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560 Hazeldean Road
Double Deck Subdivision

Concept Servicing Report

Assessment of Adequacy of Public Services and Stormwater Site Management

CONCEPT SERVICING REPORT
ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES AND STORMWATER SITE MANAGEMENT

560 HAZELDEAN ROAD
DOUBLE DECK SUBDIVISION

Prepared By:

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

August 15, 2025

Novatech File: 100057
Ref: R-2025-70

NOVATECH
Engineers, Planners & Landscape Architects

August 15, 2025

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: **John Bernier, MCIP, RPP – Planner II**

Reference: **Concept Servicing Report**
560 Hazeldean Road
Double Deck Subdivision
Our File No.: 100057

Enclosed is the Concept Servicing Report for the Double Deck Subdivision at 560 Hazeldean Road. The report addresses development servicing for the subject property.

If you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH



Lucas Wilson, P.Eng.
Project Engineer

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1.0 INTRODUCTION

1.1 Background

Novatech has been retained by Double Deck Regional Inc. (c/o Regional Group) to prepare this Conceptual Servicing Report in support of applications for Plan of Subdivision and Zoning By-law Admentment for their property municipally known as 560 Hazeldean Road. The Site is located within the community of Stittsville with frontage on Hazeldean Road. **Figure 1-1** shows the location of the Site currently operating as an instructional driving range facility. The Site will be developed with a mix of single detached homes (50 units) and townhouse blocks (48 units) with a future apartment block (under separate Site Plan Control application) fronting on Hazeldean Road.



Figure 1-1: Key Plan

The proposed Site is approximately 8.74 ha (5.95 ha developed) and will be bordered by Hazeldean Road to the North, the Carp River to the east, Bradley Commons Subdivision (currently under construction) to the west (Richcraft), and a stormwater management facility (Pond 2) to the south. **Figure 1-2** shows the proposed Concept Plan.

This Concept Servicing Report provides information on the considerations and approach by which Novatech has analyzed the existing site information for the Site, and details how the development lands can be adequately serviced while meeting the City requirements and all other pertinent regulations. This study builds upon works completed for the Fernbank Community Design Plan **[1]** prepared by Walker, Nott, Dragicevic Associates Limited, the Fernbank Master Servicing Study **[2]** prepared by Novatech, the Fernbank Environmental Management Plan prepared by Novatech **[3]** and the Fernbank Community SWM Facility – Pond 2 Design Report prepared by Novatech **[4]**.

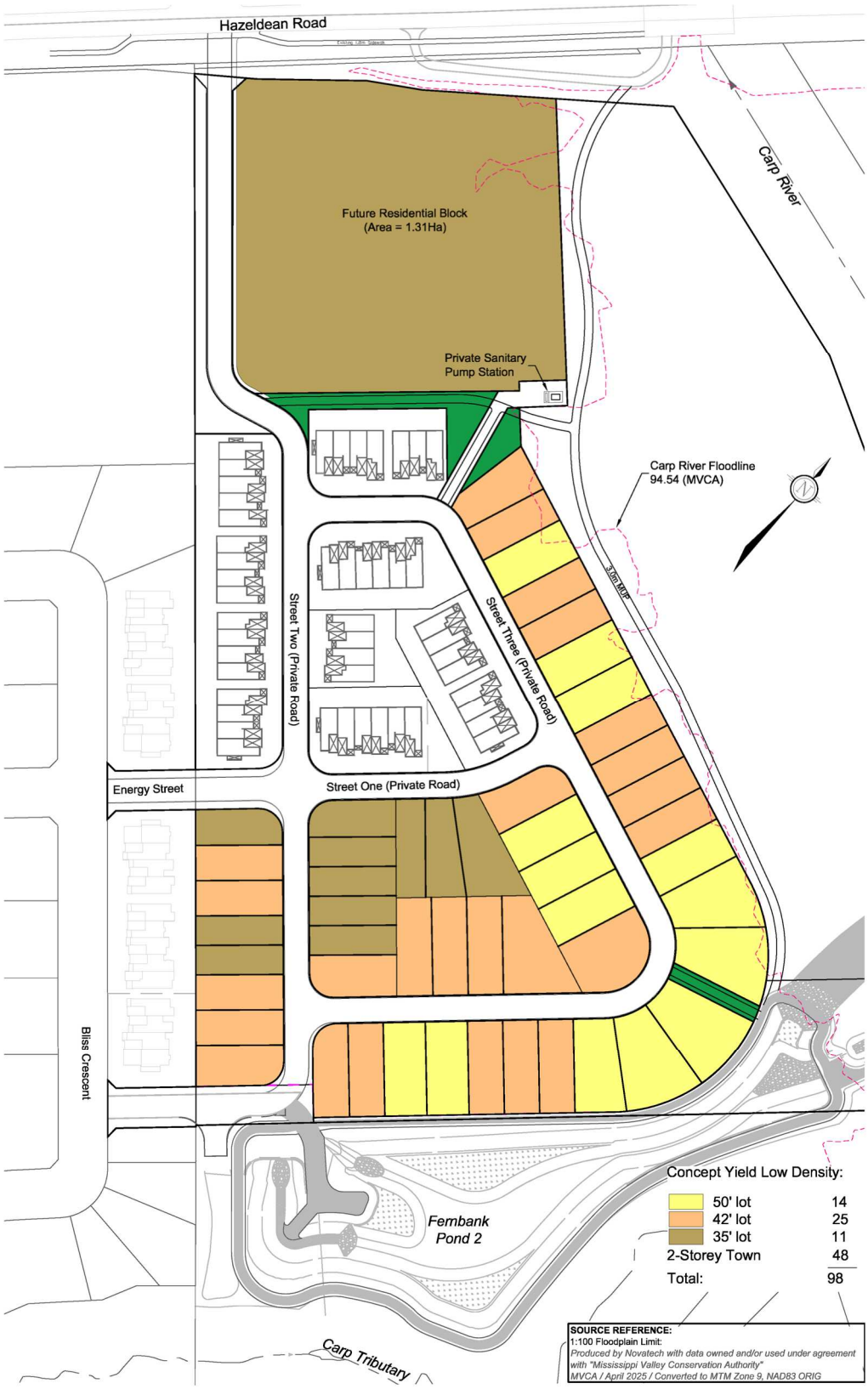


Figure 1-2: Concept Plan

2.0 TOPOGRAPHY AND GRADING

2.1 Existing Conditions

The Site generally slopes to the northeast towards the Carp River at approximately 1.0%. The maximum grade of approximately 97.0 metres at the southwest corner of the property boundary, and a minimum elevation of approximately 94.0 metres in the northeast corner give a total elevation differential of approximately 3.0 metres across the entire site.

Paterson Group Inc. conducted a geotechnical investigation **[5]** in support of the proposed development.

The field investigation was performed May 29th and 30th, 2025 and consisted of five (5) boreholes spaced across the site to a maximum depth of 12.7 m below the existing ground surface. Paterson conducted field investigation at the site in December 2020 consisting of eight (8) boreholes advanced to a maximum depth of 6.6 m and in May 2018 consisting of four (4) boreholes advanced to a maximum depth of 6.4 m. The principle findings of these investigations determined that the soil profile consists of topsoil or asphalt underlain by fill and a clayey silt to silty clay deposit. Practical refusal to auguring was encountered at a depth of 7.3 m to 11.6 m at three (3) borehole locations. Based on available geological mapping, the bedrock in the majority of the site is part of the Verulam formation, which consists of interbedded limestone and shale. The southwest portion of the site consists of limestone interbedded with dolomite of the Gull River formation. Long-term groundwater table can be expected at approximately 0.5 m to 1.5 m below ground surface. From a geotechnical perspective, it was noted that the site was suitable for the proposed development.

2.2 Proposed Conditions

Grade raise constraints are shown in **Figure 2-1** below and are described as Areas 1, 2 and 3.

Existing elevations will be met along Hazeldean Road, the west property boundary (Bradley Commons), the east property boundary shared with the Carp River and Pond 2 to the south. A preliminary grading plan is shown in **Appendix C**.



Figure 2-1: Grade Raise Constraints

3.0 WATER DISTRIBUTION

3.1 Existing Conditions

A 200mm watermain is located west of the Site within Bliss Crescent, located within the adjacent Bradley Commons subdivision. Two 200mm stubs were installed as part of the subdivision works, one located at the connection to Energy Street, and another located at the southwest corner by Pond 2.

3.2 Proposed Conditions

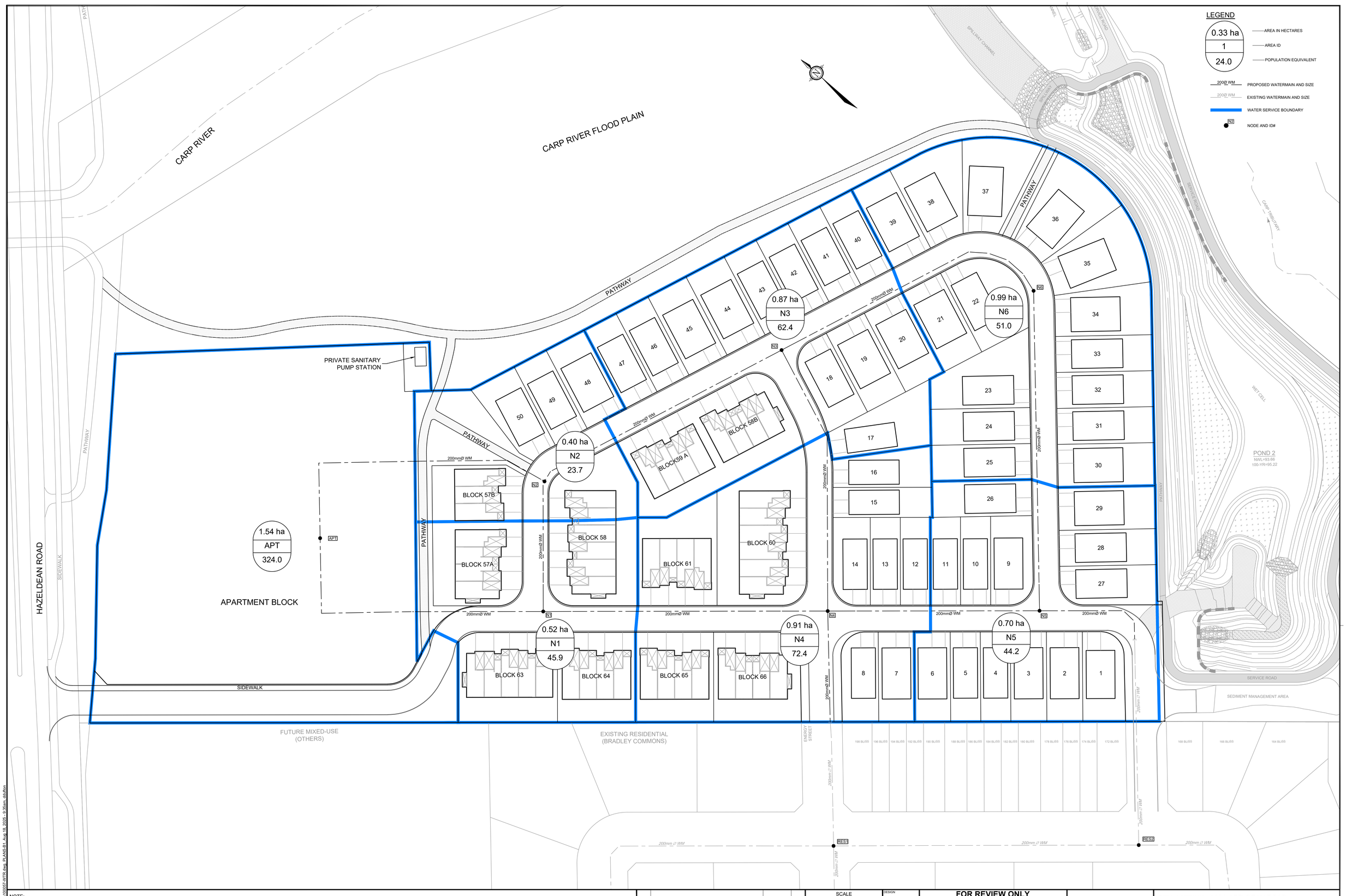
The Site will be connected to the existing watermain network by way of two separate feed points. Connections are proposed to the existing 200mm diameter stubs located off Bliss Crescent in the adjacent subdivision to the west. The conceptual layout of the proposed watermain is shown on the Water Distribution Plan (**100057-WTR**). Refer to the Typical Roadway Cross-sections located in the General Plan of Services (**100057-GP**) in **Appendix C** for the proposed locations of the watermains within the private roadways.

The watermain boundary conditions below were obtained from the City of Ottawa and have been included in **Appendix A**:

Boundary Condition Connection 1 (Energy Street):
Max HGL = 162.1m
Peak Hour = 155.9m
Max Day + FF of 167 L/s = 151.9m
Max Day + FF of 233 L/s = 147.0m
Max Day + FF of 250 L/s = 145.6m
Max Day + FF of 267 L/s = 144.1m

Boundary Condition Connection 2 (Bliss Crescent):
Max HGL = 162.1m
Peak Hour = 155.9m
Max Day + FF of 167 L/s = 148.6m
Max Day + FF of 233 L/s = 141.0m
Max Day + FF of 250 L/s = 138.8m
Max Day + FF of 267 L/s = 136.4m

City of Ottawa watermain design criteria are outlined in **Table 3.1**.



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

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CITY of OTTAWA - 560 HAZELDEAN ROAD
DOUBLE DECK SUBDIVISION

WATER DISTRIBUTION PLAN

PROJECT No. 100057
REV REV # 1
DRAWING No. 100057-WTR

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Table 3.1: Watermain Design Criteria

Design Parameter	Design Criteria
Single Family Home Population	3.4 people/unit
Townhouse Population	2.7 people/unit
Apartment Block Population	1.8 people/unit (Assumed 180 units)
Residential Demand	280 L/c/d
Maximum Day Demand	2.5 x Average Day
Peak Hour Demand	2.2 x Maximum Day
Fire Demand	167 L/s, 250 L/s, 267 L/s
Maximum Pressure	690 kPa (100psi) unoccupied areas
Maximum Pressure	552 kPa (80psi) occupied areas outside of ROW
Minimum Pressure	275 kPa (40 psi) except during fire flow
Minimum Pressure (Fire)	140 kPa (20 psi)

In accordance with the City of Ottawa's Technical Bulletin, a fire flow of 167L/s was used for residential dwelling types that met the bulletins requirements (singles, 3 and 4 unit Townhomes). A fire flow of 267 L/s was used for the 6-unit townhomes while a fire flow of 250L/s was used for the future apartment block.

The proposed watermain was modeled using EPANET 2. The EPANET model layout is shown in drawing **100057-WTR**.

A summary of the model results is shown below in **Table 3.2**, **Table 3.3** and **Table 3.4**. Full model results are included in **Appendix A**.

Table 3.2: Summary of Hydraulic Model Results - Maximum Day + Fire Flow

Operating Condition	Minimum Pressure
252.62 L/s at APT	140.28 kPa (APT) (20.35 psi)
267.37 L/s at N1	173.34 kPa (N1) (25.14 psi)
267.19 L/s at N2	171.09 kPa (N2) (24.81 psi)
167.51 L/s at N3	441.84 kPa (N3) (64.08 psi)
267.59 L/s at N4	303.13 kPa (APT) (43.97 psi)
167.36 L/s at N5	465.48 kPa (N5) (67.51 psi)
167.41 L/s at N6	421.73 kPa (N6) (61.17 psi)

Table 3.3: Summary of Hydraulic Model Results - Peak Hour Demand

Operating Condition	Maximum Pressure	Minimum Pressure
11.115 L/s through system	582.13 kPa (APT) (84.43 psi)	571.73 kPa (N1) (82.92 psi)

Table 3.4: Summary of Hydraulic Model Results – Maximum Pressure Check

Operating Condition	Maximum Pressure	Minimum Pressure
2.021 L/s through system	643.54 kPa (APT) (93.34 psi)	633.04 kPa (N1) (91.81 psi)

Water modelling shows the planned network will meet minimum system pressure requirements during both the fire flow and peak hour design conditions. The maximum pressure check shows modelled system pressures are above 552 kPa (80 psi) throughout the subdivision, therefore pressure reducing valves will be required on all dwellings, installed immediately downstream of the isolation valve in the home, located downstream of the meter so it is owner maintained.

4.0 SANITARY SEWERS

4.1 Existing Conditions

An existing 250mm sanitary cap has been provided by the adjacent landowner (RIchcraft) as part of the Bradley Commons subdivision works at the limit of Energy Street. The existing sanitary system drains to the Hazeldean Pump Station via the Fernbank Trunk.

Previous design coordination with Richcraft accounted for a sanitary flow of 5.4 L/s from the Site to be routed through the Bradley Commons sanitary sewers.

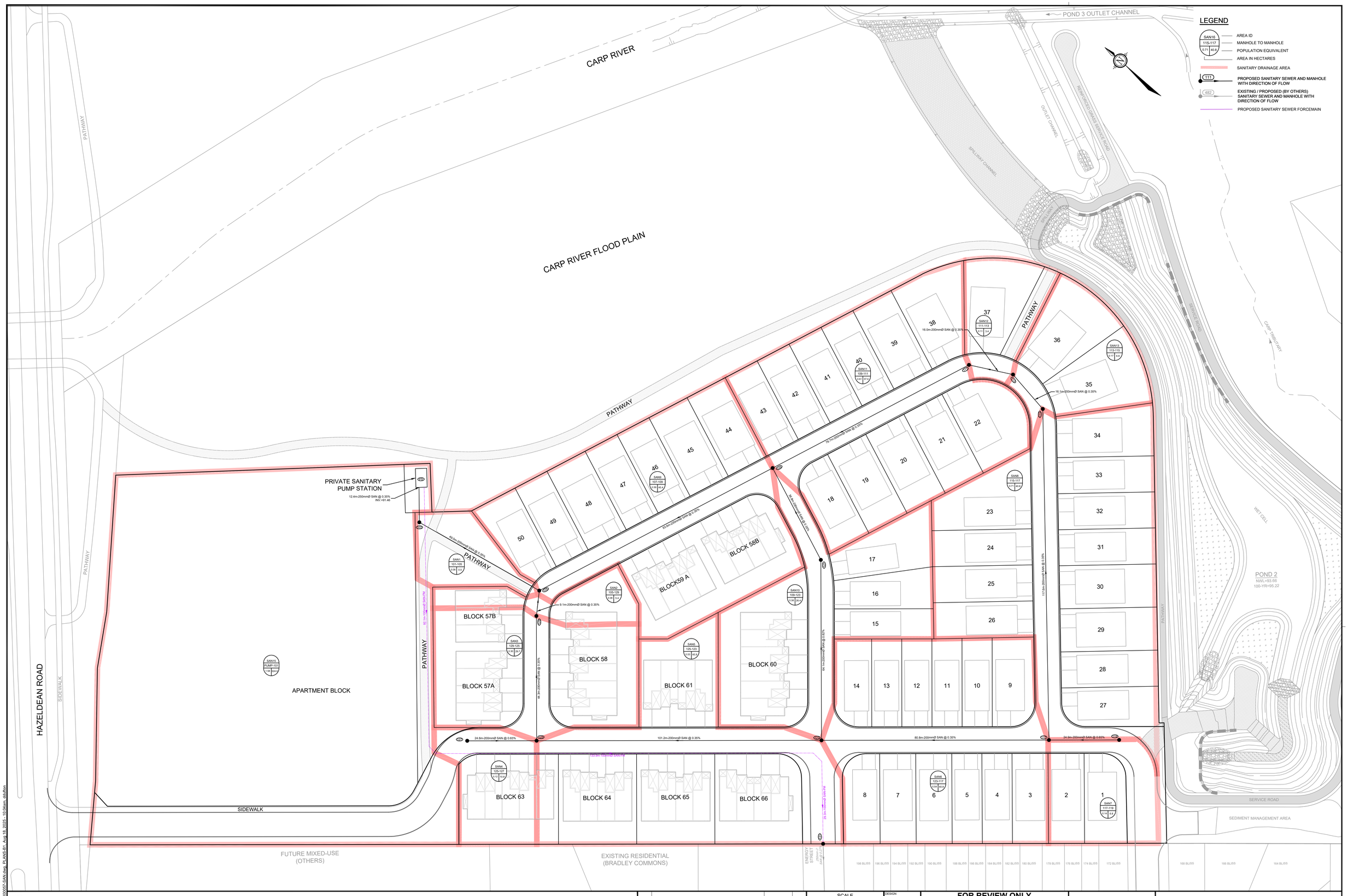
4.2 Proposed Conditions

Design parameters are specified in the City of Ottawa Sewer Design Guidelines **[6]**. The peak design flow parameters in **Table 4.1** have been used in the sewer capacity analysis.

The existing 250mm diameter sanitary stub, located at Energy Street, has an invert elevation of 95.68m and is too high to provide a gravity outlet for the Site. Sanitary flow from the Site will be directed to a new private sanitary pump station located adjacent the southeast corner of the apartment block. The pump station will be designed as per the current City of Ottawa standards for “small pump stations”. A typical small pumping station is defined as installations with maximum capacities less than 15 L/s and electrical motor drivers of 5 horsepower or less. A small sewage pumping station would consist of a duplex pumping unit with submersible pumps in a wet well. A standby generator would provide backup in the event of a power failure. Pump station details will be provided at the detailed design stage. The sanitary sewers and pump station will be sized to service the proposed subdivision and apartment block.

