11	171.34	45.74	65
47	1.11	171.34	44.74	64
48	1.11	171.34	46.24	66
49	1.11	171.34	46.24	66
50	1.11	171.34	45.74	65
51	1.11	171.34	46.24	66
52	1.11	171.34	45.74	65
53	1.11	171.34	46.24	66
Resvr 1	-83.02	172.74	0	
Resvr 2	-114.96	172.86	0	

Maximum Daily Demand and Fire Flow (Node 36)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
3	0.00	172.4	44.13	63
4	1.37	172.16	43.36	62
5	0.21	171.97	43.77	63
6	0.00	172.09	43.74	62
7	0.30	171.99	43.49	62
8	0.42	171.89	43.49	62
9	0.59	171.87	43.52	62
10	0.00	171.85	43.55	62
11	0.00	171.88	43.77	63
12	0.66	171.83	43.28	62
13	0.68	171.64	43.14	62
14	0.00	171.62	43.57	62
15	0.47	171.58	43.08	62
16	0.61	171.56	43.54	62
17	1.02	171.56	43.01	61
18	0.00	171.54	43.81	63
19	0.00	171.39	43.6	62
20	0.81	171.37	43.52	62
21	0.31	171.35	43.8	63
22	0.46	171.35	43.6	62
23	0.50	170.9	43.35	62
24	0.64	171	43.3	62
25	0.00	171.3	42.9	61
26	0.24	170.3	42.95	61
27	0.61	170.78	43.53	62
28	0.00	171.27	42.97	61

Maximum Daily Demand and Fire Flow (Node 36)

Node	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
29	0.00	171.28	43.66	62
31	0.19	168.72	41.12	59
32	0.19	167.77	40.37	58
34	0.53	165.41	37.96	54
35	0.47	163.32	35.77	51
36	167.46	148.07	20.27	29
37	1.11	171.39	43.79	63
38	1.11	171.37	43.77	63
39	1.11	171.41	43.81	63
40	1.11	171.36	44.76	64
41	1.11	171.35	44.25	63
42	1.11	171.35	45.25	65
43	1.11	171.35	44.25	63
44	1.11	171.35	45.75	65
30	0.11	169.68	42.25	60
33	0.30	167.54	39.49	56
45	1.07	171.75	43.85	63
46	1.11	171.34	45.74	65
47	1.11	171.34	44.74	64
48	1.11	171.34	46.24	66
49	1.11	171.34	46.24	66
50	1.11	171.34	45.74	65
51	1.11	171.34	46.24	66
52	1.11	171.34	45.74	65
53	1.11	171.34	46.24	66
Resvr 1	-83.02	172.74	0	
Resvr 2	-114.96	172.86	0	

Maximum Daily Demand and Fire Flow (Node 38)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.4	44.13	63
4	1.37	172.16	43.36	62
5	0.21	171.97	43.77	63
6	0.00	172.09	43.74	62
7	0.30	171.99	43.49	62
8	0.42	171.89	43.49	62
9	0.59	171.87	43.52	62
10	0.00	171.85	43.55	62
11	0.00	171.88	43.77	63
12	0.66	171.83	43.28	62
13	0.68	171.64	43.14	62
14	0.00	171.62	43.57	62
15	0.47	171.58	43.08	62
16	0.61	171.56	43.54	62
17	1.02	171.56	43.01	61
18	0.00	171.54	43.81	63
19	0.00	171.39	43.6	62
20	0.81	171.37	43.52	62
21	0.31	171.35	43.8	63
22	0.46	171.35	43.6	62
23	0.50	170.9	43.35	62
24	0.64	171	43.3	62
25	0.00	171.3	42.9	61
26	0.24	170.3	42.95	61
27	0.61	170.78	43.53	62
28	0.00	171.27	42.97	61

Maximum Daily Demand and Fire Flow (Node 38)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	171.28	43.66	62
31	0.19	168.72	41.12	59
32	0.19	167.77	40.37	58
34	0.53	165.41	37.96	54
35	0.47	163.32	35.77	51
36	167.46	148.07	20.27	29
37	1.11	171.39	43.79	63
38	1.11	171.37	43.77	63
39	1.11	171.41	43.81	63
40	1.11	171.36	44.76	64
41	1.11	171.35	44.25	63
42	1.11	171.35	45.25	65
43	1.11	171.35	44.25	63
44	1.11	171.35	45.75	65
30	0.11	169.68	42.25	60
33	0.30	167.54	39.49	56
45	1.07	171.75	43.85	63
46	1.11	171.34	45.74	65
47	1.11	171.34	44.74	64
48	1.11	171.34	46.24	66
49	1.11	171.34	46.24	66
50	1.11	171.34	45.74	65
51	1.11	171.34	46.24	66
52	1.11	171.34	45.74	65
53	1.11	171.34	46.24	66
Resvr 1	-83.02	172.74	0	
Resvr 2	-114.96	172.86	0	

Maximum Daily Demand and Fire Flow (Node 48)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.19	43.92	63
4	1.37	171.72	42.92	61
5	0.21	171.29	43.09	62
6	0.00	171.73	43.38	62
7	0.30	171.49	42.99	61
8	0.42	171.25	42.85	61
9	0.59	171.14	42.79	61
10	0.00	171.03	42.73	61
11	0.00	171.45	43.34	62
12	0.66	171.18	42.63	61
13	0.68	170.61	42.11	60
14	0.00	170.32	42.27	60
15	0.47	170.59	42.09	60
16	0.61	170.32	42.3	60
17	1.02	170.76	42.21	60
18	0.00	171.16	43.43	62
19	0.00	171.12	43.33	62
20	0.81	170.59	42.74	61
21	0.31	170.07	42.52	61
22	0.46	169.74	41.99	60
23	0.50	171.13	43.58	62
24	0.64	171.17	43.47	62
25	0.00	171.31	42.91	61
26	0.24	171.43	44.08	63
27	0.61	171.49	44.24	63
28	0.00	171.56	43.26	62

Maximum Daily Demand and Fire Flow (Node 48)

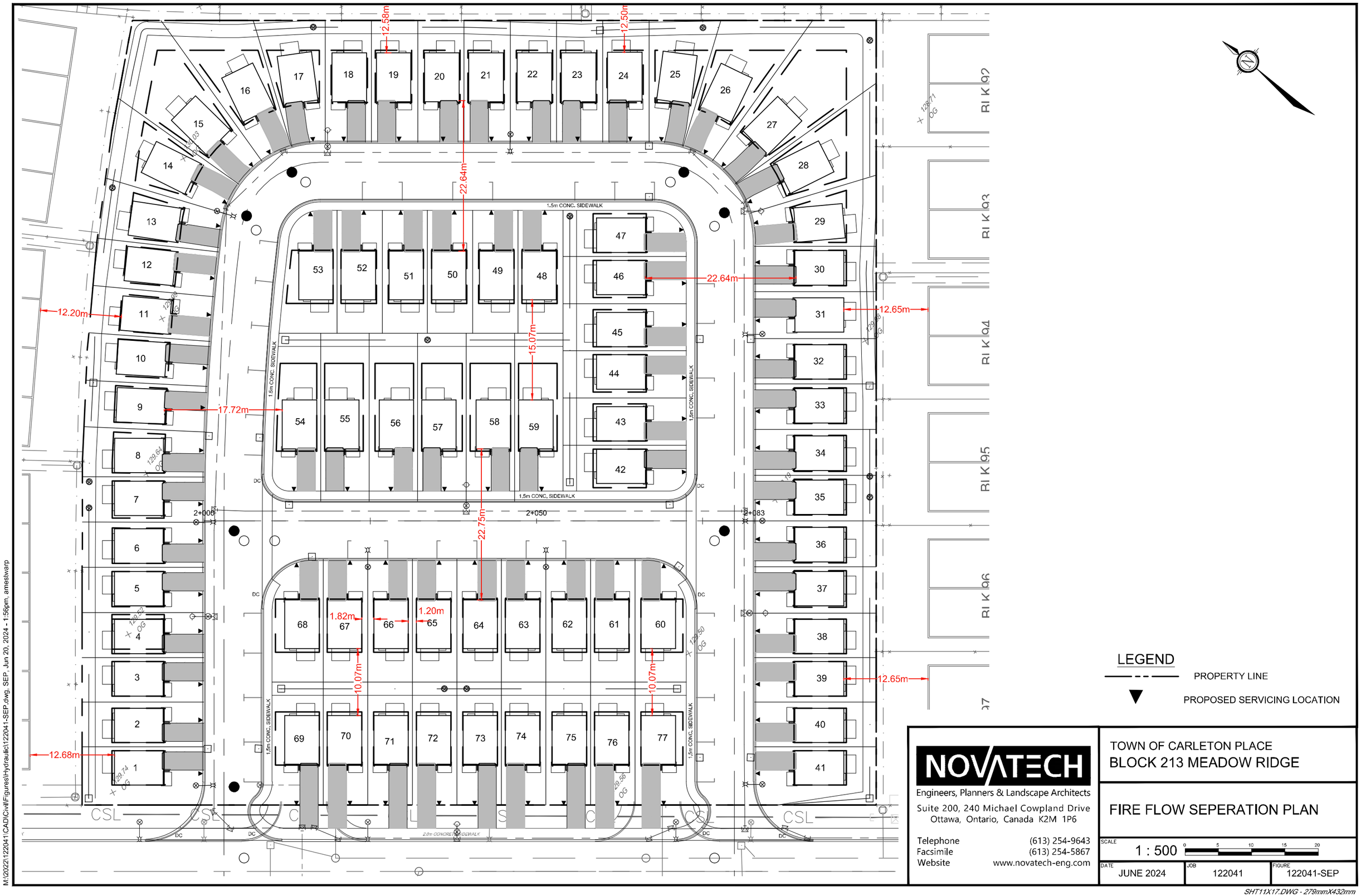
Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	171.83	44.21	63
31	0.19	171.7	44.1	63
32	0.19	171.63	44.23	63
34	0.53	171.68	44.23	63
35	0.47	171.65	44.1	63
36	0.46	171.65	43.85	63
37	1.11	167.62	40.02	57
38	1.11	166.73	39.13	56
39	1.11	168.27	40.67	58
40	1.11	166.27	39.67	57
41	1.11	168.41	41.31	59
42	1.11	166.88	40.78	58
43	1.11	168.12	41.02	59
44	1.11	167.38	41.78	60
30	0.11	171.77	44.34	63
33	0.30	171.73	43.68	62
45	1.07	171.35	43.45	62
46	1.11	162.69	37.09	53
47	1.11	158.58	31.98	46
48	168.11	152.19	27.09	39
49	1.11	159.92	34.82	50
50	1.11	166.1	40.5	58
51	1.11	165.72	40.62	58
52	1.11	165.97	40.37	58
53	1.11	165.8	40.7	58
Resvr 1	-106.89	172.74	0	
Resvr 2	-91.09	172.86	0	

Maximum Daily Demand and Fire Flow (Node 53)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
3	0.00	172.19	43.92	63
4	1.37	171.72	42.92	61
5	0.21	171.3	43.1	62
6	0.00	171.73	43.38	62
7	0.30	171.49	42.99	61
8	0.42	171.26	42.86	61
9	0.59	171.14	42.79	61
10	0.00	171.04	42.74	61
11	0.00	171.45	43.34	62
12	0.66	171.19	42.64	61
13	0.68	170.62	42.12	60
14	0.00	170.34	42.29	60
15	0.47	170.6	42.1	60
16	0.61	170.34	42.32	60
17	1.02	170.77	42.22	60
18	0.00	171.16	43.43	62
19	0.00	171.12	43.33	62
20	0.81	170.58	42.73	61
21	0.31	170.06	42.51	61
22	0.46	169.72	41.97	60
23	0.50	171.13	43.58	62
24	0.64	171.17	43.47	62
25	0.00	171.31	42.91	61
26	0.24	171.43	44.08	63
27	0.61	171.49	44.24	63
28	0.00	171.56	43.26	62

Maximum Daily Demand and Fire Flow (Node 53)

Node	Demand (LPS)	Head (m)	Pressure (m)	(PSI)
29	0.00	171.83	44.21	63
31	0.19	171.69	44.09	63
32	0.19	171.62	44.22	63
34	0.53	171.68	44.23	63
35	0.47	171.65	44.1	63
36	0.46	171.65	43.85	63
37	1.11	167.87	40.27	58
38	1.11	167.19	39.59	57
39	1.11	168.37	40.77	58
40	1.11	166.85	40.25	58
41	1.11	168.37	41.27	59
42	1.11	166.65	40.55	58
43	1.11	168.05	40.95	59
44	1.11	167.22	41.62	59
30	0.11	171.77	44.34	63
33	0.30	171.72	43.67	62
45	1.07	171.35	43.45	62
46	1.11	165.71	40.11	57
47	1.11	165.59	38.99	56
48	1.11	165.42	40.32	58
49	1.11	165.34	40.24	57
50	1.11	165.32	39.72	57
51	1.11	164.29	39.19	56
52	1.11	161.65	36.05	52
53	168.11	155.96	30.86	44
Resvr 1	-106.77	172.74	0	
Resvr 2	-91.21	172.86	0	



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TOWN OF CARLETON PLACE
BLOCK 213 MEADOW RIDGE

