NOVATECH

Engineers, Planners & Landscape Architects

Engineering

- Land/Site Development
- Municipal Infrastructure
- Environmental/ Water Resources
- Traffic/ Transportation
- Recreational

Planning

- Land/Site Development
- Planning Application Management
- Municipal Planning
- Urban Design
- Expert Witness (LPAT)
- Wireless Industry

Landscape Architecture

- Streetscapes & Public Amenities
- Open Space, Parks & Recreation
- Community & Residential
- Commercial & Institutional
- Environmental Restoration

3200 Reid's Lane Subdivision

Conceptual Servicing and Stormwater Management Report

Prepared for: Crestview Innovation Inc.

39 Years

Engineering excellence. Planning progress. Liveable landscapes.

CONCEPTUAL SERVICING AND STORMWATER MANAGEMENT REPORT

3200 REID'S LANE SUBDIVISION

CITY OF OTTAWA

Prepared by:

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

September 2021
Revised June 2023

Novatech File No.: 119089
Report Reference No.: R-2021-060

June 1, 2023

BY EMAIL

City of Ottawa
Development Review, Planning, Real Estate and
Economic Development Department
110 Laurier Ave. West, 4th Floor
Ottawa ON, K1P 1J1

Attention: Kevin Hall, C.E.T., Senior Project Manager

Dear Mr. Hall

Re: Conceptual Servicing and Stormwater Management Report
Reid's Lane Subdivision
3200 Reid's Lane, Ottawa, ON
Response to Comments
Our File No.: 119089

Please find enclosed the revised "*Conceptual Servicing and Stormwater Management Report – Reid's Lane Subdivision*" dated June 2023, prepared in support of an application for Draft Plan Approval.

This report has been updated based on comments received from the City of Ottawa (January 14, 2022) and the Rideau Valley Conservation Authority (March 4, 2022, with technical comments dated November 29, 2021). The comments are included in Appendix A.

A copy of this report has been forwarded to the Rideau Valley Conservation Authority as part of the City's Draft Plan of Subdivision circulation.

Yours truly,

NOVATECH

Lisa Bowley, P. Eng.
Project Manager | Land Development Engineering

Encl.

cc: Rideau Valley Conservation Authority
Crestview Innovation Inc.

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

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

LIST OF DRAWINGS

MODELLING FILES

Available upon request: Stormwater Management Modelling Files (PCSWMM)

1.0 INTRODUCTION

Novatech has been retained to provide a conceptual servicing and stormwater management report in support of an application for Draft Plan Approval for the proposed Reid's Lane subdivision.

1.1 Purpose

This report outlines the approach to servicing the development with regards to water supply, sanitary disposal, storm drainage and stormwater management. A pre-consultation meeting was held with the City of Ottawa in May 2019. Pre-consultation notes (May 16, 2019 and May 28, 2019) are included in **Appendix A** for reference.

This report has been updated based on comments received from the City of Ottawa (January 14, 2022) and the Rideau Valley Conservation Authority (March 4, 2022, with technical comments dated November 29, 2021). The comments are included in **Appendix A**.

1.2 Site Location and Description

The Subject Property is located in the City of Ottawa. The subdivision lands are legally described as Part of Lots 27 & 28, Concession 1, Osgoode, and Part of Lots 50 & 51, Registered Plan 393, Ottawa. The property includes a portion of an adjacent eastern parcel that has been used historically as an informal walking trail connecting Osgoode Main Street and Lombardy Drive. The adjacent eastern parcel is legally described as Part of Lot 28, Concession 1, being parts 3 and 4 on Plan 5R1527, Osgoode. Refer to Figure 1 for the site location.

The subdivision has approximately 22metres of frontage along Lombardy Drive, and an approximate area of 3.54hectares (8.75acres). The property is vacant and located north of residential properties fronting onto Osgoode Main Street. Refer to **Figure 2** for existing site conditions.

1.3 Additional Reports

This report should be read in conjunction with the following reports:

- Tree Conservation Report and Environmental Impact Statement prepared by Muncaster Environmental Planning Inc., dated April 30, 2020;
- Hydrogeological Investigation and terrain Evaluation prepared by Kollaard Associates, revision 1, dated May 10, 2023.

2.0 SITE SERVICING

The proposed development would extend Lombardy Drive approximately 240m from the existing cul-de-sac and would create seven residential lots with a minimum lot size of 0.4ha (1 acre). The proposed lots would front onto a proposed internal roadway (Lombardy Drive extension). Refer to the Preliminary Grading Plan **(119089-PGR)** for the Typical Road Cross-Section of the proposed internal roadway.

The proposed lot layout is shown on the Draft Plan of Subdivision included with this report.

2.1 Grading and Drainage

The proposed grading would have minimum slopes, where possible. The tree retention areas suggested in the Tree Conservation Report and Environmental Impact Statement would remain in a natural state.

Preliminary road grades are shown on the Preliminary Grading Plan (**119089-PGR**).

2.2 Water Supply and Sewage Disposal

The proposed residential lots would be serviced by individual drilled wells. Discussion of the water supply is provided in the Hydrogeological Investigation and Terrain Evaluation prepared by Kollaard.

Sanitary servicing for the proposed residential dwellings would be provided by individual on-site septic systems. Preliminary septic system locations and recommendations regarding construction of the septic systems have been provided in the Hydrogeological Investigation and Terrain Evaluation. Applications for approvals of the septic systems would be made by individual homeowners at the building permit stage.

Conceptual locations of the well and septic systems are shown on the Lot Development Plan provided in the Kollaard report, for all proposed lots within the subdivision.

3.0 STORMWATER MANAGEMENT CRITERIA

The following criteria will be applied to the stormwater management analysis and conceptual design.

<u>Water Quantity</u>

- Control post-development peak flows to pre-development levels.

<u>Conveyance</u>

- Road and driveway culverts are to be designed to convey the anticipated post-development peak flows:
  - Road crossing culverts are to have a minimum size of 600mm and are to be sized for the 10-year event.
  - Driveway culverts are to have a minimum size of 400mm and are to be sized for the 5-year event.
- Storm drainage is to be provided using roadside ditches and side/rearyard drainage swales:
  - Storm runoff for all storms up to and including the 100-year event is to be confined within the right-of-ways or within defined drainage easements.

Water Quality

- Implement lot level and conveyance Best Management Practices.
- Provide an *Enhanced* level of water quality protection, corresponding to a long-term average total suspended solid (TSS) removal rate of 80%.

Flood Protection

- Ensure the proposed residential lots are adequately protected from surface flooding during the 100-year storm event.
- Ensure there are no adverse surface flooding effects on existing downstream residential lots during the 100-year storm event.

Erosion and Sediment Control

- Provide temporary and permanent erosion and sediment control measures prior to, during and after construction.

4.0 STORMWATER MANAGEMENT DESIGN

Pre-development and Post-development drainage areas were developed to assess the stormwater management design requirements for the subject site. The Storm Drainage Area Plan (**119089-STM**) shows the catchment areas for both pre and post-development conditions.

As described by Kollaard, the soils on the site consist of topsoil underlain by fine to medium grained sand overlying silty clays or glacial tills.

In the previous submission of the Conceptual Servicing and Stormwater Management report (September 2021), the majority of the runoff in the post-development condition was directed to the Lombardy Drive roadside ditches. This design results in post-development flows from the overall site being lower than pre-development flows, however, there was an increase in flows directed to the Lombardy Drive roadside ditches. This raised concerns for the capacity of the roadside ditches along Lombardy Drive and the potential for impacts further downstream.

This design approach has been revised to result in no increase in flows to either site outlet (Lombard Drive roadside ditches or Osgood Link Pathway ditch), as discussed below.

Pre-development conditions

Under pre-development conditions, all storm runoff from the site is tributary to the Doyle Municipal Drain and ultimately the Rideau River.

- The west portion of the site (Area EX-1) drains to an existing ditch along the Osgoode Link Pathway
- The east portion of the site (Area EX-2) drains to the Lombardy Drive roadside ditches

Storm runoff from both catchment areas (EX-1 and EX-2) is conveyed north by existing drainage ditches to the main branch of the Doyle Municipal Drain.

Post-development conditions

Under post-development conditions, the drainage of the proposed development has been designed to more closely match pre-development conditions. The west portion (4.40 ha) of the developed area of the subdivision will drain to the Osgoode Link Pathway ditch and runoff will be controlled to pre-development levels through a dry pond and outlet structure. The east portion (0.35 ha) of the subdivision will drain uncontrolled to the Lombardy Drive roadside ditches. The uncontrolled flows to the Lombardy Drive roadside ditches will be lower than pre-development flows.

4.1 Model Parameters

The time of concentration for each drainage area was calculated using the Uplands Overland Flow Method. Weighted curve numbers have been calculated for each drainage area. The times of concentration, curve numbers and initial abstraction values are summarized in **Table 1**. The curve numbers are shown on the Storm Drainage Area Plan.

Table 1 – Weighted Curve Numbers

Area ID	Area (ha)	Time of Concentration (min)	CN	I_a
Pre-Development				
EX-1	3.31	16	72	9.8
EX-2	1.44	15	74	9.0
Post-Development				
A	1.18	15	75	9.0
B	0.40	15	72	10.1
C	0.18	15	72	9.9
D	0.56	15	73	9.7
E	0.48	15	78	7.6
F	0.23	15	75	8.8
G	0.11	15	78	7.8
H	0.42	15	74	9.4
EX-1	0.23	15	81	6.0
EX-2	0.48	15	83	5.2
EX-3	0.48	15	81	6.0

4.2 Water Quantity Control

Peak flows for both pre and post-development conditions were evaluated using the PCSWMM model. Storm runoff from the subdivision will increase under post-development conditions due to an increase in imperviousness (i.e. roads, houses and driveways).

Under post-development conditions, the peak flow from the west portion of the site would be controlled by using a stormwater management dry pond with a flow control structure outletting to the Osgoode Link Pathway ditch. The drainage areas that outlet to the Lombardy Drive roadside ditches would be reduced so that the post-development runoff is less than pre-development levels and therefore, no stormwater quantity control is required for this outlet.

Refer to **Appendix B** for supporting stormwater management calculations and model output. PCSWMM modelling files are available upon request with this submission.

Peak Flows

Pre and post-development peak flows are summarized in **Table 2**:

- The 12-hour SCS storm event generated larger peak flows for both pre and post-development conditions, and results in the maximum storage required within the dry pond and roadside ditches.
- The sizing of the flow control structure was governed by the 24-hour SCS storm event due to a larger volume of runoff and lower pre-development peak flows than the other modelled design storms.

Table 2 demonstrates that the post-development flows to both Osgoode Link Pathway ditch and Lombardy Drive roadside ditches would be lower than pre-development levels for all storm events.

Table 2 – Peak Flows (L/s)

Storm Distribution->		**3hr Chicago**				**12hr SCS**			**24hr SCS**		
Return Period->		**25mm**	**2yr**	**5yr**	**100yr**	**2yr**	**5yr**	**100yr**	**2yr**	**5yr**	**100yr**
Osgoode Link Pathway	*Pre*	15	37	84	278	59	113	307	52	92	230
	Post [1]	13	33	72	218	50	97	252	51	92	229
Lombardy Drive	*Pre*	8	20	43	137	30	56	147	25	44	107
	Post	3	6	13	72	8	17	82	7	12	54
Total	*Pre*	23	57	128	415	89	169	454	77	137	337
	Post	15	39	84	290	58	114	334	57	104	282

[1] Controlled Flow

Outlet to Osgoode Link Pathway Ditch

The conceptual PCSWMM model indicates that the stormwater management dry pond in addition to the proposed roadside ditches would provide sufficient storage to contain the runoff from all storms up to and including the 100-year event. The post-development peak flows would be controlled by a flow control structure.

The control structure would be located on the west side of the dry pond at the outlet, near Block 8. An emergency overflow spillway along the west side of the dry pond would provide relief for storm events exceeding the 100-year event. The location of the dry pond is shown on the Preliminary Grading Plan (**119089-PGR**). The specific design of the dry pond and flow control structure would be established during detailed design.

In addition to the proposed dry pond and control structure, Best Management Practices (BMPs) and Low Impact Development (LIDs) practices (refer to **Section 4.6**) would further reduce the post-development runoff. These practices are not typically modelled during the conceptual design stage but could be added to the modelling during detailed design.

Outlet to Lombardy Drive Roadside Ditches

The conceptual PCSWMM model shows that the uncontrolled post-development runoff to the Lombardy Drive roadside ditches is below the pre-development peak flows for all storm events. No controls are required or proposed for the outlet to the Lombardy Drive roadside ditches. The proposed roadside ditches would split the 100-year flows from the site between the east and west ditches, 58 L/s and 24 L/s, respectively.

4.3 Water Quality Control

The Rideau Valley Conservation Authority has indicated that an *Enhanced* level water quality control (corresponding to a long-term average TSS removal rate of 80%) is required for this subdivision. Quality control for the right-of-way and the front yard areas of the residential units would be provided by a combination of lot level "Best Management Practices" (BMPs) and conveyance controls.

Lot level BMPs would include minimizing grade changes on the lots, minimizing the disturbed area on each lot and encouraging builders to direct roof leaders to grassed areas. These practices would promote infiltration and reduce surface runoff.

Grassed Swale Design Criteria

The roadside ditches would be designed as water quality swales, using criteria outlined in section 4.5.9 of the "*Stormwater Management Planning and Design Manual*" (MOE, March 2003). The design criteria used is summarized in **Table 3**.

Table 3 – Water Quality Design Criteria for Grassed Swales

Criteria	**Recommended**
Drainage Area	< 2.0 ha
Channel Slope	< 4.0%
Bottom Width	> 0.75 m
Side Slopes (H:V)	> 2.5:1
25mm Event (Water Quality)	
Velocity	< 0.5 m/s

Although grassed ditches and swales are generally used for the conveyance of storm water, under the appropriate conditions they permit significant amounts of total suspended solid (TSS) removal. Grassed ditches are effective for treatment when the bottom width is maximized while the depth of flow and channel slope is minimized.

Grassed Swale Design (Roadside Ditches)

All ditches projected to drain the roadway and upstream external areas meet the criteria listed in **Table 3**. The PCSWMM model results indicate that the peak flows generated by the 25mm storm event (water quality event) would have a maximum velocity less than 0.5m/s in the ditches.

The MOE Manual states that "*Grassed swales are most effective for stormwater treatment when depth of flow is minimized, bottom width is maximized (≥ 0.75 m) and channel slope is minimized (e.g., ≤ 1%)*". The depth of flow in the ditches during the 25mm event would range from 0 to 0.15m. Most of the ditch length would have a flow depth of less than 0.1m. The larger flow depths

would occur at the upstream side of driveway culvert crossings and at the inlet to the proposed dry pond. The ditch bottom width would be 1.0m and the channel slope would be 0.5%.
Water quality calculations for each ditch would be provided as part of the detailed design submission. The conceptual model results demonstrate that it would be feasible to design the proposed ditches and swales to provide an *Enhanced* level of water quality treatment for the site.

Maintenance and Effectiveness

Case studies on the effectiveness of grassed ditches and swales for water quality control have provided variable results, which precludes the ability to precisely calculate pollutant removal efficiencies. However, the above referenced publications indicate that properly designed grassed channels can provide in excess of 80% long-term TSS removal, which will meet the requirements for an *Enhanced* level of quality control as per the MOE guidelines.

Both dry and wet swales demonstrate good pollutant removal, with dry swales providing significantly better performance for metals and nitrate. Dry swales typically remove 65 percent of total phosphorus (TP), 50 percent of total nitrogen (TN), and between 80 and 90 percent of metals. Wet swale removal rates are closer to 20 percent of TP, 40 percent of TN, and between 40 and 70 percent of metals. The total suspended solids (TSS) removal for both swale types is typically between 80 and 90 percent.[1]

The majority of contaminants would come from the right-of-way. Storm runoff from grassed areas typically does not require any quality treatment. The site grading and drainage system would be designed to minimize the drainage area to the roadside ditches and individual outlets to provide the requisite level of treatment. Treatment is based on the flow characteristics of the water quality storm event (the 25mm storm), namely the flow depth and velocity. The other recommended criteria in **Table 3** form recommended physical characteristics for a given swale based on a 35% catchment area imperviousness to achieve those flow characteristics. So, while some of the physical criteria such as the recommended maximum drainage area may not be met, the key flow criteria would be shown to be met as part of the detailed design. It is equally worth noting that the proposed site is substantially less impervious than the 35% which was used to populate the recommended physical design criteria for the grassed swale, therefore, TSS loading is anticipated to be quite low.

4.4 Flood Protection

The following items would be evaluated at the detailed design stage:

- The proposed roadside ditches/easements would be designed to convey runoff for storm events up to and including the 1:100 year event.
- Road and driveway culverts would be sized to minimize potential flooding of private property for all storms up to the 1:100 year event.
- All required quantity control storage would be provided in the roadside ditches and would be confined in the right-of-way and/or adjacent easements.

---

[1] *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA, 1996) http://www.fhwa.dot.gov/environment/ultraurb/3fs10.htm*

- Terrace elevations would be set a minimum of 0.3m above the 1:100year ponding elevation.

4.5 Erosion and Sediment Control

The following erosion and sediment control measures would be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). These measures are generally in conformance with the recommendations from the Environmental Impact Statement. An Erosion and Sediment Control drawing would be prepared at the detailed design stage.

4.5.1 Temporary Measures

- Installing silt fences;
- Installing a chain of rock flow check dams at the outlet(s) from the site; and
- Conducting regular street sweeping once the roads are completed.

The proposed temporary erosion and sediment control measures would be implemented prior to construction, would remain in place throughout each phase of construction and would be inspected regularly. Design drawings would indicate that no control measure be permanently removed without prior authorization from the Engineer.

4.5.2 Permanent Measures

- Swales and roadside ditches constructed at minimum grade, where possible;
- Seeding disturbed areas and establishing grass growth; and
- Roadside ditches acting as water quality swales.

4.6 Best Management Practices and Low Impact Development

In addition to stormwater management measures designed to meet the quantity and quality control criteria for the subdivision, additional best management practices (BMPs) and low impact development practices (LIDs) should be considered where feasible. Lot-level and conveyance stormwater BMPs and LIDs can potentially increase infiltration throughout the site, and help to preserve the natural hydrologic cycle, recharge groundwater reserves, reduce runoff volumes and peak flows, and further promote the removal of pollutants from the site.

Most LIDs require periodic inspection and maintenance. As such, the selection of appropriate LIDs requires careful consideration of site conditions (soil type, groundwater table, existing and proposed land use, maintenance requirements) to ensure they will provide a long-term benefit to the proposed development.

The preliminary geotechnical investigation shows that there is a shallow depth to groundwater, making BMPs and LIDs unlikely to infiltrate effectively. BMPs and LIDs could still provide some infiltration and runoff improvements to the proposed development. The evaluation and selection of LIDs would be further refined during the detailed design process.

Maintenance of LID infrastructure in right-of-way would be the responsibility of the City, while LIDs and BMPs on private property would be the responsibility of the homeowner.

5.0 WATER BALANCE

The proposed subdivision will consist of residential estate lots. Proposed BMPs and LIDs are discussed in **Section 4.6**.

By implementing infiltration BMPs and LIDs as part of the storm drainage design, the impacts of development on the hydrologic cycle can be considerably reduced. In addition, infiltration of clean runoff will also benefit the stormwater management. There are currently no infiltration targets set for the site.

A water budget was performed which is included in **Appendix C**. The water budget estimates the post-development annual infiltration will be 151mm, which is a 24mm decrease from the existing conditions estimate of 175mm. The water budget calculations are based on land use and the implementation of BMPs within the proposed development will provide additional infiltration and an improved water balance. The evaluation and selection of BMPs and LIDs would be completed during the detailed design process.

6.0 CONCLUSIONS

The conclusions are as follows:

- Servicing for residential dwellings would be provided by individual wells and septic systems.
- Stormwater quantity control measures would result in post-development peak flows below pre-development flows for the site.
    - Quantity control for flows directed to the Osgoode Link Pathway ditch would be provided by a dry pond and an outlet control structure.
    - By reducing the drainage area to Lombardy Drive roadside ditches under post-development conditions, the post-development runoff would be less than pre-development levels and no controls would be required.
- Stormwater quality control measures would provide an Enhanced level of water quality protection, corresponding to a long-term average TSS removal rate of 80%, by means of flat-bottomed roadside ditches which would act as water quality swales.
- Flood protection would be provided with 100-year storm runoff being contained within the roadside ditches. Terrace elevations would be set a minimum of 0.3m above the 1:100year ponding elevation.
- Erosion and sediment control would be provided both during construction and on a permanent basis.
- Best management practices and low impact development practices would be considered as part of the detailed design.
- The water balance shows that the proposed development would result in a 24mm decrease in infiltration.

NOVATECH

Prepared by:

Melanie Schroeder, P.Eng.
Project Engineer
Water Resources

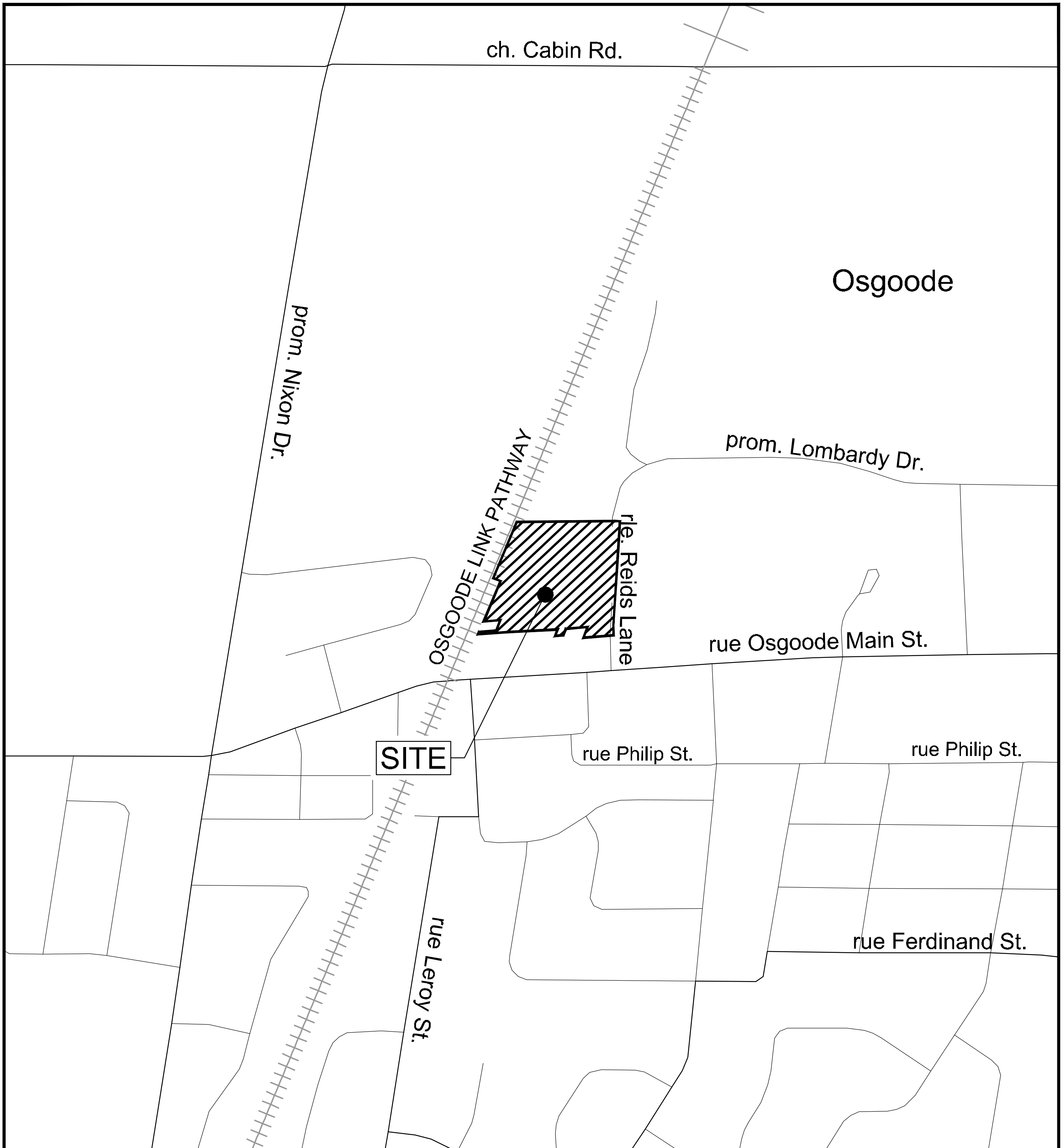
Lisa Bowley, P. Eng.
Project Manager
Land Development Engineering

Reviewed by:

Michael J. Petepiece, P.Eng.
Senior Project Manager | Water Resources

Reviewed by:

Susan M. Gordon, P.Eng., MBA
Director | Land Development



M:\2019\119089\CAD\Design\119089-PGR.dwg, KP, May 31, 2023 - 4:07pm, rkargus

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

REID'S LANE SUBDIVISION

KEY PLAN

SCALE 1 : 5000 (0, 50, 100, 150, 200)		
DATE JUNE 2023	JOB 119089	FIGURE 1

SHT8X11.DWG - 216mmx279mm

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

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

REID'S LANE SUBDIVISION

EXISTING CONDITIONS

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE JUNE 2023 | JOB 119089 | FIGURE 2

M:\2019\119089\CAD\Design\Figures\119089-EX.dwg, EX, May 31, 2023 - 4:12pm, rkargus

SHT11X17.DWG - 279mmX432mm

APPENDIX A

CORRESPONDENCE

Plan of Subdivision Pre-consultation

Meeting Date: May 16, 2019 & May 28, 2019

3200 Reid's Lane

Applicant: Novatech **Councillor** Eli El-Chantiry, Ward 5

Proposal Summary: To create a 7-lot residential subdivision and new road.