The subdivision and apartment block produce a peak sanitary flow of 8.7 L/s. The sanitary sewer design sheet is located in **Appendix A**.

The on-site sanitary sewage pump station will discharge via a 263 m long 100mm diameter forcemain to the existing 250mm sanitary stub at Energy Street. The location of the internal gravity sanitary sewer, pump station and forcemain are shown on the Sanitary Drainage Area Plan (**100057-SAN**). Refer to the Typical Roadway Cross-sections located on the General Plan of Services Plan (**100057-GP**) for the locations of the gravity sanitary sewers and forcemains within the proposed private roadway.



LEGEND

- SAN16 / 115-117 / 0.71 / 40.8 — AREA ID / MANHOLE TO MANHOLE / POPULATION EQUIVALENT / AREA IN HECTARES
- SANITARY DRAINAGE AREA
- 111 — PROPOSED SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
- 482 — EXISTING / PROPOSED (BY OTHERS) SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
- PROPOSED SANITARY SEWER FORCEMAIN

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CITY of OTTAWA - 560 HAZELDEAN ROAD
DOUBLE DECK SUBDIVISION

SANITARY DRAINAGE AREA PLAN

PROJECT No. 100057
REV. REV # 1
DRAWING No. 100057-SAN

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Table 4.1: Sanitary Sewer Design Parameters

Parameter	Design Parameter
Single Unit Population	3.4 people/unit
Townhome Unit Population	2.7 people/unit
Apartment Block Unit Population	1.8 people/unit (Assumed 180 units)
Residential Flow Rate, Average Daily	280 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0)
Infiltration Rate	0.33 L/s/ha
Minimum Pipe Size	200mm
Minimum Velocity	0.6 m/s
Maximum Velocity	3.0 m/s

The peak sanitary design flow of 8.7 L/s exceeds the sanitary flow of 5.4 L/s used in the analysis of the existing downstream sanitary sewer system within the Bradley Commons Subdivision. The 300mm diameter sanitary sewer running across the Carp River West Tributary was installed at 0.14 % with a capacity of 37.7 L/s. The proposed Site has increased the sanitary flow by 3.3 L/s which has increased the flow passing through the critical 300mm sanitary sewer to 32.1 L/s. Refer to **Appendix A** for design sheets which include the proposed development and excerpts from the Bradley Commons – Phase 4 Servicing and Stormwater Management Report prepared by Stantec (April 2020) **[7]**. Based on the above analysis, the additional 3.3 L/s of peak flow can be accommodated by the downstream sanitary system.

5.0 STORM SERVICING AND STORMWATER MANAGEMENT

5.1 Existing Drainage Conditions

The proposed Site is located within the Carp River Subwatershed, and is tributary to the Carp River, which falls under the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). A portion of the Site, along the eastern property boundary, is located within the Carp River 1:100 year floodplain. Under current conditions, the Site drains northeasterly towards the Carp River. Pond 2 is located directly south of the Site and has been designed to provide quality and quantity control for the development lands.

5.2 Stormwater Management Criteria

The following stormwater management criteria have been developed based on the criteria in the Fernbank EMP, and requirements of the MVCA and the City of Ottawa Sewer Design Guidelines (October 2012) and Technical Bulletin PIEDTB-2016-01 (September 2016) and the Fernbank Community SWM Facility – Pond 2 Design Report.

5.2.1 Minor System (Storm Sewers)

- Storm sewers are designed using the Rational Method with a 2-year return period.
- Inlet control devices (ICDs) are to be installed in road and rearyard catchbasins to control inflows to the storm sewers;
- Ensure that the 100-year hydraulic grade line is at least 0.3 m below the underside of footing (USF) elevations for the proposed development.

5.2.2 Major System (Overland Flow)

- Overland flows are to be confined within the right-of-way and/or defined drainage easements for all storms up to and including the 100-year event;
- Maximum depth of flow (static + dynamic) on private streets shall not exceed 0.35 m during the 100-year event. The depth of flow may extend adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event;
- Runoff that exceeds the available storage in the right-of-way will be conveyed overland along defined major system flow routes towards the proposed major system outlet to the SWM Facility. There must be at least 15cm of vertical clearance between the spill elevation on the street and the ground elevation at the building envelope that is in the proximity of the flow route or ponding area;
- Although rear yard storage cannot be accounted for in computer modelling, the effect of flow attenuation can be accounted for by assuming a constant slope ditch/swale draining to the street with the following geometry:
    - A minimum slope of 1.5%;
    - A depth ranging between 150mm (min) and 600mm (max); and
    - Maximum side slopes of 3H:1V.
- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60;

5.2.3 Water Quality & Quantity Control

- A *Normal* (70% TSS removal) level of quality control will be provided by Pond 2;
- Implement lot level and conveyance Best Management Practices to promote infiltration and treatment of storm runoff;
- Post-development peak flows are not to exceed pre-development peak flows for all storms up to and including the 100-year event for outflows from Pond 2.

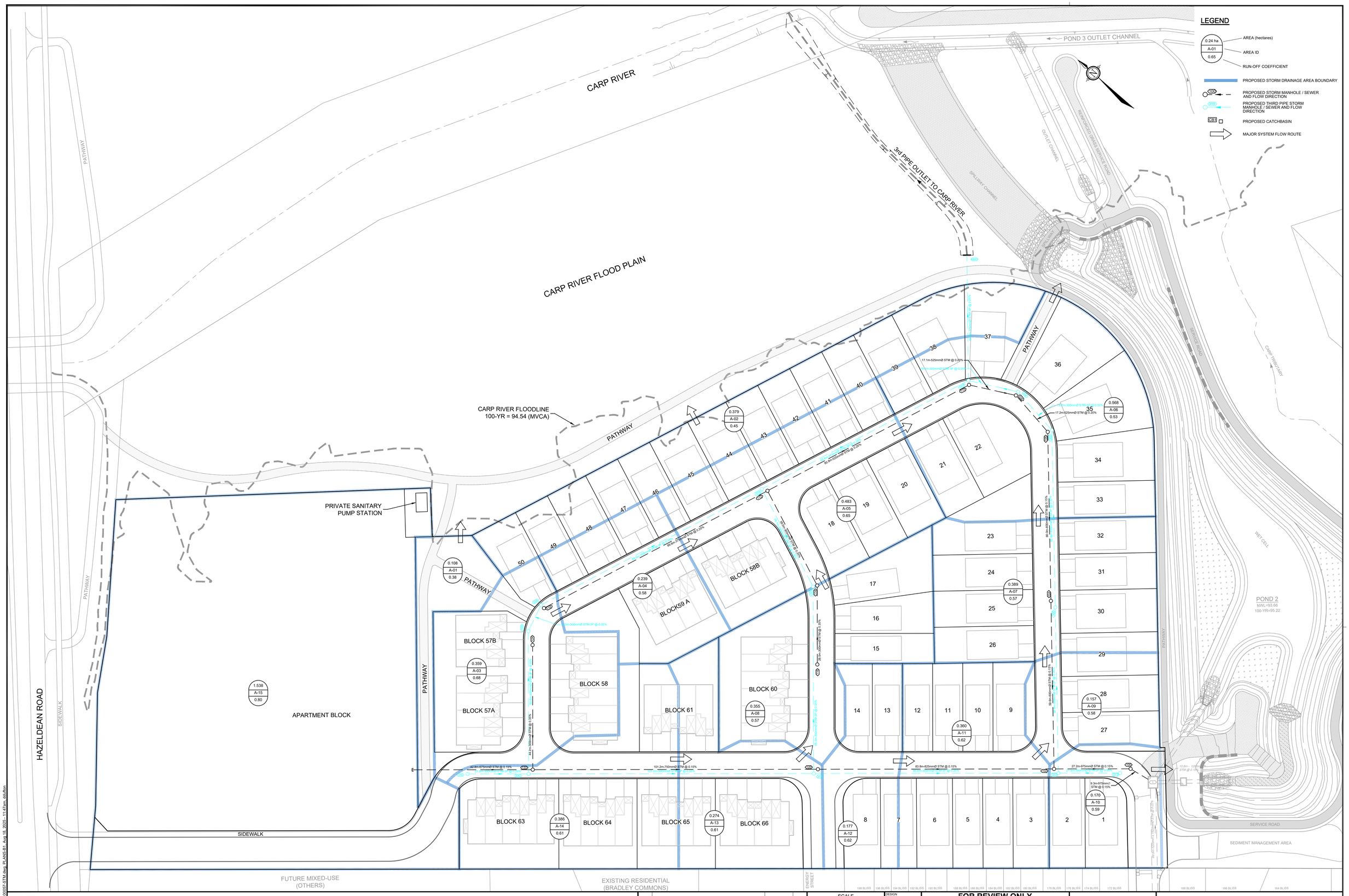
5.3 Storm Servicing Design

Storm servicing for the development will be provided using a dual drainage system. Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from large storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). Pond 2 will serve as the outlet for both the major and minor systems.

Rear-yards which back onto the Carp River along the eastern property boundary, will sheet drain towards the Carp River, maintaining existing drainage pattern.

5.3.1 Minor System Design

The proposed storm sewers have been designed using the Rational Method to convey peak flows (surface drainage only) associated with a 2-year return period using the criteria outlined in **Table 5.1** and **Table 5.2**. Flows from the dwellings foundation drain will connect to a separate 3rd pipe system and outlet to a proposed ditch at the southeast corner of the Site. The 3rd pipe outlet will be set at an elevation of 93.71m, which corresponds to the 2-year water level in the Carp River provided by the updated Carp River PCSWMM model. The storm sewer design sheet is provided in **Appendix B**. The conceptual storm sewer system and post-development catchment areas are shown on the Storm Drainage Area Plan (**100057-STM**). Refer to the Typical Roadway Cross-sections located on the General Plan of Services (**100057-GP**) for the proposed locations of the minor system storm sewers and the 3rd pipe system.



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CITY of OTTAWA - 560 HAZELDEAN ROAD
DOUBLE DECK SUBDIVISION

STORM DRAINAGE AREA PLAN

PROJECT No. 100057
REV REV # 1
DRAWING No. 100057-STM

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Table 5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Proposed Development	2 Year Return Period
Storm Sewer Design	Rational Method / PCSWMM
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (T_c)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	300 mm

Table 5.2: Runoff Coefficients

Land Use	Runoff Coefficient
Hard Surface	0.90
Grassed Surface	0.20
Apartment Block	0.80

Initial Time of Concentration

For conceptual design purposes, the subcatchment areas have been discretized as semi-lumped areas and do not represent each individual sewer section. A 10-minute initial time of concentration has been used to represent the travel time through the sewers in the uppermost reaches of the catchments.

At the detailed design stage, the catchment areas will be refined to reflect the areas tributary to each inlet of the sewer system.

Inlet Control Devices

Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system capacity (1:2yr). ICDs sizes and catchbasin locations will be determined during the detailed design stage.

5.3.2 Major System Design

The major system design will conform to the design standards outlined in the Ottawa Sewer Design Guidelines (October 2012) and Technical Bulletin PIEDTB-2016-01 (September 2016). During detailed design, the right-of-way will be graded to provide sufficient storage to contain the major system runoff from storm events exceeding the minor system capacity for all storms up to and including the 100-year design event. The site will be graded to provide an engineered overland flow route for large, infrequent storms, or in the event that the storm sewer system becomes obstructed, with major system flows routed to Pond 2 through Block 68, located at the southeast corner of the site.

Major System Flow Depths

For events exceeding the minor system design storm and up to the 100-year design storm, flow depths in the right of way are to be limited to the maximum water depth (dynamic + static) of 0.35mm.

5.3.3 Groundwater Infiltration and Water Balance

As discussed in the Fernbank Environmental Management Plan, the hydrogeologic conditions of the Site will be altered by the increase in hard surfaces and the increased efficiency of stormwater conveyance. The net result will be a reduction in groundwater infiltration, which can potentially result in a reduction in the groundwater table, reduction of baseflow in watercourses, reduced well capacities and consolidation of the overburden, among other impacts.

The recommended infiltration target is to match pre-development infiltration rates. The water balance analysis in the Fernbank Environmental Management Plan indicates that maintaining annual pre-development infiltration should be achievable using infiltration best management practices; the types, locations, and suitability of infiltration BMPs will be dependent on site specific details and land use.

Infiltration Best Management Practices

Infiltration of surface runoff will be accomplished using lot level and conveyance controls. The most suitable practices for groundwater infiltration include:

- Infiltration of runoff captured by rear yard catchbasins;
- Direct roof leaders to rear yard areas;
- The use of fine sandy loam topsoil in residential lawns.

By implementing infiltration Best Management Practices as part of the storm drainage design for the Site, the impacts of development on the hydrologic cycle can be considerably reduced. Infiltration of clean runoff will also have additional benefits for stormwater management; by reducing the volume of “clean” water conveyed to Pond 2, the performance of Pond 2 will be increased.

5.3.4 SWM Facility – Pond 2

Water quantity control and water quality treatment will be provided by an end-of pipe stormwater management facility. Pond 2 has been sized to control and treat runoff from the development lands.

The original Pond 2 design report, accounted for a total drainage area of 5.95 ha with a weighted runoff coefficient of 0.70. The updated design accounts for an area of 5.95 ha with a weighted runoff coefficient of 0.64. Since the areas have remained unchanged and the runoff coefficient has decreased, the SWM facility will provide quality treated as originally intended.

5.4 Hydrologic & Hydraulic Modeling

The *City of Ottawa Sewer Design Guidelines* (October 2012) require hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the development lands was evaluated using the PCSWMM hydrologic/hydraulic model.

The Pond 2 detailed design PCSWMM model has been updated to include the proposed subdivision and apartment block to evaluate the impact of the proposed development on water levels and outflows of Pond 2.

The PCSWMM model is a semi-lumped model that represents both the minor and major system flows from the development. The results of the analysis were used to:

- Simulate major and minor system runoff from the site;
- Ensure the stormwater management facility is sufficiently sized to control runoff from the proposed development and the upstream drainage areas.

Modeling files have been provided as part of the submission package.

5.4.1 Design Storms

The hydrologic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the Chicago design storms were taken from the *Ottawa Design Guidelines - Sewer* (November 2004). The 12-Hour SCS MTO design storms were copied from the provided Carp River PCSWMM model, to ensure consistent results.

3 Hour Chicago Distribution:	*12 Hour MTO SCS Distribution*:
25mm Event (Water Quality)	2-year Event
2-year Event	5-year Event
5-year Event	10-year Event
10-year Event	100-year Event
100-year Event	

The 12-hour SCS storm (MTO distribution) generated the highest overall peak flows and have been used to govern the design of the storm drainage system.

5.4.2 Storm Drainage Areas

The site has been divided into subcatchments based on the proposed land use and roadway design. The catchment areas shown on the Storm Drainage Area Plan (**100057-STM)** correspond to the areas used in the Storm Sewer Design Sheet (**Appendix A**).

5.4.3 Model Parameters

The hydrologic parameters for each subcatchment were developed based on the Land Use and the Storm Drainage Area Plan (**100057-STM**). An overview of the modeling parameters is provided in **Table 5.3**.

Table 5.3: PCSWMM Model Parameters

Area ID	Area (ha)	Runoff Coeff. (C)	Percent Impervious (%)	Zero Impervious (%)	Curve Number (CN)	Equivalent Width (m)	Average Slope (%)
Site							
A-01	0.108	0.38	25.4	0	80.5	43.2	1
A-02	0.379	0.45	35.7	95	80.5	108.3	1
A-03	0.359	0.68	68.8	50	80.5	119.7	1
A-04	0.239	0.58	54.3	50	80.5	79.7	1
A-05	0.483	0.65	64.1	50	80.5	161.0	1
A-06	0.568	0.53	47.4	50	80.5	189.3	1
A-07	0.389	0.57	53.5	50	80.5	129.7	1
A-08	0.355	0.57	53	50	80.5	118.3	1
A-09	0.157	0.58	54.8	50	80.5	52.3	1
A-10	0.170	0.59	55.5	50	80.5	56.7	1
A-11	0.360	0.62	59.4	50	80.5	120.0	1
A-12	0.177	0.62	59.4	50	80.5	59.0	1
A-13	0.274	0.61	58.9	50	80.5	91.3	1
A-14	0.386	0.61	58.1	50	80.5	128.7	1
A-15	1.538	0.8	85.7	50	80.5	346.0	1
TOTAL:	**5.95**	**0.64**	**62.5**				

Major System Storage

Since the major system has not yet been designed, the subcatchment areas are not based on a detailed grading plan. Major system storage is represented in the PCSWMM model using storage nodes. The required storage volumes are based on containing the runoff from the 100-year event within road sags (max depth of 0.35m) with no cascading overland flow. The release rates from the storage nodes have been established as follows:

- 2-year peak flow from the subcatchment flow uncontrolled to the storm sewers, storage is provided for larger storm events;

As the project is only at the Draft Plan stage, detailed lot-level grading information is not yet available. The PCSWMM model is set up with the main trunk sewers, as outlined in the storm sewer design sheet.

The required major system storage volumes are provided in **Section 5.4.4 "Model Results"** - refer to **Table 5.7**.

Runoff Coefficient/ Impervious Values

Impervious (%IMP) values for each subcatchment area were calculated based on the Runoff Coefficients (see **Table 5.2**) noted on the Storm Drainage Area Plan (**100057-STM**) using the equation:

$$\%IMP = \frac{(C - 0.2)}{0.7}$$

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Residential rooftops are assumed to provide no depression storage and all rainfall is converted to runoff. The percentage of rooftop area to total impervious area is represented by the 'no depression storage' column in **Table 5.3**.

Curve Number

The Carp River Watershed PCSWMM model uses an SCS Curve Number of 80.5, as such, the original Pond 2 model used the same SCS Curve Number. Thus, all subcatchments within the Site have been given a curve number value of 80.5, to remain consistent with the Carp River Watershed model and original Pond 2 model.

Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in the *Sewer Design Guidelines, October 2012, Section 5.4.5.6*. For areas where detailed roadway information is available, the total length of the street segment, multiplied by 2 (in areas where there is to be development on both sides of the street) has been used. In areas where detailed roadway information is not available, such as in the apartment block, a value of 225m per ha has been used.

Modeling Files / Schematic

The PCSWMM model schematics are provided in **Appendix B**. Digital copies of the modeling files and model output for all storm events are provided as part of the submission package.

5.4.4 Model Results

The results of the PCSWMM model are summarized in the following sections. The original Pond 2 model, prepared by Novatech, has been updated to ensure that the water levels and outflows from the Pond haven't been negatively impacted due to the proposed development. The results of the updated PCSWMM model and previous results are summarized in the following sections.

Peak Flows

The SWM facility was designed to control post-development peak flows in the Carp River West Tributary to pre-development levels. A comparison of the original and updated Pond 2 peak flows are provided in **Table 5.4**.

Table 5.4: Pond 2 Inflows & Outflows (cms)

Storm Distribution->		**MTO SCS Type II Storm Events**			
Return Period->		**2-year**	**5-year**	**10-year**	**100-year**
Outflow	*Original*	0.135	0.394	0.687	2.705
	Updated	0.132	0.362	0.641	2.607
EMP Target		***0.320***	***0.530***	***0.700***	***2.700***

Area A-02, consisting of rooftop and rear-yards, is proposed to sheet drain directly to the Carp River, matching existing drainage patterns. The 100-year peak flow being directed to the Carp

River from A-02 is 0.100 cms resulting in a total outflow to the Carp River during the 100-year MTO SCS storm event of 2.707 cms, roughly equivalent to the original Pond 2 design report value of 2.705 cms.

Water Levels

A comparison of the water levels in Pond 2 are provided in the table below.

Table 5.5: Pond 2 Water Levels (m)

Storm Distribution->	MTO SCS Type II Storm Events			
Return Period->	**2-year**	**5-year**	**10-year**	**100-year**
Original	94.63	94.84	94.97	95.22
Updated	94.61	94.82	94.95	95.21

As shown above, the water levels in Pond 2 have decreased slightly compared with the original elevations. This is due to the overall runoff coefficient decreasing from 0.70 to 0.64 which results in a reduction in the runoff volume being directed to the facility.

Hydraulic Grade Line

Since the foundation drains are disconnected from the minor system storm sewer and instead are directed to a 3rd pipe system, the PCSWMM model was not used to calculate the hydraulic grade line (HGL). The HGL at the outlet of the pipe system was set at the 100-year floodplain elevation of 94.54m (MVCA) and calculated upstream at an assumed slope of 0.1%. As the design is only at the draft plan stage, underside of footing (USF) elevations have not yet been determined. The HGL analysis will need to be revised at the detailed design stage to ensure the required 0.30m freeboard is being provided between the USF and 100-year HGL elevations.