FIRE FLOW SEPERATION PLAN

SCALE 1 : 500 (0 5 10 15 20)
DATE JUNE 2024
JOB 122041
FIGURE 122041-SEP

M:\2022\122041\CADCivil\Figures\Hydraulic\122041-SEP.dwg, SEP, Jun 20, 2024 - 1:56pm, amestwarp

SHT11X17.DWG - 279mmX432mm

FUS - Fire Flow Calculations

Engineers, Planners & Landscape Architects

Novatech Project #: 122041
Project Name: Block 213
Date: 6/20/2024
Input By: Anthony Mestwarp
Reviewed By: Greg Macdonald
Drawing Reference: 122041-SEP

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)
Formula Method

Building Description: 3-Storey Single Unit Dwelling (Lot 66)
Type V - Wood frame

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	37.9			
		Number of Floors/Storeys	3			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**114**	
	F	**Base fire flow without reductions**				**4,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**3,400**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**2,550**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**75%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 122041
Project Name: Block 213
Date: 6/20/2024
Input By: Anthony Mestwarp, P.Eng
Reviewed By: Greg MacDonald
Drawing Reference: Watermain Layout Plan

Legend: Input by User | No Input Required | Calculated Cells →

Reference: Ottawa Design Guidelines - Water Distribution (2010 and TBs)
MOE Design Guidelines for Drinking-Water Systems (2008)
Fire Underwriter's Survey Guideline (2020)
Ontario Building Code, Part 3 (2012)

Small System = NO

Location	Total Water Demand													
Node	Residential Input & Average Demand							Maximum Day & Peak Hour Demand				Design Fire Demand	
								Maximum Day Demand		Peak Hour Demand		Required Fire Flow (RFF)	
	Singles	Semis / Towns	Apts (2-BR)	Apts (1-BR)	Apts (Avg)	Pop. Equiv.	Res. Average Day Flow Demand (L/s)	Res. Peaking Factor	Max Day Flow Demand (L/s)	Res. Peaking Factor	Peak Hour Flow Demand (L/s)	FUS (L/min)	Max Day + RFF (L/s)
201						0.00	0.00	2.50	0.00	5.50	0.00		0.00
202	4					10.80	0.04	2.50	0.11	5.50	0.24		0.11
203(HYD)	5					13.50	0.05	2.50	0.14	5.50	0.30	10,000	166.80
204	4					10.80	0.04	2.50	0.11	5.50	0.24		0.11
205(HYD)	4					10.80	0.04	2.50	0.11	5.50	0.24	10,000	166.78
206(HYD)	4					10.80	0.04	2.50	0.11	5.50	0.24	10,000	166.78
207	8					21.60	0.09	2.50	0.22	5.50	0.48		0.22
208(HYD)	12					32.40	0.13	2.50	0.33	5.50	0.72	10,000	166.99
209	6					16.20	0.07	2.50	0.16	5.50	0.36		0.16
210(HYD)	14					37.80	0.15	2.50	0.38	5.50	0.84	10,000	167.05
211(HYD)	16					43.20	0.18	2.50	0.44	5.50	0.96	10,000	167.10
Totals	**77**	**0**	**0**	**0**	**0**	**207.90**	**0.84**	**2.50**	**2.11**	**5.50**	**4.63**		

Demand Parameters

Residential					
Unit Type	Singles	Semis/ Towns	Apts (2-BR)	Apts (1-BR)	Apts (Avg)
Population Equiv.	2.7	2.7	2.1	1.4	1.8
Dailly Demand	L/per person/day				
Average Demand	350				
Basic Demand	200				

Quick Fire Flow Reference Guide			
FUS (L/min)	Comments	OBC (L/min)	Comments
> 2,000	Min FUS	< 9,000	Unsprinklered Non- Combustible
	Low Density - Singles/Towns		
10,000	Complies w/ TB2014-02 Cap. (10m rear spacing, 6 units max, <600 m²)		
13,000	Non-complying w/TB2014-01. Calculate.		

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: Block 213
Date: 6/20/2024
Input By: Anthony Mestwarp, P.Eng
Reviewed By: Greg MacDonald
Drawing Reference: Watermain Layout Plan

Calculated Cells →

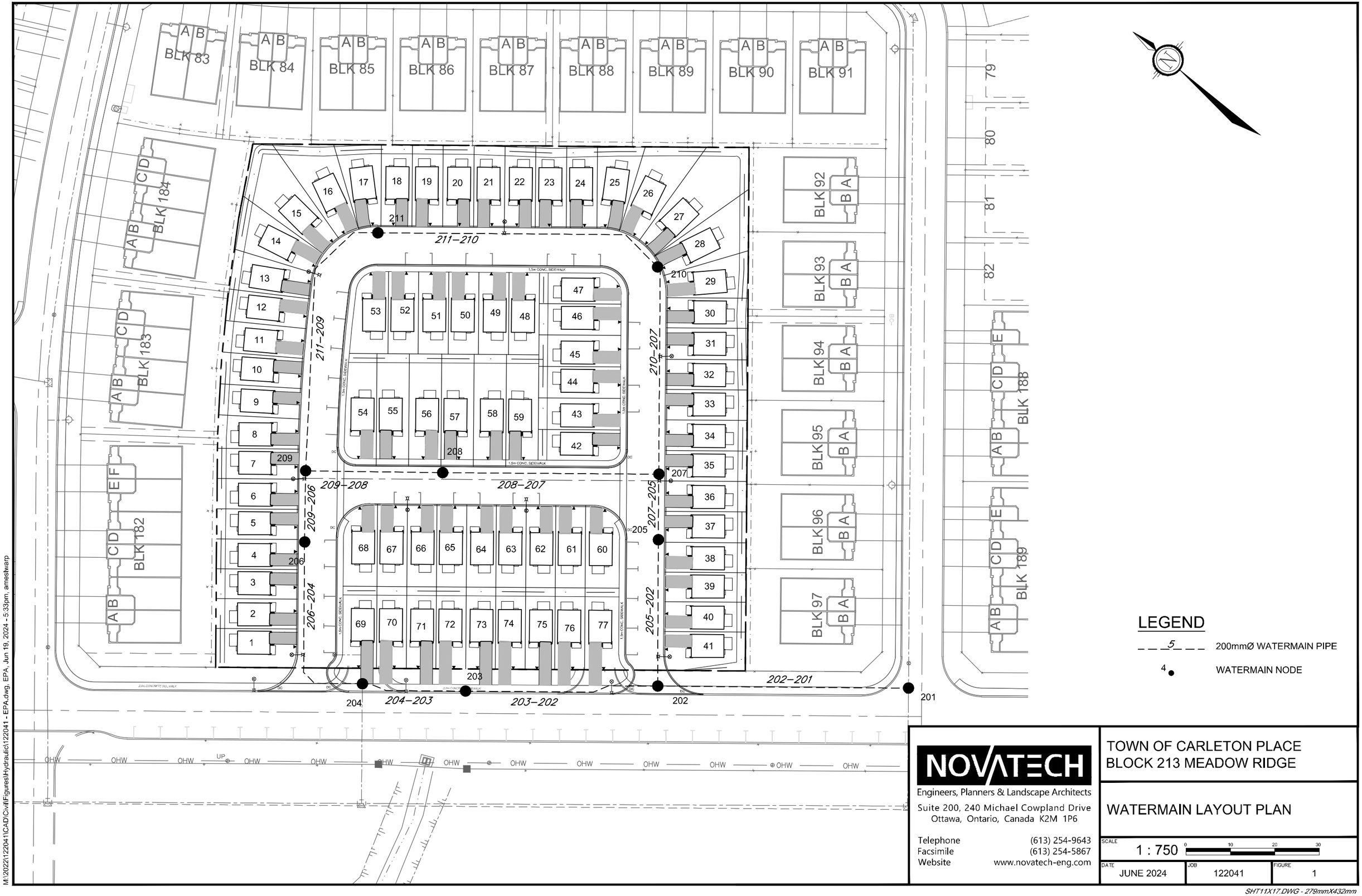
Reference: Ottawa Design Guidelines - Water Distribution (2010 and TBs)
MOE Design Guidelines for Drinking-Water Systems (2008)
Fire Underwriter's Survey Guideline (2020)
Ontario Building Code, Part 3 (2012)

Small System = NO

Location	Total Water Demand												
Node	Residential Input & Average Demand							Maximum Day & Peak Hour Demand				Design Fire Demand	
	Singles	Semis / Towns	Apts (2-BR)	Apts (1-BR)	Apts (Avg)	Pop. Equiv.	Res. Average Day Flow Demand (L/s)	Maximum Day Demand		Peak Hour Demand		Required Fire Flow (RFF)	Max Day + RFF (L/s)
								Res. Peaking Factor	Max Day Flow Demand (L/s)	Res. Peaking Factor	Peak Hour Flow Demand (L/s)	FUS (L/min)	

Residential Peaking Factors		Max Day (x Avg Day)	Peak Hour (x Avg Day)
Small System (If Applicable) *Modified*	Pop.		
	0	9.50	14.30
	30	9.50	14.30
	150	4.90	7.40
	300	3.60	*5.50*
	450	3.00	*5.50*
	500	2.90	*5.50*
Large System (Default)	> 500	2.50	5.50

15,000	**Medium Density** Back-to-back Towns.
	High Density
20,000	Wood Frame 4-Storey
5,000	Fire-Resisitve Podium/Multi-Storey
30,000	**High Contiguous / Hazard Areas**
< 45,000	**Max FUS**



LEGEND

5 — 200mmØ WATERMAIN PIPE

4 — WATERMAIN NODE

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TOWN OF CARLETON PLACE
BLOCK 213 MEADOW RIDGE

WATERMAIN LAYOUT PLAN

SCALE 1 : 750 (0, 10, 20, 30)

DATE JUNE 2024 | JOB 122041 | FIGURE 1

M:\2022\122041\CAD\Civil\Figures\Hydraulic\122041 - EPA.dwg, EPA, Jun 19, 2024 - 5:33pm, amestwarp

SHT11X17.DWG - 279mmX432mm

Pipe Data

Phase	Pipe	Length (m)	Diameter (mm)	Roughness Coefficient
Overall Model	101	65	300	120
	102	84	300	120
	103	91	300	120
	106	80	300	120
	107	86	300	120
	108	79	300	120
	109	65	300	120
	120	95	200	110
	121	97	200	110
	122	76	200	110
	147	104	200	110
	152	207	200	110
	131	114	300	120
	130	114	300	120
	129	37	300	120
	148	108	300	120
	155	203	300	120
	111	127	200	110
	112	127	200	110
	113	80	200	110
	117	74	200	110
	116	74	200	110
	119	88	200	110
	118	87	200	110
	123	94	200	110
	124	83	200	110
	125	80	200	110
	126	89	200	110
	128	165	200	110
	132	121	200	110
	134	47	200	110
	133	143	200	110
	135	62	200	110
	137	80	200	110
	136	80	200	110
	138	92	200	110
	140	74	200	110
	143	63	200	110
	146	93	200	110
	145	81	200	110
	150	144	200	110
	149	215	200	110
	151	123	200	110
	154	263	200	110
	153	251	200	110
	156	76	200	110
	157	218	200	110
	158	164	200	110
	114	55	200	110
	115	55	200	110
	144	81	200	110
	141	74	200	110
	139	23	200	110
	142	81	200	110
	110	164	300	120
	104	70	300	120
	105	124	300	120
	160	100	200	110
	163	125	200	110
	161	200	200	110
	162	125	200	110
	164	200	200	110
	165	270	200	110
	169	125	200	110
	170	200	200	110
	168	125	200	110
	159	100	300	120
	166	270	200	110
Block 213	167	200	300	120
	202-201	56.5	200	110
	201-17	157	200	110
	203-202	43.6	200	110
	204-203	23.5	200	110
	211-210	66.14	200	110
	211-209	63	200	110
	210-207	47	200	110
	207-205	14.8	200	110
	205-202	33	200	110
	206-204	43.7	200	110
	209-206	16	200	110
	204-45	27	200	110
	201-18	27	200	110
	209-208	30.9	200	110
	208-207	48.8	200	110