Attendees:

Murray Chown, Novatech
Susan Gordon, Novatech
Ryan Poulton, Novatech
Miles Yang, Owner
Cheryl McWilliams, Senior Planner, PIEDD, City of Ottawa
Harry Alvey, Project Manager, PIEDD, City of Ottawa
Amira Shehata, Transportation Engineer, PIEDD, City of Ottawa
Kersten Nitsche, Planner II, Parks and Facilities Planning, Recreation, Culture, and Facilities Department, City of Ottawa
Kevin Wherry, Manager, Parks and Facilities Planning, Recreation, Culture, and Facilities Department, City of Ottawa
Matthew Hayley, Environmental Planner, PIEDD, City of Ottawa
Seana Turkington, Planner, PIEDD, City of Ottawa

Meeting Minutes

May 16 Minutes

Proposal details

- Proposal to create 7 new residential lots via a Plan of Subdivision.
- There are 2 Concept Plans—Concept Plan 1 proposes encroaching onto City Parkland for the creation of a Right-of Way which starts at 26 metres and decreases to 20 metres as the road continues; Concept Plan 2 proposes an 18 metre Right-of-Way, with the road entirely contained on the subject site.
- The laneway which abuts the subject site is privately owned.

Planning (Provided by Cheryl McWilliams and Seana Turkington)

- Property designated Village on Schedule A of the Official Plan and is designated as Village Residential on the Land Use Schedule for the consolidated Villages Secondary Plan-Osgoode.
- Due to the lot configuration of abutting lots, it would be beneficial to consider lot line adjustments to the abutting lots. This would result in a more regular lot for the subject site; however, it would result in the loss of some land area for lots 4 through 7.
- Concerning a potential land swap for parkland in exchange for an extended pedestrian pathway.
- Concept Plan 1 has better connectivity with the Douglas Thompson Pathway, due to the proposed pathway between lots 3 and 4.
- The laneway to Osgoode Main currently has three properties with driveway access from the pathway. The pathway is also privately owned. If a pedestrian pathway were to be extended along this laneway, the existing driveways need to be taken into consideration.

Parks Planning Comments (Provided by Seana Turkington on behalf of Kersten Nitsche)

- Through the development application Parks will collect cash-in-lieu of parkland for this development.
- The cash-in-lieu of parkland amount will be calculated as the lesser of:

- One (1) hectare for every five hundred (500) dwelling units (pursuant to Section 42 of the *Planning Act*); or
- 10% of the value of the land as required by the Parkland Dedication By-law.

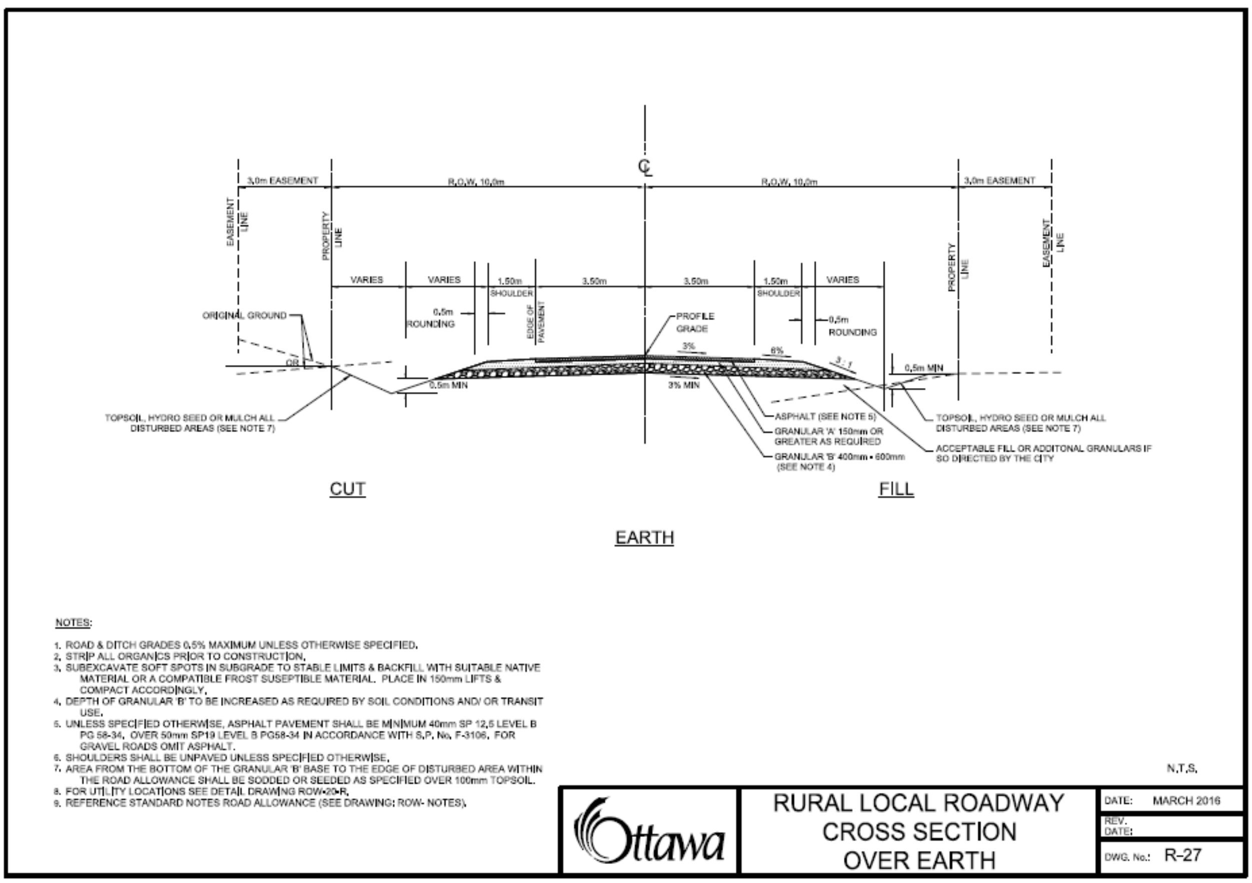
- Parks will also provide draft conditions depending on how this application proceeds.
- Parks is not supportive of Concept 1 as it proposes to use parkland for road access to the development. At this time, Parks will not support any applications to purchase parkland.

Engineering Comments (Provided by Harry Alvey)

- Review the size of the cul-de-sac to ensure that there is sufficient turning radii for garbage trucks and emergency services.
- There is an active rail line abutting the subject site. A 30-metre setback and safety berm will be required. Lots 3 and 4 will be impacted by the 30-metre setback and berm.
- At this point in time, no slope stability issues are anticipated.
- Note that there are high groundwater levels in Osgoode.

Transportation Comments (Provided by Amira Shehata)

- There is an existing pathway on Lombardi Street. If a pathway is extended further towards Osgoode Main, this would ensure pedestrian connectivity. If extension of the pathway is not possible, please explore alternative pedestrian connections.
- In the past, the intent was to extend Reid`s Lane to Osgoode Main.
- A Transportation Impact Assessment will not be required. This is based on the proposed development size and location.
- Please see the below road cross-section for a 20-metre ROW.



Environmental Comments (Provided by Matthew Hayley)

- A Tree Conservation Report will be required for any trees over 10cm in diameter.
- There is potential for Species at Risk on the subject site, specifically butternut.
- An Environmental Impact Statement will be required but, will be limited to potential Species at Risk present on site.

- There is a pathway shown in Concept Plan 1 that connects to the Douglas Thompson Pathway (DT Pathway) There is a tree on the DT Pathway that blocks the proposed pathway on Concept Plan 1. Consider moving pathway to ensure tree is preserved.

Rideau Valley Conservation Authority Comments (Provided by Jamie Batchelor)

- Regarding Stormwater Management, the recommendation is for post-development runoff to be equivalent to pre-development runoff and 80% TSS removal will be required.
- Please contact the RVCA to arrange a technical pre-consultation meeting to discuss the requirement for the hydrogeological report.

May 28 Minutes

- Considering a land exchange or outright purchase of lane to allow for the proposed Right-of-Way as shown in Concept Plan 1.

Parks Comments (Provided by Kevin Wherry and Kersten Nitsche)

- Consider connecting the proposed pathway (shown in a sketch provided May 24, 2019) to the Douglas Thompson Pathway and Peace Park.
- To infringe upon less parkland, altering the road design is highly recommended along with a width reduction to a 20-metre Right-of-Way for the entirety of the proposed road.
- There is a portion of Reid's Lane that is accessed by three properties. Consider closing Reid's Lane at the end of the access for these driveways.
- It would be worth considering a lot line adjustment to give some additional land to abutting lots. This would result in a better lot configuration for the subject site.
- Cash-in-Lieu of Parkland will be required, as will the fee in lieu of the Park Development Charge, which is currently $1818.
- There is currently some extra road allowance (the bulb-out) on Lombardy Drive. Initially, it was planned to extend Lombardy Drive to Osgoode Main. The subdivision agreement will need to be referenced to determine if this bulb-out is to return to the ownership of the property known as 5538 Lombardy Drive.

ADDITIONAL COMMENTS

Planning Comments

Official Plan: Village

Secondary Plan and/or Community Design Plan: Consolidated Villages Secondary Plan (Osgoode)

Zoning By-law: Development Reserve Zone, Subzone 1 (DR1)

Other: Based on GeoOttawa, the site has archaeological potential. As such, please fill out a screening form from the Ministry of Tourism, Culture and Sport's website and include with the application submission.

Environmental Comments

There are no further comments from Environmental Planning. For further comments from the RVCA, please contact the Conservation Authority directly.

Engineering Comments:

Water/Sanitary/Storm Servicing

- Water pipes:
  - No municipal water pipes are adjacent the proposed development. A hydrogeological and terrain analysis is required to determine that a satisfactory quality of groundwater is available and a quantity of flow that exceeds design requirements. The parameters tested shall be the "subdivision suite" known to local well testing companies.

- Sanitary Sewers:
  - No municipal sanitary pipes are adjacent the proposed development. A groundwater impact study is required to discuss the amount of septage treatment that is available if the design septage is more than 10,000 l/day.

- Storm Sewers:
    - No municipal storm pipes are adjacent the proposed development. The developer will need to define legal and sufficient outlet and achieve such outlet, entirely at the developer's cost. There appears to be a wet area on the site and an ephemeral stream that will both need to be discussed.

- Storm Water Management:
    - The consultant should determine a stormwater management regime for the application and, maintain post-development flows to pre-development levels by way of their choise, to the satisfaction of the municipality.
    - Any existing stormwater runoff from adjacent site(s) that crosses the property must be accommodated by the proposed stormwater management design.
    - Stormwater quality control is required for the site. The Rideau Valley Conservation Authority (RVCA) can be contacted to determine the level of stormwater quality control required for the site.
    - All stormwater management determinations shall have supporting rationale.
    - Stormwater management solutions should reference, and show concurrence with, the content of the Jock River Reach 2 and Mud Creek Sub-watershed Study.

Rights-of-Way

- Please refer to the City of Ottawa Private Approach By-Law 2003-447 for the entrance design.
- It is suggested that Lombardy Drive continues at the current width and that Reids Lane be converted to a MUP or other non-vehicular corridor.
- It is suggested to widen the adjacent rail corridor to the wider width of the two. The site is entirely within a 300 m rail corridor buffer and a 30 m setback and a safety berm, to appropriate standards, will be required (it is understood that the MECP will need the appropriate rail acceptance prior to their approval).
- A noise and vibration study because of the proximity of the rail corridor will be required.

Wellhead protection

- The application is within the Mississippi-Rideau highly vulnerable aquifer area- this will need to be researched for any ECA.

LID

- As per 8.3.13 of the Sewer Design Guidelines, Second Edition, document no. SDG002, prepared by the City of Ottawa, October 2012, including technical bulletins ISDTB-2014-1, PIEDTB-2016-01, ISDTB-2018-01, and ISTB-2018-04, the development shall include techniques for control of pollutants and sediments.

Permits and Approvals

- Please contact the Ministry of the Environment, Conservation and Parks (MECP) and the Rideau Valley Conservation Authority (RVCA), amongst other federal and provincial departments/agencies, to identify all the necessary permits and approvals required to facilitate the development: responsibility rests with the developer and their consultant for determining which approvals are needed and for obtaining all external agency approvals. The address shall be in good standing with all approval agencies, for example the RVCA, prior to approval.
- Copies of confirmation of correspondence will be required by the City of Ottawa from all approval agencies that a form of assent is given. Please note that a stormwater program for multiple lots is understood to be a to the direct type of Environmental Compliance Approval (ECA) application with the MOECC; please speak with your engineering consultant to understand the impact this has on the application. An MECP ECA application is not submitted until after planning approval. No construction shall commence until after a commence work notification is given in writing from an engineering Project Manager or Senior Engineer staff member of Development Review – Rural Services.

Ministry of the Environment, Conservation and Parks	Rideau Valley Conservation Authority
Contact Information:	Contact Information:
Christina Des Rochers	Roxanne Coghlan
Water Inspector	roxanne.coghlan@rvca.ca

613-521-3450 ext. 231

Christina.Desrochers@ontario.ca

Submission Requirements for engineering:

- Site Servicing Plan*
- Grading and Drainage Area Plan*
- Erosion and Sediment Control Plan* (for SPA only)

*All identified required plans are to be submitted on standard A1 size sheets as per City of Ottawa Servicing and Grading Plan Requirements (https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-and-grading-plan-requirements), and, on at least one of the plans, note the survey monument used to establish datum on the plans with sufficient information to enable a layperson to locate the monument.

Report Submission Requirements[1]:

- Site Servicing Report
- Storm Water Management Report
    - Please note that engineering issues will need to be significantly acceptable to forward any SWM reports for modelling review.
    - Upstream catchments will need to be drawn and verified.
    - A range of historical storms will need to be modelled (if modelling is required/provided).
- Hydro-geological and terrain analysis
- Groundwater impact study (only if septage is more than 10,000 l/day)
- Erosion and Sediment Control Measures
- Geotechnical Investigation Study
    - Please note that the area may contain sensitive marine clays. If yes, please note that Atterberg limits, consolidation testing, sensitivity values, density tests, shrinkage tests, and grade raise restrictions, and vane shear test results, and rationalised discussion thereof will be required in the report. The geotechnical consultant will need to provide full copies of any published and peer reviewed papers relied on to determine results and conclusions.
    - Chemical analysis will be required.
    - Please note that a long-term groundwater elevation will be required as per section 8.2 of Technical Bulletin ISTB-2018-04, City of Ottawa, dated June 27, 2018.
    - Earthquake analysis is now required to be provided in the report.
    - Deviation from the “Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa”, 1st Edition, September 2007, Golder Associates (Geotechnical Guidelines), or “Slope Stability Guidelines for Development Applications in the City of Ottawa”, 1st Edition, December 2004, Golder Associates (Slope Stability Guidelines), revised 2012, is permitted with supply of full copies (either digital or printed) of per reviewed and published papers with specific reference to actual pages that plainly agree with the consultants’ design approach.

Footnote [1] - All required plans & reports are to be provided on a CD in *.pdf format (at application submission and for any, and all, re-submissions. Drawings shall be provided as individual files)

Application Submission Information

Application Type: **Plan of Subdivision**

For information on Applications, including fees, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/fees-and-funding-programs/development-application-fees

The application processing timeline generally depends on the quality of the submission. For more information on standard processing timelines, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control

Prior to submitting a formal application, it is recommended that you pre-consult with the Ward Councillor.

Application Submission Requirements

For information on the preparation of Studies and Plans and the City's Planning and Engineering requirements, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

To request City of Ottawa plan(s) or report information, please contact the ISD Information Centre at (613)-580-2424 ext. 44455.

Please provide electronic copy (PDF) of all plans and studies required.

All plans and drawings must be produced on A1-sized paper and folded to 21.6 cm x 27.9 cm (8½"x 11").

Note that many of the plans and studies collected with this application must be signed, sealed and dated by a qualified engineer, architect, surveyor, planner or designated specialist.

File No.: D07-16-21-0028

January 14, 2022

Ryan Poulton
Novatech Engineering
Via email: r.poulton@novatech-eng.com

Dear Mr. Poulton,

Re: Draft Plan of Subdivision Application – 3200 Reid's Lane (1st review)

A review of the first submission concerning the above-noted draft plan of subdivision has been undertaken by internal and external contacts. Please find below the comments on your application. *Please ensure that changes required below on one plan are reflected on all other plans, when applicable.*

General:

1. Please note that comments from the Conservation Authority's Review will be forthcoming sometime in February. Once Development Review staff have received these comments, you will be notified.
2. Please note that there will be comments forthcoming regarding Stormwater Management.

Planning Comments:

3. In the Planning Rationale submitted, a pedestrian connection is mentioned but, it is unclear how this pedestrian connection will function or where it will start/end. Any proposed pedestrian connections should, ideally, be shown on plans filed and should make clear if the proposed pedestrian connection would consist of a paved shoulder or something else.
4. The Planning Rationale should contain a fulsome discussion on the Guidelines for New Development near Rail Corridors. The proposed subdivision should be designed to comply with the guideline requirements and said design considerations should be discussed in the rationale. Please revise the Planning Rationale accordingly.
5. At this time, there is reluctance to convey 3-metres (approximately) of Peace Park for a 23-m Right-of-Way when it appears the 20.5 metres shown on the Draft Plan would be sufficient and, given that a 23-metre ROW would require disposal of City-owned Parkland, which is generally avoided to the greatest extent possible. If 20.5 metres is not going to be sufficient, please provide rationale as to why the additional 3-metres is required.
6. Note that tree retention within the proposed subdivision should take into consideration existing and proposed grading and drainage patterns, as these patterns may impact the survival of retained trees in the long term.
7. Although still in the early stages, please take into consideration how the site will be accessed during construction. Generally, access is to avoid residential streets to the greatest extent possible.

8. It may be beneficial from a connectivity perspective to make Lot 7 slightly smaller (which is possible to do and still maintain the 0.4 ha minimum requirement/lot) and have ideally a 3-metre pedestrian pathway from Osgoode Main Street to the proposed extension of Lombardy Drive over a portion of Reid's Lane (see area in yellow in image below). This would also allow for a pedestrian connection to Peace Park, which would be ideal.

Engineering Comments:

Conceptual Servicing and Stormwater Management Report, Report No: R-2021-060, prepared by Novatech Engineering, dated September 2021.

9. Section 2.1 is not correct. This statement may be true for large 0.8ha estate lots, but these are village lots that are half the size and with the proposed raise of the existing grade to have the runoff flow in the desired direction lots of fill will need to be trucked in.
10. Driveway culverts are a minimum 500mm diameter. We can permit a smaller diameter to aide with controlling runoff, but the City standard is 500mm.
11. If these lands are not currently in the Doyle Municipal Drain watershed the Engineers Report will most likely have to be updated. Please check with the City Municipal Drains group.
12. The use of a post-development time of concentration of 10min is unrealistic for lots of this size. A 10 min TC is for compact suburban subdivisions, not 0.4ha lots.
13. This report needs to further analyze the downstream impacts the runoff from this subdivision could have. It is unclear if the downstream ditch has capacity for this additional flow. Please clarify. Furthermore, it is unclear if the downstream culverts have adequate capacity. Please clarify. In the past, there have been drainage issues that and the City has repaired the ditch that drains Lombardy Drive.
14. Novatech's current plan is to raise the roads and have the runoff from this site outlet to the existing ditches on Lombardy Drive. The drainage on Lombardy Drive appears to outlet about halfway down the street into a ditch that outlets to the Doyle Municipal Drain. It is understood that this drainage ditch that accepts runoff from Lombardy Drive is under a mutual drainage agreement between the residents on Lombardy and the downstream landowner. This agreement has provisions in it for maintenance costs divided up between the City and residents. In order to outlet to this ditch, 3200 Reid's Lane will have to ask to enter into this agreement.
15. It is unclear where the drainage from the rear of the subdivision lots will be directed-- will they drain to Lombardy Drive, the rail corridor, or somewhere else? Please clarify.

16. It is unclear how the existing off-site drainage from the neighbouring properties is to be accommodated (specifically the lots fronting on Osgoode Main Street). Please clarify.

Draft Plan of Subdivision, Project No. 119089, prepared by Novatech Engineering, dated 2021/06/07.

17. Please ensure that there is enough property available to construct a proper cul-de-sac. The City requires a minimum of 14m paved asphalt surface plus the boulevard. Required radius of the turning circle could be 20-21m.

Other

18. Please submit a Phase I ESA. This report, which should have been requested during the pre-consultation, is a requirement per Section 4.8.4 of the Official Plan for all Plan of Subdivision applications and for sites where there may be potential contamination.

Environmental Comments:

Tree Conservation Report and Environmental Impact Statement, prepared by Muncaster Environmental Planning Inc., dated April 1, 2021.

19. The TCR needs to address tree preservation and drainage through detailed design as the plan presented may not be feasible with the site's proposed grading and drainage.
20. At this time, staff have concerns regarding the boundary trees. Please identify any boundary trees or large trees along the property lines that have a CRZ that extends into the development (e.g., over 2m within the proposed development).

Preliminary Grading Plan, 119089-PGR, prepared by Novatech Engineering, dated Sept 03/21.

21. Please ensure this plan coordinates with the EIS and Tree Conservation Report to maximize tree retention.

Parks Comments:

22. Compensation would be required for the removal/disposal of any portion of Peace Park needed for the proposed 23m right-of-way. A 20m right-of-way width would be preferable as it would not impact the park and would also match the east-west portion of the Lombardy Drive extension.
23. Please note that the following condition will be requested at the time of Draft Approval, in addition to any further standard subdivision conditions related to Parkland/Cash-in-Lieu: "The Owner shall provide an open ditch or culvert, where a rural road cross section is proposed, and driveway(s) in the road allowance adjacent to the park frontage, in accordance with the approved street cross-section."

Corporate Real Estate Office (CREO) Comments:

24. The subject property abuts a rail corridor to the east and, is within a 300-metre buffer area. Accordingly, the subject site and proposed development on it, should take into account existing guidelines for new development near rail corridors.
25. Based on the guidelines, the following apply:
    a. According to the guidelines, a 30-metre setback from the property line to the face of the building is recommended, combined with an earthen berm 2 meters above

grade (2:5:1) (see page 27 & 28). It is also recommended that a noise and vibration study should be conducted according to page 28 of the guidelines.

   b. Appropriate uses within the 30-metre setback area include public and private roads, landscaping, parking spaces/structures, and storage sheds.
   c. Consideration to reducing the stated setback is possible, subject to engineered mitigation measures (such as a crash wall, larger berm, etc.).

26. Since 3200 Reid's Lane is located within the 300-metre area of concern, CREO requests that the guidelines be followed, and pursuant to the guidelines, that the existence of the rail corridor be registered on title and a clause be inserted in all offers to purchase, agreements of Purchase and Sale and/or Lease agreements for all developments within 300 meters of this railway right-of-way.