Table 5.6: 100-year HGL Elevations

Manhole ID	T/G Elevation (m)	Outlet pipe Obvert (m)	HGL Elevation (m)	Minimum USF (m)
Outlet	-	94.09	94.54	94.84
302	96.77	94.20	94.58	94.88
304	96.76	94.26	94.60	94.90
306	96.78	94.32	94.62	94.92
308	96.95	94.54	94.68	94.98
310	97.14	94.75	94.74	95.05
312	96.82	94.90	94.76	95.20
314 (310 side)	97.45	95.12	94.83	95.42
314 (320 side)	97.45	94.78	94.77	95.08
316	97.64	95.19	94.84	95.49
318	97.04	94.41	94.67	94.97
320	97.12	94.55	94.71	95.01
324	97.30	94.72	94.76	95.06
326	97.37	94.76	94.77	95.07

Manhole ID	T/G Elevation (m)	Outlet pipe Obvert (m)	HGL Elevation (m)	Minimum USF (m)
330 (326 side)	97.58	94.94	94.82	95.24
330 (314 side)	97.58	95.15	94.87	95.45

Note that the minimum USF calculated above is based on 0.30m above either the HGL or the obvert of the pipe, whichever is greater.

Major System Storage

The storage required in the right-of-way has been evaluated on a per-hectare basis for each subcatchment based on a maximum static ponding depth of 0.30m. Refer to **Table 5.7**.

Table 5.7: Major System Storage

Drainage Area ID	Area (ha)	Storage Required (100-year)		
		Area (m2)	Total Volume (m3)	Per-Ha Volume (m3/ha)
A-01	0.108	13.0	2	19
A-02	0.391	-	-	-
A-03	0.359	313.0	47	131
A-04	0.239	153.0	23	96
A-05	0.483	379.6	57	118
A-06	0.568	473.0	71	128
A-07	0.389	346.3	52	134
A-08	0.355	279.6	42	118
A-09	0.157	73.0	11	70
A-10	0.170	119.6	18	106
A-11	0.360	273.0	41	114
A-12	0.177	146.3	22	124
A-13	0.274	233.0	35	128
A-14	0.386	313.0	47	122
A-15	1.538	1119.6	168	109

The major system storage volumes will be reassessed at the detailed design stage to ensure the appropriate major system storage is provided.

3rd Pipe System Outlet Channel

The pipe system capturing foundation drainage will outlet to a proposed channel with an invert elevation of 93.71m, corresponding to the Carp River 2-year water level within the vicinity of the channel. The channel will be a 0.30m wide flat bottom ditch with 3:1 side slopes, running at 0.25% and will outlet above the normal water level in the Carp River (93.13m). The flows generated from the foundation drains were calculated per the City of Ottawa Sewer Design Guidelines and are based on 0.45 L/s per dwelling which results in a total flow of 44.1 L/s. The outlet channel has a minimum depth of 0.20m with a capacity of 61.0 L/s.

6.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). Detailed plans will be provided at the detailed design stage.

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), filter fabric or inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), turbidity curtain (OPSD 219.260), dewatering trap (OPSD 219.240), temporary water passage system (OPSD 221.030), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work.

All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accord with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
    - Straw bale barriers are to be installed in drainage ditches
    - Inserts are to be placed under the grates of all proposed and existing catchbasins and structures.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

A list of Best Management Practices, recommended by the Mississippi Valley Conservation Authority, for the development are provided below:

- Natural areas to be retained are to be isolated by sturdy construction fencing or similar barrier at least 1.0m in height during construction in order to ensure their retention.
- Construction equipment will remain within the areas of active construction and will not cross the sediment control measures.
- Following construction, bare soils will be re-seeded to reduce surface erosion.
- Erosion and sediment control measures will be in place for the duration of construction and until the site is re-vegetated. Erosion and sediment control measures should be maintained in good condition for the duration of construction. These measures should be removed at the completion of construction once the site has stabilized.
- Disturbed areas should be replanted with locally grown native species.
- No woody vegetation should be removed between April 15th and August 15th unless a breeding bird survey is conducted.
- Should any species at risk be discovered and/or should any species at risk or their habitat be potentially impacted by on site activities, the Ministry of Natural Resources and Forestry (MNRF) should be contacted immediately and activities should be modified to avoid impacts until further direction is provided by MNRF.

7.0 UTILITIES

The development will be provided by Hydro Ottawa, Bell Canada, Enbridge Gas and Rogers Cablevision (as required); services will be constructed as per the City and Utility standards. The works will be coordinated with local utility companies during the detailed design. The cross-section of the utility trench and the connection to the existing services will also be confirmed during the detailed design.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding, the report conclusions are summarized below:

1) There is adequate capacity in the existing infrastructure (sanitary, storm and water) to accommodate the planned development at 560 Hazeldean Road.
2) The proposed grading design generally follows the existing topographic contours with an emergency overland flow route to Pond 2.
3) Light weight fill will be used in select locations as required to comply with grade raise restrictions.
4) A private sanitary pump station will discharge to the existing sanitary system located in the adjacent Bradley Commons subdivision.
5) Pond 2 will provide quality and quantity control of stormwater runoff in compliance with MVCA criteria.
6) Hydro, Gas, Bell and Cablevision have infrastructure nearby to service the proposed development.

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

Prepared By:

NOVATECH



Lucas Wilson, P.Eng.
Project Engineer

Reviewed By:



Mark Bissett, P.Eng.
Senior Project Manager

References

1 “Fernbank Community Design Plan, Walker, Nott, Dragicevic Associates Ltd. [June 24, 2009]

2 “Fernbank Master Servicing Study”, Novatech [June 24, 2009]

3 “Fernbank Environmental Management Plan”, Novatech [June 24, 2009]

4 “Fernbank Community SWM Facility – Pond 2 Design Report”, Novatech [October 28, 2020]

5 “Geotechnical Investigation Double Deck”, Paterson Group [June 17, 2025]

6 ““Sewer Design Guidelines”, Department of Public Works and Services, City of Ottawa [October 2012]

7 “Servicing and Stormwater Management Report – Bradley Commons Phase 4”, Stantec [April 16, 2020]

Appendix A: Sewer Design Sheets and Water Modelling

Storm Sewer Design Sheet (Rational Method)
Sanitary Sewer Design Sheets
Bradley Commons – Ph 4 Servicing Report Excerpts
Watermain Boundary Conditions
Watermain Modelling

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 100057
Project Name: 560 Hazeldean Road - Double Deck
Date: 8/15/2025
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference: 100057-SAN

Legend:
- Design Input by User
- As-Built Input by User
- Cumulative Cell
- Calculated Design Cell Output
- Calculated Annual Cell Output
- Calculated Rare Cell Output

Reference: City of Ottawa - Sewer Design Guidelines (2012 and TBs)
MOE - Design Guidelines for Sewage Works (2008)

Location				Demand																Design Capacity							
				Residential Flow										Industrial / Commercial / Institutional (ICI) Flow						Extraneous Flow Area Method		Total Design Flow	Proposed Sewer Pipe Sizing / Design							
Street	Area ID	From MH	To MH	Singles	Semis / Towns	Apts	Park Area	Population (in 1000's)	Cumulative Population (in 1000's)	Average Pop. Flow Q(q) (L/s)	Design Peaking Factor M	Peak Design Pop. Flow Q(p) (L/s)	Res. Drainage Area (ha.)	Cumulative Res. Drainage Area (ha.)	Commercial / Institutional Area (ha.)	Cumulative Commercial / Institutional Area (ha.)	Average Design Commercial / Institutional Flow (L/s)	Commercial / Institutional Peaking Factor	Cumulative ICI Area (ha.)	Peak Design ICI Flow Q (ici) (L/s)	Cumulative Extraneous Drainage Area (ha.)	Design Extraneous Flow Q(e) (L/s)	Total Peak Design Flow Q(D) (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Pipe ID Actual (m)	Roughness n	Design Grade So (%)	Capacity Qfull (L/s)	Full Flow Velocity (m/s)	Q(D) / Qfull
SAN7		119	117	2				0.007	0.007	0.02	3.74	0.08	0.140	0.140	0.000	0.000	0.00	1.00	0.000	0.00	0.140	0.05	0.13	24.9	200 PVC	0.203	0.013	0.65	27.6	0.85	0.5%
SAN6		117	123	12				0.041	0.048	0.15	3.66	0.56	0.540	0.680	0.000	0.000	0.00	1.00	0.000	0.00	0.680	0.22	0.79	80.8	200 PVC	0.203	0.013	0.35	20.2	0.62	3.9%
SAN5		123	125		17			0.046	0.094	0.30	3.60	1.09	0.530	1.210	0.000	0.000	0.00	1.00	0.000	0.00	1.210	0.40	1.49	101.2	200 PVC	0.203	0.013	0.35	20.2	0.62	7.4%
SAN3, SAN4		125	129		15			0.041	0.134	0.43	3.57	1.55	0.420	1.630	0.000	0.000	0.00	1.00	0.000	0.00	1.630	0.54	2.09	44.3	200 PVC	0.203	0.013	0.35	20.2	0.62	10.3%
SAN2		129	105		2			0.005	0.139	0.45	3.56	1.61	0.080	1.710	0.000	0.000	0.00	1.00	0.000	0.00	1.710	0.56	2.17	9.1	200 PVC	0.203	0.013	0.35	20.2	0.62	10.7%
SAN8		117	115	12				0.041	0.041	0.13	3.67	0.48	0.710	0.710	0.000	0.000	0.00	1.00	0.000	0.00	0.710	0.23	0.72	117.6	200 PVC	0.203	0.013	0.35	20.2	0.62	3.6%
SAN13		115	113	2				0.007	0.048	0.15	3.66	0.56	0.170	0.880	0.000	0.000	0.00	1.00	0.000	0.00	0.880	0.29	0.85	16.1	200 PVC	0.203	0.013	0.35	20.2	0.62	4.2%
SAN12		113	111	1				0.003	0.051	0.17	3.65	0.60	0.110	0.990	0.000	0.000	0.00	1.00	0.000	0.00	0.990	0.33	0.93	16.0	200 PVC	0.203	0.013	0.35	20.2	0.62	4.6%
SAN11		111	109	11				0.037	0.088	0.29	3.61	1.03	0.610	1.600	0.000	0.000	0.00	1.00	0.000	0.00	1.600	0.53	1.56	78.7	200 PVC	0.203	0.013	0.35	20.2	0.62	7.7%
SAN10		123	109	3	6			0.026	0.026	0.09	3.69	0.32	0.380	0.380	0.000	0.000	0.00	1.00	0.000	0.00	0.380	0.13	0.44	100.9	200 PVC	0.203	0.013	0.35	20.2	0.62	2.2%
SAN9		109	105	7	8			0.045	0.160	0.52	3.55	1.84	0.590	2.570	0.000	0.000	0.00	1.00	0.000	0.00	2.570	0.85	2.69	93.6	200 PVC	0.203	0.013	0.35	20.2	0.62	13.3%
SAN1		105	PUMP					0.000	0.300	0.97	3.46	3.36	0.080	4.360	0.000	0.000	0.00	1.00	0.000	0.00	4.360	1.44	4.80	61.4	250 PVC	0.254	0.013	0.35	36.7	0.72	13.1%
SAN15		APT	PUMP			180		0.324	0.324	1.05	3.45	3.62	1.580	1.580	0.000	0.000	0.00	1.00	0.000	0.00	1.580	0.52	4.15		200 PVC	0.203	0.013	0.35	20.2	0.62	20.5%
		PUMP	STUB					0.000	0.624	2.02	3.34	6.75	0.000	5.940	0.000	0.000	0.00	1.00	0.000	0.00	5.940	1.96	8.71		200 PVC	0.203	0.013	0.32	19.4	0.60	45.0%
Totals				**50**	**48**	**180**	**0.000**	**0.624**	**0.624**	**2.02**	**3.34**	**6.75**	**5.940**	**5.940**	**0.000**	**0.000**	**0.00**	**1.00**	**0.000**	**0.00**	**5.940**	**1.96**	**8.71**	**744.6**							

Demand Equation / Parameters

1. **Q(D), Q(A), Q(R) =** Q(p) + Q(fd) + Q(ici) + Q(e)
2. **Q(p) =** (P x q x M x K / 86,400)
3. **q =** 280 L/per person/day (design)
   200 L/per person/day (annual and rare)
4. **M = Harmon Formula (maximum of 4.0)**
5. **K =** 0.8 (design)
   0.6 (annual and rare)
6. **Park flow is considered equivalent to a single unit / ha**
   Park Demand = 4 single unit equivalent / park ha (~ 3,600 L/ha/day)
7. **Q(fd) =** 0.45 L/s/unit
8. **Q(ici) =** ICI Area x ICI Flow x ICI Peak
9. **Q(e) =** 0.33 L/s/ha (design)
   0.30 L/s/ha (annual)
   0.55 L/s/ha (rare)

Definitions

Q(D) = Peak Design Flow (L/s)
Q(A) = Peak Annual Flow (L/s)
Q(R) = Peak Rare Flow (L/s)
Q(p) = Peak Design Population Flow (L/s)
Q(q) = Average Population Flow (L/s)

	Singles	Semis / Towns	Apts
P = Residential Population =	3.4	2.7	1.8
q = Average Capita Flow			
M = Harmon Formula			
K = Harmon Correction Factor			
Typ. Service Diameter (mm) =	135		
Typ. Service Length (m) =	15	15	
I/I Pipe Rate (L/mm dia/m/hr) =	0.007		

Q(fd) = Foundation Flow (L/s)
Q(ici) = Industrial / Commercial / Institutional Flow (L/s)
Q(e) = Extraneous Flow (L/s)

Institutional / Commercial / Industrial	Industrial	Commercial / Institutional	
Design =	35000	28000	L/gross ha/day
Annual / Rare =	10000	17000	L/gross ha/day
ICI Peak *			
Design =	1.0	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)
Annual / Rare =		1.0	

Capacity Equation

Q full = $1000*(1/n)*A_p*R^{2/3}*So^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p = Pipe flow area (m^2)
R = Hydraulic Radius of wetted area (dia./4 for full pipes)
So = Pipe slope/gradient