High Pressure Check

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	Age* (hrs)	
Overall Model	3	128.27	0	181.28	53.01	75.38	0.18	
	4	128.8	0.55	181.27	52.47	74.61	0.87	
	5	128.2	0.09	181.27	53.07	75.46	1.9	
	6	128.35	0	181.27	52.92	75.25	0.48	
	7	128.5	0.12	181.27	52.77	75.04	0.79	
	8	128.4	0.17	181.27	52.87	75.18	1.13	
	9	128.35	0.23	181.27	52.92	75.25	1.98	
	10	128.3	0	181.27	52.97	75.32	2.83	
	11	128.11	0	181.27	53.16	75.59	0.94	
	12	128.55	0.26	181.27	52.72	74.97	1.97	
	13	128.5	0.27	181.27	52.77	75.04	2.58	
	14	128.05	0	181.27	53.22	75.68	3.36	
	15	128.5	0.19	181.27	52.77	75.04	5.86	
	16	128.02	0.24	181.27	53.25	75.72	6.73	
	17	128.55	0.41	181.27	52.72	74.97	4.92	
	18	127.73	0	181.27	53.54	76.13	2.86	
	19	127.79	0	181.27	53.48	76.05	2.63	
	20	127.85	0.32	181.27	53.42	75.96	3.26	
	21	127.55	0.13	181.27	53.72	76.39	4.2	
	22	127.75	0.18	181.27	53.52	76.10	4.95	
	23	127.55	0.2	181.27	53.72	76.39	4.06	
	24	127.7	0.26	181.27	53.57	76.17	3.08	
	25	128.4	0	181.27	52.87	75.18	1.32	
	26	127.35	0.1	181.27	53.92	76.67	3.63	
	27	127.25	0.24	181.27	54.02	76.81	1.7	
	28	128.3	0	181.27	52.97	75.32	0.86	
	29	127.62	0	181.27	53.65	76.29	0.56	
	31	127.6	0.08	181.27	53.67	76.32	1.46	
	32	127.4	0.08	181.27	53.87	76.60	3.14	
	34	127.45	0.21	181.27	53.82	76.53	2.79	
	35	127.55	0.19	181.27	53.72	76.39	4.52	
	36	127.8	0.18	181.27	53.47	76.03	9.03	
	37	127.6	0.45	181.26	53.66	76.30	6.22	
	38	127.6	0.45	181.26	53.66	76.30	9.78	
	39	127.6	0.45	181.26	53.66	76.30	4.94	
	40	126.6	0.45	181.26	54.66	77.72	9.41	
	41	127.1	0.45	181.26	54.16	77.01	5.36	
	42	126.1	0.45	181.26	55.16	78.44	7.17	
	43	127.1	0.45	181.26	54.16	77.01	5.96	
	44	125.6	0.45	181.26	55.66	79.15	8.79	
	30	127.43	0.04	181.27	53.84	76.56	0.68	
	33	128.05	0.12	181.27	53.22	75.68	1.64	
	45	127.9	0	181.27	53.37	75.89	1.43	
	46	125.6	0.45	181.26	55.66	79.15	11.29	
	47	126.6	0.45	181.26	54.66	77.72	13.21	
	48	125.1	0.45	181.26	56.16	79.86	21.93	**Maximum Age (Overall)**
	49	125.1	0.45	181.26	56.16	79.86	16.47	
	50	125.6	0.45	181.26	55.66	79.15	7.91	
	51	125.1	0.45	181.26	56.16	79.86	11.19	
	52	125.60	0.45	181.26	55.66	79.15	9.81	
	53	125.10	0.45	181.26	56.16	79.86	17.12	**Maximum Pressure (Overal)**
Block 213	201	130.40	0.00	181.27	50.87	72.34	3.57	**Maximum Pressure (Block 213)**
	202	130.51	0.04	181.27	50.76	72.18	2.83	
	203(HYD)	130.79	0.05	181.27	50.48	71.78	2.03	**Maximum Age (Block 213)**
	204	130.71	0.04	181.27	50.56	71.89	1.64	
	205(HYD)	130.65	0.04	181.27	50.62	71.98	4.50	
	206(HYD)	130.73	0.04	181.27	50.54	71.87	2.37	
	207	130.81	0.09	181.27	50.52	71.84	6.82	
	208(HYD)	130.87	0.13	181.27	50.40	71.67	3.91	
	209	130.87	0.07	181.27	50.40	71.67	2.65	
	210(HYD)	130.83	0.15	181.27	50.44	71.72	13.18	
	211(HYD)	131.22	0.18	181.27	50.05	71.17	5.37	
	1 Reservoir	181.28	-7.10	181.28	0.00	0.00	0.00	
	2 Reservoir	181.28	-5.79	181.28	0.00	0.00	0.00	

* Age is based on a boundary age of 0.00hrs
1m of head = 1.42197 PSI

Maximum Daily Demand and Fire Flow

Node 203 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.8	1.37	171.81	43.01	61.16	
	5	128.2	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.58	43.23	61.47	
	7	128.5	0.30	171.46	42.96	61.09	
	8	128.4	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.3	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.5	0.68	171.14	42.64	60.63	
	14	128.05	0.00	171.15	43.1	61.29	
	15	128.5	0.47	171.05	42.55	60.50	
	16	128.02	0.61	171.11	43.09	61.27	
	17	128.55	1.02	170.81	42.26	60.09	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.12	43.33	61.61	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.12	43.37	61.67	
	23	127.55	0.50	171.42	43.87	62.38	
	24	127.7	0.64	171.41	43.71	62.15	
	25	128.4	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.61	44.26	62.94	
	27	127.25	0.61	171.64	44.39	63.12	
	28	128.3	0.00	171.67	43.37	61.67	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.6	0.19	171.81	44.21	62.87	
	32	127.4	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.78	44.23	62.89	
	36	127.8	0.46	171.78	43.98	62.54	
	37	127.6	1.11	171.09	43.49	61.84	
	38	127.6	1.11	171.09	43.49	61.84	
	39	127.6	1.11	171.1	43.5	61.86	
	40	126.6	1.11	171.09	44.49	63.26	
	41	127.1	1.11	171.1	44	62.57	
	42	126.1	1.11	171.09	44.99	63.97	
	43	127.1	1.11	171.1	44	62.57	
	44	125.6	1.11	171.09	45.49	64.69	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.84	43.79	62.27	
	45	127.9	0.00	170.78	42.88	60.97	
	46	125.6	1.11	171.08	45.48	64.67	
	47	126.6	1.11	171.08	44.48	63.25	
	48	125.1	1.11	171.08	45.98	65.38	
	49	125.1	1.11	171.08	45.98	65.38	
	50	125.6	1.11	171.08	45.48	64.67	
	51	125.1	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.08	45.48	64.67	
	53	125.10	1.11	171.08	45.98	65.38	
Block 213	201	130.40	0.00	170.42	40.02	56.91	
	202	130.51	0.11	168.87	38.36	54.55	
	203(HYD)	130.79	166.80	167.49	36.70	52.19	**Minimum Pressure**
	204.00	130.71	0.11	168.92	38.21	54.33	
	205(HYD)	130.65	0.11	168.88	38.23	54.36	
	206(HYD)	130.73	0.11	168.90	38.17	54.28	
	207	130.81	0.22	168.88	38.07	54.13	
	208(HYD)	130.87	0.33	168.89	38.02	54.06	
	209	130.87	0.16	168.89	38.02	54.06	
	210(HYD)	130.83	0.38	168.88	38.05	54.11	
	211(HYD)	131.22	0.44	168.89	37.67	53.57	
	1 Reservoir	172.74	-111.99	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.69	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Maximum Daily Demand and Fire Flow

Node 205 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.8	1.37	171.81	43.01	61.16	
	5	128.2	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.59	43.24	61.49	
	7	128.5	0.30	171.47	42.97	61.10	
	8	128.4	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.3	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.5	0.68	171.13	42.63	60.62	
	14	128.05	0.00	171.14	43.09	61.27	
	15	128.5	0.47	171.04	42.54	60.49	
	16	128.02	0.61	171.1	43.08	61.26	
	17	128.55	1.02	170.77	42.22	60.04	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.11	43.32	61.60	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.11	43.36	61.66	
	23	127.55	0.50	171.41	43.86	62.37	
	24	127.7	0.64	171.41	43.71	62.15	
	25	128.4	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.6	44.25	62.92	
	27	127.25	0.61	171.63	44.38	63.11	
	28	128.3	0.00	171.66	43.36	61.66	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.6	0.19	171.81	44.21	62.87	
	32	127.4	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.77	44.22	62.88	
	36	127.8	0.46	171.77	43.97	62.52	
	37	127.6	1.11	171.09	43.49	61.84	
	38	127.6	1.11	171.08	43.48	61.83	
	39	127.6	1.11	171.1	43.5	61.86	
	40	126.6	1.11	171.08	44.48	63.25	
	41	127.1	1.11	171.1	44	62.57	
	42	126.1	1.11	171.08	44.98	63.96	
	43	127.1	1.11	171.09	43.99	62.55	
	44	125.6	1.11	171.08	45.48	64.67	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.83	43.78	62.25	
	45	127.9	0.00	170.8	42.9	61.00	
	46	125.6	1.11	171.07	45.47	64.66	
	47	126.6	1.11	171.07	44.47	63.24	
	48	125.1	1.11	171.07	45.97	65.37	
	49	125.1	1.11	171.07	45.97	65.37	
	50	125.6	1.11	171.08	45.48	64.67	
	51	125.1	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.07	45.47	64.66	
	53	125.10	1.11	171.07	45.97	65.37	
Block 213	201	130.40	0.00	170.33	39.93	56.78	
	202	130.51	0.11	168.51	38.00	54.03	
	203(HYD)	130.79	0.14	168.90	38.11	54.19	
	204.00	130.71	0.11	169.12	38.41	54.62	
	205(HYD)	130.65	166.78	166.25	35.60	50.62	**Minimum Pressure**
	206(HYD)	130.73	0.11	167.92	37.19	52.88	
	207	130.81	0.22	166.64	35.83	50.95	
	208(HYD)	130.87	0.33	167.15	36.28	51.59	
	209	130.87	0.16	167.48	36.61	52.06	
	210(HYD)	130.83	0.38	166.85	36.02	51.22	
	211(HYD)	131.22	0.44	167.17	35.95	51.12	
	1 Reservoir	172.74	-111.83	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.86	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Maximum Daily Demand and Fire Flow

Node 206 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.80	1.37	171.81	43.01	61.16	
	5	128.20	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.58	43.23	61.47	
	7	128.50	0.30	171.46	42.96	61.09	
	8	128.40	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.30	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.50	0.68	171.14	42.64	60.63	
	14	128.05	0.00	171.15	43.1	61.29	
	15	128.50	0.47	171.05	42.55	60.50	
	16	128.02	0.61	171.11	43.09	61.27	
	17	128.55	1.02	170.81	42.26	60.09	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.12	43.33	61.61	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.12	43.37	61.67	
	23	127.55	0.50	171.42	43.87	62.38	
	24	127.70	0.64	171.41	43.71	62.15	
	25	128.40	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.61	44.26	62.94	
	27	127.25	0.61	171.64	44.39	63.12	
	28	128.30	0.00	171.67	43.37	61.67	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.60	0.19	171.82	44.22	62.88	
	32	127.40	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.78	44.23	62.89	
	36	127.80	0.46	171.78	43.98	62.54	
	37	127.60	1.11	171.09	43.49	61.84	
	38	127.60	1.11	171.09	43.49	61.84	
	39	127.60	1.11	171.1	43.5	61.86	
	40	126.60	1.11	171.09	44.49	63.26	
	41	127.10	1.11	171.1	44	62.57	
	42	126.10	1.11	171.09	44.99	63.97	
	43	127.10	1.11	171.1	44	62.57	
	44	125.60	1.11	171.09	45.49	64.69	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.84	43.79	62.27	
	45	127.90	0.00	170.78	42.88	60.97	
	46	125.60	1.11	171.08	45.48	64.67	
	47	126.60	1.11	171.08	44.48	63.25	
	48	125.10	1.11	171.08	45.98	65.38	
	49	125.10	1.11	171.08	45.98	65.38	
	50	125.60	1.11	171.08	45.48	64.67	
	51	125.10	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.08	45.48	64.67	
	53	125.10	1.11	171.08	45.98	65.38	
Block 213	201	130.40	0.00	170.43	40.03	56.92	
	202	130.51	0.11	168.89	38.38	54.58	
	203(HYD)	130.79	0.14	168.90	38.11	54.19	
	204.00	130.71	0.11	168.90	38.19	54.31	
	205(HYD)	130.65	0.11	167.90	37.25	52.97	
	206(HYD)	130.73	166.78	166.07	35.34	50.25	**Minimum Pressure**
	207	130.81	0.22	167.46	36.65	52.12	
	208(HYD)	130.87	0.33	166.89	36.02	51.22	
	209	130.87	0.16	166.53	35.66	50.71	
	210(HYD)	130.83	0.38	167.20	36.37	51.72	
	211(HYD)	131.22	0.44	166.86	35.64	50.68	
	1 Reservoir	172.74	-112.01	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.68	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Maximum Daily Demand and Fire Flow