Bell Canada Comments:

27. The Owner is advised to contact Bell Canada at planninganddevelopment@bell.ca during the detailed utility design stage to confirm the provision of communication/telecommunication infrastructure needed to service the development.
28. It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.
29. If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

Enbridge Gas Inc. Comments:

30. The applicant shall contact Enbridge Gas Inc.'s Customer Connections department by emailing salesarea60@enbridge.com to determine gas availability, service and meter installation details and not ensure all gas piping is installed prior to the commencement of site landscaping (including, but not limited to: tree planting, silva cells, and/or soil trenches) and/or asphalt paving.
31. This response does not constitute a pipe locate, clearance for construction or availability of gas.
32. If the gas main needs to be relocated as a result of changes in the alignment or grade of the future road allowances or for temporary gas pipe installations pertaining to phased construction, all costs are the responsibility of the applicant.
33. In the event that easement(s) are required to service this development, and any future adjacent development, the applicant will provide the easement(s) to Enbridge Gas Inc. at no cost. The inhibiting order will not be lifted until the application has met all of Enbridge Gas Inc.'s requirements.

OCDSB Comments:

34. Ottawa-Carleton District School Board (OCDSB) Planning staff has reviewed the above noted application for a proposed subdivision located within the Osgoode community. The proposal includes seven (7) rural residential lots that include the extension of Lombardy Drive and existing rural subdivision. We do not have any concerns with the above application and would like to note that we do not have a requirement for a school within the subject subdivision lands. We do however require our standard clause to be included

within the Subdivision Agreement and associated Purchase and Sale Agreement for each lot. Our clause is as follows:

"The Owner shall include in all Agreements of Purchase and Sale the following clause:

Prospective purchases are informed that school accommodation pressures exist in in the Ottawa-Carleton District School Board schools designated to serve this development which are currently being addressed by the utilization of portable classrooms and/or by directing students to schools outside their community."

Rogers

35. Rogers Communications Canada Inc. ("**Rogers**") has reviewed the application for the above Subdivision and has determined that it intends to offer its communications services to residents of the Subdivision. Accordingly, we request that municipal approval for the Subdivision be granted subject to the following conditions:
    i. The Owner shall agree in the Subdivision Agreement to (a) permit all CRTC-licensed telecommunications companies intending to serve the Subdivision ("**Rogers Communications Canada Inc.**") to install their facilities within the Subdivision, and (b) provide joint trenches for such purpose.
    ii. The Owner shall agree in the Subdivision Agreement to grant, at its own cost, all easements required by the Communications Service Providers to serve the Subdivision, and will cause the registration of all such easements on title to the property.
    iii. The Owner shall agree in the Subdivision Agreement to coordinate construction activities with the Communications Service Providers and other utilities, and prepare an overall composite utility plan that shows the locations of all utility infrastructure for the Subdivision, as well as the timing and phasing of installation.
    iv. The Owner shall agree in the Subdivision Agreement that, if the Owner requires any existing Rogers facilities to be relocated, the Owner shall be responsible for the relocation of such facilities and provide where applicable, an easement to Rogers to accommodate the relocated facilities.

Summary of Public Comments:

36. Multiple concerns were received regarding the potential increase in traffic volume on Lombardy Drive. As it relates to traffic, there are also concerns about pedestrian safety as there have been issues in the past concerning speeding on Lombardy Drive.
37. In the past, illegal dumping occurred at 3200 Reid's Lane. The property should be remediated, and groundwater should be monitored to ensure no negative impacts.
38. Concerns raised about the potential impacts to nearby wells including the potential impacts of the previous dumping, construction activities, and introduction of additional demand on the aquifer.
39. Concerned about the access to the rear of existing properties along Osgoode Main Street Street off of Reid's Lane. The existing access to the rear yards should be maintained. Lot 7 may restrict the access of larger trucks necessary for septic servicing, landscaping, etc.

40. Is the existing design covenant in place for the subdivision currently along Lombardy Drive going to be maintained? This subdivision should be in keeping with the style and siting of the existing homes along Lombardy Drive.
41. Would like clarification as to whether or not snowmobilers will be able to access the multi-use pathway via Lot 8 so sleds do not need to use Osgoode Main Street.
42. Concerned that the development will require significant amounts of backfill and therefore increase the flooding potential of existing properties.
43. How will drainage be handled? The existing drainage ditch connecting to Cabin Road has overflowed in the past and flooding has occurred in the rear of some properties abutting the ditch. Will potential future issues related to the proposed development be assumed by the developer or by all property owners along the existing and new portion of Lombardy Drive?
44. It appears as though the conceptual Stormwater and Site Servicing Report was labelled/saved as "Waterson Place P3" which is what comes up when the report (correctly labelled on DevApps) is opened from the City's webpage.
45. How will construction vehicles access the site—will it be via Reid's Lane or along Lombardy Drive?
46. There should be natural obstacles (berm, etc) along the portion of Lot 7, Lombardy Drive and Peace Park that intersect (area in orange circle in image below) as there is a tobaggan hill in Peace Park. Safe sledding should be preserved.

The next submission should address <u>each and all</u> of the comments or issues, to ensure the effectiveness and consistency of the next review. Your resubmission cover letter must indicate how each comment has been addressed. You must coordinate the responses from the different consultants and submit only **<u>one cover letter</u>** with numbered responses. If revisions are made other than the ones addressing the comments above, these need to be identified in your cover letter.

If you have any questions on any of the above, please do not hesitate to contact the undersigned at 613-580-2424 extension 27790 or via email at Seana.Turkington@ottawa.ca.

Sincerely,

Seana Turkington, MCIP, RPP
Planner I
Development Review/ Examen des demandes d'améndagement
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique

City of Ottawa/Ville d'Ottawa
☎ 613.580.2424 ext/poste. 27790
ottawa.ca/planning / ottawa.ca/urbanisme

c.c.

Kevin Hall, Senior Engineer, Infrastructure City of Ottawa
Matthew Hayley, Environmental Planner, City of Ottawa
Warren Bedford, Parks Planner, City of Ottawa
Mike Giampa, Transportation Engineer, City of Ottawa

File: 21-OSG-SUB-0034

March 4th, 2022

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

Attention: Seana Turkington

Subject: Crestview Innovation Inc.
Plan of Subdivision Application D07-16-21-0028
3200 Reid's Lane, formerly Osgoode, now City of Ottawa

Dear Ms. Turkington,

The Conservation Partners Planning and Development Review Team have completed a review of the above noted application for:

- The creation of a plan of subdivision to permit the development of seven rural residential lots, each with a minimum lot area of approximately 4000 square metres, as well as the extension of Lombardy Drive South for access.

We have undertaken our review within the context of Sections 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*, and from the perspective of the Conservation Authority regulations. The following comments are offered for your consideration.

Natural Hazards

There have been no natural hazards identified on the property which would preclude this application.

Natural Heritage

There have been no natural heritage features identified on this property which would preclude this application.

Stormwater Management

In accordance with our MOA with the City, the RVCA has reviewed the report "*Conceptual Servicing and Stormwater Management Report – 3200 Reid's Lane Subdivision*" dated September 2021, prepared by Novatech Engineers, Planners, and Landscape Architects. The report was reviewed by Evelyn Liu, M.Sc., P.Eng., RVCA Water Resource Engineer. The review has identified some additional information/clarifications required to continue our review (see technical memo attached).

Hydrogeological and Terrain Analysis

In accordance with our MOA with the City, the Conservation Authority has reviewed the report "*Hydrogeological Investigation and Terrain Evaluation – Proposed Residential Subdivision, 3200 Reid's Lane, Osgoode Ward, City of Ottawa, Ontario*" dated September 1st 2021, prepared by Kollaard Associates Engineers. The review was undertaken on behalf of the Rideau Valley Conservation Authority by Mike Melaney, M.Sc., P.Eng., South Nation Conservation Hydrogeologist. The review has identified additional information/clarifications required to continue our review (see attached technical memo).

It should also be noted that the report has identified the location of the on-site private sewage disposal systems and wells for each lot on Figure 6. Specifically, Figure 6 has identified the private on-site sewage systems for lots 3 and 4 systems close to the lot lines and the Osgoode Link Pathway. While, presently this may not be an issue, it will leave limited options for screening or sound barriers such as berms should it be required adjacent the Osgoode Pathway Link. Therefore, the City should satisfy themselves that any future plans or requirements for the Osgood Pathway Link are not compromised by the proposed locations of the on-site private sewage disposal systems.

Conclusion

In conclusion, the RVCA recommends that this application be placed ON HOLD until such time as the items in this letter have been adequately addressed. Please keep us informed on the status of this application. For any questions regarding the information contained in this letter, please feel free to contact me.

Respectfully,

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

Cc: Mike Melaney: South Nation Conservation Authority
Ryan Poulton: Novatech Engineers, Planners and Landscape Architects
Glen McDonald: RVCA

Planning and Engineering - Technical Review Memorandum

Nov. 29, 2021

To: Jamie Batchelor, Planner, Planning & Regulation, RVCA
From: Evelyn Liu P.Eng., Engineering & Regulation, RVCA
RE: 3200 Reid's Lane, Ottawa

Stormwater Management *Review*

I have reviewed the following material, regarding stormwater management:

"Conceptual Servicing And Stormwater Management Report 3200 Reid's Lane Subdivision City Of Ottawa" Prepared by Lisa Bowley , P. Eng, of NOVATECH, dated Sep 3, 2021

Our comments are as followings:

1. The pre-consultation requires that "Stormwater management solutions should reference, and show concurrence with, the content of the Jock River Reach 2 and Mud Creek Subwatershed Study". What are the requirements stated in these documentations pertaining to the subject site? Please ensure the proposed stormwater management adheres to the design criteria in these documentations.

2. Section 4.2 stated that:

- The 12-hour SCS storm event generated larger peak flows for both pre and post-development conditions, and required the maximum storage within the roadside ditches.
- The sizing of the flow control structure was governed by the 24-hour SCS storm event.

Please provide explanations on how two storm events were selected in the peak flows and sizing of the control structure.

3. Detailed sizing of the swales and outlet structure should be provided in the detailed design stage.
4. Any new outlet to the Drain will require a permit from RVCA under On Reg. 174/06.

I trust this is satisfactory for your present purpose. Please call if you have any questions.

Respectfully,
Department of Engineering and Regulation
Evelyn Liu, M.Asc., P.Eng.
Water Resources Engineer

APPENDIX B

STORMWATER MANAGEMENT CALCULATIONS

3200 Reid's Lane (119089)
Pre-Development Model Parameters

NOVATECH
Engineers, Planners & Landscape Architects

Time to Peak Calculations
(Uplands Overland Flow Method)
Existing Conditions

Area ID	Area (ha)	Overland Flow						Concentrated Overland Flow						Overall		
		Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Time of Concentratio (min)	Time to Peak (min)	Time to Peak (min)
EX-1	3.31	100	94.00	91.15	2.8%	0.25	6.67	195	91.15	90.00	0.6%	0.35	9.29	16	11	11
EX-2	1.44	100	93.75	92.50	1.3%	0.16	10.42	140	92.50	90.50	1.4%	0.50	4.67	15	10	10

Weighted Curve Number Calculations
Soil type 'C' (Soil Mapping and Boreholes: silty sand and sandy clay)

Area ID	Land Use 1	Area	CN	Land Use 2	Area	CN	Weighted CN	
EX-1	Forest	79%	70	Residential	21%	81	72	** Soil Type (HSG) = C; Forest Cover = Good; Residential Unit = 1/3 acre
EX-2	Forest	67%	70	Residential	33%	83	74	** Soil Type (HSG) = C; Forest Cover = Good; Residential Unit = 1/4 acre

Weighted IA Calculations

Area ID	Land Use 1	Area	IA	Land Use 2	Area	IA	Weighted IA
EX-1	Forest	79%	10.9	Residential	21%	6.0	9.8
EX-2	Forest	67%	10.9	Residential	33%	5.2	9.0

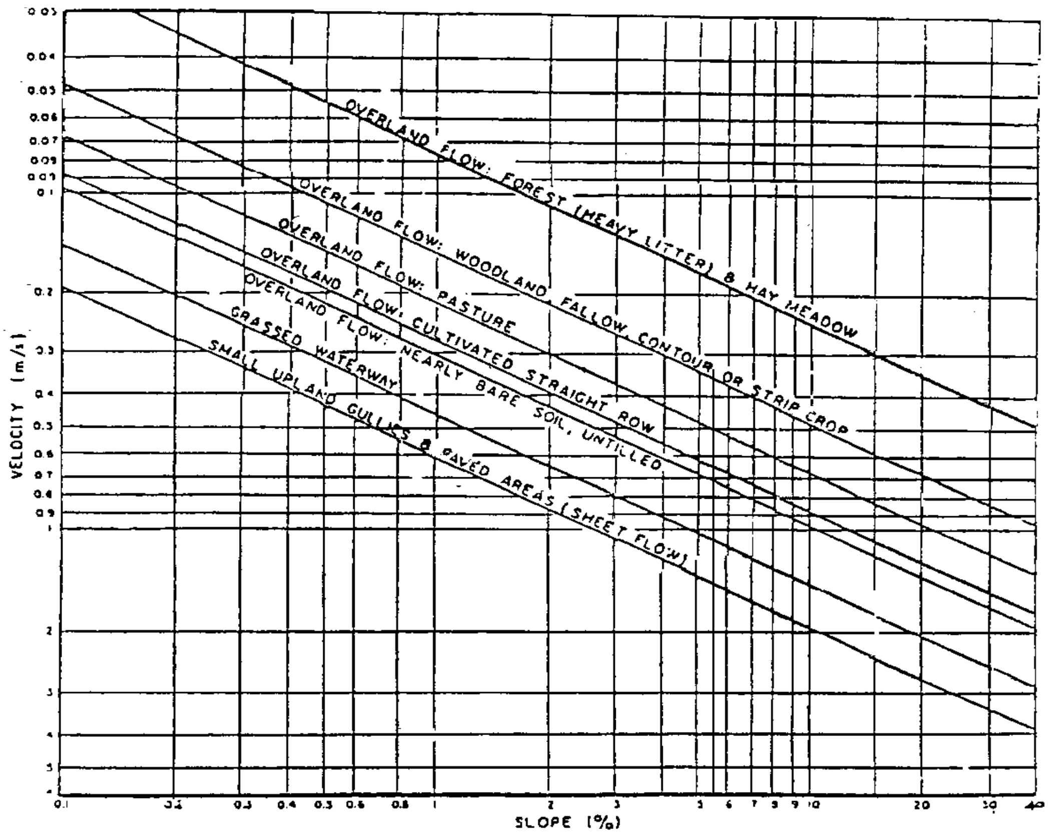


Figure A.5.2: Upland Method for Estimating Time of Concentration
(SCS National Engineering Handbook, 1971)

3200 Reid's Lane (119089)
Pre-Development Model Parameters

NOVATECH
Engineers, Planners & Landscape Architects

Time to Peak Calculations
(Uplands Overland Flow Method)
Proposed Conditions

Area ID	Area (ha)	Overland Flow						Concentrated Overland Flow						Overall	
		Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Time of Concentration (min)	Time of Concentration (min)
A	1.18	85	93.25	91.20	2.4%	0.32	4.43	0	-	-	-	-	0.00	4	15
B	0.40	100	92.50	90.80	1.7%	0.27	6.17	0	-	-	-	-	0.00	6	15
C	0.18	30	90.25	90.10	0.5%	0.16	3.13	0	-	-	-	-	0.00	3	15
D	0.56	50	91.90	90.15	3.5%	0.40	2.08	0	-	-	-	-	0.00	2	15
E	0.48	25	91.80	91.20	2.4%	0.32	1.30	0	-	-	-	-	0.00	1	15
F	0.23	30	91.60	91.25	1.2%	0.22	2.27	0	-	-	-	-	0.00	2	15
G	0.11	10	91.55	91.15	4.0%	0.42	0.40	0	-	-	-	-	0.00	0	15
H	0.42	95	93.40	91.50	2.0%	0.30	5.28	0	-	-	-	-	0.00	5	15
EX-1	0.23	60	94.15	93.45	1.2%	0.22	4.55	0	-	-	-	-	0.00	5	15
EX-2	0.48	60	93.90	93.15	1.3%	0.24	4.17	0	-	-	-	-	0.00	4	15
EX-3	0.48	60	94.00	92.60	2.3%	0.32	3.13	0	-	-	-	-	0.00	3	15

Weighted Curve Number Calculations
Soil type 'C' (Soil Mapping and Boreholes: silty sand and sandy clay)

Area ID	Land Use 1	Area	CN	Land Use 2	Area	CN	Weighted CN	
A	Pavement/Roof	14%	98	Lawn	86%	71	75	** Soil Type (HSG) = C; Lawn = Meadow
B	Pavement/Roof	2%	98	Lawn	98%	71	72	** Soil Type (HSG) = C; Lawn = Meadow
C	Pavement/Roof	5%	98	Lawn	95%	71	72	** Soil Type (HSG) = C; Lawn = Meadow
D	Pavement/Roof	6%	98	Lawn	94%	71	73	** Soil Type (HSG) = C; Lawn = Meadow
E	Pavement/Roof	28%	98	Lawn	72%	71	78	** Soil Type (HSG) = C; Lawn = Meadow
F	Pavement/Roof	16%	98	Lawn	84%	71	75	** Soil Type (HSG) = C; Lawn = Meadow
G	Pavement/Roof	26%	98	Lawn	74%	71	78	** Soil Type (HSG) = C; Lawn = Meadow
H	Pavement/Roof	10%	98	Lawn	90%	71	74	** Soil Type (HSG) = C; Lawn = Meadow
EX-1	Residential	100%	81	Lawn	0%	71	81	** Soil Type (HSG) = C; Lawn = Meadow; Residential Unit = 1/3 acre
EX-2	Residential	100%	83	Lawn	0%	71	83	** Soil Type (HSG) = C; Lawn = Meadow; Residential Unit = 1/4 acre
EX-3	Residential	100%	81	Lawn	0%	71	81	** Soil Type (HSG) = C; Lawn = Meadow; Residential Unit = 1/3 acre

76.34029

Weighted IA Calculations

Area ID	Land Use 1	Area	IA	Land Use 2	Area	IA	Weighted IA
A	Pavement/Roof	14%	0.5	Lawn	86%	10.4	9.0
B	Pavement/Roof	2%	0.5	Lawn	98%	10.4	10.1
C	Pavement/Roof	5%	0.5	Lawn	95%	10.4	9.9
D	Pavement/Roof	6%	0.5	Lawn	94%	10.4	9.7
E	Pavement/Roof	28%	0.5	Lawn	72%	10.4	7.6
F	Pavement/Roof	16%	0.5	Lawn	84%	10.4	8.8
G	Pavement/Roof	26%	0.5	Lawn	74%	10.4	7.8
H	Pavement/Roof	10%	0.5	Lawn	90%	10.4	9.4
EX-1	Residential	100%	6.0	Lawn	0%	10.4	6.0
EX-2	Residential	100%	5.2	Lawn	0%	10.4	5.2
EX-3	Residential	100%	6.0	Lawn	0%	10.4	6.0

3200 Reid's Lane (119089)
Design Storm Time Series Data
Chicago Design Storms

NOVATECH
Engineers, Planners & Landscape Architects

C25mm-4.stm

Duration min	Intensity mm/hr
0:00	0
0:10	1.51
0:20	1.75
0:30	2.07
0:40	2.58
0:50	3.46
1:00	5.39
1:10	13.44
1:20	56.67
1:30	17.77
1:40	9.12
1:50	6.14
2:00	4.65
2:10	3.76
2:20	3.17
2:30	2.74
2:40	2.43
2:50	2.18
3:00	1.98
3:10	1.81
3:20	1.68
3:30	1.56
3:40	1.47
3:50	1.38
4:00	1.31

C2-3.stm

Duration min	Intensity mm/hr
0:00	0
0:10	2.81
0:20	3.5
0:30	4.69
0:40	7.3
0:50	18.21
1:00	76.81
1:10	24.08
1:20	12.36
1:30	8.32
1:40	6.3
1:50	5.09
2:00	4.29
2:10	3.72
2:20	3.29
2:30	2.95
2:40	2.68
2:50	2.46
3:00	2.28

C5-3.stm

Duration min	Intensity mm/hr
0:00	0
0:10	3.68
0:20	4.58
0:30	6.15
0:40	9.61
0:50	24.17
1:00	104.19
1:10	32.04
1:20	16.34
1:30	10.96
1:40	8.29
1:50	6.69
2:00	5.63
2:10	4.87
2:20	4.3
2:30	3.86
2:40	3.51
2:50	3.22
3:00	2.98

3200 Reid's Lane (119089)

Design Storm Time Series Data
Chicago Design Storms

C100-3.stm			C100-3+20%.stm	
Duration	Intensity		Duration	Intensity
min	mm/hr		min	mm/hr
0:00	0		0:00	0
0:10	6.05		0:10	6:14
0:20	7.54		0:20	9.05
0:30	10.16		0:30	12.19
0:40	15.97		0:40	19.16
0:50	40.65		0:50	48.78
1:00	178.56		1:00	214.27
1:10	54.05		1:10	64.86
1:20	27.32		1:20	32.78
1:30	18.24		1:30	21.89
1:40	13.74		1:40	16.49
1:50	11.06		1:50	13.27
2:00	9.29		2:00	11.15
2:10	8.02		2:10	9.62
2:20	7.08		2:20	8.5
2:30	6.35		2:30	7.62
2:40	5.76		2:40	6.91
2:50	5.28		2:50	6.34
3:00	4.88		3:00	5.86

3200 Reid's Lane (119089)
Design Storm Time Series Data
SCS Design Storms

NOVATECH
Engineers, Planners & Landscape Architects

S2-12.stm		S5-12.stm		S100-12.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0.00	0:00	0	0:00	0
0:30	1.27	0:30	1.69	0:30	2.82
1:00	0.59	1:00	0.79	1:00	1.31
1:30	1.10	1:30	1.46	1:30	2.44
2:00	1.10	2:00	1.46	2:00	2.44
2:30	1.44	2:30	1.91	2:30	3.19
3:00	1.27	3:00	1.69	3:00	2.82
3:30	1.69	3:30	2.25	3:30	3.76
4:00	1.69	4:00	2.25	4:00	3.76
4:30	2.29	4:30	3.03	4:30	5.07
5:00	2.88	5:00	3.82	5:00	6.39
5:30	4.57	5:30	6.07	5:30	10.14
6:00	36.24	6:00	48.08	6:00	80.38
6:30	9.23	6:30	12.25	6:30	20.47
7:00	4.06	7:00	5.39	7:00	9.01
7:30	2.71	7:30	3.59	7:30	6.01
8:00	2.37	8:00	3.15	8:00	5.26
8:30	1.86	8:30	2.47	8:30	4.13
9:00	1.95	9:00	2.58	9:00	4.32
9:30	1.27	9:30	1.69	9:30	2.82
10:00	1.02	10:00	1.35	10:00	2.25
10:30	1.44	10:30	1.91	10:30	3.19
11:00	0.93	11:00	1.24	11:00	2.07
11:30	0.85	11:30	1.12	11:30	1.88
12:00	0.85	12:00	1.12	12:00	1.88