Stantec

SUBDIVISION:
HAZELDEAN CRAIG SUBDIVISION PHASE 4

DATE: 8/7/2019
REVISION: 1
DESIGNED BY: JP
CHECKED BY: DT

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

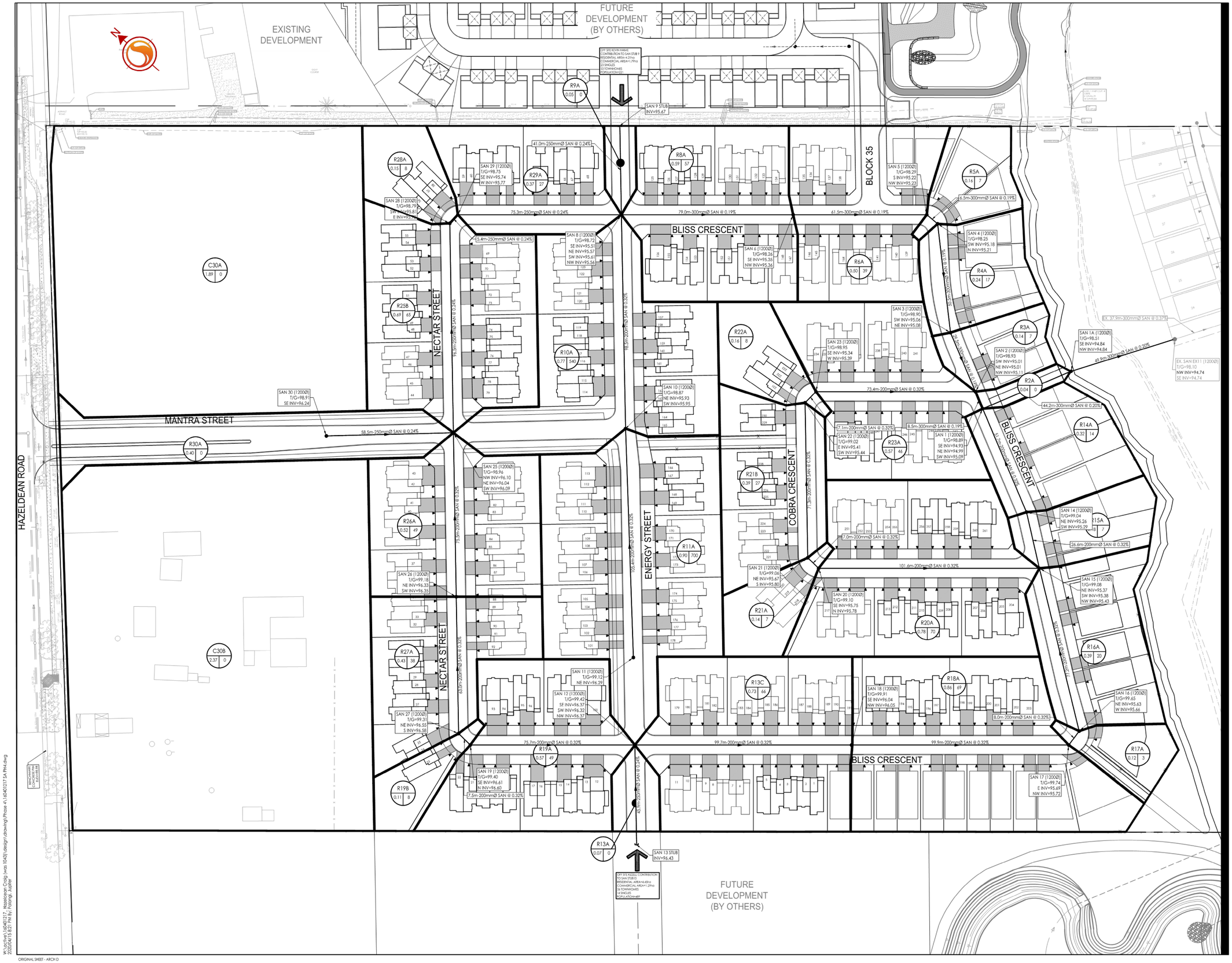
FILE NUMBER: 160401217

DESIGN PARAMETERS

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

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
R9A	9	8	0.36	0	12	0	32	0.36	32	3.68	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.36	0.36	0.1	0.5	48.5	200	PVC	SDR 35	0.32	18.9	**2.66%**	0.60	0.22
R13A, KIZZEL	13	12	0.97	0	32	0	86	0.97	86	3.61	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.97	0.97	0.3	1.3	39.5	200	PVC	SDR 35	0.65	27.0	**4.93%**	0.85	0.36
R12A	12	11	0.75	0	25	0	68	1.72	154	3.55	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.75	1.72	0.6	2.3	106.2	200	PVC	SDR 35	0.32	18.9	**12.36%**	0.60	0.33
R11A	11	10	0.24	0	7	0	19	1.96	173	3.54	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.24	1.96	0.6	2.6	32.4	200	PVC	SDR 35	0.32	18.9	**13.88%**	0.60	0.35
R30A, C30A, C30B	30	25	0.40	0	0	0	0	0.40	0	3.80	0.0	4.26	4.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.1	4.66	4.66	1.5	3.6	58.4	200	PVC	SDR 35	0.32	18.9	**19.09%**	0.60	0.38
R29A	29	28	0.56	0	20	0	54	0.56	54	3.65	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.56	0.56	0.2	0.8	69.8	200	PVC	SDR 35	0.32	18.9	**4.35%**	0.60	0.24
R28A	28	25	0.54	0	18	0	49	1.09	103	3.59	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.54	1.09	0.4	1.6	77.1	200	PVC	SDR 35	0.32	18.9	**8.22%**	0.60	0.30
R27A, KIZZEL	27	26	3.66	0	74	0	441	3.66	441	3.40	4.9	1.29	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.6	4.95	4.95	1.6	7.1	87.2	200	PVC	SDR 35	0.32	18.9	**37.64%**	0.60	0.47
R26A	26	25	0.63	0	22	0	59	4.29	500	3.38	5.5	0.00	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.6	0.63	5.58	1.8	7.9	88.7	200	PVC	SDR 35	0.32	18.9	**42.01%**	0.60	0.48
R25A	25	10	0.14	0	0	0	0	5.92	603	3.34	6.5	0.00	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.7	0.14	11.48	3.8	13.0	79.0	200	PVC	SDR 35	0.32	18.9	**68.85%**	0.60	0.56
R10A	10	8	0.63	0	20	0	54	8.51	830	3.28	8.8	0.00	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.7	0.63	14.06	4.6	16.2	98.5	200	PVC	SDR 35	0.32	18.9	**85.44%**	0.60	0.60
R8A	8	6	0.34	0	9	0	24	9.20	886	3.27	9.4	0.00	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.7	0.34	14.75	4.9	17.0	79.0	200	PVC	SDR 35	0.32	18.9	**89.62%**	0.60	0.61
R7A, KEVIN HAIME	7	6	4.36	0	5	0	274	4.36	274	3.48	3.1	1.79	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.9	6.15	6.15	2.0	6.0	48.6	300	PVC	SDR 35	0.19	41.9	**14.29%**	0.59	0.35
R6A	6	5	0.52	5	9	0	41	14.08	1201	3.20	12.4	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.52	21.42	7.1	23.1	59.3	300	PVC	SDR 35	0.19	41.9	**55.16%**	0.59	0.52
R5A	5	4	0.19	2	0	0	7	14.27	1208	3.20	12.5	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.19	21.61	7.1	23.2	11.0	300	PVC	SDR 35	0.32	54.3	**42.74%**	0.77	0.63
R4A	4	3	0.20	3	0	0	10	14.47	1218	3.19	12.6	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.20	21.81	7.2	23.4	39.2	300	PVC	SDR 35	0.19	41.9	**55.86%**	0.59	0.53
R3A	3	2	0.15	3	0	0	10	14.62	1228	3.19	12.7	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.15	21.97	7.2	23.5	28.9	300	PVC	SDR 35	0.19	41.9	**56.22%**	0.59	0.53
R21B	21	24	0.32	0	8	0	22	0.32	22	3.70	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.32	0.32	0.1	0.4	62.8	200	PVC	SDR 35	0.32	18.9	**1.93%**	0.60	0.19
R24A	24	23	0.18	0	5	0	14	0.50	35	3.67	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.18	0.50	0.2	0.6	11.6	200	PVC	SDR 35	0.32	18.9	**3.09%**	0.60	0.23
R23A	23	22	0.52	0	16	0	43	1.03	78	3.62	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.52	1.03	0.3	1.3	56.6	200	PVC	SDR 35	0.32	18.9	**6.64%**	0.60	0.28
	22	2	0.00	0	0	0	0	1.03	78	3.62	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	1.03	0.3	1.3	14.4	200	PVC	SDR 35	0.32	18.9	**6.64%**	0.60	0.28
R2A	2	1	0.03	0	0	0	0	15.68	1307	3.18	13.5	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.03	23.02	7.6	24.6	9.1	300	PVC	SDR 35	0.19	41.4	**59.47%**	0.59	0.53
R21A	21	20	0.23	0	5	0	14	0.23	14	3.72	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.23	0.23	0.1	0.2	11.4	200	PVC	SDR 35	0.65	27.0	**0.89%**	0.85	0.23
R20A	20	15	0.71	0	25	0	68	0.94	81	3.61	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.71	0.94	0.3	1.3	99.1	200	PVC	SDR 35	0.32	18.9	**6.66%**	0.60	0.28
R19A, KIZZEL	19	18	0.79	14	0	0	48	0.79	48	3.66	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.79	0.79	0.3	0.8	39.6	200	PVC	SDR 35	0.32	18.9	**4.36%**	0.60	0.24
R12B	12	18	0.54	0	17	0	46	0.54	46	3.66	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.54	0.54	0.2	0.7	81.0	200	PVC	SDR 35	0.32	18.9	**3.82%**	0.60	0.24
R18A	18	17	0.87	10	16	0	77	2.21	171	3.54	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.87	2.21	0.7	2.7	114.1	200	PVC	SDR 35	0.32	18.9	**14.19%**	0.60	0.35
R17A	17	16	0.21	2	0	0	7	2.41	178	3.53	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.21	2.41	0.8	2.8	13.5	200	PVC	SDR 35	0.32	18.9	**14.95%**	0.60	0.35
R16A	16	15	0.38	6	0	0	20	2.79	198	3.52	2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.38	2.79	0.9	3.2	70.2	200	PVC	SDR 35	0.32	18.9	**16.81%**	0.60	0.37
R15A	15	14	0.18	2	0	0	7	3.91	286	3.47	3.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.18	3.91	1.3	4.5	28.3	200	PVC	SDR 35	0.32	18.9	**23.81%**	0.60	0.40
R14A	14	1	0.33	4	0	0	14	4.24	299	3.46	3.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.33	4.24	1.4	4.8	52.7	200	PVC	SDR 35	0.32	18.9	**25.16%**	0.60	0.41
	1	1A	0.00	0	0	0	0	19.92	1606	3.13	16.3	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.00	27.27	9.0	28.8	44.2	300	PVC	SDR 35	0.20	42.9	**67.16%**	0.61	0.57
	1A	EX11	0.00	0	0	0	0	19.92	1606	3.13	16.3	0.00	7.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.6	0.00	27.27	9.0	28.8	49.9	300	PVC	SDR 35	0.20	42.9	**67.16%**	0.61	0.57
																												300							

ADDITIONAL 3.3 L/s FROM SITE RESULTS IN TOTAL FLOW OF 32.1 L/s. THE 300mm SANITARY SEWER AS-BUILT SHOWS IT WAS INSTALLED AT A SLOPE OF 0.14% RESULTING IN A FULL FLOW CAPACITY OF 37.7 L/s. WITH AN INCREASED FLOW OF 32.1 L/s, THE 300mm SANITARY SEWER WILL BE RUNNING AT 85.1% CAPACITY AT THE MOST CRITICAL JUNCTION POINT.



Stantec

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Ottawa ON
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Legend

- 1 / 0.38 / 14 — SANITARY DRAINAGE AREA ID# / POPULATION
- SANITARY DRAINAGE AREA No.
- SANITARY DRAINAGE AREA
- PROPOSED SANITARY SEWER
- FUTURE PHASE
- FUTURE SANITARY SEWER
- EXISTING PHASE
- EXISTING SANITARY SEWER
- FUTURE STUB
- F21 / 0.65 37 — FUTURE SANITARY DRAINAGE AREA
- 891 / 12.72 — OFF-SITE OVERALL CONTRIBUTING POPULATION / OFF-SITE OVERALL CONTRIBUTING AREA (ha.)

Notes

2	ISSUED FOR SECOND SUBMISSION	JP	SG	20.04.15
1	ISSUED FOR FIRST SUBMISSION	JP	SG	19.07.09
Revision		By	Appd.	YY.MM.DD

File Name: 160401217 SA PH4	JP	MJS	SG	19.04.09
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
D. C. THIFFAULT
100186107
16/04/2020
PROVINCE OF ONTARIO

Client/Project

2118356 ONTARIO INC.

BRADLEY COMMONS
PHASE 4
OTTAWA, ON, CANADA

Title

SANITARY DRAINAGE PLAN

Project No.	Scale	
160401217	1:750	0 7.5 22.5 37.5m
Drawing No.	Sheet	Revision
SA-1	29 of 30	2

DWG# 17514

D07-16-13-0036

W:\active\160401217 - Hazeldean Cmty Lands (840)\design\drawing\Phase 4\160401217 SA PH4.dwg
2020/04/16 8:21 PM By: Pranav Jupiter

ORIGINAL SHEET - ARCH D

560 Hazeldean Road - Double Deck

Project No.: 100057

STORM SEWER DESIGN SHEET

FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION				AREA (ha)			FLOW							TOTAL FLOW	SEWER DATA								
Street	Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
	A-01, A-15	CAP	122	1.646	0.77	1.27	3.523	3.523	10.00	76.81			270.6	270.6	0.686	675	Conc	0.15	42.8	339.4	0.92	0.78	80%
						0.00	0.000	0.000	10.00														
						0.00	0.000	0.000	10.00														
	A-03	124	122	0.359	0.68	0.24	0.679	0.679	10.00	76.81			52.1	52.1	0.305	300	PVC	0.35	44.2	59.6	0.82	0.90	87%
						0.00	0.000	0.000	10.00														
						0.00	0.000	0.000	10.00														
	A-13, A-14	122	120	0.660	0.61	0.40	1.119	5.321	10.90	73.51			391.2	391.2	0.762	750	Conc	0.15	101.2	449.6	0.99	1.71	87%
						0.00	0.000	0.000	10.90														
						0.00	0.000	0.000	10.90														
	A-11, A-12	120	102	0.537	0.62	0.33	0.926	6.247	12.61	68.04			425.1	425.1	0.838	825	Conc	0.15	83.8	579.7	1.05	1.33	73%
						0.00	0.000	0.000	12.61														
						0.00	0.000	0.000	12.61														
	A-04	118	112	0.239	0.58	0.14	0.385	0.385	10.00	76.81			29.6	29.6	0.381	375	PVC	0.25	89.6	91.4	0.80	1.86	32%
						0.00	0.000	0.000	10.00														
						0.00	0.000	0.000	10.00														
	A-08	116	114	0.355	0.57	0.20	0.563	0.563	10.00	76.81			43.2	43.2	0.305	300	PVC	0.35	28.0	59.6	0.82	0.57	72%
						0.00	0.000	0.000	10.00														
						0.00	0.000	0.000	10.00														
		114	112	0.000	0.00	0.00	0.000	0.563	10.57	74.68			42.0	42.0	0.305	300	PVC	0.35	38.0	59.6	0.82	0.77	70%
						0.00	0.000	0.000	10.57														
						0.00	0.000	0.000	10.57														
	A-05	112	110	0.483	0.65	0.31	0.873	1.821	11.86	70.32			128.0	128.0	0.533	525	Conc	0.20	80.8	200.5	0.90	1.50	64%
						0.00	0.000	0.000	11.86														
						0.00	0.000	0.000	11.86														
		110	106	0.000	0.00	0.00	0.000	1.821	13.36	65.92			120.0	120.0	0.533	525	Conc	0.20	34.3	200.5	0.90	0.64	60%
						0.00	0.000	0.000	13.36														
						0.00	0.000	0.000	13.36														
	A-06, A-07	106	104	0.957	0.55	0.53	1.463	3.284	14.00	64.23			210.9	210.9	0.610	600	Conc	0.15	60.0	247.9	0.85	1.18	85%
						0.00	0.000	0.000	14.00														
						0.00	0.000	0.000	14.00														
	A-09	104	102	0.157	0.58	0.09	0.253	3.537	15.18	61.35			217.0	217.0	0.610	600	Conc	0.15	59.6	247.9	0.85	1.17	88%
						0.00	0.000	0.000	15.18														
						0.00	0.000	0.000	15.18														
	A-10	102	100	0.170	0.59	0.10	0.279	10.063	16.35	58.76			591.3	591.3	0.991	975	Conc	0.15	27.2	905.1	1.17	0.39	65%
						0.00	0.000	0.000	16.35														
						0.00	0.000	0.000	16.35														
		100	1			0.00	0.000	10.063	16.73	57.96			583.2	583.2	0.991	975	Conc	0.15	9.3	905.1	1.17	0.13	64%
						0.00	0.000	0.000	16.73														
						0.00	0.000	0.000	16.73														

Q = 2.78 AIC, where

Q = Peak Flow in Litres per Second (L/s)

A = Area in hectares (ha)

I = Rainfall Intensity (mm/hr), 2 year storm

C = Runoff Coefficient

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
2025.08.15
PROVINCE OF ONTARIO

Consultant:	**Novatech**
Date:	August 15, 2025
Design By:	Lucas Wilson
Client:	**Dwg. Reference:** / **Checked By:**
Regional	100057-STM / MAB

DOUBLE DECK - 560 HAZELDEAN ROAD
Water Demand

	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Singles	N/A	50	170	0.551	1.377	3.030
Towns	N/A	48	130	0.420	1.050	2.310
Future Apartment Block:	N/A	180	324	1.050	2.625	5.775
Total	**0.00**	**278**	**624**	**2.021**	**5.052**	**11.115**

Water Demand Parameters

Singles	3.4	ppl/unit
Towns	2.7	ppl/unit
Future Block 10 Apartment Unit	1.8	ppl/unit
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Residential Fire Flow	167/267	L/s

560 Hazeldean Road- Double Deck: Watermain Demand

Node	Singles	Towns	Future Apartment Unit	Total Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
N1		17		46	0.149	0.372	0.818	267
N2	3	5		24	0.077	0.192	0.422	267
N3	12	8		62	0.202	0.506	1.112	167
N4	7	18		72	0.235	0.587	1.290	267
N5	13			44	0.143	0.358	0.788	167
N6	15			51	0.165	0.413	0.909	167
APT			180	324	1.050	2.625	5.775	250
Total	**50**	**48**	**180**	**624**	**2.021**	**5.052**	**11.115**	

Water Demand Parameters

Singles	3.4	ppl/unit	Residential Max Day	2.5	x Avg Day
Towns	2.7	ppl/unit	Residential Peak Hour	2.2	x Max Day
Future Apartment Unit	1.8	ppl/unit	Residential Fire Flow	267 (Max)	L/s
Residential Demand	280	L/c/day	Apartment Fire Flow	250	L/s

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.82	155.85	58.28	571.73	82.92
Junc N2	97.35	0.42	155.85	58.5	573.89	83.23
Junc N3	97.03	1.11	155.86	58.83	577.12	83.70
Junc N4	97.45	1.29	155.87	58.42	573.10	83.12
Junc N5	97.18	0.79	155.87	58.69	575.75	83.51
Junc N6	96.82	0.91	155.87	59.05	579.28	84.02
Junc APT	96.5	5.78	155.84	59.34	582.13	84.43
Resvr RES1	155.9	-6.17	155.9	0	0.00	0.00
Resvr RES2	155.9	-4.95	155.9	0	0.00	0.00

Network Table - Links - (Peak Hour)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	0.27	0.01	0.00	0.053
Pipe P2	97	200	110	-3.01	0.10	0.10	0.041
Pipe P3	97	200	110	2.63	0.08	0.07	0.042
Pipe P4	101	200	110	4.01	0.13	0.16	0.039
Pipe P5	84	200	110	6.17	0.20	0.36	0.037
Pipe P6	75	200	110	1.76	0.06	0.04	0.045
Pipe P7	115	200	110	4.95	0.16	0.24	0.038
Pipe P8	114	200	110	-2.40	0.08	0.06	0.042
Pipe P9	104	200	110	-1.49	0.05	0.03	0.046
Pipe P10	106	200	110	2.92	0.09	0.09	0.041
Pipe P11	109	200	110	-2.86	0.09	0.09	0.041

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes - (Max Pressure Check)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi	Age Hours
Junc N1	97.57	0.15	162.1	64.53	633.04	91.81	2.42
Junc N2	97.35	0.08	162.1	64.75	635.20	92.13	6.28
Junc N3	97.03	0.2	162.1	65.07	638.34	92.58	4.34
Junc N4	97.45	0.23	162.1	64.65	634.22	91.99	1.21
Junc N5	97.18	0.14	162.1	64.92	636.87	92.37	1.11
Junc N6	96.82	0.17	162.1	65.28	640.40	92.88	3.39
Junc APT	96.5	1.05	162.1	65.6	643.54	93.34	6.11
Resvr RES1	162.1	-1.12	162.1	0	0.00	0.00	0
Resvr RES2	162.1	-0.9	162.1	0	0.00	0.00	0

Network Table - Links - (Max Pressure Check)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	0.05	0.00	0.00	0.000
Pipe P2	97	200	110	-0.55	0.02	0.00	0.052
Pipe P3	97	200	110	0.48	0.02	0.00	0.052
Pipe P4	101	200	110	0.73	0.02	0.01	0.050
Pipe P5	84	200	110	1.12	0.04	0.02	0.048
Pipe P6	75	200	110	0.32	0.01	0.00	0.066
Pipe P7	115	200	110	0.90	0.03	0.01	0.049
Pipe P8	114	200	110	-0.44	0.01	0.00	0.057
Pipe P9	104	200	110	-0.27	0.01	0.00	0.056
Pipe P10	106	200	110	0.53	0.02	0.00	0.053
Pipe P11	109	200	110	-0.52	0.02	0.00	0.054

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'APT')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	120.9	23.33	228.87	33.19
Junc N2	97.35	0.19	120.87	23.52	230.73	33.46
Junc N3	97.03	0.51	129.12	32.09	314.80	45.66
Junc N4	97.45	0.59	132.13	34.68	340.21	49.34
Junc N5	97.18	0.36	132.94	35.76	350.81	50.88
Junc N6	96.82	0.41	130.93	34.11	334.62	48.53
Junc APT	96.5	252.62	110.45	14.3	140.28	20.35
Resvr RES1	145.6	-165.89	145.6	0	0.00	0.00
Resvr RES2	138.8	-89.16	138.8	0	0.00	0.00

Network Table - Links (Max Day + FF 'APT')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	7.81	0.25	0.56	0.036
Pipe P2	97	200	110	-117.52	3.74	85.10	0.024
Pipe P3	97	200	110	68.16	2.17	31.02	0.026
Pipe P4	101	200	110	135.67	4.32	111.02	0.023
Pipe P5	84	200	110	165.89	5.28	161.12	0.023
Pipe P6	75	200	110	38.52	1.23	10.78	0.028
Pipe P7	115	200	110	89.16	2.84	51.03	0.025
Pipe P8	114	200	110	-50.29	1.60	17.67	0.027
Pipe P9	104	200	110	-49.87	1.59	17.40	0.027
Pipe P10	106	200	110	127.48	4.06	98.93	0.024
Pipe P11	109	200	110	-125.15	3.98	95.60	0.024

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N1')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	267.37	115.24	17.67	173.34	25.14
Junc N2	97.35	0.19	117.28	19.93	195.51	28.36
Junc N3	97.03	0.51	125.81	28.78	282.33	40.95
Junc N4	97.45	0.59	128.86	31.41	308.13	44.69
Junc N5	97.18	0.36	129.84	32.66	320.39	46.47
Junc N6	96.82	0.41	127.72	30.9	303.13	43.97
Junc APT	96.5	2.63	116.17	19.67	192.96	27.99
Resvr RES1	144.1	-177.3	144.1	0	0.00	0.00
Resvr RES2	136.4	-94.76	136.4	0	0.00	0.00

Network Table - Links (Max Day + FF 'N1')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	-82.21	2.62	43.91	0.025
Pipe P2	97	200	110	-119.64	3.81	87.95	0.024
Pipe P3	97	200	110	68.76	2.19	31.53	0.026
Pipe P4	101	200	110	150.55	4.79	134.63	0.023
Pipe P5	84	200	110	177.30	5.64	182.24	0.022
Pipe P6	75	200	110	42.60	1.36	12.99	0.028
Pipe P7	115	200	110	94.76	3.02	57.11	0.025
Pipe P8	114	200	110	-51.80	1.65	18.66	0.027
Pipe P9	104	200	110	-51.38	1.64	18.39	0.027
Pipe P10	106	200	110	-34.61	1.10	8.84	0.029
Pipe P11	109	200	110	-37.23	1.19	10.12	0.028

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N2')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	117.43	19.86	194.83	28.26
Junc N2	97.35	267.19	114.79	17.44	171.09	24.81
Junc N3	97.03	0.51	125.12	28.09	275.56	39.97
Junc N4	97.45	0.59	128.95	31.5	309.02	44.82
Junc N5	97.18	0.36	129.78	32.6	319.81	46.38
Junc N6	96.82	0.41	127.33	30.51	299.30	43.41
Junc APT	96.5	2.63	116.05	19.55	191.79	27.82
Resvr RES1	144.1	-176.78	144.1	0	0.00	0.00
Resvr RES2	136.4	-95.28	136.4	0	0.00	0.00

Network Table - Links (Max Day + FF 'N2')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	94.50	3.01	56.83	0.025
Pipe P2	97	200	110	-132.67	4.22	106.51	0.023
Pipe P3	97	200	110	77.64	2.47	39.49	0.025
Pipe P4	101	200	110	137.52	4.38	113.85	0.023
Pipe P5	84	200	110	176.78	5.63	181.25	0.022
Pipe P6	75	200	110	38.97	1.24	11.02	0.028
Pipe P7	115	200	110	95.28	3.03	57.69	0.025
Pipe P8	114	200	110	-55.95	1.78	21.53	0.027
Pipe P9	104	200	110	-55.54	1.77	21.23	0.027
Pipe P10	106	200	110	42.65	1.36	13.02	0.028
Pipe P11	109	200	110	40.02	1.27	11.58	0.028

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N2')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	143.86	46.29	454.10	65.86
Junc N2	97.35	0.19	143.49	46.14	452.63	65.65
Junc N3	97.03	167.51	142.07	45.04	441.84	64.08
Junc N4	97.45	0.59	145.55	48.1	471.86	68.44
Junc N5	97.18	0.36	145.65	48.47	475.49	68.96
Junc N6	96.82	0.41	143.77	46.95	460.58	66.80
Junc APT	96.5	2.63	143.65	47.15	462.54	67.09
Resvr RES1	151.9	-110.52	151.9	0	0.00	0.00
Resvr RES2	148.6	-61.53	148.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'N2')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	32.74	1.04	7.98	0.029
Pipe P2	97	200	110	45.53	1.45	14.70	0.027
Pipe P3	97	200	110	73.78	2.35	35.93	0.026
Pipe P4	101	200	110	48.72	1.55	16.66	0.027
Pipe P5	84	200	110	110.52	3.52	75.95	0.024
Pipe P6	75	200	110	12.57	0.40	1.36	0.033
Pipe P7	115	200	110	61.53	1.96	25.67	0.026
Pipe P8	114	200	110	-48.60	1.55	16.59	0.027
Pipe P9	104	200	110	-48.19	1.53	16.33	0.027
Pipe P10	106	200	110	15.60	0.50	2.02	0.032
Pipe P11	109	200	110	12.98	0.41	1.44	0.033

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N4')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	128.47	30.9	303.13	43.97
Junc N2	97.35	0.19	128.49	31.14	305.48	44.31
Junc N3	97.03	0.51	128.63	31.6	310.00	44.96
Junc N4	97.45	267.59	128.38	30.93	303.42	44.01
Junc N5	97.18	0.36	130.22	33.04	324.12	47.01
Junc N6	96.82	0.41	129.38	32.56	319.41	46.33
Junc APT	96.5	2.63	128.47	31.97	313.63	45.49
Resvr RES1	144.1	-180.31	144.1	0	0.00	0.00
Resvr RES2	136.4	-91.75	136.4	0	0.00	0.00