Node 208 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.80	1.37	171.81	43.01	61.16	
	5	128.20	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.58	43.23	61.47	
	7	128.50	0.30	171.46	42.96	61.09	
	8	128.40	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.30	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.50	0.68	171.14	42.64	60.63	
	14	128.05	0.00	171.14	43.09	61.27	
	15	128.50	0.47	171.05	42.55	60.50	
	16	128.02	0.61	171.1	43.08	61.26	
	17	128.55	1.02	170.8	42.25	60.08	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.12	43.33	61.61	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.11	43.36	61.66	
	23	127.55	0.50	171.41	43.86	62.37	
	24	127.70	0.64	171.41	43.71	62.15	
	25	128.40	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.61	44.26	62.94	
	27	127.25	0.61	171.63	44.38	63.11	
	28	128.30	0.00	171.67	43.37	61.67	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.60	0.19	171.81	44.21	62.87	
	32	127.40	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.77	44.22	62.88	
	36	127.80	0.46	171.77	43.97	62.52	
	37	127.60	1.11	171.09	43.49	61.84	
	38	127.60	1.11	171.09	43.49	61.84	
	39	127.60	1.11	171.1	43.5	61.86	
	40	126.60	1.11	171.09	44.49	63.26	
	41	127.10	1.11	171.1	44	62.57	
	42	126.10	1.11	171.09	44.99	63.97	
	43	127.10	1.11	171.09	43.99	62.55	
	44	125.60	1.11	171.09	45.49	64.69	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.84	43.79	62.27	
	45	127.90	0.00	170.79	42.89	60.99	
	46	125.60	1.11	171.08	45.48	64.67	
	47	126.60	1.11	171.08	44.48	63.25	
	48	125.10	1.11	171.08	45.98	65.38	
	49	125.10	1.11	171.08	45.98	65.38	
	50	125.60	1.11	171.08	45.48	64.67	
	51	125.10	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.08	45.48	64.67	
	53	125.10	1.11	171.08	45.98	65.38	
Block 213	201	130.40	0.00	170.39	39.99	56.86	
	202	130.51	0.11	168.76	38.25	54.39	
	203(HYD)	130.79	0.14	168.90	38.11	54.19	
	204.00	130.71	0.11	168.98	38.27	54.42	
	205(HYD)	130.65	0.11	167.19	36.54	51.96	
	206(HYD)	130.73	0.11	167.05	36.32	51.65	
	207	130.81	0.22	166.49	35.68	50.74	
	208(HYD)	130.87	166.99	164.67	33.80	48.06	**Minimum Pressure**
	209	130.87	0.16	166.34	35.47	50.44	
	210(HYD)	130.83	0.38	166.45	35.62	50.65	
	211(HYD)	131.22	0.44	166.39	35.17	50.01	
	1 Reservoir	172.74	-111.93	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.75	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Maximum Daily Demand and Fire Flow

Node 210 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.80	1.37	171.81	43.01	61.16	
	5	128.20	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.59	43.24	61.49	
	7	128.50	0.30	171.46	42.96	61.09	
	8	128.40	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.30	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.50	0.68	171.14	42.64	60.63	
	14	128.05	0.00	171.14	43.09	61.27	
	15	128.50	0.47	171.05	42.55	60.50	
	16	128.02	0.61	171.1	43.08	61.26	
	17	128.55	1.02	170.79	42.24	60.06	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.12	43.33	61.61	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.11	43.36	61.66	
	23	127.55	0.50	171.41	43.86	62.37	
	24	127.70	0.64	171.41	43.71	62.15	
	25	128.40	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.61	44.26	62.94	
	27	127.25	0.61	171.63	44.38	63.11	
	28	128.30	0.00	171.67	43.37	61.67	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.60	0.19	171.81	44.21	62.87	
	32	127.40	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.77	44.22	62.88	
	36	127.80	0.46	171.77	43.97	62.52	
	37	127.60	1.11	171.09	43.49	61.84	
	38	127.60	1.11	171.08	43.48	61.83	
	39	127.60	1.11	171.1	43.5	61.86	
	40	126.60	1.11	171.08	44.48	63.25	
	41	127.10	1.11	171.1	44	62.57	
	42	126.10	1.11	171.09	44.99	63.97	
	43	127.10	1.11	171.09	43.99	62.55	
	44	125.60	1.11	171.09	45.49	64.69	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.83	43.78	62.25	
	45	127.90	0.00	170.79	42.89	60.99	
	46	125.60	1.11	171.08	45.48	64.67	
	47	126.60	1.11	171.07	44.47	63.24	
	48	125.10	1.11	171.07	45.97	65.37	
	49	125.10	1.11	171.08	45.98	65.38	
	50	125.60	1.11	171.08	45.48	64.67	
	51	125.10	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.08	45.48	64.67	
	53	125.10	1.11	171.08	45.98	65.38	
Block 213	201	130.40	0.00	170.39	39.99	56.86	
	202	130.51	0.11	168.73	38.22	54.35	
	203(HYD)	130.79	0.14	168.90	38.11	54.19	
	204.00	130.71	0.11	169.00	38.29	54.45	
	205(HYD)	130.65	0.11	167.07	36.42	51.79	
	206(HYD)	130.73	0.11	167.18	36.45	51.83	
	207	130.81	0.22	166.33	35.52	50.51	
	208(HYD)	130.87	0.33	166.44	35.57	50.58	
	209	130.87	0.16	166.51	35.64	50.68	
	210(HYD)	130.83	167.05	163.09	32.26	45.87	**Minimum Pressure**
	211(HYD)	131.22	0.44	164.83	33.61	47.79	
	1 Reservoir	172.74	-111.93	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.76	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Maximum Daily Demand and Fire Flow

Node 211 (HYD) - 166.67L/s Fire Demand

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	172.14	43.87	62.38	
	4	128.80	1.37	171.81	43.01	61.16	
	5	128.20	0.21	171.52	43.32	61.60	
	6	128.35	0.00	171.58	43.23	61.47	
	7	128.50	0.30	171.46	42.96	61.09	
	8	128.40	0.42	171.35	42.95	61.07	
	9	128.35	0.59	171.35	43	61.14	
	10	128.30	0.00	171.35	43.05	61.22	
	11	128.11	0.00	171.16	43.05	61.22	
	12	128.55	0.66	171.19	42.64	60.63	
	13	128.50	0.68	171.14	42.64	60.63	
	14	128.05	0.00	171.14	43.09	61.27	
	15	128.50	0.47	171.05	42.55	60.50	
	16	128.02	0.61	171.1	43.08	61.26	
	17	128.55	1.02	170.8	42.25	60.08	
	18	127.73	0.00	170.83	43.1	61.29	
	19	127.79	0.00	171.12	43.33	61.61	
	20	127.85	0.81	171.12	43.27	61.53	
	21	127.55	0.31	171.12	43.57	61.96	
	22	127.75	0.46	171.11	43.36	61.66	
	23	127.55	0.50	171.41	43.86	62.37	
	24	127.70	0.64	171.41	43.71	62.15	
	25	128.40	0.00	171.41	43.01	61.16	
	26	127.35	0.24	171.61	44.26	62.94	
	27	127.25	0.61	171.63	44.38	63.11	
	28	128.30	0.00	171.67	43.37	61.67	
	29	127.62	0.00	171.92	44.3	62.99	
	31	127.60	0.19	171.81	44.21	62.87	
	32	127.40	0.19	171.76	44.36	63.08	
	34	127.45	0.53	171.8	44.35	63.06	
	35	127.55	0.47	171.77	44.22	62.88	
	36	127.80	0.46	171.77	43.97	62.52	
	37	127.60	1.11	171.09	43.49	61.84	
	38	127.60	1.11	171.09	43.49	61.84	
	39	127.60	1.11	171.1	43.5	61.86	
	40	126.60	1.11	171.09	44.49	63.26	
	41	127.10	1.11	171.1	44	62.57	
	42	126.10	1.11	171.09	44.99	63.97	
	43	127.10	1.11	171.09	43.99	62.55	
	44	125.60	1.11	171.09	45.49	64.69	
	30	127.43	0.11	171.87	44.44	63.19	
	33	128.05	0.30	171.84	43.79	62.27	
	45	127.90	0.00	170.79	42.89	60.99	
	46	125.60	1.11	171.08	45.48	64.67	
	47	126.60	1.11	171.08	44.48	63.25	
	48	125.10	1.11	171.08	45.98	65.38	
	49	125.10	1.11	171.08	45.98	65.38	
	50	125.60	1.11	171.08	45.48	64.67	
	51	125.10	1.11	171.08	45.98	65.38	
	52	125.60	1.11	171.08	45.48	64.67	
	53	125.10	1.11	171.08	45.98	65.38	
Block 213	201	130.40	0.00	170.39	39.99	56.86	
	202	130.51	0.11	168.76	38.25	54.39	
	203(HYD)	130.79	0.14	168.90	38.11	54.19	
	204.00	130.71	0.11	168.98	38.27	54.42	
	205(HYD)	130.65	0.11	167.18	36.53	51.94	
	206(HYD)	130.73	0.11	167.05	36.32	51.65	
	207	130.81	0.22	166.48	35.67	50.72	
	208(HYD)	130.87	0.33	166.40	35.53	50.52	
	209	130.87	0.16	166.35	35.48	50.45	
	210(HYD)	130.83	0.38	164.89	34.06	48.43	
	211(HYD)	131.22	167.10	162.66	31.44	44.71	**Minimum Pressure**
	1 Reservoir	172.74	-111.93	172.74	0.00	0.00	
	2 Reservoir	172.86	-86.75	172.86	0.00	0.00	

1m of head = 1.42197 **PSI**

Peak Hour

Phase	Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
Overall Model	3	128.27	0.00	179.15	50.88	72.35	
	4	128.80	3.01	179.07	50.27	71.48	
	5	128.20	0.47	179.03	50.83	72.28	
	6	128.35	0.00	179.09	50.74	72.15	
	7	128.50	0.67	179.05	50.55	71.88	
	8	128.40	0.91	179.02	50.62	71.98	
	9	128.35	1.29	179.01	50.66	72.04	
	10	128.30	0.00	179.01	50.71	72.11	
	11	128.11	0.00	179.05	50.94	72.44	
	12	128.55	1.45	179.02	50.47	71.77	
	13	128.50	1.49	178.97	50.47	71.77	
	14	128.05	0.00	178.96	50.91	72.39	
	15	128.50	1.02	178.97	50.47	71.77	
	16	128.02	1.34	178.95	50.93	72.42	
	17	128.55	2.25	178.98	50.43	71.71	
	18	127.73	0.00	179.03	51.30	72.95	
	19	127.79	0.00	179.03	51.24	72.86	
	20	127.85	1.78	178.99	51.14	72.72	
	21	127.55	0.69	178.95	51.40	73.09	
	22	127.75	1.00	178.93	51.18	72.78	
	23	127.55	1.09	179.02	51.47	73.19	
	24	127.70	1.40	179.03	51.33	72.99	
	25	128.40	0.00	179.05	50.65	72.02	
	26	127.35	0.53	179.05	51.70	73.52	
	27	127.25	1.34	179.06	51.81	73.67	
	28	128.30	0.00	179.08	50.78	72.21	
	29	127.62	0.00	179.11	51.49	73.22	
	31	127.60	0.42	179.08	51.48	73.20	
	32	127.40	0.42	179.07	51.67	73.47	
	34	127.45	1.16	179.07	51.62	73.40	
	35	127.55	1.02	179.07	51.52	73.26	
	36	127.80	1.00	179.07	51.27	72.90	
	37	127.60	2.45	178.80	51.20	72.80	
	38	127.60	2.45	178.78	51.18	72.78	
	39	127.60	2.45	178.84	51.24	72.86	
	40	126.60	2.45	178.78	52.18	74.20	
	41	127.10	2.45	178.85	51.75	73.59	
	42	126.10	2.45	178.79	52.69	74.92	
	43	127.10	2.45	178.83	51.73	73.56	
	44	125.60	2.45	178.80	53.20	75.65	
	30	127.43	0.25	179.10	51.67	73.47	
	33	128.05	0.67	179.08	51.03	72.56	
	45	127.90	0.00	179.04	51.14	72.72	
	46	125.60	2.45	178.76	53.16	75.59	
	47	126.60	2.45	178.74	52.14	74.14	
	48	125.10	2.45	178.74	53.64	76.27	
	49	125.10	2.45	178.75	53.65	76.29	
	50	125.60	2.45	178.77	53.17	75.61	
	51	125.10	2.45	178.76	53.66	76.30	
	52	125.60	2.45	178.76	53.16	75.59	
	53	125.10	2.45	178.76	53.66	76.30	
Block 213	201	130.40	0.00	179.02	48.62	69.14	
	202	130.51	0.24	179.03	48.52	68.99	
	203(HYD)	130.79	0.30	179.03	48.24	68.60	
	204.00	130.71	0.24	179.03	48.32	68.71	
	205(HYD)	130.65	0.24	179.03	48.38	68.79	
	206(HYD)	130.73	0.24	179.03	48.30	68.68	
	207	130.81	0.48	179.03	48.22	68.57	
	208(HYD)	130.87	0.72	179.03	48.16	68.48	
	209	130.87	0.36	179.03	48.16	68.48	
	210(HYD)	130.83	0.84	179.02	48.19	68.52	
	211(HYD)	131.22	0.96	179.02	47.80	67.97	**Minimum Pressure**
	1 Reservoir	179.23	-37.40	179.23	0.00	0.00	
	2 Reservoir	179.27	-33.09	179.27	0.00	0.00	

1m of head = 1.42197 **PSI**

APPENDIX B
Sanitary Servicing Information

9.3 Proposed Sanitary Demand

Theoretical flows can be calculated for the proposed development using the following design parameters and are summarized in **Table 13** and **Table 14**.

Design Flow Parameters

Residential Average Flow = 350 L/cap/day
Population per unit – singles = 3.4 persons per unit
Population per unit – semis/townhouses = 2.7 persons per unit
Population per unit – apartments = 1.8 persons per unit
Residential Peak Factor = Harmon Equation (Max 4.0)

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where: P=Population
K=Correction Factor = 1

Infiltration allowance (design) = 0.28 L/s/ha
Minimum pipe size = 200 mm
Minimum Pipe slopes = 0.32% (200mm), 0.24% (250mm), 0.19% (300mm)
Desired Pipe slope = 0.35-0.50% (200mm)
Minimum velocity = 0.60 m/s
Maximum velocity = 3.00 m/s

Table 13: Sanitary Flows by Phase

Phase	Singles	Semis	Towns	Sanitary Flow (L/s)
1	37	24	80	**8.7**
2	58	30	27+39(Block 213)	**9.7**
3	41	14	94	**9.9**
Total	**136**	**68**	**240**	**26.8**

9.4 Proposed Sanitary Sewers

Appendix E contains the associated sanitary design sheets that provide a functional design for the sanitary sewer. The corresponding Sanitary Drainage Area plan is included within the drawing set described at the front of this report.