3200 Reid's Lane (119089)

Design Storm Time Series Data

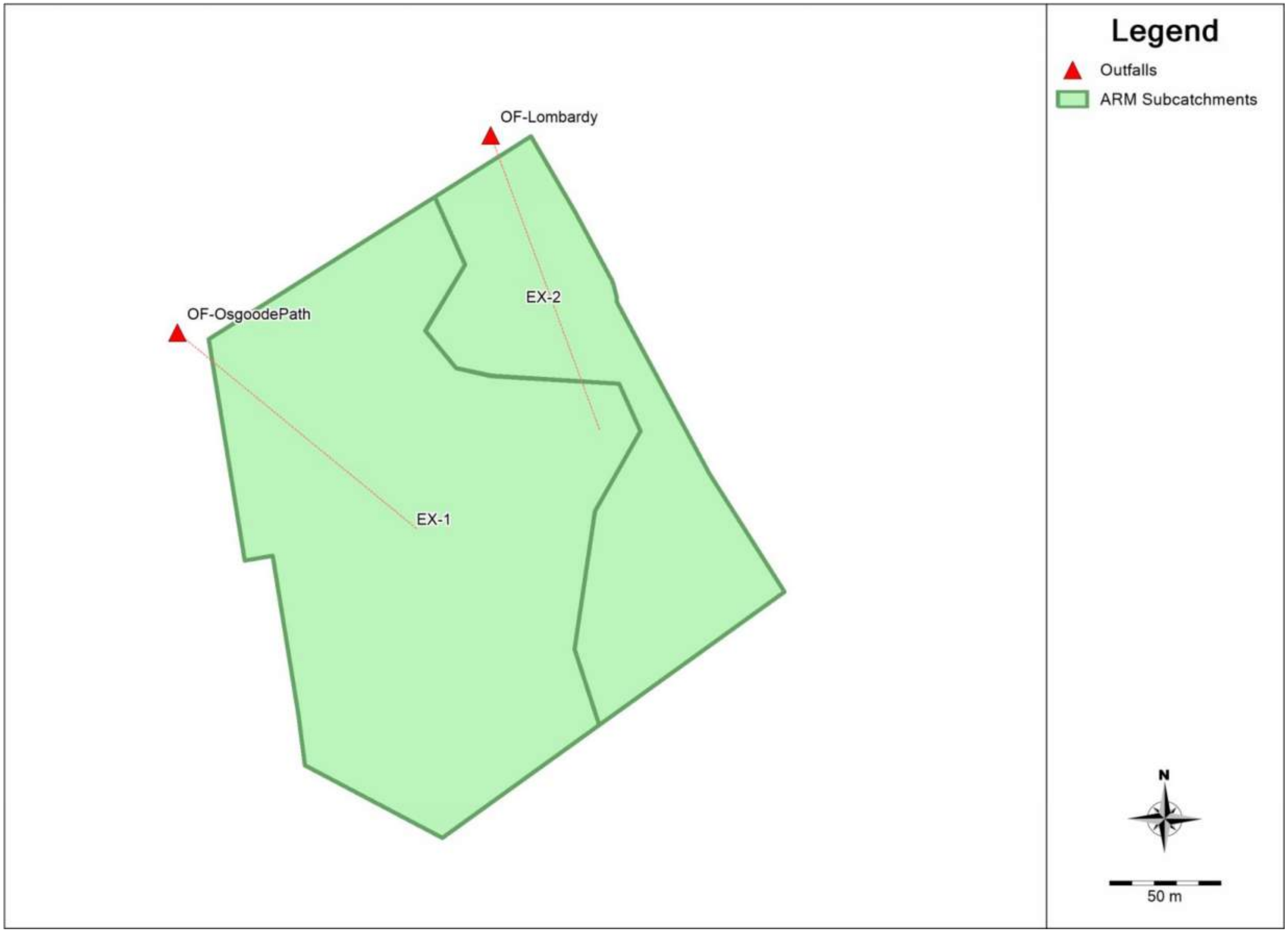
SCS Design Storms

S2-24.stm		S5-24.stm		S100-24.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0.00	0:00	0	0:00	0
1:00	0.72	1:00	0.44	1:00	0.6
2:00	0.34	2:00	0.44	2:00	0.75
3:00	0.63	3:00	0.81	3:00	1.39
4:00	0.63	4:00	0.81	4:00	1.39
5:00	0.81	5:00	1.06	5:00	1.81
6:00	0.72	6:00	0.94	6:00	1.6
7:00	0.96	7:00	1.25	7:00	2.13
8:00	0.96	8:00	1.25	8:00	2.13
9:00	1.30	9:00	1.68	9:00	2.88
10:00	1.63	10:00	2.12	10:00	3.63
11:00	2.59	11:00	3.37	11:00	5.76
12:00	20.55	12:00	26.71	12:00	45.69
13:00	5.23	13:00	6.8	13:00	11.64
14:00	2.30	14:00	2.99	14:00	5.12
15:00	1.54	15:00	2	15:00	3.42
16:00	1.34	16:00	1.75	16:00	2.99
17:00	1.06	17:00	1.37	17:00	2.35
18:00	1.11	18:00	1.44	18:00	2.46
19:00	0.72	19:00	0.94	19:00	1.6
20:00	0.58	20:00	0.75	20:00	1.28
21:00	0.81	21:00	1.06	21:00	1.81
22:00	0.53	22:00	0.68	22:00	1.17
23:00	0.48	23:00	0.63	23:00	1.07
0:00	0.48	0:00	0.63	0:00	1.07

Overall Model Schematic

3200 Reid's Lane (119089)
PCSWMM Pre-Development Model Schematics

Subcatchments and Outfalls



Date: 2021-08-27
M:\2019\119089\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\119089-Pre PCSWMM Model Schematics.docx

ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM VERSION 7.4.3240

This is a new version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:	05/04/2021 00:00:00
Simulation end time:	05/06/2021 00:00:00
Runoff wet weather time steps:	240 seconds
Report time steps:	60 seconds
Number of data points:	2881

****
Unit Hydrographs Runoff Method
****

Subcatchment	Runoff Method	Raingage	Area (ha)	Time of Concentration (min)	Time to Peak (min)	Time after Peak (min)	Peak UH Flow (m³/s/mm)	UH Depth (mm)
EX-2	Nash IUH	Raingage	1.44	15	10	62	0.01299	0.998
EX-1	Nash IUH	Raingage	3.31	16	10.67	69.33	0.028	0.999

****
ARM Runoff Summary
****

Subcatchment	Total Precip (mm)	Total Losses (mm)	Total Runoff (mm)	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff (fraction)
EX-2	93.91	52.511	41.326	0.595	147.197	0.44
EX-1	93.91	55.228	38.64	1.279	306.992	0.411

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 0
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Raingage	07-SCS100yr-12hr	INTENSITY	30 min.

```
************
Node Summary
************
                                           Invert      Max.    Ponded    External
Name                 Type                   Elev.     Depth      Area    Inflow
---------------------------------------------------------------------------------
OF-Lombardy          OUTFALL                90.80      0.00       0.0
OF-OsgoodePath       OUTFALL                90.75      0.00       0.0


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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Surcharge Method ......... EXTRAN
Starting Date ............ 05/04/2021 00:00:00
Ending Date .............. 05/06/2021 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00


**************************        Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.000         0.000
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.187         1.874
External Outflow .........         0.187         1.874
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


Analysis begun on:  Fri Aug 27 13:27:45 2021
Analysis ended on:  Fri Aug 27 13:27:45 2021
Total elapsed time: < 1 sec
```

```
ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM VERSION 7.4.3240
---------------------------------------------------------

This is a new version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:                  05/04/2021 00:00:00
Simulation end time:                    05/06/2021 00:00:00
Runoff wet weather time steps:          240 seconds
Report time steps:                      60 seconds
Number of data points:                  2881


******************************
Unit Hydrographs Runoff Method
******************************
```

Subcatchment	Runoff Method	Raingage	Area (ha)	Time of Concentration (min)	Time to Peak (min)	Time after Peak (min)	Peak UH Flow (m³/s/mm)	UH Depth (mm)
EX-2	Nash IUH	Raingage	1.44	15	10	62	0.01299	0.998
EX-1	Nash IUH	Raingage	3.31	16	10.67	69.33	0.028	0.999

```
******************
ARM Runoff Summary
******************
```

Subcatchment	Total Precip (mm)	Total Losses (mm)	Total Runoff (mm)	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff (fraction)
EX-2	106.73	55.647	50.993	0.734	107.249	0.478
EX-1	106.73	58.723	47.946	1.587	229.942	0.449

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 0
Number of nodes ........... 2
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
```

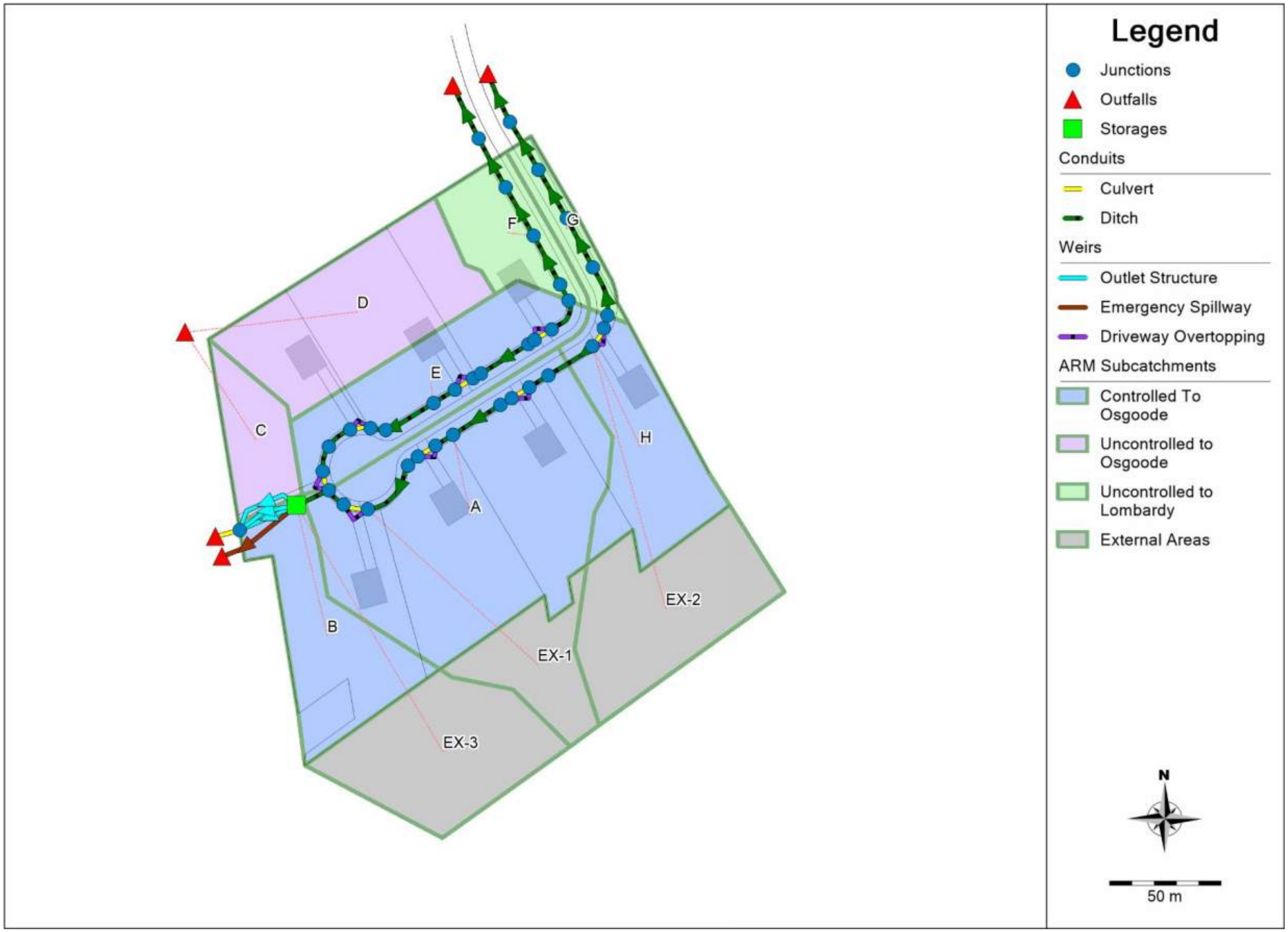
Name	Data Source	Data Type	Recording Interval
Raingage	10-SCS100yr-24hr	INTENSITY	60 min.

```
************
Node Summary
************
                                             Invert      Max.    Ponded    External
Name                 Type                     Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
OF-Lombardy          OUTFALL                  90.80      0.00       0.0
OF-OsgoodePath       OUTFALL                  90.75      0.00       0.0


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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Surcharge Method ......... EXTRAN
Starting Date ............ 05/04/2021 00:00:00
Ending Date .............. 05/06/2021 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00


**************************        Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.000         0.000
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.232         2.321
External Outflow .........         0.232         2.321
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


Analysis begun on:  Thu Aug 12 09:49:29 2021
Analysis ended on:  Thu Aug 12 09:49:29 2021
Total elapsed time: < 1 sec
```

Overall Model Schematic

3200 Reid's Lane (119089)
PCSWMM Post-Development Model Schematics

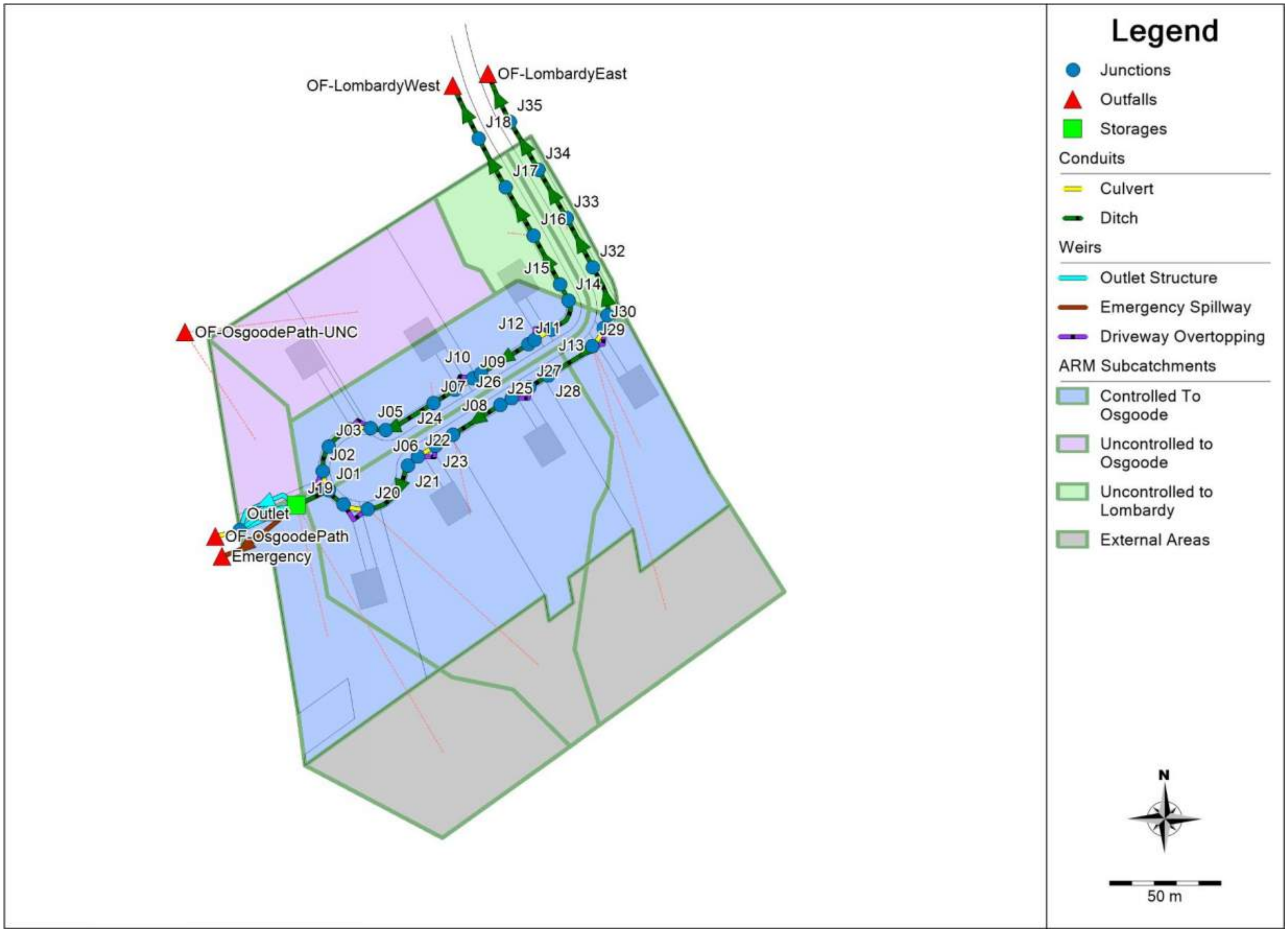
Subcatchments



Date: 2022-06-09
M:\2019\119089\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\119089-Post PCSWMM Model Schematics_Rev1.docx

3200 Reid's Lane (119089)
PCSWMM Post-Development Model Schematics

Junctions and Outfalls



Date: 2022-06-09
M:\2019\119089\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\119089-Post PCSWMM Model Schematics_Rev1.docx

```
ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM VERSION 7.4.3240
---------------------------------------------------------

This is a new version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:                 05/04/2021 00:00:00
Simulation end time:                   05/06/2021 00:00:00
Runoff wet weather time steps:         240 seconds
Report time steps:                     60 seconds
Number of data points:                 2881


******************************
Unit Hydrographs Runoff Method
******************************
```

Subcatchment	Runoff Method	Raingage	Area (ha)	Time of Concentration (min)	Time to Peak (min)	Time after Peak (min)	Peak UH Flow (m^3/s/mm)	UH Depth (mm)
EX-2	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
EX-1	Nash IUH	Raingage	0.23	15	10	50	0.00208	0.997
EX-3	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
D	Nash IUH	Raingage	0.56	15	10	54	0.00505	0.998
A	Nash IUH	Raingage	1.18	15	10	58	0.01065	0.998
B	Nash IUH	Raingage	0.4	15	10	54	0.00361	0.998
C	Nash IUH	Raingage	0.18	15	10	46	0.00162	0.996
E	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
G	Nash IUH	Raingage	0.11	15	10	46	0.00099	0.996
F	Nash IUH	Raingage	0.23	15	10	50	0.00208	0.997
H	Nash IUH	Raingage	0.42	15	10	54	0.00379	0.998

```
******************
ARM Runoff Summary
******************
```

Subcatchment	Total Precip (mm)	Total Losses (mm)	Total Runoff (mm)	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff (fraction)
EX-2	93.91	37.993	55.792	0.268	67.489	0.594
EX-1	93.91	41.512	52.261	0.12	30.239	0.556
EX-3	93.91	41.512	52.292	0.251	63.109	0.557
D	93.91	54.106	39.714	0.222	54.867	0.423
A	93.91	51.394	42.432	0.501	124.318	0.452
B	93.91	55.44	38.375	0.154	37.743	0.409
C	93.91	55.299	38.467	0.069	17.045	0.41
E	93.91	46.747	47.062	0.226	56.547	0.501
G	93.91	46.906	46.827	0.052	12.92	0.499
F	93.91	51.244	42.552	0.098	24.31	0.453
H	93.91	52.806	41.024	0.172	42.641	0.437

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

WARNING 04: minimum elevation drop used for Conduit C37
```

```
WARNING 02: maximum depth increased for Node J09
WARNING 02: maximum depth increased for Node J13
WARNING 02: maximum depth increased for Node J20
WARNING 02: maximum depth increased for Node J23
WARNING 02: maximum depth increased for Node J27
WARNING 02: maximum depth increased for Node J30

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 0
Number of nodes ........... 42
Number of links ........... 50
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                      Data       Recording
Name                 Data Source                      Type       Interval
------------------------------------------------------------------------
Raingage             07-SCS100yr-12hr                 INTENSITY   30 min.


************
Node Summary
************
                                           Invert      Max.    Ponded    External
Name                 Type                   Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
J01                  JUNCTION               90.45      1.00       0.0
J02                  JUNCTION               90.49      1.00       0.0
J03                  JUNCTION               90.55      1.00       0.0
J04                  JUNCTION               90.61      1.00       0.0
J05                  JUNCTION               90.65      1.00       0.0
J06                  JUNCTION               90.69      1.00       0.0
J07                  JUNCTION               90.81      1.00       0.0
J08                  JUNCTION               90.86      1.00       0.0
J09                  JUNCTION               90.90      1.00       0.0
J10                  JUNCTION               90.92      1.00       0.0
J11                  JUNCTION               91.04      1.00       0.0
J12                  JUNCTION               91.06      1.00       0.0
J13                  JUNCTION               91.10      1.00       0.0
J14                  JUNCTION               91.18      1.00       0.0
J15                  JUNCTION               91.10      1.00       0.0
J16                  JUNCTION               90.84      1.00       0.0
J17                  JUNCTION               90.58      1.00       0.0
J18                  JUNCTION               90.32      1.00       0.0
J19                  JUNCTION               90.49      1.00       0.0
J20                  JUNCTION               90.54      1.00       0.0
J21                  JUNCTION               90.67      1.00       0.0
J22                  JUNCTION               90.70      1.00       0.0
J23                  JUNCTION               90.74      1.00       0.0
J24                  JUNCTION               90.78      1.00       0.0
J25                  JUNCTION               90.89      1.00       0.0
J26                  JUNCTION               90.92      1.00       0.0
J27                  JUNCTION               90.96      1.00       0.0
J28                  JUNCTION               91.00      1.00       0.0
J29                  JUNCTION               91.11      1.00       0.0
J30                  JUNCTION               91.15      1.00       0.0
```

J31	JUNCTION	91.18	1.00	0.0
J32	JUNCTION	90.97	1.00	0.0
J33	JUNCTION	90.74	1.00	0.0
J34	JUNCTION	90.50	1.00	0.0
J35	JUNCTION	90.27	1.00	0.0
Outlet	JUNCTION	90.45	1.00	0.0
Emergency	OUTFALL	90.40	0.00	0.0
OF-LombardyEast	OUTFALL	90.05	0.40	0.0
OF-LombardyWest	OUTFALL	90.05	0.40	0.0
OF-OsgoodePath	OUTFALL	90.35	0.61	0.0
OF-OsgoodePath-UNC	OUTFALL	91.00	0.00	0.0
DryPond	STORAGE	90.45	1.00	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C01	J02	J01	CONDUIT	9.0	0.4444	0.0240
C02	J03	J02	CONDUIT	12.0	0.5000	0.0350
C03	J04	J03	CONDUIT	12.0	0.5000	0.0350
C04	J05	J04	CONDUIT	9.0	0.4444	0.0240
C05	J06	J05	CONDUIT	7.0	0.5714	0.0350
C06	J07	J06	CONDUIT	25.0	0.4800	0.0350
C07	J08	J07	CONDUIT	11.0	0.4546	0.0350
C08	J09	J08	CONDUIT	9.0	0.4444	0.0240
C09	J10	J09	CONDUIT	4.0	0.5000	0.0350
C10	J11	J10	CONDUIT	25.0	0.4800	0.0350
C11	J12	J11	CONDUIT	3.0	0.6667	0.0350
C12	J13	J12	CONDUIT	9.0	0.4444	0.0240
C13	J14	J13	CONDUIT	17.0	0.4706	0.0350
C14	J14	J15	CONDUIT	8.0	1.0001	0.0350
C15	J15	J16	CONDUIT	25.0	1.0401	0.0350
C16	J16	J17	CONDUIT	25.0	1.0401	0.0350
C17	J17	J18	CONDUIT	25.0	1.0401	0.0350
C18	J18	OF-LombardyWest	CONDUIT	26.0	1.0385	0.0350
C19	J19	J01	CONDUIT	9.0	0.4444	0.0350
C20	J20	J19	CONDUIT	11.0	0.4546	0.0240
C21	J21	J20	CONDUIT	29.0	0.4483	0.0350
C22	J22	J21	CONDUIT	6.0	0.5000	0.0350
C23	J23	J22	CONDUIT	9.0	0.4444	0.0240
C24	J24	J23	CONDUIT	9.0	0.4444	0.0350
C25	J25	J24	CONDUIT	25.0	0.4400	0.0350
C26	J26	J25	CONDUIT	6.0	0.5000	0.0350
C27	J27	J26	CONDUIT	9.0	0.4444	0.0240
C28	J28	J27	CONDUIT	10.0	0.4000	0.0350
C29	J29	J28	CONDUIT	24.0	0.4583	0.0350
C30	J30	J29	CONDUIT	10.0	0.4000	0.0240
C31	J31	J30	CONDUIT	6.0	0.5000	0.0350
C32	J31	J32	CONDUIT	23.0	0.9131	0.0350
C33	J32	J33	CONDUIT	25.0	0.9200	0.0350
C34	J33	J34	CONDUIT	25.0	0.9600	0.0350
C35	J34	J35	CONDUIT	25.0	0.9200	0.0350
C36	J35	OF-LombardyEast	CONDUIT	24.0	0.9167	0.0350
C37	J01	DryPond	CONDUIT	15.0	0.0020	0.0350
C38	Outlet	OF-OsgoodePath	CONDUIT	7.0	1.4287	0.0130
W_Emergency	DryPond	Emergency	WEIR			
W01	DryPond	Outlet	WEIR			
W02	DryPond	Outlet	WEIR			
W03	DryPond	Outlet	WEIR			
W04	J01	J02	WEIR			
W05	J05	J04	WEIR			

W06	J09	J08	WEIR
W07	J13	J12	WEIR
W08	J20	J19	WEIR
W09	J23	J22	WEIR
W10	J27	J26	WEIR
W11	J30	J29	WEIR

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C01	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C02	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1687.01
C03	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1132.60
C04	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C05	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	752.91
C06	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	690.06
C07	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	671.51
C08	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C09	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	704.28
C10	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	690.06
C11	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	813.24
C12	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C13	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	683.26
C14	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	996.03
C15	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C16	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C17	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C18	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.00
C19	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1590.53
C20	CIRCULAR	0.40	0.13	0.10	0.40	1	76.06
C21	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1597.37
C22	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1687.01
C23	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C24	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1590.53
C25	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1582.56
C26	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1132.60
C27	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C28	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1013.02
C29	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	674.30
C30	CIRCULAR	0.40	0.13	0.10	0.40	1	71.35
C31	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	704.28
C32	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	951.73
C33	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	955.35
C34	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	975.90
C35	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	955.35
C36	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	953.62
C37	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	107.55
C38	HORIZ_ELLIPSE	0.61	0.47	0.19	0.96	1	1418.65