Network Table - Links (Max Day + FF 'N4')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	-8.04	0.26	0.59	0.036
Pipe P2	97	200	110	-12.82	0.41	1.41	0.033
Pipe P3	97	200	110	-17.71	0.56	2.56	0.032
Pipe P4	101	200	110	-9.63	0.31	0.83	0.035
Pipe P5	84	200	110	180.31	5.74	188.01	0.022
Pipe P6	75	200	110	59.94	1.91	24.46	0.026
Pipe P7	115	200	110	91.75	2.92	53.80	0.025
Pipe P8	114	200	110	-31.45	1.00	7.41	0.029
Pipe P9	104	200	110	-31.04	0.99	7.23	0.029
Pipe P10	106	200	110	-1.97	0.06	0.04	0.044
Pipe P11	109	200	110	-4.59	0.15	0.21	0.039

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N5')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	146.46	48.89	479.61	69.56
Junc N2	97.35	0.19	146.42	49.07	481.38	69.82
Junc N3	97.03	0.51	146.31	49.28	483.44	70.12
Junc N4	97.45	0.59	146.65	49.2	482.65	70.00
Junc N5	97.18	167.36	144.63	47.45	465.48	67.51
Junc N6	96.82	0.41	145.49	48.67	477.45	69.25
Junc APT	96.5	2.63	146.43	49.93	489.81	71.04
Resvr RES1	151.9	-99.74	151.9	0	0.00	0.00
Resvr RES2	148.6	-72.31	148.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'N5')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	9.36	0.30	0.78	0.035
Pipe P2	97	200	110	11.79	0.38	1.20	0.034
Pipe P3	97	200	110	21.10	0.67	3.54	0.031
Pipe P4	101	200	110	14.98	0.48	1.87	0.032
Pipe P5	84	200	110	99.74	3.17	62.80	0.024
Pipe P6	75	200	110	-63.08	2.01	26.88	0.026
Pipe P7	115	200	110	72.31	2.30	34.62	0.026
Pipe P8	114	200	110	31.97	1.02	7.64	0.029
Pipe P9	104	200	110	32.38	1.03	7.82	0.029
Pipe P10	106	200	110	5.24	0.17	0.27	0.038
Pipe P11	109	200	110	2.62	0.08	0.07	0.042

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560 Hazeldean Road - Double Deck: Watermain Analysis

Network Table - Nodes (Max Day + FF 'N6')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	97.57	0.37	144.95	47.38	464.80	67.41
Junc N2	97.35	0.19	144.77	47.42	465.19	67.47
Junc N3	97.03	0.51	144.11	47.08	461.85	66.99
Junc N4	97.45	0.59	145.79	48.34	474.22	68.78
Junc N5	97.18	0.36	145.45	48.27	473.53	68.68
Junc N6	96.82	167.41	139.81	42.99	421.73	61.17
Junc APT	96.5	2.63	144.84	48.34	474.22	68.78
Resvr RES1	151.9	-108.23	151.9	0	0.00	0.00
Resvr RES2	148.6	-63.82	148.6	0	0.00	0.00

Network Table - Links (Max Day + FF 'N6')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	46	200	110	22.13	0.70	3.86	0.031
Pipe P2	97	200	110	30.25	0.96	6.89	0.029
Pipe P3	97	200	110	49.89	1.59	17.41	0.027
Pipe P4	101	200	110	33.43	1.06	8.30	0.029
Pipe P5	84	200	110	108.23	3.45	73.06	0.024
Pipe P6	75	200	110	-24.31	0.77	4.60	0.030
Pipe P7	115	200	110	63.82	2.03	27.47	0.026
Pipe P8	114	200	110	-87.78	2.79	49.57	0.025
Pipe P9	104	200	110	79.63	2.53	41.39	0.025
Pipe P10	106	200	110	10.94	0.35	1.05	0.034
Pipe P11	109	200	110	8.31	0.26	0.63	0.035

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FUS - Fire Flow Calculations

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Novatech Project #: 100057
Project Name: Double Deck - 560 Hazeldean Road
Date: 8/15/2025
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference:

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

Building Description: 6-unit Townhome
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)	630			
		Number of Floors/Storeys	2			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**1,260**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%		
		Limited combustible	Yes	-15%	-15%	**10,200**
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		**0**
				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	20.1 - 30 m		10%	
		East Side	10.1 - 20 m		15%	
		South Side	3.1 - 10 m		20%	**5,610**
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**55%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**16,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**267**
				or	USGPM	4,227

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 100057
Project Name: Double Deck - 560 Hazeldean Road
Date: 8/15/2025
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference:

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

Building Description: 4-unit Townhome
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)	425			
		Number of Floors/Storeys	2			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**850**	
	F	**Base fire flow without reductions**				**10,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		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	3.1 - 10 m		20%	**5,525**
		East Side	10.1 - 20 m		15%	
		South Side	3.1 - 10 m		20%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**65%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 100057
Project Name: Double Deck - 560 Hazeldean Road
Date: 8/15/2025
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference:

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

Building Description: Single
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)	215			
		Number of Floors/Storeys	2			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**430**	
	F	**Base fire flow without reductions**				**7,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**4,463**
		East Side	3.1 - 10 m		20%	
		South Side	0 - 3 m		25%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**75%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**10,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**167**
				or	USGPM	2,642

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 100057
Project Name: Double Deck - 560 Hazeldean Road
Date: 8/15/2025
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference:

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

Building Description: Future Apartments
Type V - Wood frame

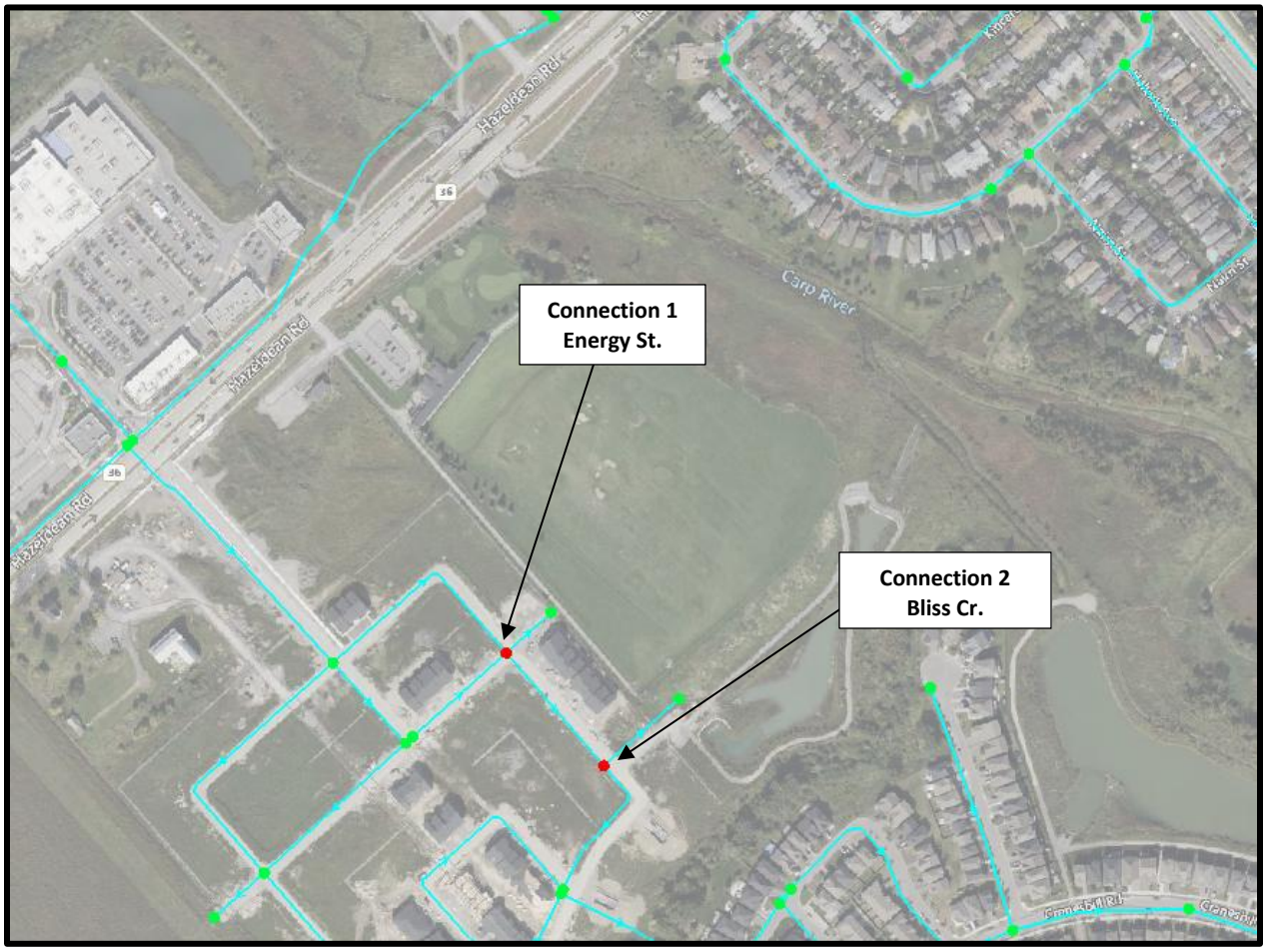
Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	912			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**5,472**	
	F	**Base fire flow without reductions**				**24,000**
		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%	**20,400**
		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)	Yes	-30%	-30%	**-8,127**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	5450	100%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**3,060**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**15%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**15,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**250**
				or	USGPM	3,963

Boundary Conditions
560 Hazeldean Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	121	2.02
Maximum Daily Demand	303	5.05
Peak Hour	667	11.12
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	14,000	233.33
Fire Flow Demand #3	15,000	250.00
Fire Flow Demand #4	16,000	266.67

Location



Results

Connection 1 – Energy Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	162.1	91.0
Peak Hour	155.9	82.1
Max Day plus Fire Flow #1	151.9	76.3
Max Day plus Fire Flow #2	147.0	69.5
Max Day plus Fire Flow #3	145.6	67.5
Max Day plus Fire Flow #4	144.1	65.3

[1] Ground Elevation = 98.2 m

Connection 2 – Bliss Crescent

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	162.1	92.1
Peak Hour	155.9	83.2
Max Day plus Fire Flow #1	148.6	72.8
Max Day plus Fire Flow #2	141.0	62.0
Max Day plus Fire Flow #3	138.8	58.8
Max Day plus Fire Flow #4	136.4	55.5

[1] Ground Elevation = 97.4 m

Notes

1. The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update.
2. Demands for proposed Connection 1 at existing water main along Energy Street were assigned to upstream junction at Bliss Crescent & Energy Street off the public looped watermains. The engineer must calculate headloss off the dead-end main.
3. Demands for proposed Connection 2 at existing water main stub off Bliss Crescent were assigned to upstream junction off the public looped watermains. The engineer must calculate headloss off the dead-end main.
4. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.

    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

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

Appendix B: Stormwater Documentation

PCSWMM Model Schematic
Outlet Channel Capacity Analysis
MVCA Floodplain Map
Pond 2 Design Report Excerpts
100-year Model Output – SCS Storm

Fernbank Community - Pond 2
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects



Legend

- Junctions
- Outfalls
- Storages

Conduits

- Visible
- Major System
- Ditch
- Orifices
- Weirs
- Outlets

Subcatchments

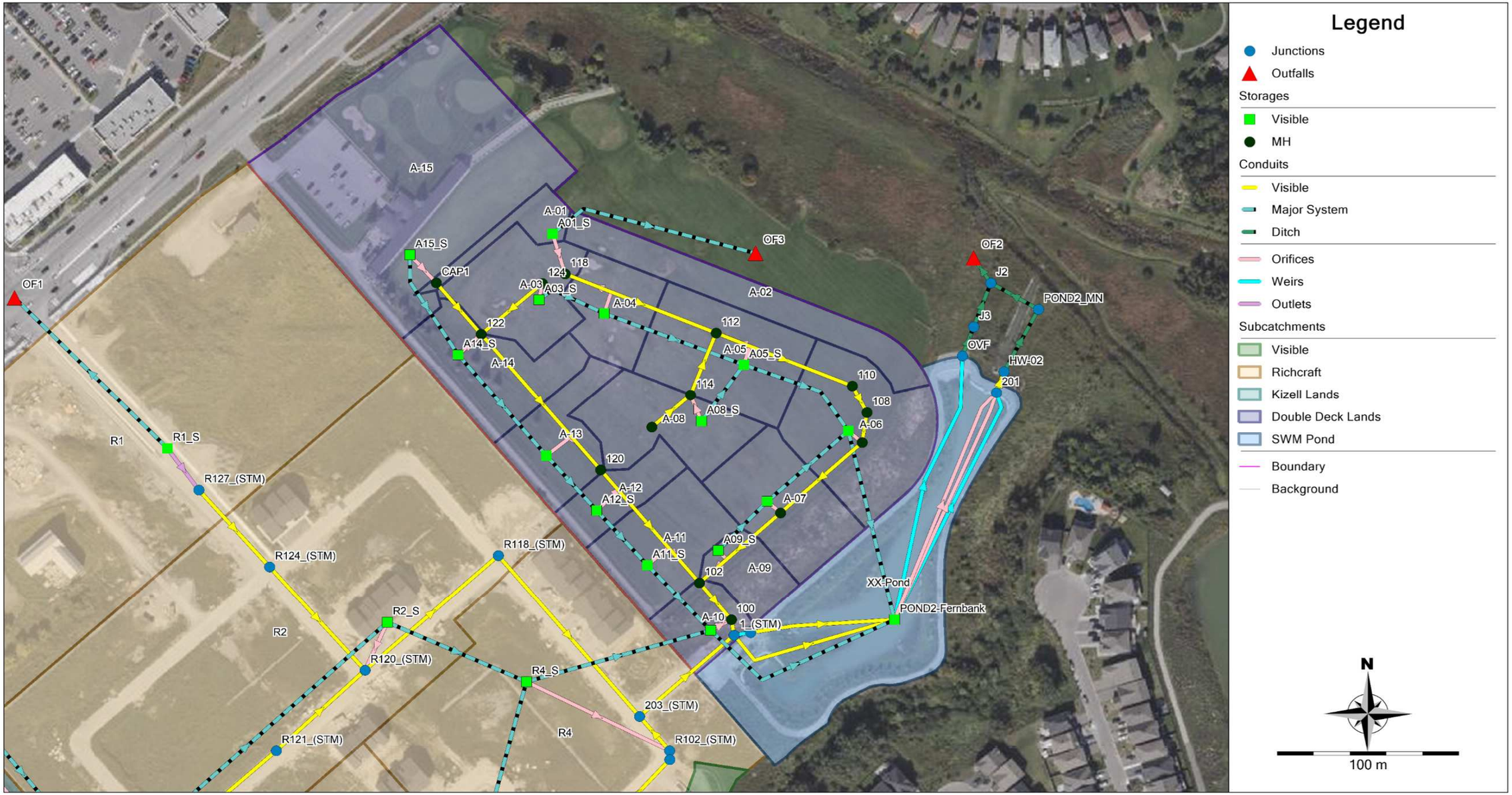
- Visible
- Richcraft
- Kizell Lands
- Double Deck Lands
- SWM Pond

N

200 m

560 Hazeldean Road - Double Deck Subdivision
PCSWMM Model Schematic

NOVATECH
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560 Hazeldean Road - Double Deck Subdivision

3rd Pipe System - Outlet Channel

Parameter	Units	Ditch Capacity
		Prop.
Depth	m	0.20
Bottom Width	m	0.30
Side slope (L)	1 to X	3.0
Side slope (R)	1 to X	3.0
Top Width (L)	m	0.60
Top Width (R)	m	0.60
Top Width (total)	m	1.50
Area	m^2	0.180
Perimeter	m	1.56
R=A/P	m	0.12
n	-	0.035
Slope	m/m	0.0025
V	**m/s**	**0.34**
Q	**m^3/s**	**0.061**

**Manning's equation for flat bottom ditch*

DRAFT

FLOOD HAZARD AND REGULATION MAP

CARP RIVER

CARTE DU RISQUE D'INONDATION ET DE RÉGULATION

LEGEND / LÉGENDE

- Regulatory Flood Plain / La Crue Régulatrice
- Regulation Limit / Limite Réglementaire
- Contours / Courbes
- Cross Sections / La coupe traversale

Cross Section Number — Nombre de la coupe traversale

47919 / 130.2

Regulatory Flood Elevation (m) — Niveau de la crue regulatrice (m)

INDEX CONTOUR INTERVAL 2 METRES
WITH 0.5 METRE INTERMEDIATE CONTOUR
NORTH AMERICAN DATUM 1983

COURBES DE NIVEAU PRINCIPALES DE 2.0 MÈTRE
AVEC COURBES DE NIVEAU INTERMÉDIAIRES DE 0.5 MÈTRES
SYSTÈME DE RÉFÉRENCE GÉODÉSIQUE NORD-AMÉRIQUE 1983

GENERAL INFORMATION

Vertical Datum: CGVD28
Horizontal Datum: North American 1983
Map Projection: Ottawa Transverse Mercator Projection

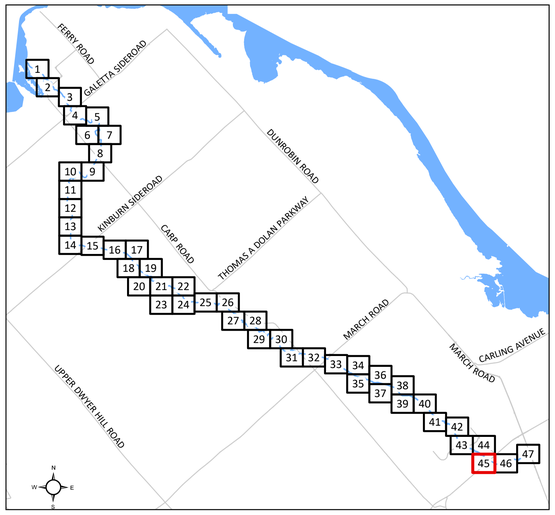
RENSEIGNMENTS GÉNÉRAUX

Niveau de référence vertical: CGVD28
Niveau de référence horizontal: Nord-american 1983
Projection cartographique: Projection Mercator Transverse d'Ottawa

Mississippi Valley Conservation Authority

Ottawa

SHEET INDEX / TABLEAU D'ASSEMBLAGE



Note: The regulation limit represents all areas regulated under the Conservation Authorities Act, Section 28, Ontario Regulation 41/24. The regulation limit is defined as a buffer around all flooding hazards, erosion hazards, and wetlands. These areas are regulated in an effort to maintain the vitality of our watersheds while also protecting lives and property from natural hazards.

Remarque : La limite réglementaire représente toutes les zones réglementées en vertu de la Loi sur les offices de protection de la nature, article 28, Règlement de l'Ontario 41/24. La limite de régulation est définie comme une zone tampon autour de tous les risques d'inondation, d'érosion et de zones humides. Ces zones sont réglementées dans le but de maintenir la vitalité de nos bassins versants tout en protégeant les vies et les biens contre les risques naturels.

REVISIONS		
NO.	DESCRIPTION	DATE

Date Exported: 16/04/2024 9:51 AM

SCALE 1:2,000 ÉCHELLE

0 20 40 80 120

Meters / Mètres

This map and the associated information displayed are to be used for general illustrative purposes only. Although best efforts have been made to create accuracy; due to the complex and extensive nature of the data, all representations and/or information provided herein are approximate and to be verified by user. The user hereby acknowledges that this map is not intended for true and accurate navigational purposes and hereby accepts and assumes all inherent risks associated with the use of this map.

This map is produced in part with data provided by the Ontario Geographic Data Exchange under License with the Ontario Ministry of Natural Resources and the Queen's Printer for Ontario, 2024

Aerial Imagery © DRAPE 2019
Digital Elevation Information © City of Ottawa

Cette carte et les renseignements connexes qui sont affichés sont fournis à titre d'exemple général seulement. En dépit de tous les efforts consentis pour en garantir l'exactitude, les représentations ou renseignements que l'on trouvera ici demeurent approximatifs du fait de la nature complexe et de l'étendue des données, et doivent donc être vérifiés par l'utilisateur. L'utilisateur reconnait par la présente que cette carte n'est pas conçue pour une navigation exacte et véridique, accepte et endosse les risques connexes associés à son utilisation.

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Images a ériennes © DRAPE 2019
Données a tim triques numériques © Ville d'Ottawa

FERNBANK COMMUNITY SWM FACILITY - POND 2

DESIGN REPORT

Prepared By:

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

First submission: January 4, 2019
Revision 1: August 14, 2019
Revision 2: April 15, 2020
Revision 3: July 28, 2020
Revision 4: October 16, 2020
Revision 5: October 28, 2020

Novatech File: 114010
Ref: R-2019-001

3.2 Model Results

Table 3.1 provides the total major and minor system inflows to Pond 2 and the outflows for each storm event. The SCS Storm events gave the largest peak flows and have been used to govern the design of the pond. Peak flows are from the Standalone Pond 2 PCSWMM model. Peak flows from the Interim and Ultimate Carp River models have been included in **Appendix D**.