Service laterals require a minimum slope of 1.0%, with a desired slope of 2% and are specified as follows;

Singles 135mm diameter PVC DR 28
Towns/Semis 135mm diameter PVC DR 28

SANITARY SEWER DESIGN SHEET

PEGASUS SUBDIVISION

DEVELOPER: OLYMPIA HOMES

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 108047
DESIGNED BY: LSC/AJL
CHECKED BY: GJM
DATE PREPARED: May. 2015
REVISED: Nov. 2015
REVISED: June. 2016
REVISED: March, 2017

LOCATION							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER								
STREET	FROM MH	TO MH	SINGLES	TOWNS	POPULATION (in 1000's)	AREA (ha.)	POPULATION (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	Roughness Coef.	GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
Dunlop	301	303	2		0.0068	0.178	0.007	0.178	4.00	0.11	0.05	0.16	27.6	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.01
Peever	501	503		13	0.0351	0.836	0.035	0.836	4.00	0.57	0.23	0.80	57.4	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Peever	503	505		12	0.0324	0.445	0.068	1.281	4.00	1.09	0.36	1.45	51.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Peever	505	507		21	0.0567	0.718	0.124	1.999	4.00	2.01	0.56	2.57	86.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.11
Peever	507	303		6	0.0162	0.284	0.140	2.283	4.00	2.28	0.64	2.91	41.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.12
Dunlop	303	305	4		0.0136	0.269	0.161	2.730	4.00	2.61	0.76	3.37	48.9	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.11
Dunlop	305	307			0.0000	0.147	0.161	2.877	4.00	2.61	0.81	3.41	32.0	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.12
Borland	601	603		10	0.0270	0.607	0.027	0.607	4.00	0.44	0.17	0.61	46.9	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Borland	603	605	1	3	0.0115	0.186	0.039	0.793	4.00	0.62	0.22	0.85	35.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.04
Borland	605	607	4		0.0136	0.208	0.052	1.001	4.00	0.84	0.28	1.12	39.6	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.05
Borland	607	609	10		0.0340	0.442	0.086	1.443	4.00	1.40	0.40	1.80	58.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.08
Borland	609	307	6		0.0204	0.335	0.107	1.778	4.00	1.73	0.50	2.22	49.6	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.09
Dunlop	307	309			0.0000	0.282	0.267	4.937	4.00	4.33	1.38	5.71	48.9	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.19
Dunlop	309	311			0.0000	0.234	0.267	5.171	4.00	4.33	1.45	5.78	35.8	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.20
Hurdis	401	403		10	0.0270	0.608	0.027	0.608	4.00	0.44	0.17	0.61	61.2	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Leblanc	605	403		14	0.0378	0.578	0.076	0.578	4.00	1.24	0.16	1.40	87.1	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Hurdis	403	405	1	6	0.0196	0.283	0.123	1.469	4.00	1.99	0.41	2.40	48.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.10
Hurdis	405	407	4	1	0.0163	0.259	0.139	1.728	4.00	2.26	0.48	2.74	48.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.12
Antonakos	803	801		7	0.0189	0.304	0.019	0.304	4.00	0.31	0.09	0.39	64.6	200	201.2	DR 35	0.013	0.85	30.7	0.97	0.01
Antonakos	801	407		2	0.0054	0.112	0.024	0.416	4.00	0.39	0.12	0.51	28.5	200	201.2	DR 35	0.013	0.85	30.7	0.97	0.02
Hurdis	407	311	5	8	0.0386	0.519	0.202	2.663	4.00	3.27	0.75	4.02	75.3	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.17
Dunlop	311	313	5		0.0170	0.390	0.486	8.224	3.98	7.84	2.30	10.15	82.3	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.34
Pollock	901	313		14	0.0378	0.550	0.038	0.550	4.00	0.61	0.15	0.77	66.3	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.02
Dunlop	313	315	10		0.0340	0.608	0.558	9.382	3.95	8.93	2.63	11.56	81.7	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.39
Dunlop	315	211	10		0.0340	0.631	0.592	10.013	3.94	9.44	2.80	12.24	89.6	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.41
Robertson	Stub	211			1.7600	31.700	1.760	31.700	3.63	25.87	8.88	34.74	43.9	375	366.4	DR 35	0.013	0.16	65.9	0.63	0.53
Robertson	211	209			0.0000	0.061	2.352	41.774	3.53	33.64	11.70	45.33	37.0	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.71
Blk 213	Stub	101		39	0.1053	1.633	0.105	1.633	4.00	1.71	0.46	2.16	14.0	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.06
Hooper	101	103			0.0000	0.000	0.105	1.633	4.00	1.71	0.46	2.16	70.7	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.07
Antonakos	803	805	3	9	0.0345	0.566	0.035	0.566	4.00	0.56	0.16	0.72	82.2	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Antonakos	805	807	1		0.0034	0.135	0.038	0.701	4.00	0.61	0.20	0.81	12.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Antonakos	807	809	5	4	0.0278	0.503	0.066	1.204	4.00	1.06	0.34	1.40	68.3	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Antonakos	809	103		18	0.0486	0.804	0.114	2.008	4.00	1.85	0.56	2.41	94.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.10
Hooper	103	203			0.0000	0.000	0.220	3.641	4.00	3.56	1.02	4.58	81.3	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.15
Robertson	203	205	9	3	0.0387	0.767	0.258	4.408	4.00	4.19	1.23	5.42	89.1	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.18
Robertson	205	207	9		0.0306	0.504	0.289	4.912	4.00	4.68	1.38	6.06	59.9	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.20
Robertson	207	209	6		0.0204	0.366	0.309	5.278	4.00	5.01	1.48	6.49	65.9	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.21

SANITARY SEWER DESIGN SHEET

PEGASUS SUBDIVISION

DEVELOPER: OLYMPIA HOMES

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 108047
DESIGNED BY: LSC/AJL
CHECKED BY: GJM
DATE PREPARED: May. 2015
REVISED: Nov. 2015
REVISED: June. 2016
REVISED: March, 2017

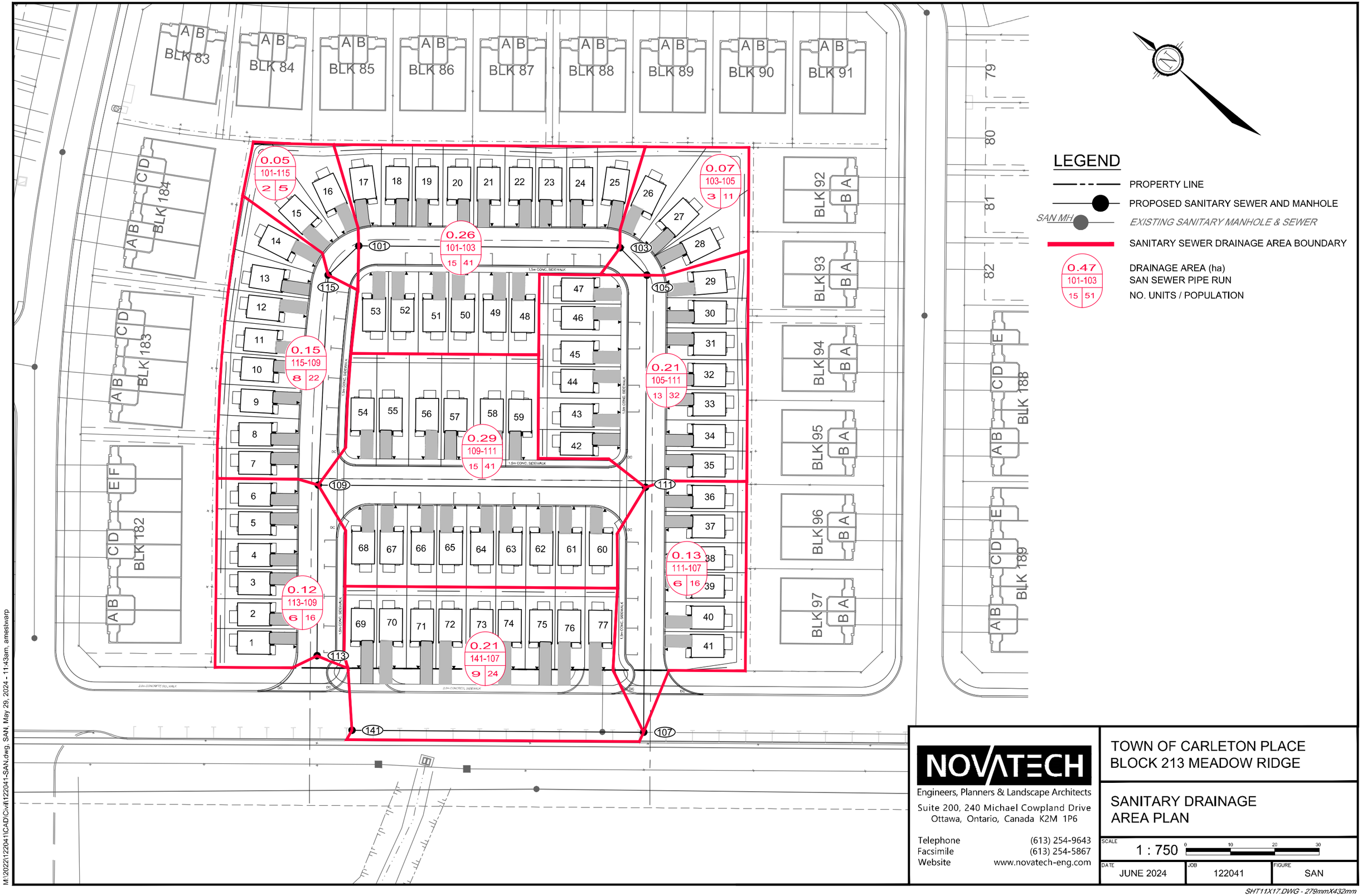
LOCATION							CUMULATIVE						PROPOSED SEWER								
STREET	FROM MH	TO MH	SINGLES	TOWNS	POPULATION (in 1000's)	AREA (ha.)	POPULATION (in 1000's)	AREA (ha.)	PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	Roughness Coef.	GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
Eastwood	209	321	1		0.0034	0.100	2.665	47.152	3.49	37.63	13.20	50.83	21.4	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.80
Eastwood	321	323	6		0.0204	0.360	2.685	47.512	3.48	37.89	13.30	51.19	40.8	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.80
Eastwood	323	325	6		0.0204	0.372	2.706	47.884	3.48	38.14	13.41	51.55	54.4	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.81
Wylie	123	125		23	0.0621	0.981	0.062	0.981	4.00	1.01	0.27	1.28	94.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.05
Wylie	125	127		4	0.0108	0.194	0.073	1.175	4.00	1.18	0.33	1.51	24.4	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Wylie	127	325			0.0000	0.055	0.073	1.230	4.00	1.18	0.34	1.53	37.7	200	201.2	DR 35	0.013	1.31	38.1	1.20	0.04
Eastwood	325	327	4		0.0136	0.247	2.792	49.361	3.47	39.23	13.82	53.06	31.6	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.83
Eastwood	327	329	3		0.0102	0.186	2.802	49.547	3.47	39.36	13.87	53.24	29.1	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.83
Reynolds	121	333		17	0.0459	0.815	0.046	0.815	4.00	0.74	0.23	0.97	70.9	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.04
Reynolds	333	329		5	0.0135	0.265	0.059	1.080	4.00	0.96	0.30	1.26	62.7	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.04
Eastwood	329	133	4		0.0136	0.357	2.875	50.984	3.46	40.28	14.28	54.55	92.7	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.85
Cummings	131	133		7	0.0189	0.470	0.019	0.470	4.00	0.31	0.13	0.44	106.0	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.02
Eastwood	133	109		13	0.0351	0.484	2.929	51.938	3.45	40.95	14.54	55.50	68.8	375	366.4	DR 35	0.013	0.22	77.3	0.73	0.72
Coor	137	105	4		0.0136	0.292	0.014	0.292	4.00	0.22	0.08	0.30	18.0	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.01
Coor	105	107	6		0.0204	0.512	0.034	0.804	4.00	0.55	0.23	0.78	30.8	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.03
Coor	107	109	7	1	0.0265	0.393	0.040	0.685	4.00	0.65	0.19	0.84	66.8	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.03
Hooper	109	111		14	0.0378	0.476	3.007	53.099	3.44	41.93	14.87	56.79	76.3	375	366.4	DR 35	0.013	0.22	77.3	0.73	0.73
Hooper	135	117			0.0000		0.000	0.000	4.00	0.00	0.00	71.66	24.1	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.89
Hooper	117	115		8	0.0216	0.433	0.022	0.433	4.00	0.35	0.12	72.13	76.7	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.90
Hooper	115	113		2	0.0054	0.089	0.027	0.522	4.00	0.44	0.15	72.24	13.4	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.90
Hooper	113	111		14	0.0378	0.457	0.065	0.979	4.00	1.05	0.27	72.98	64.6	300	299.4	DR 35	0.013	1.42	114.6	1.63	0.64
Pump Station	111	PS			0.0000		3.072	54.078	3.43	42.73	15.14	129.53	48.2	450	447.9	DR 35	0.013	0.40	178.0	1.13	0.73
						54.59															