****
Transect Summary
****

Transect RoadsideDitch-Deep
Area:

0.0044	0.0093	0.0148	0.0208	0.0274
0.0346	0.0424	0.0507	0.0596	0.0690

```
              0.0790      0.0896      0.1007      0.1124      0.1247
              0.1375      0.1509      0.1649      0.1794      0.1945
              0.2101      0.2263      0.2431      0.2604      0.2783
              0.2967      0.3158      0.3353      0.3554      0.3761
              0.3974      0.4192      0.4416      0.4645      0.4880
              0.5121      0.5367      0.5618      0.5876      0.6139
              0.6407      0.6693      0.7029      0.7386      0.7757
              0.8143      0.8558      0.9006      0.9487      1.0000
  Hrad:
              0.0326      0.0616      0.0881      0.1128      0.1361
              0.1584      0.1798      0.2006      0.2209      0.2407
              0.2602      0.2793      0.2982      0.3169      0.3354
              0.3537      0.3720      0.3901      0.4081      0.4261
              0.4439      0.4616      0.4793      0.4969      0.5144
              0.5319      0.5493      0.5667      0.5840      0.6013
              0.6185      0.6358      0.6530      0.6701      0.6872
              0.7043      0.7214      0.7385      0.7555      0.7726
              0.7896      0.8158      0.8403      0.8642      0.8887
              0.9129      0.9352      0.9569      0.9784      1.0000
  Width:
              0.0876      0.0982      0.1089      0.1196      0.1302
              0.1409      0.1516      0.1622      0.1729      0.1835
              0.1942      0.2049      0.2155      0.2262      0.2369
              0.2475      0.2581      0.2687      0.2793      0.2899
              0.3005      0.3111      0.3216      0.3322      0.3428
              0.3534      0.3640      0.3746      0.3852      0.3957
              0.4063      0.4169      0.4275      0.4381      0.4487
              0.4592      0.4698      0.4804      0.4910      0.5016
              0.5122      0.5872      0.6604      0.6869      0.7135
              0.7523      0.8142      0.8762      0.9381      1.0000

  Transect RoadsideDitch-Moderate
  Area:
              0.0040      0.0085      0.0136      0.0191      0.0252
              0.0318      0.0389      0.0466      0.0547      0.0634
              0.0726      0.0823      0.0925      0.1033      0.1145
              0.1263      0.1386      0.1515      0.1648      0.1786
              0.1930      0.2079      0.2233      0.2392      0.2557
              0.2726      0.2901      0.3081      0.3278      0.3524
              0.3795      0.4069      0.4346      0.4626      0.4908
              0.5192      0.5479      0.5769      0.6061      0.6356
              0.6653      0.6956      0.7271      0.7599      0.7940
              0.8294      0.8675      0.9087      0.9528      1.0000
  Hrad:
              0.0198      0.0375      0.0536      0.0686      0.0827
              0.0963      0.1093      0.1219      0.1343      0.1463
              0.1582      0.1698      0.1813      0.1926      0.2039
              0.2150      0.3745      0.3928      0.4109      0.4289
              0.4468      0.4647      0.4824      0.5001      0.5177
              0.5353      0.5528      0.5703      0.5052      0.4457
              0.4755      0.5049      0.5341      0.5631      0.5919
              0.6204      0.6487      0.6768      0.7047      0.7324
              0.7599      0.7915      0.8235      0.8541      0.8835
              0.9115      0.9365      0.9593      0.9804      1.0000
  Width:
              0.0876      0.0982      0.1089      0.1196      0.1302
              0.1409      0.1516      0.1622      0.1729      0.1835
              0.1942      0.2049      0.2155      0.2262      0.2369
              0.2475      0.2582      0.2688      0.2794      0.2900
              0.3006      0.3112      0.3218      0.3325      0.3431
              0.3537      0.3643      0.3749      0.4532      0.5554
              0.5607      0.5660      0.5713      0.5766      0.5819
              0.5872      0.5925      0.5978      0.6032      0.6085
```

```
          0.6138     0.6338     0.6604     0.6869     0.7135
          0.7523     0.8142     0.8762     0.9381     1.0000

Transect RoadsideDitch-Normal
Area:
          0.0036     0.0077     0.0123     0.0173     0.0228
          0.0287     0.0352     0.0421     0.0494     0.0573
          0.0656     0.0744     0.0836     0.0933     0.1035
          0.1142     0.1257     0.1409     0.1602     0.1821
          0.2043     0.2268     0.2494     0.2723     0.2955
          0.3189     0.3425     0.3663     0.3904     0.4147
          0.4393     0.4640     0.4891     0.5143     0.5398
          0.5655     0.5914     0.6176     0.6440     0.6707
          0.6976     0.7249     0.7534     0.7830     0.8138
          0.8458     0.8803     0.9175     0.9574     1.0000
Hrad:
          0.0240     0.0453     0.0648     0.0830     0.1001
          0.1165     0.1323     0.1476     0.1625     0.1770
          0.1914     0.2055     0.2194     0.2331     0.2467
          0.2602     0.2750     0.2848     0.2896     0.2980
          0.3119     0.3290     0.3483     0.3691     0.3909
          0.4135     0.4367     0.4603     0.4842     0.5083
          0.5327     0.5571     0.5816     0.6061     0.6307
          0.6552     0.6797     0.7042     0.7286     0.7530
          0.7773     0.8057     0.8347     0.8626     0.8896
          0.9154     0.9387     0.9603     0.9806     1.0000
Width:
          0.0876     0.0982     0.1089     0.1196     0.1302
          0.1409     0.1516     0.1622     0.1729     0.1835
          0.1942     0.2049     0.2155     0.2262     0.2369
          0.2475     0.2979     0.3917     0.4855     0.5023
          0.5076     0.5129     0.5182     0.5235     0.5288
          0.5342     0.5395     0.5448     0.5501     0.5554
          0.5607     0.5660     0.5713     0.5766     0.5819
          0.5872     0.5925     0.5978     0.6032     0.6085
          0.6138     0.6338     0.6604     0.6869     0.7135
          0.7523     0.8142     0.8762     0.9381     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 ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 05/04/2021 00:00:00
Ending Date .............. 05/06/2021 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
```

```
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.213          2.132
External Outflow .........         0.213          2.129
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....         0.142


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link C38 (8)
Link W01 (6)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.99 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.07
Percent Not Converging      :     0.00
Time Step Frequencies       :
    2.000 -  1.516 sec      :    99.20 %
    1.516 -  1.149 sec      :     0.27 %
    1.149 -  0.871 sec      :     0.20 %
    0.871 -  0.660 sec      :     0.14 %
    0.660 -  0.500 sec      :     0.19 %


******************
Node Depth Summary
******************

---------------------------------------------------------------------------------
                               Average  Maximum  Maximum  Time of Max    Reported
                                 Depth    Depth      HGL   Occurrence   Max Depth
Node                 Type       Meters   Meters   Meters  days hr:min      Meters
---------------------------------------------------------------------------------
```

J01	JUNCTION	0.05	0.52	90.97	0	07:01	0.52
J02	JUNCTION	0.04	0.49	90.98	0	07:02	0.49
J03	JUNCTION	0.03	0.43	90.98	0	07:02	0.43
J04	JUNCTION	0.02	0.37	90.98	0	07:02	0.37
J05	JUNCTION	0.02	0.33	90.98	0	07:01	0.33
J06	JUNCTION	0.01	0.29	90.98	0	07:01	0.29
J07	JUNCTION	0.01	0.18	90.99	0	07:01	0.18
J08	JUNCTION	0.00	0.13	90.99	0	07:01	0.13
J09	JUNCTION	0.00	0.09	90.99	0	07:01	0.09
J10	JUNCTION	0.00	0.07	90.99	0	07:01	0.07
J11	JUNCTION	0.00	0.00	91.04	0	00:00	0.00
J12	JUNCTION	0.00	0.00	91.06	0	00:00	0.00
J13	JUNCTION	0.00	0.00	91.10	0	00:00	0.00
J14	JUNCTION	0.00	0.00	91.18	0	00:00	0.00
J15	JUNCTION	0.00	0.00	91.10	0	00:00	0.00
J16	JUNCTION	0.00	0.05	90.89	0	06:33	0.05
J17	JUNCTION	0.00	0.05	90.63	0	06:33	0.05
J18	JUNCTION	0.00	0.05	90.37	0	06:35	0.05
J19	JUNCTION	0.04	0.48	90.97	0	07:01	0.48
J20	JUNCTION	0.04	0.64	91.18	0	06:41	0.64
J21	JUNCTION	0.02	0.51	91.18	0	06:41	0.51
J22	JUNCTION	0.02	0.48	91.18	0	06:41	0.48
J23	JUNCTION	0.03	0.64	91.38	0	06:38	0.64
J24	JUNCTION	0.03	0.60	91.38	0	06:38	0.60
J25	JUNCTION	0.02	0.49	91.38	0	06:38	0.49
J26	JUNCTION	0.01	0.46	91.38	0	06:38	0.46
J27	JUNCTION	0.02	0.45	91.41	0	06:38	0.45
J28	JUNCTION	0.02	0.41	91.41	0	06:38	0.41
J29	JUNCTION	0.01	0.30	91.41	0	06:38	0.30
J30	JUNCTION	0.00	0.14	91.29	0	06:38	0.14
J31	JUNCTION	0.00	0.08	91.26	0	06:38	0.08
J32	JUNCTION	0.00	0.08	91.05	0	06:39	0.08
J33	JUNCTION	0.00	0.09	90.83	0	06:39	0.09
J34	JUNCTION	0.00	0.09	90.59	0	06:39	0.09
J35	JUNCTION	0.00	0.09	90.36	0	06:40	0.09
Outlet	JUNCTION	0.03	0.30	90.75	0	07:15	0.29
Emergency	OUTFALL	0.00	0.00	90.40	0	00:00	0.00
OF-LombardyEast	OUTFALL	0.00	0.09	90.14	0	06:40	0.09
OF-LombardyWest	OUTFALL	0.00	0.05	90.10	0	06:35	0.05
OF-OsgoodePath	OUTFALL	0.02	0.16	90.51	0	07:02	0.16
OF-OsgoodePath-UNC	OUTFALL	0.00	0.00	91.00	0	00:00	0.00
DryPond	STORAGE	0.05	0.52	90.97	0	07:02	0.52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J01	JUNCTION	0.00	215.53	0 06:38	0	1.21	-0.008
J02	JUNCTION	0.00	42.68	0 06:34	0	0.226	0.010
J03	JUNCTION	0.00	49.13	0 06:34	0	0.226	0.013
J04	JUNCTION	0.00	52.29	0 06:34	0	0.226	-0.019
J05	JUNCTION	0.00	52.71	0 06:34	0	0.226	-0.000
J06	JUNCTION	0.00	54.21	0 06:32	0	0.226	0.054
J07	JUNCTION	56.54	56.54	0 06:32	0.226	0.228	-0.063
J08	JUNCTION	0.00	1.97	0 06:46	0	0.00397	-0.033
J09	JUNCTION	0.00	1.36	0 06:46	0	0.00252	0.103

```
  J10                 JUNCTION      0.00      1.11     0  06:46           0     0.00111       0.121
  J11                 JUNCTION      0.00      0.00     0  00:00           0           0       0.000 ltr
  J12                 JUNCTION      0.00      0.00     0  00:00           0           0       0.000 ltr
  J13                 JUNCTION      0.00      0.00     0  00:00           0           0       0.000 ltr
  J14                 JUNCTION      0.00      0.00     0  00:00           0           0       0.000 ltr
  J15                 JUNCTION      0.00      0.00     0  00:00           0           0       0.000 ltr
  J16                 JUNCTION     24.31     24.31     0  06:32      0.0979      0.0979      -0.005
  J17                 JUNCTION      0.00     24.21     0  06:33           0      0.0979      -0.003
  J18                 JUNCTION      0.00     24.22     0  06:34           0      0.0979       0.008
  J19                 JUNCTION      0.00    185.85     0  06:38           0       0.981      -0.011
  J20                 JUNCTION     30.23    189.41     0  06:38        0.12       0.981       0.019
  J21                 JUNCTION      0.00    166.33     0  06:38           0       0.861      -0.001
  J22                 JUNCTION      0.00    167.16     0  06:37           0       0.861      -0.012
  J23                 JUNCTION      0.00    167.50     0  06:37           0       0.861       0.012
  J24                 JUNCTION    124.31    170.29     0  06:36       0.501       0.861      -0.003
  J25                 JUNCTION      0.00     60.18     0  06:25           0        0.36       0.005
  J26                 JUNCTION      0.00     63.05     0  06:25           0        0.36      -0.011
  J27                 JUNCTION      0.00     66.08     0  06:26           0        0.36       0.008
  J28                 JUNCTION      0.00     75.21     0  06:27           0        0.36       0.025
  J29                 JUNCTION    110.11    110.11     0  06:32        0.44        0.44      -0.028
  J30                 JUNCTION      0.00     46.28     0  06:38           0        0.08       0.002
  J31                 JUNCTION      0.00     46.28     0  06:38           0      0.0798      -0.018
  J32                 JUNCTION      0.00     46.34     0  06:38           0      0.0797       0.030
  J33                 JUNCTION     12.92     57.73     0  06:38      0.0515       0.131      -0.010
  J34                 JUNCTION      0.00     57.63     0  06:39           0       0.131      -0.007
  J35                 JUNCTION      0.00     57.67     0  06:39           0       0.131       0.015
  Outlet              JUNCTION      0.00    174.72     0  07:02           0        1.61       0.183
  Emergency           OUTFALL       0.00      0.00     0  00:00           0           0       0.000 ltr
  OF-LombardyEast     OUTFALL       0.00     57.57     0  06:40           0       0.131       0.000
  OF-LombardyWest     OUTFALL       0.00     24.18     0  06:35           0      0.0979       0.000
  OF-OsgoodePath      OUTFALL       0.00    180.41     0  07:02           0        1.61       0.000
  OF-OsgoodePath-UNC  OUTFALL      71.91     71.91     0  06:32       0.292       0.292       0.000
  DryPond             STORAGE     100.84    298.47     0  06:37       0.405        1.61       0.012


  *********************
  Node Surcharge Summary
  *********************

  No nodes were surcharged.


  ********************
  Node Flooding Summary
  ********************

  No nodes were flooded.


  **********************
  Storage Volume Summary
  **********************

  --------------------------------------------------------------------------------------------------
                         Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                          Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
  Storage Unit           1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
  --------------------------------------------------------------------------------------------------
  DryPond                  0.035       7     0     0         0.414      85       0  07:02     174.72


  ***********************
  Outfall Loading Summary
```

****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Emergency	0.00	0.00	0.00	0.000
OF-LombardyEast	18.27	4.70	57.57	0.131
OF-LombardyWest	18.23	3.39	24.18	0.098
OF-OsgoodePath	62.56	15.74	180.41	1.608
OF-OsgoodePath-UNC	18.27	10.05	71.91	0.292
System	23.47	33.88	281.39	2.129

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C01	CONDUIT	38.86	0 06:34	0.40	0.52	1.00
C02	CONDUIT	42.68	0 06:34	0.11	0.03	0.77
C03	CONDUIT	49.13	0 06:34	0.22	0.04	0.80
C04	CONDUIT	52.29	0 06:34	0.85	0.70	0.88
C05	CONDUIT	52.71	0 06:34	0.13	0.07	0.79
C06	CONDUIT	54.21	0 06:32	0.23	0.08	0.59
C07	CONDUIT	1.97	0 06:46	0.02	0.00	0.38
C08	CONDUIT	1.36	0 06:46	0.08	0.02	0.26
C09	CONDUIT	1.11	0 06:46	0.03	0.00	0.19
C10	CONDUIT	0.00	0 00:00	0.00	0.00	0.08
C11	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C12	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C13	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C14	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C15	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
C16	CONDUIT	24.21	0 06:33	0.38	0.02	0.14
C17	CONDUIT	24.22	0 06:34	0.38	0.02	0.14
C18	CONDUIT	24.18	0 06:35	0.38	0.02	0.14
C19	CONDUIT	182.83	0 06:38	0.29	0.11	0.84
C20	CONDUIT	155.25	0 06:37	1.26	2.04	1.00
C21	CONDUIT	162.50	0 06:38	0.16	0.10	0.92
C22	CONDUIT	166.33	0 06:38	0.35	0.10	0.83
C23	CONDUIT	138.95	0 06:29	1.11	1.85	1.00
C24	CONDUIT	167.50	0 06:37	0.15	0.11	1.00
C25	CONDUIT	54.21	0 06:40	0.12	0.03	0.90
C26	CONDUIT	60.18	0 06:25	0.29	0.05	0.94
C27	CONDUIT	63.05	0 06:25	0.85	0.84	1.00
C28	CONDUIT	66.08	0 06:26	0.14	0.07	0.86
C29	CONDUIT	75.21	0 06:27	0.25	0.11	0.88
C30	CONDUIT	46.28	0 06:38	0.65	0.65	0.55
C31	CONDUIT	46.28	0 06:38	0.32	0.07	0.28
C32	CONDUIT	46.34	0 06:38	0.45	0.05	0.21
C33	CONDUIT	46.24	0 06:39	0.42	0.05	0.22
C34	CONDUIT	57.63	0 06:39	0.49	0.06	0.23
C35	CONDUIT	57.67	0 06:39	0.49	0.06	0.23
C36	CONDUIT	57.57	0 06:40	0.49	0.06	0.23
C37	CONDUIT	206.93	0 06:38	0.37	1.92	0.87
C38	CONDUIT	180.41	0 07:02	1.23	0.13	0.37

W_Emergency	WEIR	0.00	0	00:00	0.00
W01	WEIR	45.15	0	06:35	1.00
W02	WEIR	22.82	0	06:30	1.00
W03	WEIR	110.59	0	07:02	0.74
W04	WEIR	0.00	0	00:00	0.00
W05	WEIR	0.00	0	00:00	0.00
W06	WEIR	0.00	0	00:00	0.00
W07	WEIR	0.00	0	00:00	0.00
W08	WEIR	41.49	0	06:41	0.10
W09	WEIR	37.09	0	06:38	0.09
W10	WEIR	0.00	0	00:00	0.00
W11	WEIR	0.00	0	00:00	0.00

****
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
C01	1.00	0.07	0.61	0.00	0.31	0.00	0.00	0.00	0.00	0.73
C02	1.00	0.67	0.00	0.00	0.33	0.00	0.00	0.00	0.13	0.00
C03	1.00	0.67	0.03	0.00	0.30	0.00	0.00	0.00	0.78	0.00
C04	1.00	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.02
C05	1.00	0.08	0.63	0.00	0.29	0.00	0.00	0.00	0.77	0.00
C06	1.00	0.71	0.02	0.00	0.27	0.00	0.00	0.00	0.85	0.00
C07	1.00	0.73	0.17	0.00	0.10	0.00	0.00	0.00	0.83	0.00
C08	1.00	0.13	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.01
C09	1.00	0.13	0.78	0.00	0.09	0.00	0.00	0.00	0.84	0.00
C10	1.00	0.91	0.09	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	1.00	0.00	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	0.00	0.00
C15	1.00	0.74	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	0.71	0.03	0.00	0.26	0.00	0.00	0.00	0.87	0.00
C17	1.00	0.69	0.02	0.00	0.28	0.00	0.00	0.00	0.84	0.00
C18	1.00	0.69	0.00	0.00	0.31	0.00	0.00	0.00	0.79	0.00
C19	1.00	0.07	0.37	0.00	0.56	0.00	0.00	0.00	0.72	0.00
C20	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.04
C21	1.00	0.06	0.51	0.00	0.42	0.00	0.00	0.00	0.85	0.00
C22	1.00	0.57	0.04	0.00	0.39	0.00	0.00	0.00	0.83	0.00
C23	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00
C24	1.00	0.07	0.54	0.00	0.39	0.00	0.00	0.00	0.76	0.00
C25	1.00	0.61	0.03	0.00	0.36	0.00	0.00	0.00	0.88	0.00
C26	1.00	0.63	0.04	0.00	0.33	0.00	0.00	0.00	0.88	0.00
C27	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.02
C28	1.00	0.06	0.63	0.00	0.30	0.00	0.00	0.00	0.77	0.00
C29	1.00	0.69	0.04	0.00	0.27	0.00	0.00	0.00	0.90	0.00
C30	1.00	0.73	0.20	0.00	0.07	0.00	0.00	0.00	0.00	0.82
C31	1.00	0.93	0.02	0.00	0.06	0.00	0.00	0.00	0.85	0.00
C32	1.00	0.89	0.05	0.00	0.06	0.00	0.00	0.00	0.86	0.00
C33	1.00	0.73	0.16	0.00	0.11	0.00	0.00	0.00	0.87	0.00
C34	1.00	0.70	0.03	0.00	0.27	0.00	0.00	0.00	0.89	0.00
C35	1.00	0.69	0.02	0.00	0.29	0.00	0.00	0.00	0.84	0.00
C36	1.00	0.69	0.00	0.00	0.31	0.00	0.00	0.00	0.80	0.00
C37	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00
C38	1.00	0.07	0.00	0.00	0.82	0.11	0.00	0.00	0.00	0.25

```
*************************
Conduit Surcharge Summary
*************************

-----------------------------------------------------------------------------
                                                          Hours        Hours
                       --------- Hours Full --------   Above Full   Capacity
Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
-----------------------------------------------------------------------------
C01                         1.15      1.15      1.42       0.01         0.01
C20                         1.03      1.33      1.12       1.16         0.92
C21                         0.01      0.01      0.50       0.01         0.01
C23                         0.73      0.98      0.73       1.04         0.73
C24                         0.01      0.01      0.30       0.01         0.01
C27                         0.31      0.31      0.37       0.01         0.01
C29                         0.01      0.01      0.12       0.01         0.01
C37                         0.01      0.01      0.01       1.04         0.01


Analysis begun on:  Thu Jun  9 13:33:14 2022
Analysis ended on:  Thu Jun  9 13:33:19 2022
Total elapsed time: 00:00:05
```

ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM VERSION 7.4.3240

This is a new version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time:	05/04/2021 00:00:00
Simulation end time:	05/06/2021 00:00:00
Runoff wet weather time steps:	240 seconds
Report time steps:	60 seconds
Number of data points:	2881

****
Unit Hydrographs Runoff Method
****

Subcatchment	Runoff Method	Raingage	Area (ha)	Time of Concentration (min)	Time to Peak (min)	Time after Peak (min)	Peak UH Flow (m³/s/mm)	UH Depth (mm)
EX-2	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
EX-1	Nash IUH	Raingage	0.23	15	10	50	0.00208	0.997
EX-3	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
D	Nash IUH	Raingage	0.56	15	10	54	0.00505	0.998
A	Nash IUH	Raingage	1.18	15	10	58	0.01065	0.998
B	Nash IUH	Raingage	0.4	15	10	54	0.00361	0.998
C	Nash IUH	Raingage	0.18	15	10	46	0.00162	0.996
E	Nash IUH	Raingage	0.48	15	10	54	0.00433	0.998
G	Nash IUH	Raingage	0.11	15	10	46	0.00099	0.996
F	Nash IUH	Raingage	0.23	15	10	50	0.00208	0.997
H	Nash IUH	Raingage	0.42	15	10	54	0.00379	0.998

****
ARM Runoff Summary
****

Subcatchment	Total Precip (mm)	Total Losses (mm)	Total Runoff (mm)	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff (fraction)
EX-2	106.73	39.598	66.979	0.322	45.991	0.628
EX-1	106.73	43.437	63.13	0.145	20.915	0.591
EX-3	106.73	43.437	63.146	0.303	43.662	0.592
D	106.73	57.431	49.196	0.276	40.34	0.461
A	106.73	54.365	52.263	0.617	90.183	0.49
B	106.73	58.946	47.675	0.191	27.944	0.447
C	106.73	58.797	47.756	0.086	12.592	0.447
E	106.73	49.187	57.417	0.276	40.089	0.538
G	106.73	49.351	57.164	0.063	9.163	0.536
F	106.73	54.208	52.391	0.12	17.607	0.491
H	106.73	55.956	50.667	0.213	31.153	0.475