Table 3.1: Pond 2 Inflows & Outflows (cms) Standalone PCSWMM Model - Novatech

Storm Distribution->		**MTO SCS Type II Storm Events**				
Return Period->		**2-year**	**5-year**	**10-year**	**100-year**	**100-year+20%**
Inflow	*Minor*	2.756	3.330	3.618	4.073	4.256
	Major	0.000	0.000	0.000	0.039	0.073
	Total	2.756	3.330	3.618	4.112	4.329
Outflow	*Total*	0.135	0.394	0.687	2.705	3.412
EMP Target		***0.320***	***0.530***	***0.700***	***2.700***	***N/A***

Peak flows from the standalone Novatech Pond 2 model have been compared to those from Stantec's model, which includes the detailed PCSWMM model for the Richcraft lands, to ensure that peak flows into and out of the pond are appropriately accounted for.

Table 3.2: Pond 2 Inflows & Outflows (cms) Standalone PCSWMM Model - *Stantec*

Storm Distribution->		**MTO SCS Type II Storm Events**				
Return Period->		**2-year**	**5-year**	**10-year**	**100-year**	**100-year+20%**
Inflow	*Minor*	2.792	3.445	3.642	4.048	4.269
	Major	0.000	0.000	0.000	0.000	0.000
	Total	2.792	3.445	3.642	4.048	4.269
Outflow	*Total*	0.129	0.349	0.639	2.614	3.527
EMP Target		***0.320***	***0.530***	***0.700***	***2.700***	***N/A***

As shown in **Table 3.2**, the outflows from the pond in the Stantec model are less than those accounted for in the Novatech model. However, during the 2, 5, and 10-year storm events, peak flows into the pond are slightly higher in the Stantec model. While the runoff from the subdivision has a higher peak, the total volume of runoff directed to the pond is less than anticipated by the Novatech model, resulting in slightly lower pond water levels and therefore lower peak flows leaving the pond, because the average runoff coefficient used for the residential area in the Stantec model is 0.58 versus the 0.65 used in the Novatech model for the same area. Pond water levels from each model are outlined in **Table 3.3**. As such, the Novatech model provides a more conservative analysis of the pond volume and outflows to the Carp River.

Table 3.3: Pond 2 Water Levels (m) Standalone PCSWMM Models

Storm Distribution->	**MTO SCS Type II Storm Events**				
Return Period->	**2-year**	**5-year**	**10-year**	**100-year**	**100-year+20%**
Novatech	94.63	94.84	94.97	95.22	95.26
Stantec	94.58	94.82	94.95	95.21	95.27

HAZELDEAN ROAD

HAZELDEAN ROAD

PARK N' RIDE

MIXED-USE

2.40ha K1 0.80

MIXED-USE

MIXED-USE

4.63ha R1 0.80

MIXED-USE

1.79ha D1 0.80

4.21ha K2 0.65

HIGH DENSITY RESIDENTIAL

KIZELL

RICHCRAFT

4.47ha R2 0.65

DOUBLE DECK

1.72ha D2 0.65

2.44ha D3 0.65

PARK

HIGH DENSITY RESIDENTIAL

3.22ha R3 0.65

2.60ha R4 0.65

POND 1

POND 2

1.37ha P1 0.50

POND 3

0.70ha X-R5 0.65

CARP RIVER

100-YEAR FLOOD LINE @ C/L200-94-50 (INTERIM CONDITION)

SPILLWAY CHANNEL

OUTLET CHANNEL

CARP TRIBUTARY

CARP TRIBUTARY

CLARIDGE

KIZELL

RICHCRAFT

MATTAMY

MH

$Q_{1:100}$=758L/s

375mmØ STM

450mmØ STM

975mmØ STM

1200mmØ STM

525mmØ STM

1920mm x 1220mmØ STM (ELLIPTICAL)

300mmØ STM

750mmØ STM

675mmØ STM

600mmØ STM

900mmØ STM

825mmØ STM

1920mm x 1220mmØ STM (ELLIPTICAL)

LEGEND

- 0.24 ha / D1 / 0.65 — AREA (hectares), AREA ID, RUN-OFF COEFFICIENT
- STORM DRAINAGE AREA BOUNDARY (SEMI-LUMPED MODEL)
- 100 — PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- TOTAL DRAINAGE AREA = 29.26ha
- Q_{max}=550L/s — DESIGN FLOW TO BE ROUTED THOUGH DOWNSTREAM LANDS

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

No.	REVISION	DATE	BY
8.	CITY COMMENTS	SEP 30/20	MAB
7.	REVISED PER COMMENTS	JUL 28/20	MAB
6.	ISSUED FOR APPROVAL	APR 15/20	MAB
5.	ISSUED FOR APPROVAL	AUG 14/19	MAB
4.	ISSUED FOR REVIEW	JAN 3/19	MAB
3.	UPDATED DESIGN PER CITY COMMENTS	SEP 20/16	MAB
2.	ISSUED TO CITY FOR DRAFT PLAN APPROVAL	MAY 20/16	MAB
1.	ISSUED FOR DESIGN COORDINATION	MAR 31/16	MAB

SCALE 1:1000

1:1000
0 10 20 30 40

DESIGN MAB
CHECKED MJP
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M.J. PETEPIECE 100079354 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2020.09.30 PROVINCE OF ONTARIO

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

CITY OF OTTAWA
FERNBANK COMMUNITY - POND 2

STORM DRAINAGE AREA PLAN

PROJECT No. 114010
REV REV # 8
DRAWING No. 114010-STM

L:\2014\114010\CAD\Design\114010-STM.dwg, PLANS-B1, Oct 01, 2020 - 10:35am, tiffe

PLASBF1.DWG - 1935mmx1575mm

560 Hazeldean Road – Double Deck Subdivision
PCSWMM Model MTO 100-year SCS Storm Model Output

NOVATECH
Engineers, Planners & Landscape Architects

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
  ----------------------------------------------------------------

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 23
  Number of nodes ........... 63
  Number of links ........... 82
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                 Data       Recording
  Name                 Data Source               Type       Interval
  ------------------------------------------------------------------
  RG1                  MTO_100yr_12hrSCS         INTENSITY   15 min.


  ********************
  Subcatchment Summary
  ********************
  Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
  ------------------------------------------------------------------------------------------
--------
  A-01                       0.11     43.20     25.40    1.0000 RG1                  A01_S
  A-02                       0.38    108.29     35.70    1.0000 RG1                  OF3
  A-03                       0.36    119.67     68.80    1.0000 RG1                  A03_S
  A-04                       0.24     79.67     54.30    1.0000 RG1                  A04_S
  A-05                       0.48    161.00     64.10    1.0000 RG1                  A05_S
  A-06                       0.57    189.33     47.40    1.0000 RG1                  A06_S
  A-07                       0.39    129.67     53.50    1.0000 RG1                  A07_S
  A-08                       0.35    118.33     53.00    1.0000 RG1                  A08_S
  A-09                       0.16     52.33     54.80    1.0000 RG1                  A09_S
  A-10                       0.17     56.67     55.50    1.0000 RG1                  A10_S
  A-11                       0.36    120.00     59.40    1.0000 RG1                  A11_S
  A-12                       0.18     59.00     59.40    1.0000 RG1                  A12_S
  A-13                       0.27     91.33     58.90    1.0000 RG1                  A13_S
  A-14                       0.39    128.67     58.10    1.0000 RG1                  A14_S
  A-15                       1.54    346.03     85.70    1.0000 RG1                  A15_S
  K1                         2.40    164.00     86.00    0.5000 RG1                  K1_S
  K2                         4.21    247.00     64.00    0.5000 RG1                  K2_S
  R1                         4.63    308.00     86.00    0.5000 RG1                  R1_S
  R2                         4.47    320.00     64.00    0.5000 RG1                  R2_S
  R3                         3.22    183.00     64.00    0.5000 RG1                  R3_S
  R4                         2.60    152.00     64.00    0.5000 RG1                  R4_S
  X-R5                       0.70    275.00     64.00    0.5000 RG1                  CarpOut
  XX-Pond                    1.37     61.00     43.00    0.5000 RG1                  POND2-Fernbank


  ************
  Node Summary
  ************
                                     Invert      Max.    Ponded    External
  Name                 Type           Elev.     Depth      Area    Inflow
  ------------------------------------------------------------------------
  1_(STM)              JUNCTION       92.89      3.71       0.0
  201                  JUNCTION       93.66      1.59       0.0
  203_(STM)            JUNCTION       93.33      5.02       0.0
  HW-02                JUNCTION       92.66      2.54       0.0
  J1                   JUNCTION       99.75      0.35       0.0
  J2                   JUNCTION       92.90      1.75       0.0
  J3                   JUNCTION       93.70      1.30       0.0
  MH200_(STM)          JUNCTION       92.97      3.81       0.0
  MH200a               JUNCTION       92.97      3.81       0.0
  OVF                  JUNCTION       94.12      1.38       0.0
  POND2_MN             JUNCTION       92.95      1.75       0.0
  R102_(STM)           JUNCTION       93.43      4.78       0.0
  R103_(STM)           JUNCTION       93.49      4.71       0.0
  R104_(STM)           JUNCTION       93.58      5.11       0.0
  R105_(STM)           JUNCTION       93.70      5.18       0.0
  R110_(STM)           JUNCTION       95.18      3.80       0.0
  R111_(STM)           JUNCTION       95.29      3.73       0.0
  R118_(STM)           JUNCTION       93.25      5.87       0.0
  R120_(STM)           JUNCTION       93.42      4.98       0.0
  R121_(STM)           JUNCTION       94.09      4.90       0.0
  R122_(STM)           JUNCTION       94.25      5.97       0.0
  R123_(STM)           JUNCTION       94.41      5.32       0.0
  R124_(STM)           JUNCTION       93.60      5.29       0.0
  R127_(STM)           JUNCTION       93.91      4.94       0.0
  CarpOut              OUTFALL         0.00      0.00       0.0
  OF1                  OUTFALL        99.91      0.35       0.0
  OF2                  OUTFALL        92.88      1.76       0.0
  OF3                  OUTFALL        94.34      1.00       0.0
  100                  STORAGE        93.21      3.54       0.0
  102                  STORAGE        93.25      3.94       0.0
  104                  STORAGE        93.71      3.27       0.0
  106                  STORAGE        93.80      3.01       0.0
  108                  STORAGE        93.91      2.88       0.0
  110                  STORAGE        93.94      2.86       0.0
  112                  STORAGE        94.10      2.97       0.0
  114                  STORAGE        94.45      2.70       0.0
  116                  STORAGE        94.55      2.70       0.0
  118                  STORAGE        94.93      2.41       0.0
  120                  STORAGE        93.52      3.96       0.0
  122                  STORAGE        93.75      3.85       0.0
  124                  STORAGE        94.35      3.04       0.0
  A01_S                STORAGE        95.00      2.40       0.0
  A03_S                STORAGE        96.00      2.40       0.0
  A04_S                STORAGE        95.80      2.40       0.0
  A05_S                STORAGE        95.50      2.40       0.0
  A06_S                STORAGE        95.40      2.40       0.0
  A07_S                STORAGE        95.50      2.40       0.0
  A08_S                STORAGE        95.75      2.40       0.0
  A09_S                STORAGE        95.60      2.40       0.0
  A10_S                STORAGE        95.20      2.40       0.0
  A11_S                STORAGE        95.80      2.40       0.0
  A12_S                STORAGE        96.00      2.40       0.0
  A13_S                STORAGE        96.10      2.40       0.0
  A14_S                STORAGE        96.40      2.40       0.0
  A15_S                STORAGE        96.60      2.40       0.0
  CAP1                 STORAGE        93.89      3.08       0.0
  K1_S                 STORAGE        98.05      1.75       0.0
  K2_S                 STORAGE        98.05      1.75       0.0
  POND2-Fernbank       STORAGE        91.50      3.75       0.0
  R1_S                 STORAGE        97.50      1.75       0.0
  R2_S                 STORAGE        97.50      1.75       0.0
  R3_S                 STORAGE        97.75      1.75       0.0
  R4_S                 STORAGE        97.30      1.75       0.0


  ************
  Link Summary
  ************
  Name                 From Node          To Node            Type           Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------------
  106_(STM)            R118_(STM)         203_(STM)          CONDUIT         119.9    0.1501    0.0130
  108_(STM)            R120_(STM)         R118_(STM)         CONDUIT          98.0    0.1530    0.0130
  110_(1)_(STM)        R122_(STM)         R121_(STM)         CONDUIT          82.9    0.1930    0.0130
  110_(STM)            R121_(STM)         R120_(STM)         CONDUIT          66.7    0.1948    0.0130
  112_(STM)            R124_(STM)         R120_(STM)         CONDUIT          78.7    0.2414    0.0130
  118_(STM)            R102_(STM)         203_(STM)          CONDUIT          25.4    0.1575    0.0130
  120_(STM)            R103_(STM)         R102_(STM)         CONDUIT           5.0    0.1988    0.0130
  122_(1)_(STM)        R105_(STM)         R104_(STM)         CONDUIT          29.3    0.1704    0.0130
  122_(STM)            R104_(STM)         R103_(STM)         CONDUIT          51.5    0.1553    0.0130
  124_(1)_(STM)        R111_(STM)         R110_(STM)         CONDUIT          30.1    0.1330    0.0130
  124_(STM)            R110_(STM)         R105_(STM)         CONDUIT          60.2    0.1660    0.0130
  160_(STM)            R127_(STM)         R124_(STM)         CONDUIT          58.3    0.1543    0.0130
  166_(STM)            R123_(STM)         R122_(STM)         CONDUIT          44.4    0.1350    0.0130
  202_(14)_(STM)       MH200_(STM)        POND2-Fernbank     CONDUIT          17.3    0.1156    0.0130
  202_(15)_(STM)_2     MH200a             POND2-Fernbank     CONDUIT          33.2    0.6936    0.0130
  202_(27)_(STM)       203_(STM)          MH200_(STM)        CONDUIT          69.5    0.5037    0.0130
  C1                   K1_S               J1                 CONDUIT         145.1    0.0345    0.0130
  C10                  R3_S               R4_S               CONDUIT         142.9    0.3149    0.0130
  C11                  R4_S               A10_S              CONDUIT         129.9    1.6171    0.0130
  C12                  A06_S              POND2-Fernbank     CONDUIT         124.3    1.6095    0.0130
  C13                  A15_S              A14_S              CONDUIT          64.4    0.3106    0.0130
  C14                  A07_S              A06_S              CONDUIT          60.0    0.1667    0.0130
  C15                  A13_S              A12_S              CONDUIT          41.5    0.2410    0.0130
  C16                  A12_S              A11_S              CONDUIT          41.7    0.4796    0.0130
  C17                  A11_S              A10_S              CONDUIT          50.8    1.1812    0.0130
  C18                  A10_S              POND2-Fernbank     CONDUIT         120.0    1.5002    0.0130
  C19                  A01_S              OF3                CONDUIT          20.0   11.8830    0.0350
  C2                   J1                 R2_S               CONDUIT         209.6    0.2624    0.0130
  C20                  A03_S              A04_S              CONDUIT          40.9    0.4890    0.0130
  C21                  A04_S              A05_S              CONDUIT          82.2    0.3650    0.0130
  C22                  A05_S              A06_S              CONDUIT          60.8    0.1645    0.0130
  C23                  A08_S              A05_S              CONDUIT          39.8    0.6282    0.0130
  C24                  A09_S              A07_S              CONDUIT          38.7    0.2584    0.0130
  C3                   K2_S               J1                 CONDUIT          59.6    0.0839    0.0130
```

C4	R1_S	OF1	CONDUIT	119.8	-0.5508	0.0130
C5	R2_S	R4_S	CONDUIT	152.1	0.1315	0.0130
C6	201	HW-02	CONDUIT	11.4	2.0215	0.0130
C7	A14_S	A13_S	CONDUIT	75.0	0.4000	0.0130
C7_1	OVF	J3	CONDUIT	30.0	1.4001	0.0350
C7_2	J3	J2	CONDUIT	45.0	0.6000	0.0350
C8	J2	OF2	CONDUIT	10.0	0.1272	0.0500
C9	POND2_MN	J2	CONDUIT	41.5	0.1277	0.0500
POND2-OUT	HW-02	POND2_MN	CONDUIT	58.5	0.1026	0.0320
STM-13_(STM)	124	122	CONDUIT	44.2	0.3394	0.0130
STM-16_(STM)	114	112	CONDUIT	38.0	0.3421	0.0130
STM-164_(STM)	116	114	CONDUIT	28.0	0.3568	0.0130
STM-165_(STM)	122	120	CONDUIT	101.2	0.1482	0.0130
STM-166_(STM)	120	102	CONDUIT	83.8	0.1432	0.0130
STM-20_(STM)	CAP1	122	CONDUIT	42.8	0.1636	0.0130
STM-3_(1)_(1)_(STM)	106	104	CONDUIT	60.0	0.1500	0.0130
STM-3_(1)_(STM)	104	102	CONDUIT	59.6	0.1510	0.0130
STM-3_(2)_(STM)	102	100	CONDUIT	27.2	0.1471	0.0130
STM-3_(STM_(2))	100	MH200_(STM)	CONDUIT	9.3	0.1075	0.0130
STM-5_(1)_(STM)	110	108	CONDUIT	17.1	0.1754	0.0130
STM-5_(STM)	108	106	CONDUIT	17.2	0.1744	0.0130
STM-7_(STM)	112	110	CONDUIT	80.8	0.1980	0.0130
STM-9_(STM)	118	112	CONDUIT	89.6	0.2455	0.0130
O-A01	A01_S	118	ORIFICE			
O-A03	A03_S	124	ORIFICE			
O-A04	A04_S	118	ORIFICE			
O-A05	A05_S	112	ORIFICE			
O-A06	A06_S	106	ORIFICE			
O-A07	A07_S	104	ORIFICE			
O-A08	A08_S	114	ORIFICE			
O-A09	A09_S	102	ORIFICE			
O-A10	A10_S	100	ORIFICE			
O-A11	A11_S	102	ORIFICE			
O-A12	A12_S	120	ORIFICE			
O-A13	A13_S	120	ORIFICE			
O-A14	A14_S	122	ORIFICE			
O-A15	A15_S	CAP1	ORIFICE			
OR1	K1_S	R123_(STM)	ORIFICE			
OR2	K2_S	R123_(STM)	ORIFICE			
OR7	R2_S	R120_(STM)	ORIFICE			
OR8	R4_S	R102_(STM)	ORIFICE			
OR9	R3_S	R111_(STM)	ORIFICE			
P2-2yr_Orifice	POND2-Fernbank	201	ORIFICE			
P2-ED_Orifice	POND2-Fernbank	201	ORIFICE			
202_(15)_(STM)_1	MH200_(STM)	MH200a	WEIR			
P2-100yrWeir	POND2-Fernbank	OVF	WEIR			
P2-5-10yrWeir	POND2-Fernbank	201	WEIR			
OR3	R1_S	R127_(STM)	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
106_(STM)	HORIZ_ELLIPSE	1.22	1.89	0.37	1.93	1	2.91
108_(STM)	HORIZ_ELLIPSE	1.22	1.89	0.37	1.93	1	2.94
110_(1)_(STM)	CIRCULAR	0.97	0.75	0.24	0.97	1	0.98
110_(STM)	CIRCULAR	0.97	0.75	0.24	0.97	1	0.99
112_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	1.92
118_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	0.72
120_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	0.81
122_(1)_(STM)	CIRCULAR	0.82	0.53	0.21	0.82	1	0.59
122_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	0.71
124_(1)_(STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	0.41
124_(STM)	CIRCULAR	0.82	0.53	0.21	0.82	1	0.58
160_(STM)	CIRCULAR	0.97	0.75	0.24	0.97	1	0.88
166_(STM)	CIRCULAR	0.97	0.75	0.24	0.97	1	0.82
202_(14)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	1.33
202_(15)_(STM)_2	CIRCULAR	1.20	1.13	0.30	1.20	1	3.25
202_(27)_(STM)	HORIZ_ELLIPSE	1.22	1.89	0.37	1.93	1	5.34
C1	18mROW	0.35	3.43	0.20	18.00	1	1.66
C10	18mROW	0.35	3.43	0.20	18.00	1	5.01
C11	18mROW	0.35	3.43	0.20	18.00	1	11.36
C12	18mROW	0.35	3.43	0.20	18.00	1	11.33
C13	18mROW	0.35	3.43	0.20	18.00	1	4.98
C14	18mROW	0.35	3.43	0.20	18.00	1	3.65
C15	18mROW	0.35	3.43	0.20	18.00	1	4.38
C16	18mROW	0.35	3.43	0.20	18.00	1	6.19
C17	18mROW	0.35	3.43	0.20	18.00	1	9.71
C18	18mROW	0.35	3.43	0.20	18.00	1	10.94
C19	RECT_OPEN	1.00	6.00	0.75	6.00	1	48.79
C2	18mROW	0.35	3.43	0.20	18.00	1	4.58
C20	18mROW	0.35	3.43	0.20	18.00	1	6.25
C21	18mROW	0.35	3.43	0.20	18.00	1	5.40
C22	18mROW	0.35	3.43	0.20	18.00	1	3.62
C23	18mROW	0.35	3.43	0.20	18.00	1	7.08
C24	18mROW	0.35	3.43	0.20	18.00	1	4.54
C3	18mROW	0.35	3.43	0.20	18.00	1	2.59
C4	18mROW	0.35	3.43	0.20	18.00	1	6.63
C5	18mROW	0.35	3.43	0.20	18.00	1	3.24
C6	CIRCULAR	0.75	0.44	0.19	0.75	1	1.58
C7	18mROW	0.35	3.43	0.20	18.00	1	5.65
C7_1	TRAPEZOIDAL	0.30	5.11	0.28	17.93	1	7.45
C7_2	TRAPEZOIDAL	0.30	5.11	0.28	17.93	1	4.88
C8	channel2	1.75	42.73	0.72	32.40	1	23.88
C9	channel2	1.75	42.73	0.72	32.40	1	23.93
POND2-OUT	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	2.68
STM-13_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	0.06
STM-16_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	0.06
STM-164_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	0.06
STM-165_(STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	0.43
STM-166_(STM)	CIRCULAR	0.82	0.53	0.21	0.82	1	0.54
STM-20_(STM)	CIRCULAR	0.68	0.36	0.17	0.68	1	0.34
STM-3_(1)_(1)_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	0.24
STM-3_(1)_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	0.24
STM-3_(2)_(STM)	CIRCULAR	0.97	0.75	0.24	0.97	1	0.86
STM-3_(STM_(2))	CIRCULAR	0.97	0.75	0.24	0.97	1	0.73
STM-5_(1)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	0.18
STM-5_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	0.18
STM-7_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	0.19
STM-9_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	0.09

****
Transect Summary
****

Transect 18mROW
Area:

0.0005	0.0019	0.0043	0.0077	0.0121
0.0174	0.0236	0.0308	0.0390	0.0482
0.0583	0.0694	0.0815	0.0945	0.1085
0.1234	0.1393	0.1562	0.1739	0.1919
0.2098	0.2279	0.2466	0.2659	0.2859
0.3066	0.3279	0.3499	0.3726	0.3959
0.4198	0.4444	0.4697	0.4956	0.5222
0.5495	0.5774	0.6059	0.6351	0.6650
0.6956	0.7268	0.7586	0.7911	0.8243
0.8581	0.8926	0.9277	0.9635	1.0000

Hrad:

0.0172	0.0344	0.0516	0.0688	0.0860
0.1032	0.1204	0.1376	0.1548	0.1719
0.1891	0.2063	0.2235	0.2407	0.2579
0.2751	0.2923	0.3095	0.3340	0.3681
0.4022	0.4345	0.4658	0.4961	0.5253
0.5533	0.5802	0.6060	0.6307	0.6545
0.6774	0.6995	0.7208	0.7413	0.7611
0.7804	0.7990	0.8170	0.8345	0.8515
0.8681	0.8842	0.8999	0.9152	0.9301
0.9447	0.9590	0.9730	0.9866	1.0000

Width:

0.0262	0.0524	0.0786	0.1048	0.1310
0.1572	0.1834	0.2096	0.2358	0.2621
0.2883	0.3145	0.3407	0.3669	0.3931
0.4193	0.4455	0.4717	0.4870	0.4878
0.4886	0.4991	0.5170	0.5349	0.5528
0.5707	0.5886	0.6064	0.6243	0.6422
0.6601	0.6780	0.6959	0.7138	0.7317
0.7496	0.7674	0.7853	0.8032	0.8211
0.8390	0.8569	0.8748	0.8927	0.9106
0.9284	0.9463	0.9642	0.9821	1.0000

Transect channel2
Area:

0.0017	0.0035	0.0054	0.0074	0.0095
0.0116	0.0139	0.0162	0.0186	0.0211
0.0237	0.0283	0.0400	0.0580	0.0817
0.1066	0.1317	0.1568	0.1822	0.2076
0.2332	0.2589	0.2848	0.3108	0.3369
0.3632	0.3896	0.4161	0.4427	0.4692
0.4958	0.5223	0.5488	0.5754	0.6019