Notes:

Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

Q(p) = (PxqxM/86,400), where P = Population (3.4 persons per single, 2.7 persons per town/semi)
q = Average per capita flow = 350 L/cap/day
M = Harmon Formula (maximum of 4.0)

Estimate for Phase 4 and Gibson Lands
Estimate for Lands West



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TOWN OF CARLETON PLACE
BLOCK 213 MEADOW RIDGE

SANITARY DRAINAGE AREA PLAN

SCALE: 1 : 750 (0, 10, 20, 30)

DATE: JUNE 2024 | JOB: 122041 | FIGURE: SAN

SHT11X17.DWG - 279mmX432mm

SANITARY SEWER DESIGN SHEET

Novatech Project #: 122041
Project Name: Block 213 - PEGASUS
Date Prepared: 2/25/2022
Date Revised: 9/20/2023
6/21/2024
Input By: Curtis Ferguson
Reviewed By: Anthony Mestwarp
Drawing Reference: 122041- SAN

Legend:
PROJECT SPECIFIC INFO
USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

DEMAND														DESIGN CAPACITY						
		RESIDENTIAL FLOW									EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN						
FROM MH	TO MH	SINGLE UNIT	Townhouse	PARK AREA (ha)	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
113	109	6	0	0.000	0.016	0.016	4.00	0.07	0.26	0.12	0.12	0.03	0.30	38.5	200 PVC	0.203	0.013	0.66	27.8	0.86	1.1%
101	115	2	0	0.000	0.005	0.005	4.00	0.02	0.09	0.05	0.05	0.01	0.10	9.5	200 PVC	0.203	0.013	0.65	27.6	0.85	0.4%
115	109	8	0	0.000	0.022	0.027	4.00	0.11	0.44	0.15	0.21	0.06	0.49	47.4	200 PVC	0.203	0.013	0.65	27.6	0.85	1.8%
109	111	15	0	0.000	0.041	0.084	4.00	0.34	1.36	0.29	0.61	0.17	1.53	73.8	200 PVC	0.203	0.013	0.50	24.2	0.75	6.3%
101	103	15	0	0.000	0.041	0.041	4.00	0.16	0.66	0.26	0.26	0.07	0.73	58.9	200 PVC	0.203	0.013	0.65	27.6	0.85	2.6%
103	105	3	0	0.000	0.008	0.049	4.00	0.20	0.79	0.07	0.33	0.09	0.88	7.0	200 PVC	0.203	0.013	0.50	24.2	0.75	3.6%
105	111	13	0	0.000	0.035	0.084	4.00	0.34	1.36	0.21	0.55	0.15	1.51	47.9	200 PVC	0.203	0.013	0.50	24.2	0.75	6.2%
111	107	6	0	0.000	0.016	0.184	4.00	0.74	2.98	0.13	1.29	0.36	3.34	55.2	200 PVC	0.203	0.013	0.50	24.2	0.75	13.8%
141	107	9	0	0.000	0.024	0.024	4.00	0.10	0.39	0.21	0.21	0.06	0.45	65.8	250 PVC	0.254	0.013	0.65	50.0	0.99	0.9%
		77	0	0.000	0.208	0.208	4.00	0.84	3.37	1.50	1.50	0.42	3.79		250 PVC	0.254	0.013	0.27	32.2	0.64	11.8%

Design Parameters:

1. Residential Flows
   -SINGLE UNIT 2.7 Person/ Unit
   -Town House 2.7 Person/ Unit
2. q Avg capita flow 350 L/per/day
3. M = Harmon Formula (maximum of 4.0)
4. K = 1.0
5. Extraneous F 0.28 L/sec/ha

CAPACITY EQUATION

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

Where : Q full = Capacity (L/s)

n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

SANITARY SEWER DESIGN SHEET

PEGASUS SUBDIVISION

DEVELOPER: OLYMPIA HOMES

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 108047
DESIGNED BY: LSC/AJL
CHECKED BY: GJM
DATE PREPARED: May. 2015
REVISED: Nov. 2015
REVISED: June. 2016
REVISED: March, 2017
REVISED: September, 2023

LOCATION							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER								
STREET	FROM MH	TO MH	SINGLES	TOWNS	POPULATION (in 1000's)	AREA (ha.)	POPULATION (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	Roughness Coef.	GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
Dunlop	301	303	2		0.0068	0.178	0.007	0.178	4.00	0.11	0.05	0.16	27.6	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.01
Peever	501	503		13	0.0351	0.836	0.035	0.836	4.00	0.57	0.23	0.80	57.4	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Peever	503	505		12	0.0324	0.445	0.068	1.281	4.00	1.09	0.36	1.45	51.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Peever	505	507		21	0.0567	0.718	0.124	1.999	4.00	2.01	0.56	2.57	86.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.11
Peever	507	303		6	0.0162	0.284	0.140	2.283	4.00	2.28	0.64	2.91	41.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.12
Dunlop	303	305	4		0.0136	0.269	0.161	2.730	4.00	2.61	0.76	3.37	48.9	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.11
Dunlop	305	307			0.0000	0.147	0.161	2.877	4.00	2.61	0.81	3.41	32.0	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.12
Borland	601	603		10	0.0270	0.607	0.027	0.607	4.00	0.44	0.17	0.61	46.9	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Borland	603	605	1	3	0.0115	0.186	0.039	0.793	4.00	0.62	0.22	0.85	35.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.04
Borland	605	607	4		0.0136	0.208	0.052	1.001	4.00	0.84	0.28	1.12	39.6	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.05
Borland	607	609	10		0.0340	0.442	0.086	1.443	4.00	1.40	0.40	1.80	58.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.08
Borland	609	307	6		0.0204	0.335	0.107	1.778	4.00	1.73	0.50	2.22	49.6	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.09
Dunlop	307	309			0.0000	0.282	0.267	4.937	4.00	4.33	1.38	5.71	48.9	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.19
Dunlop	309	311			0.0000	0.234	0.267	5.171	4.00	4.33	1.45	5.78	35.8	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.20
Hurdis	401	403		10	0.0270	0.608	0.027	0.608	4.00	0.44	0.17	0.61	61.2	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Leblanc	605	403		14	0.0378	0.578	0.076	0.578	4.00	1.24	0.16	1.40	87.1	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Hurdis	403	405	1	6	0.0196	0.283	0.123	1.469	4.00	1.99	0.41	2.40	48.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.10
Hurdis	405	407	4	1	0.0163	0.259	0.139	1.728	4.00	2.26	0.48	2.74	48.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.12
Antonakos	803	801		7	0.0189	0.304	0.019	0.304	4.00	0.31	0.09	0.39	64.6	200	201.2	DR 35	0.013	0.85	30.7	0.97	0.01
Antonakos	801	407		2	0.0054	0.112	0.024	0.416	4.00	0.39	0.12	0.51	28.5	200	201.2	DR 35	0.013	0.85	30.7	0.97	0.02
Hurdis	407	311	5	8	0.0386	0.519	0.202	2.663	4.00	3.27	0.75	4.02	75.3	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.17
Dunlop	311	313	5		0.0170	0.390	0.486	8.224	3.98	7.84	2.30	10.15	82.3	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.34
Pollock	901	313		14	0.0378	0.550	0.038	0.550	4.00	0.61	0.15	0.77	66.3	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.02
Dunlop	313	315	10		0.0340	0.608	0.558	9.382	3.95	8.93	2.63	11.56	81.7	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.39
Dunlop	315	211	10		0.0340	0.631	0.592	10.013	3.94	9.44	2.80	12.24	89.6	250	251.5	DR 35	0.013	0.24	29.6	0.60	0.41
Robertson	Stub	211			1.7600	31.700	1.760	31.700	3.63	25.87	8.88	34.74	43.9	375	366.4	DR 35	0.013	0.16	65.9	0.63	0.53
Robertson	211	209			0.0000	0.061	2.352	41.774	3.53	33.64	11.70	45.33	37.0	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.71
Blk 213	Stub	101		77	0.2079	1.490	0.208	1.490	4.00	3.37	0.42	3.79	14.0	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.11
Hooper	101	103			0.0000	0.143	0.208	1.633	4.00	3.37	0.46	3.83	70.7	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.13
Antonakos	803	805	3	9	0.0345	0.566	0.035	0.566	4.00	0.56	0.16	0.72	82.2	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Antonakos	805	807	1		0.0034	0.135	0.038	0.701	4.00	0.61	0.20	0.81	12.8	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.03
Antonakos	807	809	5	4	0.0278	0.503	0.066	1.204	4.00	1.06	0.34	1.40	68.3	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Antonakos	809	103		18	0.0486	0.804	0.114	2.008	4.00	1.85	0.56	2.41	94.5	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.10
Hooper	103	203			0.0000	0.000	0.322	3.641	4.00	5.22	1.02	6.24	81.3	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.21
Robertson	203	205	9	3	0.0387	0.767	0.361	4.408	4.00	5.85	1.23	7.08	89.1	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.23
Robertson	205	207	9		0.0306	0.504	0.392	4.912	4.00	6.34	1.38	7.72	59.9	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.26
Robertson	207	209	6		0.0204	0.366	0.412	5.278	4.00	6.67	1.48	8.15	65.9	250	251.5	DR 35	0.013	0.25	30.2	0.61	0.27

SANITARY SEWER DESIGN SHEET

PEGASUS SUBDIVISION

DEVELOPER: OLYMPIA HOMES

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 108047
DESIGNED BY: LSC/AJL
CHECKED BY: GJM
DATE PREPARED: May. 2015
REVISED: Nov. 2015
REVISED: June. 2016
REVISED: March, 2017
REVISED: September, 2023

LOCATION							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER								
STREET	FROM MH	TO MH	SINGLES	TOWNS	POPULATION (in 1000's)	AREA (ha.)	POPULATION (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	Roughness Coef.	GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
Eastwood	209	321	1		0.0034	0.100	2.768	47.152	3.47	38.92	13.20	52.13	21.4	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.82
Eastwood	321	323	6		0.0204	0.360	2.788	47.512	3.47	39.18	13.30	52.48	40.8	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.82
Eastwood	323	325	6		0.0204	0.372	2.808	47.884	3.47	39.44	13.41	52.84	54.4	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.83
Wylie	123	125		23	0.0621	0.981	0.062	0.981	4.00	1.01	0.27	1.28	94.7	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.05
Wylie	125	127		4	0.0108	0.194	0.073	1.175	4.00	1.18	0.33	1.51	24.4	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.06
Wylie	127	325			0.0000	0.055	0.073	1.230	4.00	1.18	0.34	1.53	37.7	200	201.2	DR 35	0.013	1.31	38.1	1.20	0.04
Eastwood	325	327	4		0.0136	0.247	2.895	49.361	3.46	40.52	13.82	54.34	31.6	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.85
Eastwood	327	329	3		0.0102	0.186	2.905	49.547	3.45	40.65	13.87	54.52	29.1	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.85
Reynolds	121	333		17	0.0459	0.815	0.046	0.815	4.00	0.74	0.23	0.97	70.9	200	201.2	DR 35	0.013	0.50	23.6	0.74	0.04
Reynolds	333	329		5	0.0135	0.265	0.059	1.080	4.00	0.96	0.30	1.26	62.7	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.04
Eastwood	329	133	4		0.0136	0.357	2.978	50.984	3.45	41.56	14.28	55.84	92.7	375	366.4	DR 35	0.013	0.15	63.8	0.61	0.87
Cummings	131	133		7	0.0189	0.470	0.019	0.470	4.00	0.31	0.13	0.44	106.0	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.02
Eastwood	133	109		13	0.0351	0.484	3.032	51.938	3.44	42.23	14.54	56.78	68.8	375	366.4	DR 35	0.013	0.22	77.3	0.73	0.73
Coor	137	105	4		0.0136	0.292	0.014	0.292	4.00	0.22	0.08	0.30	18.0	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.01
Coor	105	107	6		0.0204	0.512	0.034	0.804	4.00	0.55	0.23	0.78	30.8	200	201.2	DR 35	0.013	0.65	26.9	0.84	0.03
Coor	107	109	7	1	0.0265	0.393	0.040	0.685	4.00	0.65	0.19	0.84	66.8	200	201.2	DR 35	0.013	1.00	33.3	1.05	0.03
Hooper	109	111		14	0.0378	0.476	3.110	53.099	3.43	43.20	14.87	58.07	76.3	375	366.4	DR 35	0.013	0.22	77.3	0.73	0.75
Hooper	135	117			0.0000		0.000	0.000	4.00	0.00	0.00	71.66	24.1	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.89
Hooper	117	115		8	0.0216	0.433	0.022	0.433	4.00	0.35	0.12	72.13	76.7	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.90
Hooper	115	113		2	0.0054	0.089	0.027	0.522	4.00	0.44	0.15	72.24	13.4	300	299.4	DR 35	0.013	0.70	80.4	1.14	0.90
Hooper	113	111		14	0.0378	0.457	0.065	0.979	4.00	1.05	0.27	72.98	64.6	300	299.4	DR 35	0.013	1.42	114.6	1.63	0.64
Pump Station	111	PS			0.0000		3.175	54.078	3.42	44.00	15.14	130.80	48.2	450	447.9	DR 35	0.013	0.40	178.0	1.13	0.73
						54.59															

Notes:

Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

Q(p) = (PxqxM/86,400), where P = Population (3.4 persons per single, 2.7 persons per town/semi)
q = Average per capita flow = 350 L/cap/day
M = Harmon Formula (maximum of 4.0)

Estimate for Phase 4 and Gibson Lands
Estimate for Lands West

APPENDIX C
Storm Servicing Information

The existing facility provides no quantity control storage at this time above the water quality volume. The outlet consists of a pair of fully submerged circular culverts (800mm & 900mm CSP) with obverts corresponding to the approximate permanent pool elevation in the facility. The normal water level in the facility is effectively the same as the water level in the wetland, or approximately 126.40 m.