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 04: minimum elevation drop used for Conduit C37

```
WARNING 02: maximum depth increased for Node J09
WARNING 02: maximum depth increased for Node J13
WARNING 02: maximum depth increased for Node J20
WARNING 02: maximum depth increased for Node J23
WARNING 02: maximum depth increased for Node J27
WARNING 02: maximum depth increased for Node J30

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 0
Number of nodes ........... 42
Number of links ........... 50
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                      Data       Recording
Name                 Data Source                      Type       Interval
------------------------------------------------------------------------
Raingage             11-SCS100yr-24hr                 INTENSITY   60 min.


************
Node Summary
************
                                           Invert      Max.    Ponded    External
Name                 Type                   Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
J01                  JUNCTION               90.45      1.00       0.0
J02                  JUNCTION               90.49      1.00       0.0
J03                  JUNCTION               90.55      1.00       0.0
J04                  JUNCTION               90.61      1.00       0.0
J05                  JUNCTION               90.65      1.00       0.0
J06                  JUNCTION               90.69      1.00       0.0
J07                  JUNCTION               90.81      1.00       0.0
J08                  JUNCTION               90.86      1.00       0.0
J09                  JUNCTION               90.90      1.00       0.0
J10                  JUNCTION               90.92      1.00       0.0
J11                  JUNCTION               91.04      1.00       0.0
J12                  JUNCTION               91.06      1.00       0.0
J13                  JUNCTION               91.10      1.00       0.0
J14                  JUNCTION               91.18      1.00       0.0
J15                  JUNCTION               91.10      1.00       0.0
J16                  JUNCTION               90.84      1.00       0.0
J17                  JUNCTION               90.58      1.00       0.0
J18                  JUNCTION               90.32      1.00       0.0
J19                  JUNCTION               90.49      1.00       0.0
J20                  JUNCTION               90.54      1.00       0.0
J21                  JUNCTION               90.67      1.00       0.0
J22                  JUNCTION               90.70      1.00       0.0
J23                  JUNCTION               90.74      1.00       0.0
J24                  JUNCTION               90.78      1.00       0.0
J25                  JUNCTION               90.89      1.00       0.0
J26                  JUNCTION               90.92      1.00       0.0
J27                  JUNCTION               90.96      1.00       0.0
J28                  JUNCTION               91.00      1.00       0.0
J29                  JUNCTION               91.11      1.00       0.0
J30                  JUNCTION               91.15      1.00       0.0
```

J31	JUNCTION	91.18	1.00	0.0
J32	JUNCTION	90.97	1.00	0.0
J33	JUNCTION	90.74	1.00	0.0
J34	JUNCTION	90.50	1.00	0.0
J35	JUNCTION	90.27	1.00	0.0
Outlet	JUNCTION	90.45	1.00	0.0
Emergency	OUTFALL	90.40	0.00	0.0
OF-LombardyEast	OUTFALL	90.05	0.40	0.0
OF-LombardyWest	OUTFALL	90.05	0.40	0.0
OF-OsgoodePath	OUTFALL	90.35	0.61	0.0
OF-OsgoodePath-UNC	OUTFALL	91.00	0.00	0.0
DryPond	STORAGE	90.45	1.00	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C01	J02	J01	CONDUIT	9.0	0.4444	0.0240
C02	J03	J02	CONDUIT	12.0	0.5000	0.0350
C03	J04	J03	CONDUIT	12.0	0.5000	0.0350
C04	J05	J04	CONDUIT	9.0	0.4444	0.0240
C05	J06	J05	CONDUIT	7.0	0.5714	0.0350
C06	J07	J06	CONDUIT	25.0	0.4800	0.0350
C07	J08	J07	CONDUIT	11.0	0.4546	0.0350
C08	J09	J08	CONDUIT	9.0	0.4444	0.0240
C09	J10	J09	CONDUIT	4.0	0.5000	0.0350
C10	J11	J10	CONDUIT	25.0	0.4800	0.0350
C11	J12	J11	CONDUIT	3.0	0.6667	0.0350
C12	J13	J12	CONDUIT	9.0	0.4444	0.0240
C13	J14	J13	CONDUIT	17.0	0.4706	0.0350
C14	J14	J15	CONDUIT	8.0	1.0001	0.0350
C15	J15	J16	CONDUIT	25.0	1.0401	0.0350
C16	J16	J17	CONDUIT	25.0	1.0401	0.0350
C17	J17	J18	CONDUIT	25.0	1.0401	0.0350
C18	J18	OF-LombardyWest	CONDUIT	26.0	1.0385	0.0350
C19	J19	J01	CONDUIT	9.0	0.4444	0.0350
C20	J20	J19	CONDUIT	11.0	0.4546	0.0240
C21	J21	J20	CONDUIT	29.0	0.4483	0.0350
C22	J22	J21	CONDUIT	6.0	0.5000	0.0350
C23	J23	J22	CONDUIT	9.0	0.4444	0.0240
C24	J24	J23	CONDUIT	9.0	0.4444	0.0350
C25	J25	J24	CONDUIT	25.0	0.4400	0.0350
C26	J26	J25	CONDUIT	6.0	0.5000	0.0350
C27	J27	J26	CONDUIT	9.0	0.4444	0.0240
C28	J28	J27	CONDUIT	10.0	0.4000	0.0350
C29	J29	J28	CONDUIT	24.0	0.4583	0.0350
C30	J30	J29	CONDUIT	10.0	0.4000	0.0240
C31	J31	J30	CONDUIT	6.0	0.5000	0.0350
C32	J31	J32	CONDUIT	23.0	0.9131	0.0350
C33	J32	J33	CONDUIT	25.0	0.9200	0.0350
C34	J33	J34	CONDUIT	25.0	0.9600	0.0350
C35	J34	J35	CONDUIT	25.0	0.9200	0.0350
C36	J35	OF-LombardyEast	CONDUIT	24.0	0.9167	0.0350
C37	J01	DryPond	CONDUIT	15.0	0.0020	0.0350
C38	Outlet	OF-OsgoodePath	CONDUIT	7.0	1.4287	0.0130
W_Emergency	DryPond	Emergency	WEIR			
W01	DryPond	Outlet	WEIR			
W02	DryPond	Outlet	WEIR			
W03	DryPond	Outlet	WEIR			
W04	J01	J02	WEIR			
W05	J05	J04	WEIR			

W06	J09	J08	WEIR
W07	J13	J12	WEIR
W08	J20	J19	WEIR
W09	J23	J22	WEIR
W10	J27	J26	WEIR
W11	J30	J29	WEIR

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C01	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C02	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1687.01
C03	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1132.60
C04	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C05	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	752.91
C06	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	690.06
C07	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	671.51
C08	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C09	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	704.28
C10	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	690.06
C11	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	813.24
C12	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C13	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	683.26
C14	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	996.03
C15	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C16	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C17	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.76
C18	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	1015.00
C19	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1590.53
C20	CIRCULAR	0.40	0.13	0.10	0.40	1	76.06
C21	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1597.37
C22	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1687.01
C23	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C24	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1590.53
C25	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1582.56
C26	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1132.60
C27	CIRCULAR	0.40	0.13	0.10	0.40	1	75.21
C28	TRAPEZOIDAL	0.50	1.25	0.30	4.00	1	1013.02
C29	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	674.30
C30	CIRCULAR	0.40	0.13	0.10	0.40	1	71.35
C31	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	704.28
C32	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	951.73
C33	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	955.35
C34	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	975.90
C35	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	955.35
C36	TRAPEZOIDAL	0.40	0.88	0.25	3.40	1	953.62
C37	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	107.55
C38	HORIZ_ELLIPSE	0.61	0.47	0.19	0.96	1	1418.65

****
Transect Summary
****

Transect RoadsideDitch-Deep
Area:

0.0044	0.0093	0.0148	0.0208	0.0274
0.0346	0.0424	0.0507	0.0596	0.0690

```
              0.0790      0.0896      0.1007      0.1124      0.1247
              0.1375      0.1509      0.1649      0.1794      0.1945
              0.2101      0.2263      0.2431      0.2604      0.2783
              0.2967      0.3158      0.3353      0.3554      0.3761
              0.3974      0.4192      0.4416      0.4645      0.4880
              0.5121      0.5367      0.5618      0.5876      0.6139
              0.6407      0.6693      0.7029      0.7386      0.7757
              0.8143      0.8558      0.9006      0.9487      1.0000
  Hrad:
              0.0326      0.0616      0.0881      0.1128      0.1361
              0.1584      0.1798      0.2006      0.2209      0.2407
              0.2602      0.2793      0.2982      0.3169      0.3354
              0.3537      0.3720      0.3901      0.4081      0.4261
              0.4439      0.4616      0.4793      0.4969      0.5144
              0.5319      0.5493      0.5667      0.5840      0.6013
              0.6185      0.6358      0.6530      0.6701      0.6872
              0.7043      0.7214      0.7385      0.7555      0.7726
              0.7896      0.8158      0.8403      0.8642      0.8887
              0.9129      0.9352      0.9569      0.9784      1.0000
  Width:
              0.0876      0.0982      0.1089      0.1196      0.1302
              0.1409      0.1516      0.1622      0.1729      0.1835
              0.1942      0.2049      0.2155      0.2262      0.2369
              0.2475      0.2581      0.2687      0.2793      0.2899
              0.3005      0.3111      0.3216      0.3322      0.3428
              0.3534      0.3640      0.3746      0.3852      0.3957
              0.4063      0.4169      0.4275      0.4381      0.4487
              0.4592      0.4698      0.4804      0.4910      0.5016
              0.5122      0.5872      0.6604      0.6869      0.7135
              0.7523      0.8142      0.8762      0.9381      1.0000

  Transect RoadsideDitch-Moderate
  Area:
              0.0040      0.0085      0.0136      0.0191      0.0252
              0.0318      0.0389      0.0466      0.0547      0.0634
              0.0726      0.0823      0.0925      0.1033      0.1145
              0.1263      0.1386      0.1515      0.1648      0.1786
              0.1930      0.2079      0.2233      0.2392      0.2557
              0.2726      0.2901      0.3081      0.3278      0.3524
              0.3795      0.4069      0.4346      0.4626      0.4908
              0.5192      0.5479      0.5769      0.6061      0.6356
              0.6653      0.6956      0.7271      0.7599      0.7940
              0.8294      0.8675      0.9087      0.9528      1.0000
  Hrad:
              0.0198      0.0375      0.0536      0.0686      0.0827
              0.0963      0.1093      0.1219      0.1343      0.1463
              0.1582      0.1698      0.1813      0.1926      0.2039
              0.2150      0.3745      0.3928      0.4109      0.4289
              0.4468      0.4647      0.4824      0.5001      0.5177
              0.5353      0.5528      0.5703      0.5052      0.4457
              0.4755      0.5049      0.5341      0.5631      0.5919
              0.6204      0.6487      0.6768      0.7047      0.7324
              0.7599      0.7915      0.8235      0.8541      0.8835
              0.9115      0.9365      0.9593      0.9804      1.0000
  Width:
              0.0876      0.0982      0.1089      0.1196      0.1302
              0.1409      0.1516      0.1622      0.1729      0.1835
              0.1942      0.2049      0.2155      0.2262      0.2369
              0.2475      0.2582      0.2688      0.2794      0.2900
              0.3006      0.3112      0.3218      0.3325      0.3431
              0.3537      0.3643      0.3749      0.4532      0.5554
              0.5607      0.5660      0.5713      0.5766      0.5819
              0.5872      0.5925      0.5978      0.6032      0.6085
```

```
            0.6138     0.6338     0.6604     0.6869     0.7135
            0.7523     0.8142     0.8762     0.9381     1.0000

  Transect RoadsideDitch-Normal
  Area:
            0.0036     0.0077     0.0123     0.0173     0.0228
            0.0287     0.0352     0.0421     0.0494     0.0573
            0.0656     0.0744     0.0836     0.0933     0.1035
            0.1142     0.1257     0.1409     0.1602     0.1821
            0.2043     0.2268     0.2494     0.2723     0.2955
            0.3189     0.3425     0.3663     0.3904     0.4147
            0.4393     0.4640     0.4891     0.5143     0.5398
            0.5655     0.5914     0.6176     0.6440     0.6707
            0.6976     0.7249     0.7534     0.7830     0.8138
            0.8458     0.8803     0.9175     0.9574     1.0000
  Hrad:
            0.0240     0.0453     0.0648     0.0830     0.1001
            0.1165     0.1323     0.1476     0.1625     0.1770
            0.1914     0.2055     0.2194     0.2331     0.2467
            0.2602     0.2750     0.2848     0.2896     0.2980
            0.3119     0.3290     0.3483     0.3691     0.3909
            0.4135     0.4367     0.4603     0.4842     0.5083
            0.5327     0.5571     0.5816     0.6061     0.6307
            0.6552     0.6797     0.7042     0.7286     0.7530
            0.7773     0.8057     0.8347     0.8626     0.8896
            0.9154     0.9387     0.9603     0.9806     1.0000
  Width:
            0.0876     0.0982     0.1089     0.1196     0.1302
            0.1409     0.1516     0.1622     0.1729     0.1835
            0.1942     0.2049     0.2155     0.2262     0.2369
            0.2475     0.2979     0.3917     0.4855     0.5023
            0.5076     0.5129     0.5182     0.5235     0.5288
            0.5342     0.5395     0.5448     0.5501     0.5554
            0.5607     0.5660     0.5713     0.5766     0.5819
            0.5872     0.5925     0.5978     0.6032     0.6085
            0.6138     0.6338     0.6604     0.6869     0.7135
            0.7523     0.8142     0.8762     0.9381     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 ............... LPS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 05/04/2021 00:00:00
  Ending Date .............. 05/06/2021 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
```

```
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.261          2.610
External Outflow .........         0.261          2.608
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.001
Continuity Error (%) .....         0.076


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link C38 (11)
Link W01 (8)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.99 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.06
Percent Not Converging      :     0.00
Time Step Frequencies       :
    2.000 -  1.516 sec      :    99.20 %
    1.516 -  1.149 sec      :     0.26 %
    1.149 -  0.871 sec      :     0.18 %
    0.871 -  0.660 sec      :     0.17 %
    0.660 -  0.500 sec      :     0.20 %


******************
Node Depth Summary
******************

---------------------------------------------------------------------------------
                               Average  Maximum  Maximum  Time of Max    Reported
                                 Depth    Depth      HGL   Occurrence   Max Depth
Node                 Type       Meters   Meters   Meters  days hr:min      Meters
---------------------------------------------------------------------------------
```

J01	JUNCTION	0.07	0.52	90.97	0	13:18	0.52
J02	JUNCTION	0.05	0.49	90.98	0	13:18	0.49
J03	JUNCTION	0.03	0.43	90.98	0	13:18	0.43
J04	JUNCTION	0.02	0.37	90.98	0	13:18	0.37
J05	JUNCTION	0.03	0.33	90.98	0	13:17	0.33
J06	JUNCTION	0.02	0.29	90.98	0	13:17	0.29
J07	JUNCTION	0.01	0.17	90.98	0	13:17	0.17
J08	JUNCTION	0.00	0.12	90.98	0	13:17	0.12
J09	JUNCTION	0.00	0.08	90.98	0	13:17	0.08
J10	JUNCTION	0.00	0.06	90.98	0	13:17	0.06
J11	JUNCTION	0.00	0.00	91.04	0	00:00	0.00
J12	JUNCTION	0.00	0.00	91.06	0	00:00	0.00
J13	JUNCTION	0.00	0.00	91.10	0	00:00	0.00
J14	JUNCTION	0.00	0.00	91.18	0	00:00	0.00
J15	JUNCTION	0.00	0.00	91.10	0	00:00	0.00
J16	JUNCTION	0.00	0.05	90.89	0	13:00	0.05
J17	JUNCTION	0.00	0.05	90.63	0	13:01	0.05
J18	JUNCTION	0.00	0.05	90.37	0	13:02	0.05
J19	JUNCTION	0.05	0.48	90.97	0	13:18	0.48
J20	JUNCTION	0.06	0.62	91.16	0	13:09	0.62
J21	JUNCTION	0.03	0.49	91.16	0	13:09	0.49
J22	JUNCTION	0.03	0.46	91.16	0	13:09	0.46
J23	JUNCTION	0.05	0.59	91.33	0	13:07	0.59
J24	JUNCTION	0.04	0.55	91.33	0	13:07	0.55
J25	JUNCTION	0.02	0.44	91.33	0	13:07	0.44
J26	JUNCTION	0.02	0.41	91.33	0	13:07	0.41
J27	JUNCTION	0.03	0.39	91.35	0	13:07	0.39
J28	JUNCTION	0.02	0.35	91.35	0	13:07	0.35
J29	JUNCTION	0.01	0.24	91.35	0	13:07	0.24
J30	JUNCTION	0.00	0.11	91.26	0	13:07	0.11
J31	JUNCTION	0.00	0.06	91.24	0	13:07	0.06
J32	JUNCTION	0.00	0.06	91.03	0	13:08	0.06
J33	JUNCTION	0.00	0.07	90.81	0	13:08	0.07
J34	JUNCTION	0.00	0.07	90.57	0	13:08	0.07
J35	JUNCTION	0.00	0.07	90.34	0	13:09	0.07
Outlet	JUNCTION	0.04	0.30	90.75	0	13:30	0.29
Emergency	OUTFALL	0.00	0.00	90.40	0	00:00	0.00
OF-LombardyEast	OUTFALL	0.00	0.07	90.12	0	13:09	0.07
OF-LombardyWest	OUTFALL	0.00	0.05	90.10	0	13:02	0.05
OF-OsgoodePath	OUTFALL	0.02	0.16	90.51	0	13:30	0.16
OF-OsgoodePath-UNC	OUTFALL	0.00	0.00	91.00	0	00:00	0.00
DryPond	STORAGE	0.06	0.52	90.97	0	13:19	0.52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J01	JUNCTION	0.00	158.85	0	13:07	0	1.52	-0.002
J02	JUNCTION	0.00	26.55	0	12:42	0	0.276	0.005
J03	JUNCTION	0.00	30.65	0	12:44	0	0.276	0.007
J04	JUNCTION	0.00	32.83	0	12:48	0	0.276	-0.009
J05	JUNCTION	0.00	33.65	0	12:48	0	0.276	-0.002
J06	JUNCTION	0.00	36.30	0	12:48	0	0.276	0.037
J07	JUNCTION	40.09	40.09	0	13:00	0.276	0.278	-0.042
J08	JUNCTION	0.00	2.59	0	13:04	0	0.00383	-0.030
J09	JUNCTION	0.00	1.90	0	13:04	0	0.00242	0.088

J10	JUNCTION	0.00	1.55	0	13:04	0	0.00106	0.114	
J11	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
J12	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
J13	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
J14	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
J15	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
J16	JUNCTION	17.61	17.61	0	13:00	0.12	0.12	-0.003	
J17	JUNCTION	0.00	17.56	0	13:00	0	0.12	-0.002	
J18	JUNCTION	0.00	17.55	0	13:01	0	0.12	0.005	
J19	JUNCTION	0.00	136.38	0	13:07	0	1.24	-0.007	
J20	JUNCTION	20.91	137.48	0	13:06	0.145	1.24	0.011	
J21	JUNCTION	0.00	121.74	0	12:52	0	1.1	-0.002	
J22	JUNCTION	0.00	122.82	0	12:52	0	1.1	-0.008	
J23	JUNCTION	0.00	124.66	0	12:52	0	1.1	0.008	
J24	JUNCTION	90.17	130.84	0	12:52	0.617	1.1	-0.001	
J25	JUNCTION	0.00	52.60	0	12:44	0	0.479	0.002	
J26	JUNCTION	0.00	53.52	0	12:45	0	0.479	-0.007	
J27	JUNCTION	0.00	54.47	0	12:45	0	0.479	0.005	
J28	JUNCTION	0.00	57.08	0	12:46	0	0.48	0.014	
J29	JUNCTION	77.14	77.14	0	13:00	0.534	0.535	-0.016	
J30	JUNCTION	0.00	28.31	0	13:07	0	0.0551	0.002	
J31	JUNCTION	0.00	28.31	0	13:07	0	0.0549	-0.014	
J32	JUNCTION	0.00	28.35	0	13:07	0	0.0549	0.025	
J33	JUNCTION	9.16	36.26	0	13:07	0.0629	0.118	-0.007	
J34	JUNCTION	0.00	36.20	0	13:08	0	0.118	-0.004	
J35	JUNCTION	0.00	36.22	0	13:08	0	0.118	0.010	
Outlet	JUNCTION	0.00	173.24	0	13:19	0	2.01	0.096	
Emergency	OUTFALL	0.00	0.00	0	00:00	0	0	0.000	ltr
OF-LombardyEast	OUTFALL	0.00	36.15	0	13:09	0	0.118	0.000	
OF-LombardyWest	OUTFALL	0.00	17.52	0	13:02	0	0.12	0.000	
OF-OsgoodePath	OUTFALL	0.00	175.58	0	13:30	0	2.01	0.000	
OF-OsgoodePath-UNC	OUTFALL	52.93	52.93	0	13:00	0.361	0.361	0.000	
DryPond	STORAGE	71.60	221.76	0	13:04	0.494	2.01	0.007	

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

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 LPS
DryPond	0.046	10	0	0	0.413	85	0 13:19	173.24

****
Outfall Loading Summary

****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Emergency	0.00	0.00	0.00	0.000
OF-LombardyEast	35.85	2.08	36.15	0.118
OF-LombardyWest	35.63	2.09	17.52	0.120
OF-OsgoodePath	80.04	15.29	175.58	2.008
OF-OsgoodePath-UNC	35.71	6.25	52.93	0.361
System	37.44	25.71	264.35	2.608

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C01	CONDUIT	24.40	0	13:01	0.31	0.32	1.00
C02	CONDUIT	26.55	0	12:42	0.09	0.02	0.76
C03	CONDUIT	30.65	0	12:44	0.20	0.03	0.80
C04	CONDUIT	32.83	0	12:48	0.80	0.44	0.88
C05	CONDUIT	33.65	0	12:48	0.12	0.04	0.78
C06	CONDUIT	36.30	0	12:48	0.21	0.05	0.58
C07	CONDUIT	2.59	0	13:04	0.02	0.00	0.37
C08	CONDUIT	1.90	0	13:04	0.13	0.03	0.26
C09	CONDUIT	1.55	0	13:04	0.05	0.00	0.18
C10	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C11	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C12	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C14	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C15	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C16	CONDUIT	17.56	0	13:00	0.34	0.02	0.11
C17	CONDUIT	17.55	0	13:01	0.34	0.02	0.11
C18	CONDUIT	17.52	0	13:02	0.34	0.02	0.11
C19	CONDUIT	135.25	0	13:07	0.26	0.09	0.84
C20	CONDUIT	129.14	0	12:50	1.05	1.70	1.00
C21	CONDUIT	119.14	0	13:08	0.16	0.07	0.91
C22	CONDUIT	121.74	0	12:52	0.34	0.07	0.79
C23	CONDUIT	122.82	0	12:52	0.99	1.63	1.00
C24	CONDUIT	124.66	0	12:52	0.14	0.08	0.95
C25	CONDUIT	48.19	0	12:44	0.12	0.03	0.83
C26	CONDUIT	52.60	0	12:44	0.28	0.05	0.85
C27	CONDUIT	53.52	0	12:45	0.83	0.71	0.99
C28	CONDUIT	54.47	0	12:45	0.13	0.05	0.74
C29	CONDUIT	57.08	0	12:46	0.23	0.08	0.74
C30	CONDUIT	28.31	0	13:07	0.53	0.40	0.44
C31	CONDUIT	28.31	0	13:07	0.26	0.04	0.22
C32	CONDUIT	28.35	0	13:07	0.39	0.03	0.16
C33	CONDUIT	28.29	0	13:08	0.36	0.03	0.17
C34	CONDUIT	36.20	0	13:08	0.42	0.04	0.18
C35	CONDUIT	36.22	0	13:08	0.42	0.04	0.18
C36	CONDUIT	36.15	0	13:09	0.42	0.04	0.18
C37	CONDUIT	155.77	0	13:08	0.31	1.45	0.87
C38	CONDUIT	175.58	0	13:30	1.23	0.12	0.37

W_Emergency	WEIR	0.00	0	00:00	0.00
W01	WEIR	45.14	0	12:47	1.00
W02	WEIR	22.82	0	12:40	1.00
W03	WEIR	109.24	0	13:19	0.73
W04	WEIR	0.00	0	00:00	0.00
W05	WEIR	0.00	0	00:00	0.00
W06	WEIR	0.00	0	00:00	0.00
W07	WEIR	0.00	0	00:00	0.00
W08	WEIR	13.88	0	13:09	0.05
W09	WEIR	0.00	0	00:00	0.00
W10	WEIR	0.00	0	00:00	0.00
W11	WEIR	0.00	0	00:00	0.00