```
            0.6285     0.6550     0.6815     0.7081     0.7346
            0.7611     0.7877     0.8142     0.8408     0.8673
            0.8938     0.9204     0.9469     0.9735     1.0000
Hrad:
            0.0465     0.0901     0.1312     0.1703     0.2075
            0.2432     0.2776     0.3108     0.3429     0.3741
            0.4045     0.4002     0.3240     0.2616     0.2292
            0.2271     0.2366     0.2516     0.2696     0.2893
            0.3103     0.3319     0.3541     0.3766     0.3993
            0.4223     0.4455     0.4691     0.4934     0.5178
            0.5423     0.5667     0.5911     0.6156     0.6400
            0.6643     0.6887     0.7129     0.7372     0.7614
            0.7855     0.8096     0.8336     0.8576     0.8815
            0.9053     0.9291     0.9528     0.9764     1.0000
Width:
            0.0665     0.0698     0.0730     0.0762     0.0795
            0.0827     0.0860     0.0892     0.0924     0.0957
            0.0989     0.3212     0.5591     0.7971     0.9353
            0.9405     0.9458     0.9511     0.9563     0.9616
            0.9668     0.9721     0.9773     0.9826     0.9878
            0.9931     0.9972     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000


************************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
************************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/23/2009 00:00:00
Ending Date .............. 07/25/2009 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... NO
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Initial LID Storage ......         0.033         1.125
Total Precipitation ......         2.818        95.400
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.414        14.014
Surface Runoff ...........         2.405        81.403
Final Storage ............         0.033         1.127
Continuity Error (%) .....        -0.019


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.405        24.048
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         2.296        22.962
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.503         5.026
Final Stored Volume ......         0.612         6.117
Continuity Error (%) .....        -0.015


**************************
Highest Continuity Errors
**************************
Node J3 (2.76%)
Node MH200a (-1.89%)


*********************************
Highest Flow Instability Indexes
*********************************
Link 202_(15)_(STM)_1 (12)
Link 202_(15)_(STM)_2 (11)
Link 202_(14)_(STM) (11)
Link STM-3_(STM_(2)) (11)
Link 202_(27)_(STM) (10)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     1.00 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.09
Percent Not Converging      :     0.19