4.0 STORMWATER SERVICING CRITERIA

The following stormwater management criteria has been developed through discussions and correspondence with Mississippi Valley Conservation (MVC), Town of Carleton Place and the findings of the Environmental Impact Statement (EIS) completed by Muncaster Environmental Planning (July 18, 2013). The water quality and water quantity criteria will be used with respect to all upstream developments which are currently not providing any stormwater control and discharging into the Central Drain, which will be on-line with the proposed SWM facility.

Storm servicing for the Carleton Place Subdivision will be designed using a dual drainage approach. The minor (storm sewer) and major (overland flow) systems will convey all runoff from the proposed development to an end-of-pipe SWM facility.

4.1 Water Quantity

- Control post-development flows to pre-development levels for storms up to and including the 1:100 year event.

4.2 Water Quality

- Implement lot level and conveyance Best Management Practices to promote infiltration and treatment of storm runoff.
- Provide water quality protection, e.g. long-term TSS removal, for **all** lands tributary to the proposed SWM facility. The required water quality treatment volume will be calculated as follows:
    - Provide extended detention storage corresponding to 40m^3/ha for the overall tributary drainage area to the proposed SWM facility.
    - Provide permanent pool storage corresponding to a *Normal* (70% TSS removal) level of water quality protection for the proposed Carleton Place subdivision and upstream areas tributary to the Central Drain with no current water quality controls, e.g. Wal - Mart (WP), Canadian Tire and Independent Grocery (CD-2).
    - Provide permanent pool storage corresponding to a minimum basic level (60% TSS removal) of water quality treatment for upstream areas entering the Central Drain which will provide its own on-site water quality control when the lands develop. This approach will account for the mixing of treated and untreated runoff entering the SWM facility from the Central Drain and provides an additional level of water quality treatment.

4.3 Storm Drainage/ Conveyance

- Storm sewers are to be designed to convey the 1:5 year post-development peak flow for the proposed development.

- Overland flows are to be confined within the right-of-ways and/or defined drainage easements for all storms up to and including the 1:100 year event.
- ICD flow rates for roadways and rear yards are to be calculated for each drainage area to ensure that the following stormwater management (SWM) objectives are satisfied:
    - No surface ponding in road sags and rear yards following a 5-year rainfall event (some ponding is permissible during the storm peak).
    - Maximum 100 year flow depths and elevations on streets and rear yards shall not exceed 300 mm and shall be confined to the road right-of-way.
    - The 100-year hydraulic grade line within the storm sewers shall not be within 300 mm (vertical) to adjacent building underside of footing.
    - Major system overland flow routes will be established so as to not cause any flooding threat to residents.

4.4 Storm Sewer Design (Minor System)

The proposed storm sewers will be designed using the Rational Method to convey peak flows associated with the 1:5 year event. The design criteria used in sizing the storm sewers are summarized in **Table 4**.

Table 4: Storm Sewer Design Parameters

Parameter	Design Criteria
Local and Collector Roads	5 Year Return Period
Storm Sewer Design	Rational Method/Modeling
IDF Rainfall Data	Ottawa
Initial Time of Concentration (T_c)	10 minutes (roads and rear yards)
Minimum : Maximum Velocity	0.8 m/s : 3.0 m/s
Minimum Diameter	250 mm

4.5 Overland Flow Path (Major System)

The right-of-ways will be designed to convey runoff from storms that exceed the minor system capacity. The road profiles will be graded to ensure that the 100-year peak overland flows are confined within the right-of-way at a maximum flow depth of 0.30 m (static ponding + cascading flow). The major system will be designed to ensure that the product of velocity and depth does not exceed 0.60 during the 100-year event.

Storm runoff that exceeds the capacity of the minor system will be stored within road sags. Runoff that exceeds the capacity of the road sags will be conveyed overland along defined major system flow routes towards the proposed SWM facility.

4.6 Fish Habitat and Cattail Area Assessment

Mississippi Valley Conservation (MVC) has classified Lavallee Creek as a “warm water stream fish habitat”. MVC has also identified a cattail region in the southeast portion of the site (currently unclassified by MNR) and the Hooper Drain as potential fish habitat. Accordingly, as part of the Environmental Impact Statement (EIS) completed by Muncaster Environmental

Planning (July 2013) an assessment of aquatic habitat and the wetland cattail area was undertaken. Through subsequent correspondence with MVC (attached in Appendix B), the following recommendations were put forward:

- The Hooper Drain was constructed as a municipal stormwater outlet for the drainage area north of Cavanagh Road. The drain serves to convey controlled stormwater runoff from a storage facility north of Cavanagh Road and it also provides extended detention for the north area. The drain flows south and converges with the Central Drain and continues easterly towards the Lavallee Creek. Although not a natural water course, a minimum set-back of 15 meters will be provided between the drain and the building structures which will satisfy the requirements of the building code. The drain is centred within a 20 meter corridor and the building structures are set back 7.5 meters from the edge of this corridor.
- A 3.0 m riparian buffer will be provided along the west perimeter of the drain. This will be achieved by maintaining the existing trees along the top of the west bank and new plantings in other areas.
- A site visit conducted in May 2015 found that the existing side slopes of the drain are well established and well vegetated with no signs of erosion. No works are planned on altering these slopes.
- Rock check dams 300 mm in height will be placed at three locations in the drain beginning 200 meter downstream of Cavanagh Road. These check dams will provide further opportunities to achieve TSS removal.
- The existing cattail at the west end of the marsh is dry and was found to have limited fish community. This area of the marsh will be developed and compensation will be provided as follows:
    - A compensating area of loss marsh will be provided for in the fringe area of the stormwater management pond. This is shown on Drawing SWMF2.
    - A shallow and meandering channel will be provided in the outlet ditch to Lavallee Creek along with areas of deeper refuge pools.
    - Sunning logs will be dispersed along the channel and within the marsh area to provided sunning opportunities for turtles.

5.0 STORMWATER MANAGEMENT STRATEGY

Phases 1 – 3 (Stormwater Management Facility)

The existing Lavalee Creek SWM Facility will be expanded to provide water quality and quantity control for all upstream areas tributary to the North and Central Drains, including Phases 1 – 3 of the proposed subdivision. The required storage has been calculated as follows:

- Provide quality control storage corresponding to a *Normal* level of treatment *(70% TSS removal)* for Phase 1 *(7.4 ha)*, Phase 2 *(8.2 ha) and Phase 3 (10.5 ha*) of the proposed subdivision.
- Provide quality control storage corresponding to a *Normal* level of treatment *(70% TSS removal)* for the existing Wal-Mart, Canadian Tire and Independent Grocer upstream of the site and tributary to the Central Drain, which currently do not provide onsite treatment.
- Provide quality control storage corresponding to a *minimum basic* level of treatment *(60% TSS removal)* for areas providing water quality treatment upstream of the proposed facility and adjacent to the Central Drain. This includes existing development

with water quality control already in place, and future developments where water quality treatment is proposed.

- Provide quantity control storage to attenuate post-development runoff to pre-development levels for all storms up to and including the 100-year event.

Phase 4 (Future SWM Facility)

A separate SWM facility will be required to provide water quality and quantity control for Phase 4 *(19.32 ha).* This facility will be designed as part of the draft plan application for Phase 4.

Hooper Drain

The Hooper Drain will remain offline from the proposed SWM facility and be re-routed around the pond block to the existing wetland.

North Drain

The North Drain will be captured by a proposed 1090 x 1725mm elliptical storm sewer at the upstream limit of the proposed subdivision and be conveyed south, following the western boundary of the subdivision, to the Central Drain. See Drawing 108047-GP3.

Central Drain

The Central Drain will be realigned through the site within a designated 20 meter easement beginning at the southwest corner of the site downstream of the existing Canadian Tire and Independent Grocer. The Lavallee Creek SWM facility will remain on-line with the Central Drain.

6.0 HYDROLOGIC MODELING

6.1 Model Development

The SWMHYMO hydrologic model was used to evaluate both pre- and post-development flows for both the North and Central Drains, and to determine the amount of storage required for the expanded Lavallee Creek SWM Facility to treat and control post-development runoff from the proposed Carleton Place Subdivision.

Peak flows in the North Drain west of McNeely Avenue were provided by McIntosh Perry, who are currently designing a SWM facility to provide both quality and quantity control for the drainage areas upstream of McNeely Avenue.

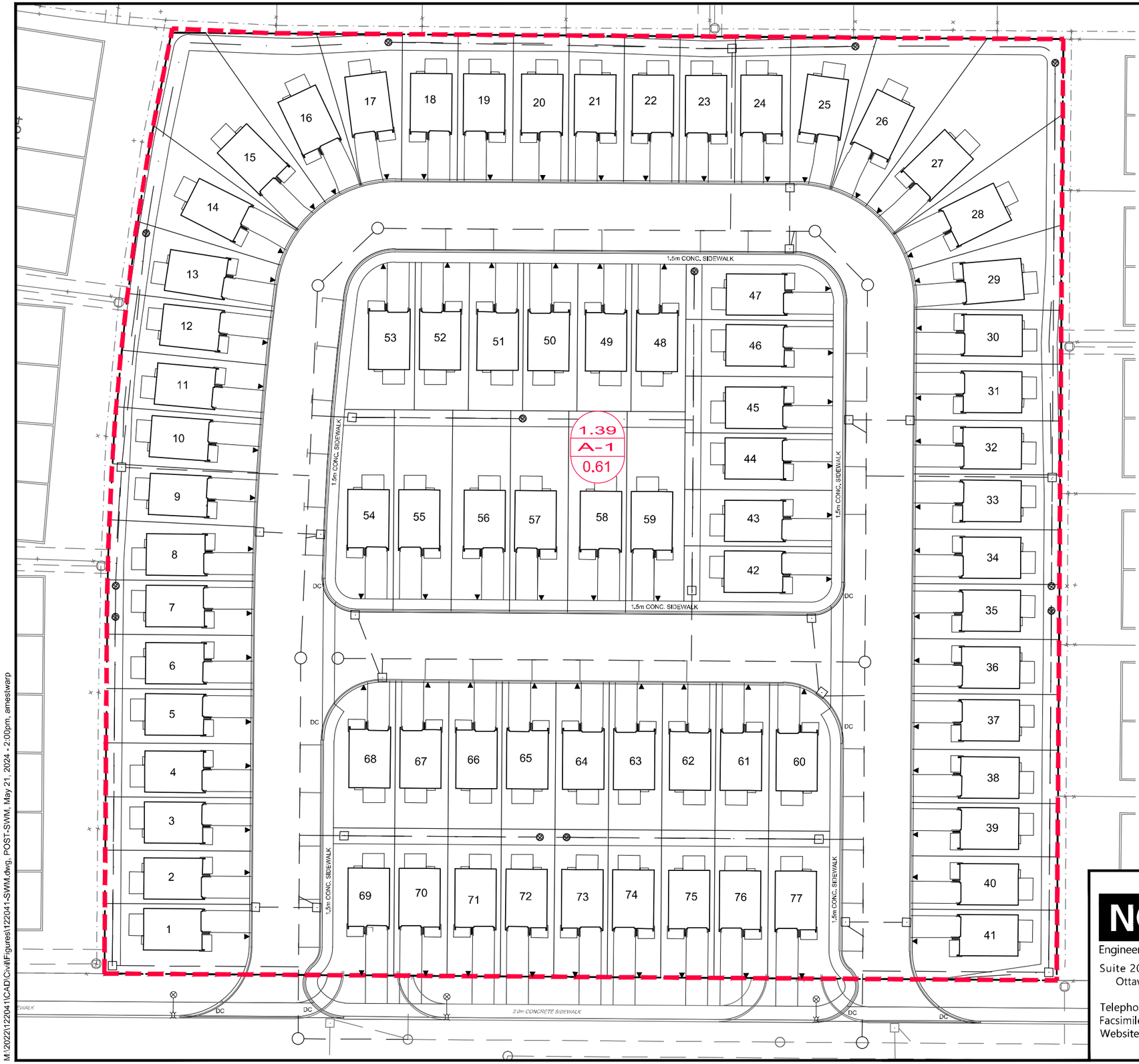
6.1.1 Modeling Files

SWMHYMO modeling files (pre- and post-development) are provided in **Appendix D**. Digital copies of the modeling files are provided on the enclosed CD.