****
Flow Classification Summary
****

	Adjusted	---------- Fraction of Time in Flow Class ----------								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C01	1.00	0.13	0.38	0.00	0.50	0.00	0.00	0.00	0.00	0.53
C02	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.62	0.00
C03	1.00	0.48	0.03	0.00	0.48	0.00	0.00	0.00	0.61	0.00
C04	1.00	0.14	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.02
C05	1.00	0.14	0.38	0.00	0.48	0.00	0.00	0.00	0.65	0.00
C06	1.00	0.52	0.02	0.00	0.46	0.00	0.00	0.00	0.65	0.00
C07	1.00	0.54	0.36	0.00	0.11	0.00	0.00	0.00	0.70	0.00
C08	1.00	0.25	0.01	0.00	0.73	0.00	0.00	0.00	0.00	0.01
C09	1.00	0.27	0.65	0.00	0.09	0.00	0.00	0.00	0.71	0.00
C10	1.00	0.91	0.09	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	1.00	0.00	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	0.00	0.00
C15	1.00	0.56	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	0.53	0.03	0.00	0.44	0.00	0.00	0.00	0.73	0.00
C17	1.00	0.51	0.02	0.00	0.46	0.00	0.00	0.00	0.69	0.00
C18	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.57	0.00
C19	1.00	0.12	0.12	0.00	0.76	0.00	0.00	0.00	0.53	0.00
C20	1.00	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.03
C21	1.00	0.12	0.27	0.00	0.62	0.00	0.00	0.00	0.79	0.00
C22	1.00	0.38	0.04	0.00	0.58	0.00	0.00	0.00	0.76	0.00
C23	1.00	0.13	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.04
C24	1.00	0.12	0.29	0.00	0.58	0.00	0.00	0.00	0.55	0.00
C25	1.00	0.41	0.03	0.00	0.56	0.00	0.00	0.00	0.80	0.00
C26	1.00	0.44	0.04	0.00	0.53	0.00	0.00	0.00	0.82	0.00
C27	1.00	0.11	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.04
C28	1.00	0.11	0.39	0.00	0.50	0.00	0.00	0.00	0.58	0.00
C29	1.00	0.49	0.04	0.00	0.47	0.00	0.00	0.00	0.84	0.00
C30	1.00	0.53	0.39	0.00	0.08	0.00	0.00	0.00	0.00	0.69
C31	1.00	0.92	0.02	0.00	0.06	0.00	0.00	0.00	0.72	0.00
C32	1.00	0.89	0.05	0.00	0.06	0.00	0.00	0.00	0.73	0.00
C33	1.00	0.55	0.34	0.00	0.11	0.00	0.00	0.00	0.74	0.00
C34	1.00	0.52	0.03	0.00	0.45	0.00	0.00	0.00	0.81	0.00
C35	1.00	0.50	0.02	0.00	0.47	0.00	0.00	0.00	0.69	0.00
C36	1.00	0.50	0.00	0.00	0.50	0.00	0.00	0.00	0.59	0.00
C37	1.00	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.00
C38	1.00	0.13	0.00	0.00	0.73	0.14	0.00	0.00	0.00	0.40

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C01	1.28	1.28	1.64	0.01	0.01
C20	1.20	1.59	1.25	1.32	1.09
C21	0.01	0.01	0.34	0.01	0.01
C23	0.58	1.01	0.58	1.16	0.58
C27	0.01	0.01	0.15	0.01	0.01
C37	0.01	0.01	0.01	1.14	0.01

Analysis begun on: Thu Jun 9 13:30:10 2022
Analysis ended on: Thu Jun 9 13:30:15 2022
Total elapsed time: 00:00:05

APPENDIX C

WATER BALANCE CALCULATIONS

Water Balance Model Description

The Thornthwaite-Mather (1957) water balance models are conceptual models that are used to simulate steady-state climatic averages or continuous values of precipitation (rain + snow), snowpack, snowmelt, soil moisture, evapotranspiration, and water surplus (infiltration + runoff) (refer to **Figure 1)**. Input parameters consist of daily precipitation *(PRECIP),* temperature *(MAX / MIN TEMP),* potential evaportranspiration *(PET)*, and the available water content *(AWC)* that can also be referred to as the water holding capacity of the soil. All water quantities in the model are based on monthly calculations and are represented as depths (volume per unit area) of liquid water over the area being simulated. *All model units are in millimetres (mm)*.

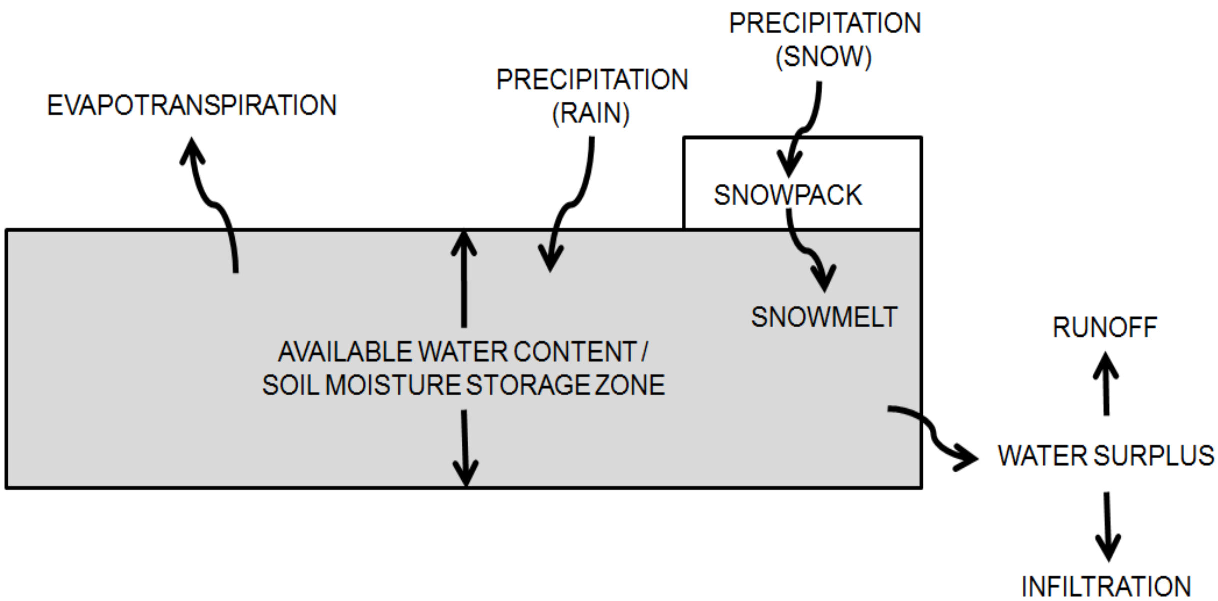


Figure 1: Conceptual Water Balance Model

Available Water Content (Water Holding Capacity)

The available water content (AWC) or water holding capacity of the soil was taken from Table 3.1 from the *Stormwater Management and Planning Manual (MOE, 2003)*, which has been reproduced in **Table 1** below. The available water content is the soil-moisture storage zone or the zone between the field capacity and vertical extent of the root zone.

Table 1: Water Holding Capacity Values (MOE, 2003)

Land Use / Soil Type	Hydrologic Soil Group	Water Holding Capacity (mm)
Urban Lawns / Shallow Rooted Crops (spinach, beans, beets, carrots)		
Fine Sand	A	50
Fine Sandy Loam	B	75
Silt Loam	C	125
Clay Loam	CD	100
Clay	D	75

Water Balance Model Description

Land Use / Soil Type	Hydrologic Soil Group	Water Holding Capacity (mm)
Moderately Rooted Crops (corn and cereal grains)		
Fine Sand	A	75
Fine Sandy Loam	B	150
Silt Loam	C	200
Clay Loam	CD	200
Clay	D	150
Pasture and Shrubs		
Fine Sand	A	100
Fine Sandy Loam	B	150
Silt Loam	C	250
Clay Loam	CD	250
Clay	D	200
Mature Forests		
Fine Sand	A	250
Fine Sandy Loam	B	300
Silt Loam	C	400
Clay Loam	CD	400
Clay	D	350

Precipitation

Daily precipitation *(PRECIP)* values consist of the total daily rainfall and water equivalent of snowmelt that fell on that day. Based on the mean daily temperature *(MEAN TEMP)* precipitation falls either as rainfall *(RAIN)* or the water equivalent of snowfall *(SNOW)*:

- *RAIN: If (MEAN TEMP >= 0, RAIN, SNOW)*
- *SNOW: If (MEAN TEMP < 0, SNOW, RAIN)*

Snowmelt / Snowpack / Water Input

Snowmelt *(MELT)* occurs if there is available snow (water equivalent) in the snowpack *(SNOWPACK)* and the maximum daily temperature *(MAX TEMP)* is greater than 0. The available snowmelt is limited to the available water in the snowpack.

Snowmelt is computed by a degree-day equation (Haith, 1985):

SNOWMELT (cm/d) = MELT COEFICIENT x [AIR TEMP (^{O}C) – MELT TEMP(^{O}C)]

The melt coefficient is typically 0.45 for northern climates (Haith, 1985). The melt temperature is assumed to be 0^{O}C. The air temperature is assumed to be the max temperature multiplied by a ratio of the max to min temperatures:

AIR TEMP = *MAX TEMP / (MAX TEMP – MIN TEMP)*

Therefore the snowmelt equation is:

- *MELT: If (MAX TEMP > 0, IF(SNOWPACK > 0, MIN((MAX TEMP*0.45*MAX TEMP/(MAX TEMP – MIN TEMP)*10mm/cm), SNOWPACK), 0), 0)*

Snow accumulates in the snowpack from the previous day if precipitation falls as snow and there is no snowmelt or the amount of snow that falls in a day exceeds the daily snowmelt:

$SNOWPACK_N = SNOWPACK_{N-1} + SNOW - MELT$

The initial snowmelt on day 1 (i.e. January 1) is assumed to be 0. The initial snowpack on day 1 is assumed to be the snowpack on the last day of simulation (i.e. December 31).

The total water input (W) is rain + snowmelt. This is the available water that fills the soil moisture storage zone each day.

Evaporation

Measured potential evaporation (PE) data (i.e. lake evaporation) is provided with the Environment Canada Climate Normals (see example below). The data represents daily averages for each month over a 20+ year period.

▼ Evaporation

Evaporation														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Lake Evaporation (mm)	0	0	0	0	3.6	4.3	4.5	3.7	2.4	1.4	0	0	0	C

The daily evaporation data was assumed to represent the middle or 15th of each month and 'smoothed' to represent the transition from month to month (see **Figure 2** below). As shown in **Figure 2** this produces a more realistic curve of potential evapotranspiration.

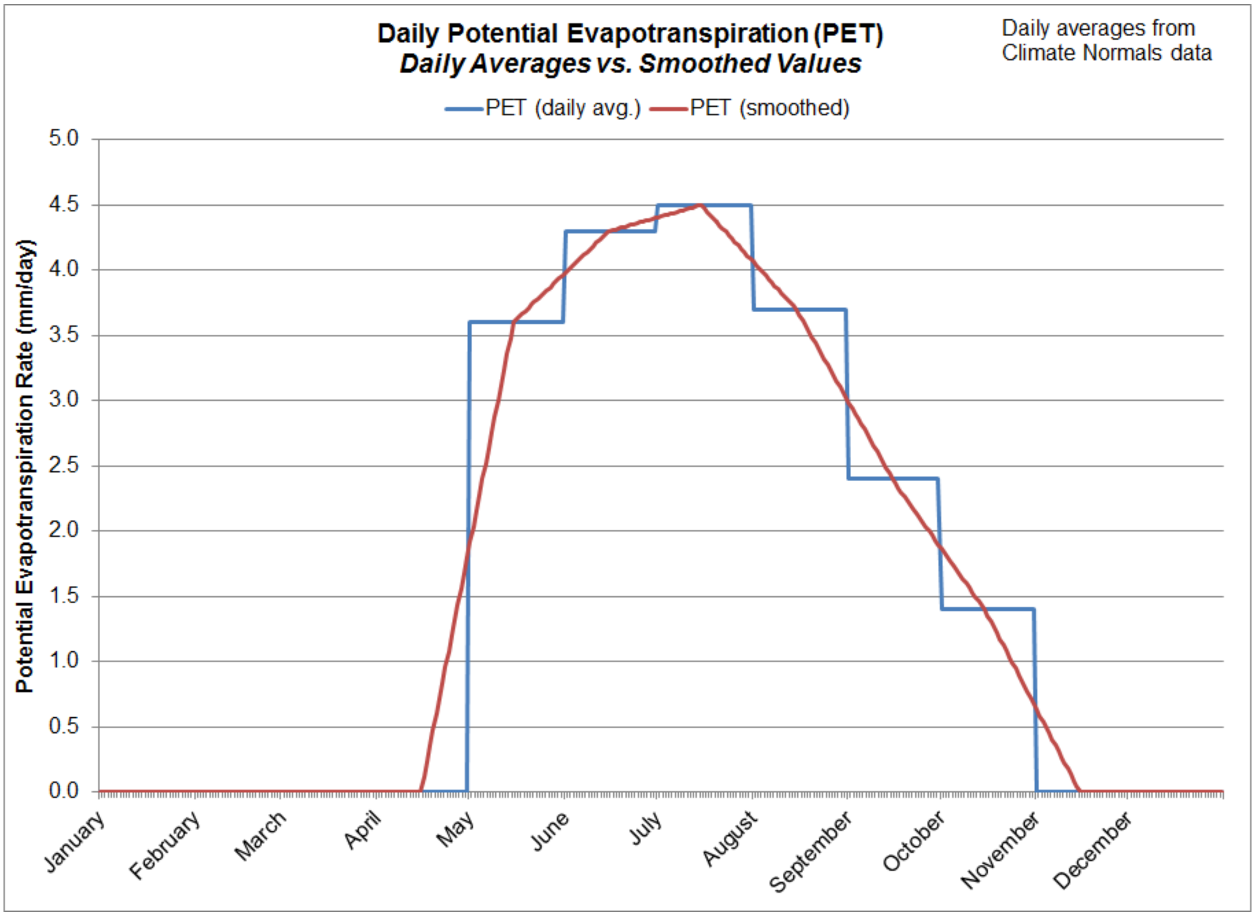


Figure 2: Daily Potential Evapotranspiration Rates (Daily Averages vs. Smoothed Values)

Potential Evapotranspiration

To convert potential evaporation data to potential crop evapotranspiration (PET) data a cover coefficient is applied based on land use and growing / dormant seasons:

PET = PE x Crop Cover Coefficient

Crop cover coefficients are based on the crop growth stages for different crop types (see **Figure 3**). A typical crop coefficient curve is shown in **Figure 4**, which depicts a crop that provides transpiration above the potential evaporation rates during the growing season.

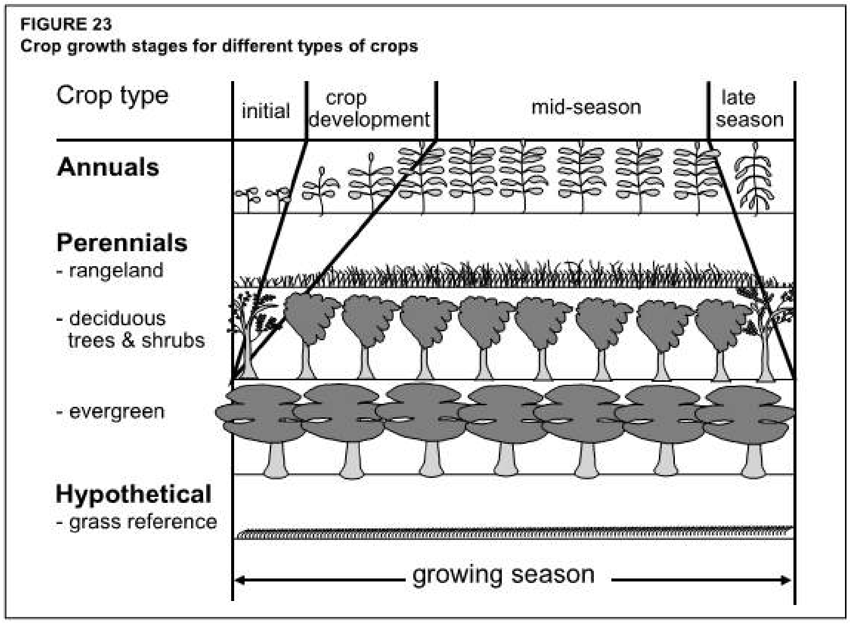


Figure 3: Crop Growth Stages for Different Types of Crops

Source: Food and Agriculture Organization of the United Nations (FAO), 1998, Crop Evapotranspiration - Guidelines for Computing Crop Water Requirements. FAO Irrigation and Drainage paper 56.

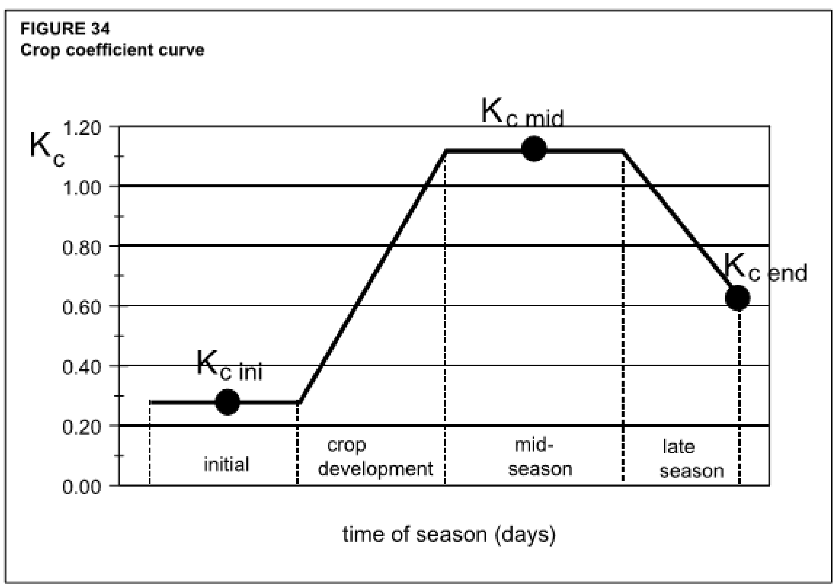


Figure 4: Crop Coefficient Curve

Source: Food and Agriculture Organization of the United Nations (FAO), 1998, Crop Evapotranspiration - Guidelines for Computing Crop Water Requirements. FAO Irrigation and Drainage paper 56.

NOVATECH
Engineers, Planners & Landscape Architects

Water Balance Model Description

The crop cover coefficients used in the water budget model for the various land use types is shown in **Table 2**. The growing / dormant seasons are shown in **Table 3**. The crop cover coefficients for the initial growing season are based on the average value of the dormant and middle of the growing season.

Table 2: Crop Cover Coefficients

Land Use	Dormant Season	Initial Growing Season	Middle of Growing Season	End of Growing Season
Urban Lawns / Shallow Rooted Crops	0.40	0.78	1.15	0.55
Moderately Rooted Crops	0.30	0.73	1.15	0.40
Pasture and Shrubs	0.40	0.68	0.95	0.90
Mature Forest	0.3	0.75	1.20	0.30
Impervious Areas	1.00	1.00	1.00	1.00

Reference: Data is based on Table 12 from the Food and Agriculture Organization of the United Nations (FAO), 1998, Crop Evapotranspiration - Guidelines for Computing Crop Water Requirements. FAO Irrigation and Drainage paper 56.

Table 3: Crop Growing Season

Month(s)	Crop Growing Season
January – April	Dormant Season
May	Initial Growing Season
June - August	Middle of Growing Season
September	End of Growing Season
October - December	Dormant Season (harvest in October)

Reference: Food and Agriculture Organization of the United Nations (FAO), 1977, Crop Water Requirements. FAO Irrigation and Drainage paper 24.

Actual Evapotranspiration

Following Alley (1984), if the monthly water input (i.e. rain + snowmelt) is greater than the potential evapotranspiration (PET) rate, the actual evapotranspiration (AET) rate takes place at the potential evapotranspiration rate:

IF W > PET, then AET = PET

If the monthly water input is less than the potential evapotranspiration rate (i.e. W < PET) then the actual evapotranspiration rate is the sum of the water input and an increment removed from the available water in the soil moisture storage zone (SOIL WATER):

IF W < PET, then AET = W + ΔSOIL WATER

WHERE: $\Delta SOIL\ WATER = SOIL\ WATER_{N-1} - SOIL\ WATER_N$

Figure 5 shows a comparison of the average monthly potential evapotranspiration and actual evapotranspiration rates.

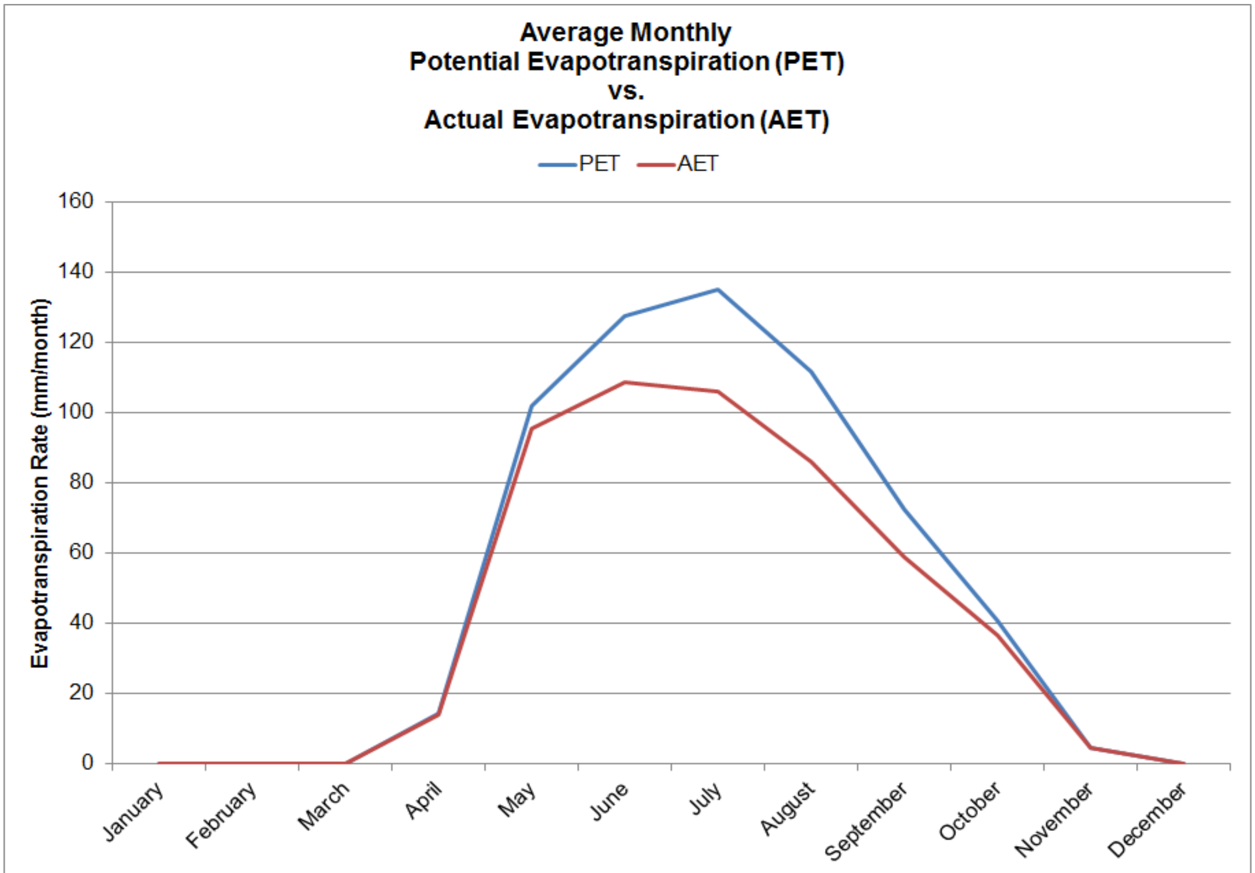


Figure 5: Average Monthly Potential Evapotranspiration vs. Actual Evapotranspiration

Soil Moisture

The soil moisture storage zone (SOIL WATER) is the amount of water available for actual evapotranspiration, but actual evapotranspiration is limited by the potential evapotranspiration rate.

The decrease / change in the soil moisture storage zone (ΔSOIL WATER) is based on the following relationship (Thornthwaite,1948), where AWC represents the available water content:

$$\Delta SOIL\ WATER = SOIL\ WATER_{N-1} \times [1-\exp(-((PET - W) / AWC))]$$

The soil moisture storage zone is replenished with rainwater and snowmelt (i.e. the water input) to the maximum value of the available water content (AWC):

$$SOIL\ WATER_N = \min[(W - PET) + SOIL\ WATER_{N-1}), AWC]$$

Water Balance Model Description

Water Surplus

The water surplus (SURPLUS) is defined as the excess water that is greater than the available water content (AWC).