***************************
Subcatchment Runoff Summary
***************************

-------------------------------------------------------------------------------------------------------------
                                 Total      Total      Total      Total      Imperv       Perv      Total
Total     Peak  Runoff
                                Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff
Runoff   Runoff   Coeff
  Subcatchment                      mm         mm         mm         mm         mm         mm         mm
10^6 ltr      CMS
-------------------------------------------------------------------------------------------------------------
  A-01                           95.40       0.00       0.00      30.97      24.25      40.21      64.46
0.07     0.03   0.676
  A-02                           95.40       0.00       0.00      26.75      34.08      34.60      68.68
0.26     0.10   0.720
  A-03                           95.40       0.00       0.00      12.88      65.67      16.89      82.56
0.30     0.11   0.865
  A-04                           95.40       0.00       0.00      18.92      51.83      24.68      76.52
0.18     0.07   0.802
  A-05                           95.40       0.00       0.00      14.83      61.19      19.42      80.61
0.39     0.15   0.845
  A-06                           95.40       0.00       0.00      21.80      45.25      28.38      73.63
0.42     0.16   0.772
  A-07                           95.40       0.00       0.00      19.25      51.07      25.11      76.19
0.30     0.11   0.799
  A-08                           95.40       0.00       0.00      19.46      50.59      25.38      75.98
0.27     0.10   0.796
  A-09                           95.40       0.00       0.00      18.71      52.31      24.42      76.73
0.12     0.05   0.804
  A-10                           95.40       0.00       0.00      18.42      52.98      24.04      77.02
0.13     0.05   0.807
  A-11                           95.40       0.00       0.00      16.79      56.70      21.95      78.65
0.28     0.11   0.824
  A-12                           95.40       0.00       0.00      16.79      56.70      21.95      78.65
0.14     0.05   0.824
  A-13                           95.40       0.00       0.00      17.00      56.22      22.21      78.44
0.21     0.08   0.822
  A-14                           95.40       0.00       0.00      17.33      55.46      22.64      78.11
0.30     0.12   0.819
  A-15                           95.40       0.00       0.00       5.89      81.79       7.76      89.55
1.38     0.52   0.939
  K1                             95.40       0.00       0.00       5.84      89.57       7.51      89.57
2.15     0.76   0.939
```

K2			95.40	0.00	0.00	15.35	80.06	18.99	80.06
3.37	1.05	0.839							
R1			95.40	0.00	0.00	5.84	89.57	7.51	89.57
4.15	1.46	0.939							
R2			95.40	0.00	0.00	15.27	80.14	19.07	80.14
3.58	1.14	0.840							
R3			95.40	0.00	0.00	15.37	80.04	18.98	80.04
2.58	0.80	0.839							
R4			95.40	0.00	0.00	15.36	80.05	18.99	80.05
2.08	0.65	0.839							
X-R5			95.40	0.00	0.00	34.77	61.09	60.67	60.67
0.42	0.16	0.636							
XX-Pond			95.40	0.00	0.00	24.95	70.45	29.43	70.45
0.97	0.24	0.739							

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
1_(STM)	JUNCTION	0.00	0.00	92.89	0 00:00	0.00
201	JUNCTION	0.11	0.49	94.15	0 06:25	0.49
203_(STM)	JUNCTION	0.86	2.21	95.54	0 06:11	2.15
HW-02	JUNCTION	0.62	1.04	93.70	0 09:35	1.04
J1	JUNCTION	0.00	0.00	99.75	0 00:00	0.00
J2	JUNCTION	0.35	0.80	93.70	0 09:40	0.80
J3	JUNCTION	0.00	0.17	93.87	0 06:28	0.17
MH200_(STM)	JUNCTION	1.21	2.32	95.29	0 06:26	2.29
MH200a	JUNCTION	1.21	2.29	95.26	0 06:26	2.25
OVF	JUNCTION	0.00	0.11	94.23	0 06:25	0.11
POND2_MN	JUNCTION	0.31	0.75	93.70	0 09:40	0.75
R102_(STM)	JUNCTION	0.77	2.20	95.63	0 06:11	2.19
R103_(STM)	JUNCTION	0.71	2.14	95.63	0 06:11	2.13
R104_(STM)	JUNCTION	0.63	2.08	95.66	0 06:11	2.07
R105_(STM)	JUNCTION	0.55	1.99	95.69	0 06:12	1.98
R110_(STM)	JUNCTION	0.35	0.76	95.94	0 06:05	0.76
R111_(STM)	JUNCTION	0.35	0.76	96.05	0 06:04	0.76
R118_(STM)	JUNCTION	0.94	2.75	96.00	0 06:11	2.45
R120_(STM)	JUNCTION	0.79	2.96	96.38	0 06:11	2.48
R121_(STM)	JUNCTION	0.38	2.57	96.66	0 06:11	1.89
R122_(STM)	JUNCTION	0.33	2.95	97.20	0 06:26	1.84
R123_(STM)	JUNCTION	0.22	3.03	97.44	0 06:26	1.74
R124_(STM)	JUNCTION	0.72	3.03	96.63	0 06:26	3.03
R127_(STM)	JUNCTION	0.63	3.74	97.65	0 06:26	3.74
CarpOut	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
OF1	OUTFALL	0.00	0.00	99.91	0 00:00	0.00
OF2	OUTFALL	0.37	0.82	93.70	0 09:40	0.82
OF3	OUTFALL	0.00	0.00	94.34	0 00:00	0.00
100	STORAGE	0.98	2.11	95.32	0 06:17	2.11
102	STORAGE	0.94	2.12	95.37	0 06:17	2.12
104	STORAGE	0.48	1.82	95.53	0 06:17	1.82
106	STORAGE	0.40	1.80	95.60	0 06:17	1.80
108	STORAGE	0.30	1.72	95.63	0 06:17	1.72
110	STORAGE	0.29	1.72	95.66	0 06:17	1.72
112	STORAGE	0.21	1.67	95.77	0 06:18	1.67
114	STORAGE	0.09	1.43	95.88	0 06:18	1.43
116	STORAGE	0.06	1.33	95.88	0 06:18	1.33
118	STORAGE	0.03	0.90	95.83	0 06:18	0.89
120	STORAGE	0.67	1.93	95.45	0 06:16	1.93
122	STORAGE	0.44	1.82	95.57	0 06:16	1.81
124	STORAGE	0.11	1.38	95.73	0 06:16	1.38
A01_S	STORAGE	0.02	1.54	96.54	0 06:00	1.54
A03_S	STORAGE	0.04	1.70	97.70	0 06:01	1.70
A04_S	STORAGE	0.03	1.70	97.50	0 06:01	1.70
A05_S	STORAGE	0.04	1.70	97.20	0 06:01	1.70
A06_S	STORAGE	0.05	1.71	97.11	0 06:03	1.71
A07_S	STORAGE	0.05	1.70	97.20	0 06:02	1.70
A08_S	STORAGE	0.04	1.70	97.45	0 06:02	1.70
A09_S	STORAGE	0.03	1.70	97.30	0 06:00	1.70
A10_S	STORAGE	0.04	1.70	96.90	0 06:01	1.70
A11_S	STORAGE	0.04	1.70	97.50	0 06:01	1.70
A12_S	STORAGE	0.04	1.70	97.70	0 06:01	1.70
A13_S	STORAGE	0.04	1.70	97.80	0 06:02	1.70
A14_S	STORAGE	0.04	1.70	98.10	0 06:02	1.70
A15_S	STORAGE	0.04	1.66	98.26	0 06:01	1.66
CAP1	STORAGE	0.32	1.72	95.61	0 06:16	1.72
K1_S	STORAGE	0.06	1.72	99.77	0 06:05	1.72
K2_S	STORAGE	0.07	1.73	99.78	0 06:06	1.73
POND2-Fernbank	STORAGE	2.68	3.71	95.21	0 06:25	3.71
R1_S	STORAGE	0.05	1.72	99.22	0 06:03	1.72
R2_S	STORAGE	0.05	1.61	99.11	0 06:01	1.61
R3_S	STORAGE	0.06	1.72	99.47	0 06:04	1.72
R4_S	STORAGE	0.06	1.70	99.00	0 06:04	1.70

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
1_(STM)	JUNCTION	0.000	0.000	0 00:00	0	0	0.000
ltr							
201	JUNCTION	0.000	1.210	0 06:25	0	20	0.003
203_(STM)	JUNCTION	0.000	3.178	0 06:03	0	17.9	0.150
HW-02	JUNCTION	0.000	1.210	0 06:25	0	20	-0.012
J1	JUNCTION	0.000	0.000	0 00:00	0	0	0.000
ltr							
J2	JUNCTION	0.000	2.572	0 06:28	0	22.3	-0.112
J3	JUNCTION	0.000	1.397	0 06:25	0	2.25	2.843
MH200_(STM)	JUNCTION	0.000	3.968	0 06:04	0	22.3	0.316
MH200a	JUNCTION	0.000	0.893	0 06:11	0	2.82	-1.851
OVF	JUNCTION	0.000	1.398	0 06:25	0	2.25	-0.002
POND2_MN	JUNCTION	0.000	1.208	0 06:29	0	20	-0.065
R102_(STM)	JUNCTION	0.000	0.809	0 06:11	0	4.66	0.026
R103_(STM)	JUNCTION	0.000	0.467	0 06:11	0	2.58	-0.017
R104_(STM)	JUNCTION	0.000	0.467	0 06:11	0	2.58	-0.011
R105_(STM)	JUNCTION	0.000	0.405	0 06:05	0	2.58	0.026
R110_(STM)	JUNCTION	0.000	0.405	0 06:04	0	2.58	-0.026
R111_(STM)	JUNCTION	0.000	0.405	0 06:04	0	2.58	0.044
R118_(STM)	JUNCTION	0.000	2.432	0 06:03	0	13.3	0.169
R120_(STM)	JUNCTION	0.000	2.432	0 06:03	0	13.3	-0.102
R121_(STM)	JUNCTION	0.000	0.842	0 06:11	0	5.53	0.019
R122_(STM)	JUNCTION	0.000	0.814	0 06:11	0	5.52	-0.147
R123_(STM)	JUNCTION	0.000	0.801	0 06:05	0	5.52	-0.002
R124_(STM)	JUNCTION	0.000	0.823	0 06:11	0	4.13	-0.223
R127_(STM)	JUNCTION	0.000	0.813	0 06:03	0	4.15	0.291
CarpOut	OUTFALL	0.157	0.157	0 06:01	0.425	0.425	0.000
OF1	OUTFALL	0.000	0.000	0 00:00	0	0	0.000
ltr							
OF2	OUTFALL	0.000	2.516	0 06:27	0	22.3	0.000
OF3	OUTFALL	0.097	0.097	0 06:00	0.26	0.26	0.000
100	STORAGE	0.000	0.860	0 06:11	0	4.46	0.060
102	STORAGE	0.000	0.816	0 06:11	0	4.34	0.234
104	STORAGE	0.000	0.274	0 06:18	0	1.63	0.175
106	STORAGE	0.000	0.225	0 06:18	0	1.33	0.006
108	STORAGE	0.000	0.164	0 06:19	0	0.911	0.016
110	STORAGE	0.000	0.162	0 06:04	0	0.912	0.023
112	STORAGE	0.000	0.171	0 06:02	0	0.909	-0.336
114	STORAGE	0.000	0.047	0 06:27	0	0.274	0.241
116	STORAGE	0.000	0.011	0 05:46	0	0.00433	0.006
118	STORAGE	0.000	0.059	0 06:00	0	0.252	0.845
120	STORAGE	0.000	0.464	0 06:12	0	2.33	0.435
122	STORAGE	0.000	0.407	0 06:02	0	1.97	0.038
124	STORAGE	0.000	0.054	0 06:01	0	0.296	0.251
A01_S	STORAGE	0.027	0.027	0 06:00	0.0696	0.0696	0.001
A03_S	STORAGE	0.114	0.114	0 06:00	0.296	0.296	0.027
A04_S	STORAGE	0.071	0.071	0 06:00	0.183	0.183	0.014
A05_S	STORAGE	0.151	0.151	0 06:00	0.389	0.389	0.024
A06_S	STORAGE	0.162	0.162	0 06:00	0.418	0.418	0.009
A07_S	STORAGE	0.115	0.115	0 06:00	0.296	0.296	0.013
A08_S	STORAGE	0.105	0.105	0 06:00	0.27	0.27	0.014
A09_S	STORAGE	0.047	0.047	0 06:00	0.12	0.12	0.025
A10_S	STORAGE	0.051	0.051	0 06:00	0.131	0.131	0.060
A11_S	STORAGE	0.110	0.110	0 06:00	0.283	0.283	0.020
A12_S	STORAGE	0.054	0.054	0 06:00	0.139	0.139	0.016
A13_S	STORAGE	0.083	0.083	0 06:00	0.215	0.215	0.021
A14_S	STORAGE	0.117	0.117	0 06:00	0.301	0.301	0.023
A15_S	STORAGE	0.520	0.520	0 06:00	1.38	1.38	0.022
CAP1	STORAGE	0.000	0.304	0 06:01	0	1.38	0.034
K1_S	STORAGE	0.759	0.759	0 06:00	2.15	2.15	0.006
K2_S	STORAGE	1.050	1.050	0 06:00	3.37	3.37	0.010
POND2-Fernbank	STORAGE	0.238	4.140	0 06:00	0.965	28.1	0.014
R1_S	STORAGE	1.461	1.461	0 06:00	4.15	4.15	0.012
R2_S	STORAGE	1.144	1.144	0 06:00	3.58	3.58	0.013

R3_S	STORAGE	0.799	0.799	0	06:00	2.58	2.58	0.010
R4_S	STORAGE	0.648	0.648	0	06:00	2.08	2.08	0.011

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
1_(STM)	JUNCTION	48.00	0.000	3.710
203_(STM)	JUNCTION	8.94	0.953	2.807
R102_(STM)	JUNCTION	7.62	0.968	2.582
R103_(STM)	JUNCTION	6.87	0.929	2.571
R104_(STM)	JUNCTION	4.94	0.879	3.031
R118_(STM)	JUNCTION	3.95	1.174	3.117
R120_(STM)	JUNCTION	0.91	1.207	2.018
R121_(STM)	JUNCTION	0.77	1.351	2.334
R122_(STM)	JUNCTION	0.72	1.744	3.021
R123_(STM)	JUNCTION	0.72	1.930	2.285
R124_(STM)	JUNCTION	0.73	1.314	2.261
R127_(STM)	JUNCTION	0.65	2.249	1.196

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
100	0.001	28	0	0	0.002	60	0 06:17	0.846
102	0.001	24	0	0	0.002	54	0 06:17	0.836
104	0.001	15	0	0	0.002	56	0 06:17	0.279
106	0.000	13	0	0	0.002	60	0 06:17	0.229
108	0.000	11	0	0	0.002	60	0 06:17	0.165
110	0.000	10	0	0	0.002	60	0 06:17	0.164
112	0.000	7	0	0	0.002	56	0 06:18	0.162
114	0.000	3	0	0	0.002	53	0 06:18	0.051
116	0.000	2	0	0	0.002	49	0 06:18	0.006
118	0.000	1	0	0	0.001	37	0 06:18	0.054
120	0.001	17	0	0	0.002	49	0 06:16	0.472
122	0.001	12	0	0	0.002	47	0 06:16	0.404
124	0.000	4	0	0	0.002	45	0 06:16	0.071
A01_S	0.000	0	0	0	0.002	22	0 06:00	0.022
A03_S	0.000	1	0	0	0.047	76	0 06:01	0.054
A04_S	0.000	0	0	0	0.023	74	0 06:01	0.038
A05_S	0.000	1	0	0	0.057	72	0 06:01	0.075
A06_S	0.001	1	0	0	0.074	76	0 06:03	0.062
A07_S	0.001	1	0	0	0.052	74	0 06:02	0.046
A08_S	0.000	1	0	0	0.042	74	0 06:02	0.047
A09_S	0.000	0	0	0	0.011	75	0 06:00	0.030
A10_S	0.000	1	0	0	0.018	75	0 06:01	0.025
A11_S	0.000	1	0	0	0.041	72	0 06:01	0.054
A12_S	0.000	1	0	0	0.022	73	0 06:01	0.025
A13_S	0.000	1	0	0	0.035	73	0 06:02	0.037
A14_S	0.000	1	0	0	0.047	75	0 06:02	0.054
A15_S	0.001	0	0	0	0.168	55	0 06:01	0.304
CAP1	0.000	10	0	0	0.002	56	0 06:16	0.301
K1_S	0.003	1	0	0	0.303	82	0 06:05	0.343
K2_S	0.005	1	0	0	0.434	88	0 06:06	0.458
POND2-Fernbank	8.081	51	0	0	15.635	98	0 06:25	2.608
R1_S	0.003	1	0	0	0.453	83	0 06:03	0.813
R2_S	0.001	0	0	0	0.169	36	0 06:01	0.820
R3_S	0.002	1	0	0	0.267	81	0 06:04	0.406
R4_S	0.002	1	0	0	0.199	76	0 06:04	0.345

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
CarpOut	24.06	0.010	0.157	0.425
OF1	0.00	0.000	0.000	0.000
OF2	100.00	0.129	2.516	22.277
OF3	28.79	0.005	0.097	0.260
System	38.21	0.144	0.097	22.962

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
106_(STM)	CONDUIT	2.432	0 06:03	1.29	0.83	1.00
108_(STM)	CONDUIT	2.432	0 06:03	1.29	0.83	1.00
110_(1)_(STM)	CONDUIT	0.842	0 06:11	1.47	0.86	1.00
110_(STM)	CONDUIT	0.863	0 06:11	1.61	0.87	1.00
112_(STM)	CONDUIT	0.876	0 06:11	0.82	0.46	1.00
118_(STM)	CONDUIT	0.809	0 06:11	1.27	1.13	1.00
120_(STM)	CONDUIT	0.467	0 06:11	0.73	0.58	1.00
122_(1)_(STM)	CONDUIT	0.467	0 06:11	0.87	0.79	1.00
122_(STM)	CONDUIT	0.467	0 06:11	0.73	0.66	1.00
124_(1)_(STM)	CONDUIT	0.405	0 06:04	1.59	1.00	0.57
124_(STM)	CONDUIT	0.405	0 06:05	1.49	0.69	0.51
160_(STM)	CONDUIT	0.823	0 06:11	1.62	0.93	1.00
166_(STM)	CONDUIT	0.814	0 06:11	1.47	0.99	1.00
202_(14)_(STM)	CONDUIT	3.555	0 05:53	3.14	2.68	1.00
202_(15)_(STM)_2	CONDUIT	0.890	0 06:11	0.79	0.27	1.00
202_(27)_(STM)	CONDUIT	3.178	0 06:03	1.68	0.60	1.00
C1	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C10	CHANNEL	0.001	0 06:04	0.16	0.00	0.04
C11	CHANNEL	0.000	0 06:04	0.19	0.00	0.01
C12	CHANNEL	0.000	0 06:03	0.20	0.00	0.16
C13	CHANNEL	0.000	0 00:00	0.00	0.00	0.01
C14	CHANNEL	0.000	0 06:02	0.00	0.00	0.01
C15	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C16	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C17	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C18	CHANNEL	0.000	0 06:01	0.00	0.00	0.16
C19	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C2	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C20	CHANNEL	0.000	0 06:01	0.11	0.00	0.01
C21	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C22	CHANNEL	0.000	0 00:00	0.00	0.00	0.01
C23	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C24	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C3	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C4	CHANNEL	0.000	0 00:00	0.00	0.00	0.00
C5	CHANNEL	0.000	0 00:00	0.00	0.00	0.01
C6	CONDUIT	1.210	0 06:25	3.95	0.76	0.66
C7	CHANNEL	0.000	0 06:02	0.00	0.00	0.01
C7_1	CONDUIT	1.397	0 06:25	0.61	0.19	0.46
C7_2	CONDUIT	1.391	0 06:28	0.65	0.29	0.45
C8	CHANNEL	2.516	0 06:27	0.51	0.11	0.46
C9	CHANNEL	1.196	0 06:42	0.42	0.05	0.44
POND2-OUT	CONDUIT	1.208	0 06:29	0.71	0.45	0.72
STM-13_(STM)	CONDUIT	0.071	0 06:17	1.00	1.26	1.00
STM-16_(STM)	CONDUIT	0.051	0 06:27	0.79	0.91	1.00
STM-164_(STM)	CONDUIT	0.011	0 05:46	0.16	0.18	1.00
STM-165_(STM)	CONDUIT	0.404	0 06:12	0.91	0.94	1.00
STM-166_(STM)	CONDUIT	0.472	0 06:11	0.88	0.87	1.00
STM-20_(STM)	CONDUIT	0.301	0 06:01	0.84	0.89	1.00
STM-3_(1)_(1)_(STM)	CONDUIT	0.229	0 06:18	0.81	0.96	1.00
STM-3_(1)_(STM)	CONDUIT	0.279	0 06:18	0.99	1.17	1.00
STM-3_(2)_(STM)	CONDUIT	0.836	0 06:11	1.12	0.97	1.00
STM-3_(STM_(2))	CONDUIT	0.846	0 06:11	1.13	1.15	1.00
STM-5_(1)_(STM)	CONDUIT	0.164	0 06:19	0.76	0.91	1.00
STM-5_(STM)	CONDUIT	0.165	0 06:18	0.76	0.92	1.00
STM-7_(STM)	CONDUIT	0.162	0 06:04	0.75	0.85	1.00
STM-9_(STM)	CONDUIT	0.054	0 06:01	0.85	0.63	1.00

O-A01	ORIFICE	0.022	0	05:56	1.00
O-A03	ORIFICE	0.054	0	06:01	1.00
O-A04	ORIFICE	0.038	0	06:01	1.00
O-A05	ORIFICE	0.075	0	06:01	1.00
O-A06	ORIFICE	0.062	0	06:03	1.00
O-A07	ORIFICE	0.046	0	06:02	1.00
O-A08	ORIFICE	0.047	0	06:02	1.00
O-A09	ORIFICE	0.030	0	06:00	1.00
O-A10	ORIFICE	0.025	0	06:01	1.00
O-A11	ORIFICE	0.054	0	06:01	1.00
O-A12	ORIFICE	0.025	0	06:01	1.00
O-A13	ORIFICE	0.037	0	06:02	1.00
O-A14	ORIFICE	0.054	0	06:02	1.00
O-A15	ORIFICE	0.304	0	06:01	1.00
OR1	ORIFICE	0.343	0	06:05	1.00
OR2	ORIFICE	0.458	0	06:06	1.00
OR7	ORIFICE	0.820	0	06:01	1.00
OR8	ORIFICE	0.345	0	06:04	1.00
OR9	ORIFICE	0.405	0	06:04	1.00
P2-2yr_Orifice	ORIFICE	0.138	0	06:25	1.00
P2-ED_Orifice	ORIFICE	0.032	0	06:25	1.00
202_(15)_(STM)_1	WEIR	0.893	0	06:11	0.34
P2-100yrWeir	WEIR	1.398	0	06:25	0.41
P2-5-10yrWeir	WEIR	1.041	0	06:15	1.00
OR3	DUMMY	0.813	0	06:03	

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
106_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
108_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.00
110_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.77	0.00
110_(STM)	1.00	0.00	0.00	0.00	0.36	0.00	0.00	0.64	0.07	0.00
112_(STM)	1.00	0.00	0.00	0.00	0.67	0.00	0.00	0.33	0.24	0.00
118_(STM)	1.00	0.00	0.00	0.00	0.95	0.00	0.00	0.05	0.00	0.00
120_(STM)	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
122_(1)_(STM)	1.00	0.00	0.00	0.00	0.61	0.00	0.00	0.39	0.08	0.00
122_(STM)	1.00	0.00	0.00	0.00	0.95	0.00	0.00	0.05	0.15	0.00
124_(1)_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
124_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
160_(STM)	1.00	0.00	0.00	0.00	0.29	0.00	0.00	0.71	0.04	0.00
166_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
202_(14)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
202_(15)_(STM)_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
202_(27)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C13	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C14	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.00
C15	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C17	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C18	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C22	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C23	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C24	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.11	0.00	0.89	0.01	0.00
C7	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7_1	1.00	0.83	0.11	0.00	0.06	0.00	0.00	0.00	0.87	0.00
C7_2	1.00	0.76	0.07	0.00	0.17	0.00	0.00	0.01	0.86	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.00
POND2-OUT	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
STM-13_(STM)	1.00	0.00	0.00	0.00	0.36	0.00	0.00	0.64	0.12	0.00
STM-16_(STM)	1.00	0.00	0.00	0.00	0.30	0.00	0.00	0.70	0.10	0.00
STM-164_(STM)	1.00	0.00	0.75	0.00	0.25	0.00	0.00	0.00	0.68	0.00
STM-165_(STM)	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.06	0.00
STM-166_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-20_(STM)	1.00	0.00	0.02	0.00	0.91	0.00	0.00	0.00	0.07	0.18
STM-3_(1)_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.06	0.00
STM-3_(1)_(STM)	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.03	0.00
STM-3_(2)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-3_(STM_(2))	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-5_(1)_(STM)	1.00	0.01	0.18	0.00	0.81	0.00	0.00	0.00	0.23	0.00
STM-5_(STM)	1.00	0.00	0.05	0.00	0.74	0.00	0.00	0.21	0.09	0.00
STM-7_(STM)	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.57	0.00
STM-9_(STM)	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.08	0.00

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
106_(STM)	5.17	5.17	8.96	0.01	0.32
108_(STM)	2.20	2.20	3.95	0.01	0.35
110_(1)_(STM)	0.72	0.72	0.81	0.01	0.01
110_(STM)	0.77	0.77	0.91	0.01	0.01
112_(STM)	0.73	0.73	1.17	0.01	0.01
118_(STM)	8.19	8.20	8.94	0.48	0.76
120_(STM)	7.42	7.42	7.62	0.01	0.01
122_(1)_(STM)	4.05	4.05	5.04	0.01	0.01
122_(STM)	4.94	4.94	6.87	0.01	0.01
160_(STM)	0.65	0.65	0.73	0.01	0.01
166_(STM)	0.72	0.72	0.72	0.01	0.01
202_(14)_(STM)	18.31	18.31	18.95	0.96	0.96
202_(15)_(STM)_2	18.30	18.30	30.75	0.01	0.01
202_(27)_(STM)	9.71	9.71	17.43	0.01	0.01
STM-13_(STM)	7.83	7.83	10.70	0.02	0.52
STM-16_(STM)	5.68	5.68	8.43	0.01	0.04
STM-164_(STM)	3.57	3.57	5.68	0.01	0.01
STM-165_(STM)	10.70	10.70	13.77	0.01	0.01
STM-166_(STM)	13.88	13.88	16.71	0.01	0.01
STM-20_(STM)	9.45	9.45	10.80	0.01	0.02
STM-3_(1)_(1)_(STM)	12.73	12.73	14.67	0.01	0.01
STM-3_(1)_(STM)	14.67	14.67	16.84	0.48	0.75
STM-3_(2)_(STM)	16.71	16.71	17.86	0.01	0.47
STM-3_(STM_(2))	17.86	17.86	18.16	0.38	1.04
STM-5_(1)_(STM)	11.42	11.42	12.01	0.01	0.40
STM-5_(STM)	12.01	12.01	12.62	0.01	0.38
STM-7_(STM)	8.34	8.34	11.42	0.01	0.01
STM-9_(STM)	0.69	0.69	1.28	0.01	0.01

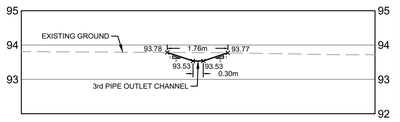
Analysis begun on: Sun Aug 17 21:13:07 2025
Analysis ended on: Sun Aug 17 21:13:16 2025
Total elapsed time: 00:00:09

Appendix C: Drawings

Master Grading Plan	100057-GR
Master Servicing Plan	100057-GP
Draft Plan of Subdivision	

3rd PIPE OUTLET CHANNEL TO CARP RIVER
SECTION A-A

SCALE 1:75



LEGEND

- 2.5% — PROPOSED GRADE AND DIRECTION OF FLOW
- FLOW DIRECTION - SLOPE VARIES (2-6%)
- 76.90 × — PROPOSED ELEVATION
- 77.50 × — EXISTING ELEVATION
- 1 / 3 — TERRACING (3:1 MAX)
- MAJOR OVERLAND FLOW DIRECTION
- 101.00 — EXISTING CONTOUR AND ELEVATION
- HP — HIGH POINT
- F — FUTURE GRADE
- AREA 1 GRADE RAISE LIMIT 1.2m FOR BUILDINGS & 1.6m FOR ROADS
- AREA 2 GRADE RAISE LIMIT 1.5m FOR BUILDINGS & 2.0m FOR ROADS
- AREA 3 GRADE RAISE LIMIT 1.8m FOR BUILDINGS & 2.2m FOR ROADS

CARP RIVER

CARP RIVER FLOOD PLAIN

CARP RIVER FLOODLINE
100-YR = 94.54 (MVCA)

3rd PIPE OUTLET TO CARP RIVER

REINFORCED GRASS SERVICE ROAD

POND 3 OUTLET CHANNEL

SPILLWAY CHANNEL

OVERFLOW CHANNEL

SERVICE ROAD

CARP TRIBUTARY

POND 2
NWL=93.66
100-YR=95.22

WET CELL

SEDIMENT MANAGEMENT AREA

HAZELDEAN ROAD

PATHWAY

SIDEWALK

PRIVATE SANITARY PUMP STATION

APARTMENT BLOCK

AREA 1
GRADE RAISE LIMIT
= 1.2m FOR BLDGS
=1.6m FOR ROADS

AREA 2
GRADE RAISE LIMIT
= 1.5m FOR BLDGS
=2.0m FOR ROADS

AREA 3
GRADE RAISE LIMIT
= 1.8m FOR BLDGS
=2.2m FOR ROADS

BLOCK 57A
BLOCK 57B
BLOCK 58
BLOCK 58B
BLOCK59 A
BLOCK 60
BLOCK 61
BLOCK 63
BLOCK 64
BLOCK 65
BLOCK 66

TIE INTO EXISTING PROPERTY LINE GRADE

TIE INTO EXISTING REAR YARD GRADE

FUTURE MIXED-USE (OTHERS)

EXISTING RESIDENTIAL (BRADLEY COMMONS)

VINCENT STREET

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

No.	REVISION	DATE	BY
1.	DRAFT PLAN APPLICATION	AUG 15/25	MAB

SCALE 1:500

1:500
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DESIGN DTD
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CHECKED MAB
APPROVED MAB

FOR REVIEW ONLY

L.R. WILSON 100160065 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

M.A. BISSETT 2025.08.15 L'ICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

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

CITY of OTTAWA
560 HAZELDEAN ROAD - DOUBLE DECK SUBDIVISION

MASTER GRADING PLAN

PROJECT No. 100057
REV REV # 1
DRAWING No. 100057-GR

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PLANB1.DWG - 1085mmx597mm

SAN MANHOLE TABLE		
MANHOLE ID	T/G ELEV	INVERT
103	91.90	S=91.56 NE=91.50
105	97.36	N=91.73 SW=91.79 E=91.88
109	97.10	W=92.21 E=92.22 S=92.81
111	96.83	W=92.50 SE=92.53
113	96.82	NW=92.59 S=92.62
115	96.84	N=92.68 SW=92.71
117	97.23	NE=93.12 SE=92.56 NW=92.55
119	96.88	NW=92.72
121	97.12	N=92.94 SW=93.54
123	97.51	NE=94.07 SE=92.27 NW=92.26
125	97.63	NE=91.99 SE=91.91 NW=91.91
127	97.66	SE=92.07
129	97.42	NE=91.82 SW=91.83
131	97.88	NE=95.69 SW=95.68

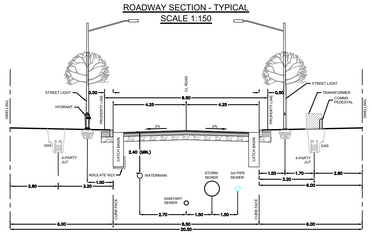
STM MANHOLE TABLE		
MANHOLE ID	T/G ELEV	INVERT
CAP1	97.10	SE=93.89
1	96.60	N=93.20 SW=92.98 SE=92.97
100	96.75	S=93.21 NW=93.21
102	97.19	SE=93.25 NE=93.62 NW=93.40
104	96.98	SW=93.71 NE=93.71
106	96.81	SW=93.80 N=93.88
108	96.79	S=93.91 NW=93.91
110	96.80	SE=93.94 W=93.94
112	97.07	E=94.10 W=94.71 S=94.32
114	97.15	N=94.45 SW=94.45
116	97.25	NE=94.55
118	97.34	E=94.93
120	97.48	NW=93.60 SE=93.52
122	97.60	NE=94.20 SE=93.75 NW=93.82
124	97.39	SW=94.35

3rd PIPE MANHOLE TABLE		
MANHOLE ID	T/G ELEV	INVERT
HW1	94.26	SW=93.71
302	96.77	SE=93.90 W=93.82 NE=93.82
304	96.76	S=93.96 NW=93.96
306	96.78	N=94.02 SW=94.02
308	96.95	NE=94.24 SW=94.24
310	97.14	SE=94.52 NE=94.45 NW=94.52
312	96.82	NW=94.60
314	97.45	NW=94.65 SE=94.82 NE=94.48
316	97.64	SE=94.89
318	97.04	E=94.03 W=94.11 S=94.11
320	97.12	SW=94.25 N=94.25
324	97.30	E=94.42 W=94.42
326	97.37	E=94.46 SW=94.46
330	97.58	NW=94.81 SE=95.00 NE=94.64

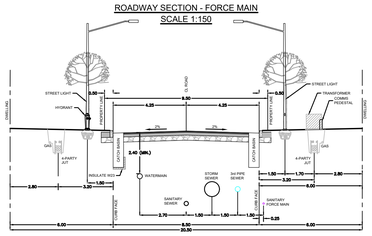
LEGEND

- SANITARY MANHOLE, SEWER & FLOW DIRECTION
- STORM MANHOLE, SEWER & FLOW DIRECTION
- 200mmØ — WATERMAIN AND DIAMETER
- VB — VALVE & VALVE BOX
- HYD — HYDRANT C/W VALVE & LEAD
- CAP

ROADWAY SECTION - TYPICAL
SCALE 1:150



ROADWAY SECTION - FORCE MAIN
SCALE 1:150



NOTE:
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CITY of OTTAWA - 560 HAZELDEAN ROAD
DOUBLE DECK SUBDIVISION

GENERAL PLAN OF SERVICES

PROJECT No. 100057
REV # 1
DRAWING No. 100057-GP

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PLEASE PRINT - DO NOT SCALE DRAWING

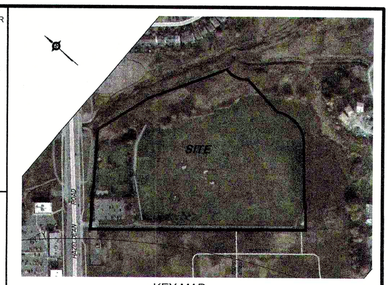
AREA SCHEDULE			
PROPOSED USE	LOT \ BLOCK	AREA (Ha)	AREA (Ac)
SINGLE UNITS	1 - 50	2.336	5.77
TOWNHOMES	57-59, 60, 61, 63-66	1.146	2.83
AMENITY AREA	54, 56, 62	0.301	0.74
HIGH DENSITY	52	1.317	3.25
PUMP STATION	53	0.016	0.04
OPEN AREA	51	2.697	6.67
PATHWAY	55, 68	0.051	0.13
PRIVATE ROAD	67	0.880	2.18
TOTAL		8.744	21.61

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

_____

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS ____ DAY OF _____ 20__ .

KERSTEN NITSCHE, MCIP, RPP, ACTING MANAGER
DEVELOPMENT REVIEW-WEST
PLANNING, DEVELOPMENT AND BUILDING SERVICES
DEPARTMENT, CITY OF OTTAWA



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF
PART OF LOT 29
CONCESSION 11
Geographic Township of Goulbourn
and
BLOCKS 35 AND 59
REGISTERED PLAN 4M-1723
CITY OF OTTAWA
Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 750

30 22.5 15 7.5 0 15 30 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

July 24, 2025
Date

Mirel Aradau
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

July 30 2025
Date

David Kardish
Double Deck Regional Inc.
I have authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) single family, multi-family residential housing, park land
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

NOTES

Bearings are grid and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.

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Ontario Land Surveyors

Job No. 25806-25 Regional Pl L1 29 Cll DPS 07 N