6.1.2 Design Storms

The hydrologic analysis used the storm distributions provided below, which is consistent with the design events used in both the Hooper Drain Report and the Lavallee Creek SWMF Report.

- 4 hour Chicago Distribution
- 12 hour SCS Type II Distribution



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN
- STM MH — *EXISTING STORM MANHOLE & SEWER*
- CB 1 — *EXISTING CATCHBASIN*
- STORM SEWER DRAINAGE AREA BOUNDARY
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- PROPOSED SERVICING TRIANGLE

NOVATECH
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BLOCK 213 MEADOW RIDGE
TOWN OF CARLETON PLACE

POST STORMWATER MANAGEMENT PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE	JOB	FIGURE
JUNE 2024	122041	SWM

M:\2022\122041\CAD\Civil\Figures\122041-SWM.dwg, POST-SWM, May 21, 2024 - 2:00pm, ameslwarp

SHT11X17.DWG - 279mmX432mm

Project: Pegasus Subdivision (108047)
Location: Carleton Place, Ontario
Client: Olympia Homes

DATE: May 2015
Rev: Dec 2015
Rev: June 2016
Rev. March 2017

NOVATECH
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Storm Sewer Design Sheet

LOCATION								FLOW					PROPOSED SEWER								
STREET	FROM	TO	AREA ID	R= 0.45	R= 0.55	R= 0.60	R= 0.65	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	NOMINAL SIZE (mm)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
Peever	MH 502	MH 504	A1			0.497		0.83	0.83	10.00	104.19	86.38	375	381.0	0.25	51.2	91.55	0.80	1.06	5.17	0.94
Peever	MH 504	MH 506	A2-A4	0.293		0.408		1.05	1.88	11.06	98.89	185.53	525	533.4	0.20	58.6	200.85	0.90	1.09	15.32	0.92
Peever	MH 506	MH 508	A5, A6	0.122		0.303		0.66	2.53	12.15	94.05	238.34	600	609.6	0.16	85.4	256.48	0.88	1.62	18.14	0.93
Peever	MH 508	MH 304	A7			0.143		0.24	2.77	13.77	87.74	243.28	600	609.6	0.16	41.6	256.48	0.88	0.79	13.20	0.95
Dunlop	MH 302	MH 304	A7A	0.036				0.05	0.05	10.00	104.19	4.69	250	254.0	0.65	36.0	50.07	0.99	0.61	45.38	0.09
Dunlop	MH 304	MH 306	A8, A9	0.125	0.320			0.65	3.46	14.56	85.00	294.37	675	685.8	0.20	49.1	392.57	1.06	0.77	98.20	0.75
Dunlop	MH 306	MH 308						0.00	3.46	15.33	82.50	285.71	675	685.8	0.20	30.1	392.57	1.06	0.47	106.86	0.73
Borland	MH 602	MH 604	A11, A12	0.234		0.451		1.05	1.05	10.00	104.19	108.88	450	457.2	0.23	48.1	142.79	0.87	0.92	33.91	0.76
Borland	MH 604	MH 606	A13	0.207				0.26	1.30	10.92	99.56	129.82	450	457.2	0.23	37.9	142.79	0.87	0.73	12.97	0.91
Borland	MH 606	MH 608						0.00	1.30	11.65	96.22	125.46	450	457.2	0.23	34.3	142.79	0.87	0.66	17.32	0.88
Borland	MH 608	MH 610	A14, A15	0.194	0.324			0.74	2.04	12.31	93.40	190.73	525	533.4	0.23	60.2	215.39	0.96	1.04	24.65	0.89
Borland	MH 610	MH 308						0.00	2.04	13.35	89.30	182.35	525	533.4	0.23	52.3	215.39	0.96	0.91	33.03	0.85
Dunlop	MH 308	MH 310	A16, A17, A17A	0.077	0.109	0.128		0.48	5.98	15.81	81.04	484.78	825	838.2	0.20	50.1	670.38	1.21	0.69	185.60	0.72
Dunlop	MH 310	MH 312						0.00	5.98	16.49	79.02	472.70	825	838.2	0.20	36.2	670.38	1.21	0.50	197.68	0.71
Hurdis	MH 402	MH 404	A20, A21, A21A	0.103		0.499		0.96	0.96	10.00	104.19	100.15	450	457.2	0.20	73.6	133.15	0.81	1.51	33.00	0.75
Leblanc	MH 606	MH 404	A22-A25	0.363		0.469		1.24	1.24	10.00	104.19	128.82	450	457.2	0.40	87.4	188.30	1.15	1.27	59.48	0.68
Hurdis	MH 404	MH 406	A26-A28	0.055		0.499		0.90	3.10	11.51	96.82	300.03	675	685.8	0.15	45.3	339.98	0.92	0.82	39.95	0.88
Hurdis	MH 406	MH 408	A29, A30	0.233				0.29	3.39	12.34	93.29	316.27	675	685.8	0.16	52.1	351.13	0.95	0.91	34.86	0.90
Antonakos	MH 804	MH 802						0.00	0.00	10.00	104.19	0.00	250	254.0	0.85	59.1	57.25	1.13	0.87	57.25	0.00
Antonakos	MH 802	MH 408						0.00	0.00	10.87	99.80	0.00	250	254.0	0.85	33.8	57.25	1.13	0.50	57.25	0.00
Hurdis	MH 408	MH 312	A31-A33	0.129		0.449		0.91	4.30	13.25	89.67	385.65	675	685.8	0.23	75.0	420.99	1.14	1.10	35.34	0.92
Dunlop	MH 312	MH 314	A34-A36	0.191	0.175	0.353		1.10	11.38	16.99	77.63	883.27	1050	1066.8	0.20	82.3	1275.31	1.43	0.96	392.03	0.69
Pollock	MH 902	MH 314	A38			0.178		0.30	0.30	10.00	104.19	30.94	250	254.0	0.75	69.8	53.78	1.06	1.10	22.85	0.58
Dunlop	MH 314	MH 316	A39-A42	0.317	0.440	0.309		1.58	13.26	17.95	75.09	995.63	1050	1066.8	0.20	120.0	1275.31	1.43	1.40	279.67	0.78
Dunlop	MH 316	MH 318	A45		0.081			0.12	13.38	19.36	71.70	959.52	1050	1066.8	0.20	68.6	1275.31	1.43	0.80	315.78	0.75
Park	MH 346	H1						0.00	13.38	20.16	69.90	935.55	1050	1066.8	0.25	58.8	1425.83	1.59	0.61	490.28	0.66
Antonakos	MH 804	MH 806	A47-A49	0.100		0.472		0.91	0.91	10.00	104.19	95.07	450	457.2	0.20	86.2	133.15	0.81	1.77	38.09	0.71
Antonakos	MH 806	MH 808						0.00	0.91	11.77	95.68	87.29	450	457.2	0.24	12.5	145.86	0.89	0.23	58.57	0.60
Antonakos	MH 808	MH 810	A51, A52	0.066		0.338		0.65	1.56	12.01	94.66	147.55	525	533.4	0.16	68.3	179.64	0.80	1.42	32.09	0.82
Antonakos	MH 810	MH 812	A53	0.105				0.13	1.69	13.43	89.02	150.45	525	533.4	0.16	90.7	179.64	0.80	1.88	29.20	0.84
Hooper	CAP	MH 104	A55				1.393	2.52	2.52	10.00	104.19	262.27	675	685.8	0.17	8.0	361.93	0.98	0.14	99.66	0.72

LOCATION								FLOW					PROPOSED SEWER								
STREET	FROM	TO	AREA ID	R= 0.45	R= 0.55	R= 0.60	R= 0.65	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	NOMINAL SIZE (mm)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
Hooper	MH 104	MH 108	A54			0.061		0.10	2.62	10.14	103.48	271.00	750	762.0	0.17	51.7	479.35	1.05	0.82	208.35	0.57
Hooper	MH 108	MH 812	A56-A58	0.073		0.349		0.67	3.29	10.96	99.40	327.25	750	762.0	0.17	76.5	479.35	1.05	1.21	152.10	0.68
Hooper	MH 812	MH 106	A59, A60	0.086		0.281		0.58	5.56	15.31	82.58	459.02	900	914.4	0.20	80.0	845.45	1.29	1.04	386.43	0.54
Robertson	MH 106	MH 206	A62-A65	0.327	0.515	0.167		1.48	7.03	16.34	79.45	558.85	975	990.6	0.20	81.0	1046.62	1.36	1.00	487.77	0.53
Robertson	MH 206	MH 208	A66, A67	0.370				0.46	7.50	17.34	76.69	574.92	975	990.6	0.20	63.5	1046.62	1.36	0.78	471.70	0.55
Robertson	MH 208	MH 210	A68-A70	0.352	0.498			1.20	8.70	18.12	74.67	649.50	975	990.6	0.15	66.4	906.40	1.17	0.94	256.89	0.72
Eastwood	MH 210	MH 322	A71		0.151			0.23	8.93	19.06	72.38	646.32	1050	1066.8	0.25	18.2	1425.83	1.59	0.19	779.52	0.45
Eastwood	MH 322	MH 324	A72, A88	0.263				0.33	9.26	19.25	71.94	666.02	1050	1066.8	0.25	41.4	1425.83	1.59	0.43	759.81	0.47
Eastwood	MH 324	MH 326	A73, A89	0.083	0.353			0.64	9.90	19.68	70.95	702.55	1050	1066.8	0.25	54.0	1425.83	1.59	0.56	723.28	0.49
Wylie	MH 124	MH 126	A74, 75			0.702		1.17	1.17	10.00	104.19	122.00	450	457.2	0.24	107.5	145.86	0.89	2.02	23.86	0.84
Wylie	MH 126	MH 128	A76	0.064				0.08	1.25	12.02	94.62	118.36	450	457.2	0.22	24.9	139.65	0.85	0.49	21.28	0.85
Wylie	MH 128	MH 326						0.00	1.25	12.51	92.58	115.82	450	457.2	0.22	38.7	139.65	0.85	0.76	23.83	0.83
Eastwood	MH 326	MH 328	A77, A90	0.131		0.178		0.46	11.61	20.25	69.71	809.57	1050	1066.8	0.25	31.5	1425.83	1.59	0.33	616.26	0.57
Eastwood	MH 328	MH 330	A78		0.273			0.42	12.03	20.58	69.01	830.21	1050	1066.8	0.25	27.7	1425.83	1.59	0.29	595.62	0.58
Reynolds	MH 110	MH 334	A79-A81	0.132		0.584		1.14	1.14	10.00	104.19	118.70	450	457.2	0.25	85.4	148.87	0.91	1.57	30.17	0.80
Reynolds	MH 334	MH 330	A82- A85	0.322		0.086		0.55	1.69	11.57	96.57	162.76	525	533.4	0.20	62.3	200.85	0.90	1.16	38.08	0.81
Eastwood	MH 330	MH 332	A86		0.229			0.35	14.07	20.87	68.40	962.17	1050	1066.8	0.25	63.6	1425.83	1.59	0.67	463.66	0.67
Eastwood	MH 332	H2						0.00	14.07	21.53	67.05	943.25	1050	1066.8	0.31	16.2	1587.74	1.77	0.15	644.50	0.59
Cummings	MH 336	MH 338	A93-A95	0.207		0.579		1.22	1.22	10.00	104.19	127.61	525	533.4	0.15	118.9	173.94	0.78	2.55	46.33	0.73
Hooper	MH 142	MH 140	A91A, A91			0.320		0.53	0.53	10.00	104.19	55.61	375	381.0	0.30	80.3	100.29	0.88	1.52	44.67	0.55
Hooper	MH 140	MH 138						0.00	0.53	11.52	96.78	51.66	450	457.2	0.20	13.7	133.15	0.81	0.28	81.49	0.39
Hooper	MH 138	MH 136	A92, A97	0.262		0.225		0.70	1.24	11.80	95.54	118.16	450	457.2	0.20	71.2	133.15	0.81	1.46	14.99	0.89
Hooper	MH 136	MH 134	A96, A98, A99	0.310		0.444		1.13	2.37	13.27	89.60	211.92	525	533.4	0.25	73.0	224.55	1.00	1.21	12.63	0.94
Coor	MH 144	MH 130						0.00	0.00	10.00	104.19	0.00	375	381.0	0.50	22.2	129.47	1.13	0.33	129.47	0.00
Coor	MH 130	MH 132	A100, A101		0.221			0.34	0.34	10.33	102.50	34.64	375	381.0	0.55	31.1	135.79	1.19	0.44	101.15	0.26
Coor	MH 132	MH 134	A102		0.309			0.47	0.47	10.33	102.50	48.43	375	381.0	0.45	66.5	122.82	1.08	1.03	74.40	0.39
Eastwood	MH 134	MH 338	A103			0.260		0.43	3.27	14.48	85.27	278.95	675	685.8	0.24	71.8	430.04	1.16	1.03	151.09	0.65
Eastwood	MH 338	H3						0.00	4.50	15.51	81.94	368.43	750	762.0	0.27	30.1	604.10	1.32	0.38	235.67	0.61

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/h)

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.80 m/sec.

DATE: 09/03/2017
PREPARED BY: NOVATECH

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