SURPLUS = W – AET - ΔSOIL WATER

The water surplus represents the difference between precipitation and evapotranspiration. It is an estimate of the water that is available to contribute to infiltration and runoff (i.e. streamflow).

Infiltration / Runoff

The amount of water surplus that is infiltration was determined by summing the infiltration factors (IF) based on topography, soils and land cover. Since the water surplus represents infiltration and runoff; direct runoff is the amount of water surplus remaining after taking into account infiltration: (1.0 – infiltration factor = runoff factor). The infiltration and runoff factors were applied to the average monthly water surplus values:

INFILTRATION = IF x SURPLUS

RUNOFF = (1.0 – IF) x SURPLUS

The infiltration factors are shown in **Table 4**, which was reproduced from Table 3.1 in the *Stormwater Management and Planning Manual (MOE, 2003)*. These infiltration factors were initially presented in the document *"Hydrogeological Technical Information Requirements for Land Development Applications" (MOE, 1995)*.

Table 4: Infiltration Factors (MOE, 2003)

Description	Value of Infiltration Factor
Topography	
Flat Land, average slope < 0.6 m/km	0.3
Rolling Land, average slope 2.8 m/km to 3.8 m/km	0.2
Hilly Land, average slope 28 m/km to 47 m/km	0.1
Surficial Soils	
Tight impervious clay	0.1
Medium combination of clay and loam	0.2
Open sandy loam	0.4
Land Cover	
Cultivated Land	0.1
Woodland	0.2

NOVATECH
Engineers, Planners & Landscape Architects

Water Balance Model Description

Each soil type been assigned a corresponding infiltration factor as per Table 3.1 in the *Stormwater Management and Planning Manual (MOE, 2003),* as shown in **Table 5** below.

Table 5: Soils Infiltration Factors

Soil Type	Hydrologic Soil Group	Infiltration Factor
Coarse Sand	A	0.40
Fine Sand	AB	0.40
Fine Sandy Loam	B	0.30
Loam	BC	0.30
Silt Loam	C	0.20
Clay Loam	CD	0.15
Clay	D	0.10

The land use was combined into five (5) main categories (mature forest, row crops, pasture / meadow, urban lawns, and impervious areas) to be consistent with Table 3.1 in the *Stormwater Management and Planning Manual (MOE, 2003)*. The land use infiltration factors are shown in **Table 6** below.

Table 6: Land Use Infiltration Factor

Land Use	Infiltration Factor
Urban Lawns	0.10
Row Crops	0.10
Pasture / Meadow	0.10
Mature Forest	0.20
Impervious Areas	0.00

Land Use / Soils / Topography

The available water content (AWC) and infiltration factors (IF), and crop cover coefficients (CROP COEF) are determined based on the combination of land use, soils and topography, as shown in **Table 7**.

Water Balance Model Description

Table 7: Model Parameters based on Land Use / Soils (existing areas)

Land Use	Soils (HSG)	AWC (mm)	IF (Land Use)	IF (Soils)	Crop Cover Coefficient			
					Dormant Season	Initial Growing Season	Middle of Growing Season	End of Growing Season
Urban Lawns	A	50	0.10	0.40	0.40	0.78	1.15	0.55
	AB	62.5		0.40				
	B	75		0.30				
	BC	100		0.30				
	C	125		0.20				
	CD	100		0.15				
	D	75		0.10				
Row Crops	A	75	0.10	0.40	0.30	0.73	1.15	0.40
	AB	112.5		0.40				
	B	150		0.30				
	BC	175		0.30				
	C	200		0.20				
	CD	200		0.15				
	D	150		0.10				
Pasture / Meadow	A	100	0.10	0.40	0.40	0.68	0.95	0.90
	AB	125		0.40				
	B	150		0.30				
	BC	200		0.30				
	C	250		0.20				
	CD	250		0.15				
	D	200		0.10				
Mature Forest	A	250	0.20	0.40	0.30	0.75	1.20	0.30
	AB	275		0.40				
	B	300		0.30				
	BC	350		0.30				
	C	400		0.20				
	CD	400		0.15				
	D	350		0.10				
Impervious Areas *(see Table 9)*	A	1.57	0.00	0.00	1.00	1.00	1.00	1.00
	AB	1.57						
	B	1.57						
	BC	1.57						
	C	1.57						
	CD	1.57						
	D	1.57						

*For impervious areas, potential evapotranspiration is equal to potential evaporation (i.e. crop cover coefficient = 1.00).

3200 Reid's Lane (119089)
Water Balance Calculations

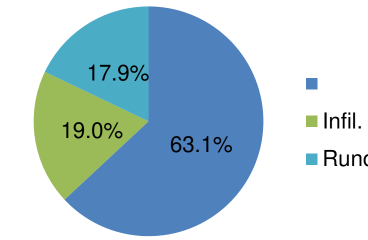
NOVATECH
Engineers, Planners & Landscape Architects

Pre-Development

Drainage Area 4.750 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	74.9%	3.560	76.6%	400 mm	0.20	**Topography**	Rolling to Hilly Land	0.15
Pasture/Meadow	0.0%	0.000	0.0%	250 mm	0.10	**Soils**	Silty sand / Sandy Clay	0.20
Urban Lawns	22.9%	1.087	23.4%	125 mm	0.10		**Pervious Infiltration Factor**	**0.53**
Imp. Areas	2.2%	0.103	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.52**
Average				**328 mm**	**0.18**		**Runoff Factor**	**0.48**

*table 3.1 MOE

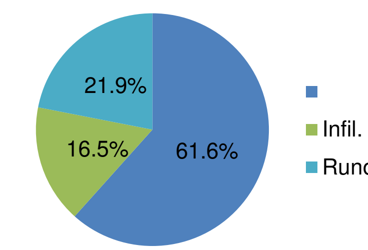


		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential ET (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	328	328	328	328	304	272	232	212	232	275	328	328	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-24	-32	-40	-21	21	43	54	0	
Deficit (mm)	D	0	0	0	0	1	4	12	10	0	0	0	0	**27**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	111	125	124	105	72	43	0	0	**580**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	0	29	70	**340**
Annual Infiltration (mm)	**I**													**175**
Annual Runoff (mm)	**R**													**165**

Post-Development

Drainage Area 4.750 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	34.7%	1.648	39.6%	400 mm	0.20	**Topography**	Rolling to Hilly Land	0.15
Pasture/Meadow	0.0%	0.000	0.0%	250 mm	0.10	**Soils**	Silty sand / Sandy Clay	0.20
Urban Lawns	52.9%	2.512	60.4%	125 mm	0.10		**Pervious Infiltration Factor**	**0.49**
Imp. Areas	12.4%	0.590	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.43**
Average				**205 mm**	**0.14**		**Runoff Factor**	**0.57**



		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential Evap. (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	205	205	205	205	181	152	118	101	122	164	205	205	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-24	-30	-34	-17	21	43	41	0	
Deficit (mm)	D	0	0	0	0	1	7	18	14	0	0	0	0	**40**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	110	122	119	100	72	43	0	0	**567**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	0	42	70	**353**
Annual Infiltration (mm)	**I**													**151**
Annual Runoff (mm)	**R**													**202**

Notes:
1) Uses measured average monthly total precipitation and potential evaporation data (converted to evapotranspiration based on a cover coefficient of 1.0).
2) Actual evapotranspiration and water surplus calculated using the Thornthwaite & Mather (1957) methodology.
3) Runoff and infiltration calculated as per the MOE SWM Planning and Design Manual (2003) methodology.
4) Impervious areas consist of rooftops, roads, and driveways.

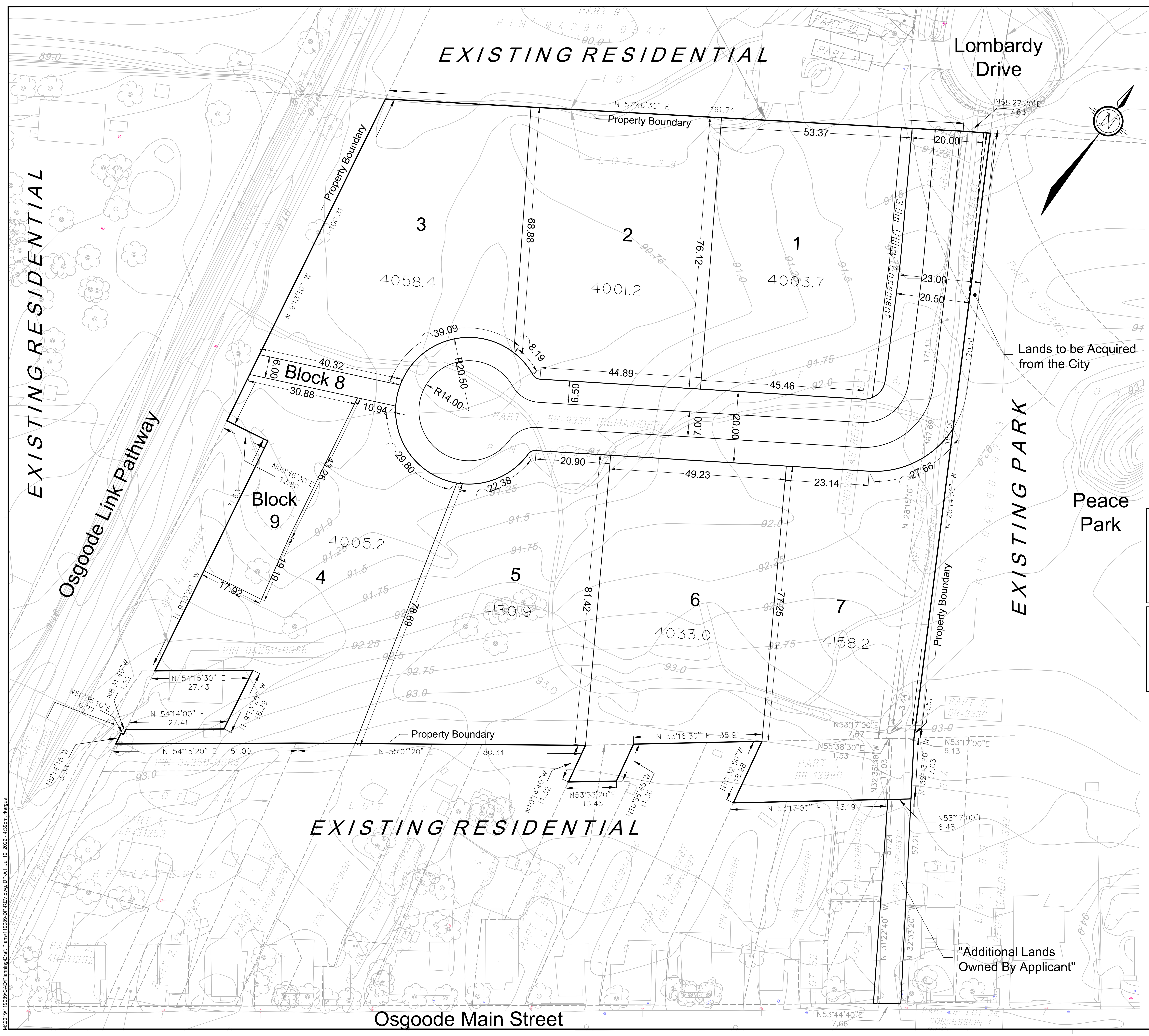
Annual Summary

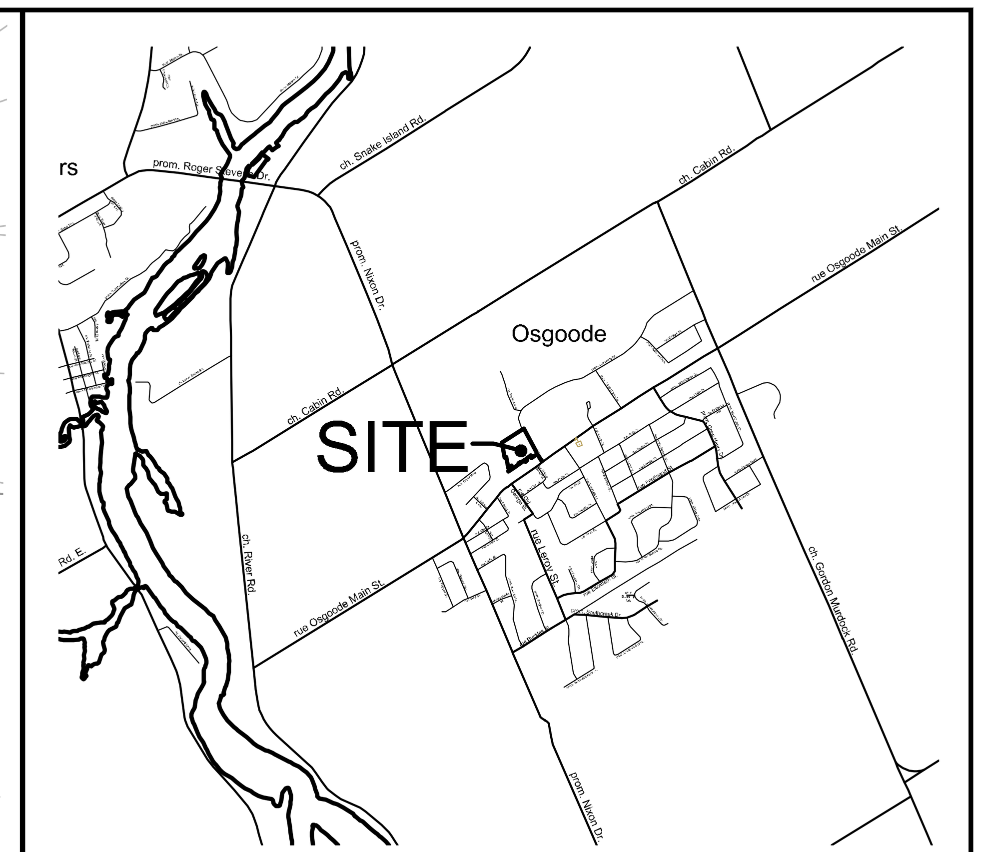
Scenario	Precipitation	ET		Surplus		Infil.		Runoff	
Pre-Development	920 mm	580 mm	63.1%	340 mm	36.9%	175 mm	19.0%	165 mm	17.9%
Post-Development	920 mm	567 mm	61.6%	353 mm	38.4%	151 mm	16.5%	202 mm	21.9%
Difference (Post - Pre)	0 mm	-13 mm	-1.4%	13 mm	1.4%	-24 mm	-2.6%	37 mm	4.0%

Thornthwaite, C.W., and Mather, J.R. 1957. Instructions and tables for computing potential evapotranspiration and the water balance. Centerton, N.J., Laboratory of Climatology, Publications in Climatology, v.10, no.3, p.185-311

Prepared by Novatech Engineering Consultants Ltd.
Date: 6/9/2022

M:\2019\119089\DATA\Calculations\Sewer Calcs\SWM\Water Balance\119089-WaterBalance_Rev1.xlsx





KEY MAP
NOT TO SCALE

METRIC : MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DRAFT PLAN OF SUBDIVISION OF
PART OF LOTS 27 & 28
CONCESSION 1
TOWNSHIP of OSGOODE
CITY OF OTTAWA
SCALE
1 : 500
DATE: APRIL, 2022

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJOINING LANDS ARE CORRECTLY SHOWN.

DATED _________________________ _________________________
?surveyor name?
ONTARIO LAND SURVEYOR

FAIRHILL, MOFFATT & WOODLAND
ONTARIO LAND SURVEYORS AA29500

OWNER'S CERTIFICATE

I/WE, ,BEING THE REGISTERED OWNER(S), HEREBY AUTHORIZE NOVATECH TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF OTTAWA FOR REVIEW AND APPROVAL.

DATED _________________________ _________________________
owner name

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT.

A) The boundaries of the land proposed to be subdivided, certified by an Ontario land Surveyor;
As shown on Draft Plan

B) The locations, widths & names of the proposed highways within the proposed subdivision & of existing highways on which the proposed subdivision abuts;
As shown on Draft Plan

C) On a small keyplan, on a scale of not less than 1cm to 100m, all of the land adjacent to the proposed subdivision that is owned by the applicant or in which the applicant has an interest, every subdivision adjacent to the proposed subdivision & the relationship of the boundaries of the land to be subdivided to the boundaries of the township lot of other original grant of which the land forms the whole part;
As Shown on Draft Plan

D) The purpose for which the proposed lots are to be used;
Residential shown on Draft Plan

E) The existing uses of all adjoining lands;
Residential and Open Space shown on Draft Plan

F) The approximate dimensions & layout of the proposed lots;
As shown on Draft Plan

G) Natural & artificial features such as buildings or other structures or installations, railways, highways, watercources, drainage ditches, wetlands & wooded areas within or adjacent to the land proposed to be subdivided;
As shown on Draft Plan

H) The availability and nature of domestic water supplies;
Development will be supplied with individual drilled wells

I) The nature & porosity of the soil;
Please refer to Terrain Analysis Report

J) Existing contours or elevations as may be required to determine the grade of the highways and the drainage of the land proposed to be subdivided;
Contours shown at 0.25 metre intervals on Draft Plan

K) The municipal services available or to be available to the land proposed to be subdivided;
Development will not be supplied with municipal services

L) The nature & extent of any restrictions affecting the land proposed to be subdivided, including restrictive covenants or easements. 1994, c. 23, s. 30; 1996, c. 4, s. 28 (3).;
As shown on Draft Plan.

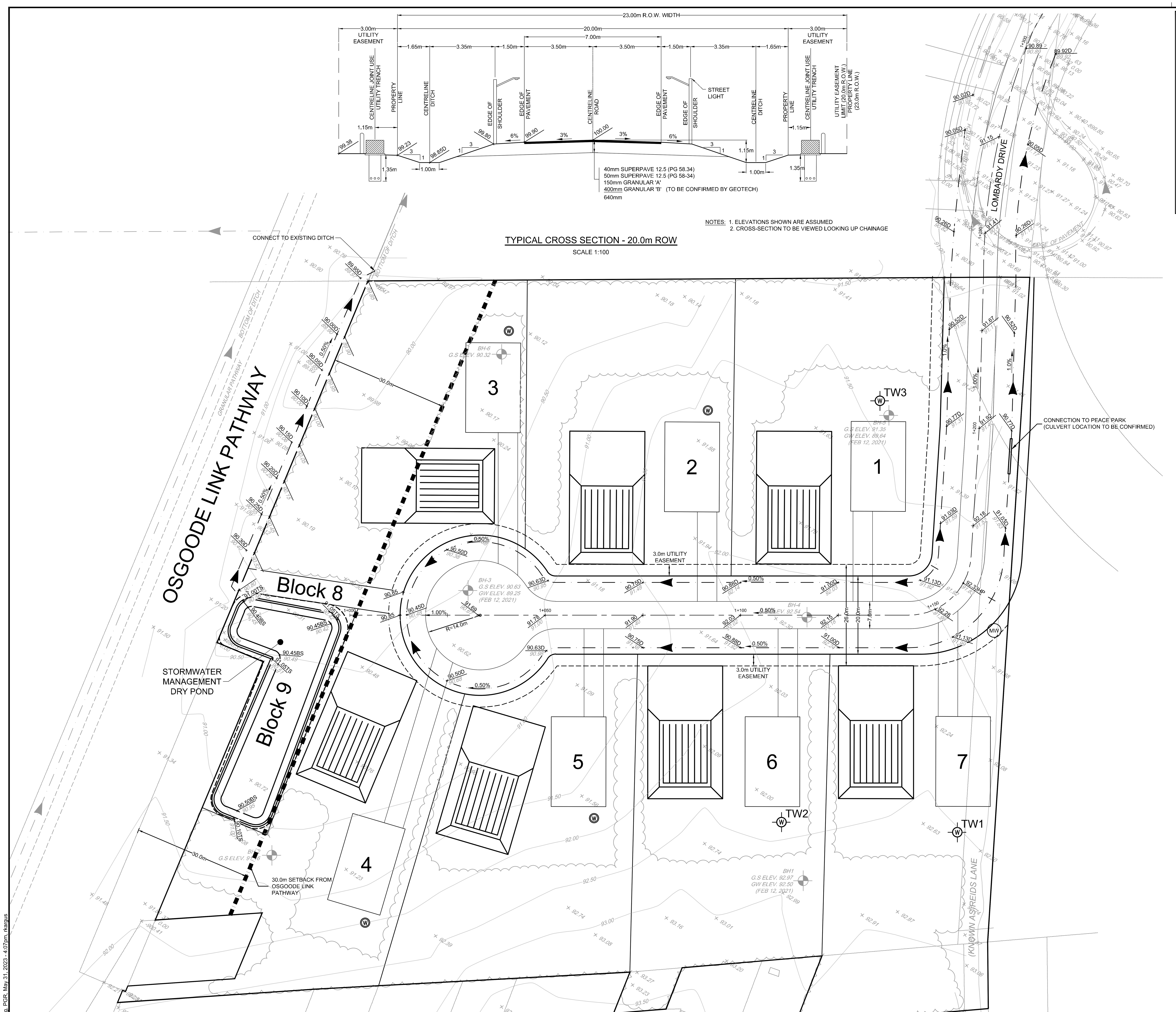
REID'S LANE SUBDIVISION

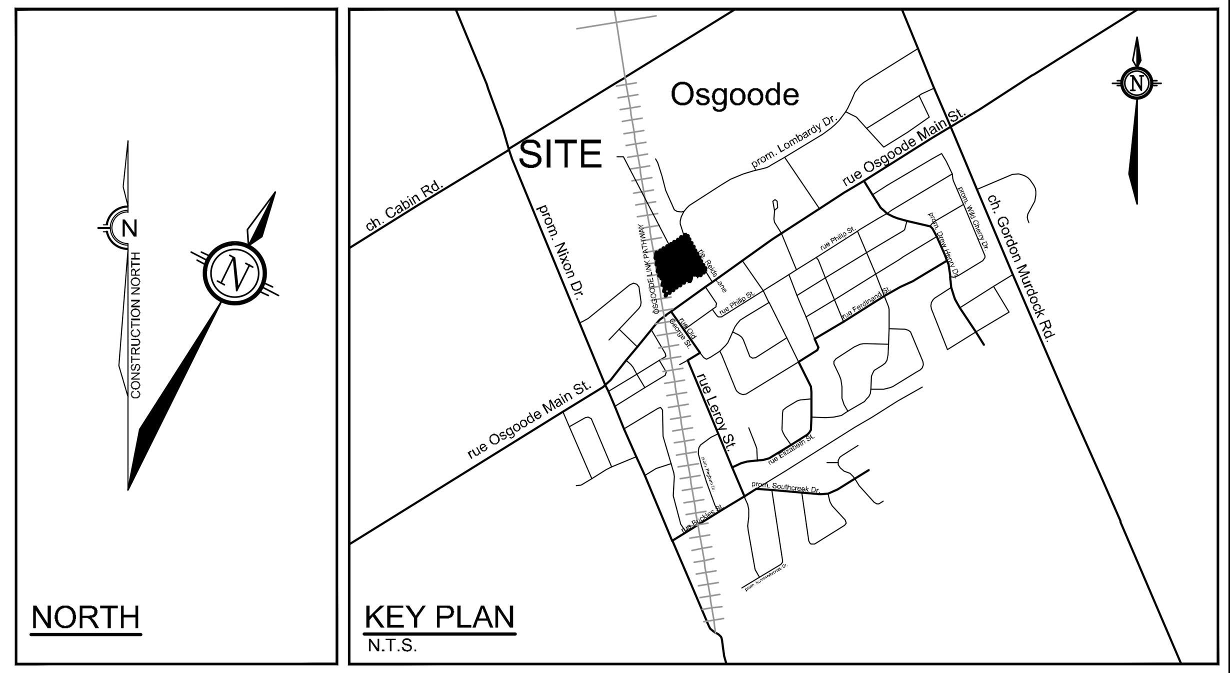
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

PROJECT No. 119089

Dxx-xx-xx-xxxx

#xxxxx





LEGEND

- PROPERTY LINE
- 30m SETBACK FROM THE OSGOODE LINK PATHWAY
- ℄ DITCH AND DIRECTION OF FLOW
- 92.10 / 92.02 — PROPOSED ELEVATION / EXISTING ELEVATION
- 92.53 — PROPOSED ELEVATION
- 90.97D — PROPOSED DITCH ELEVATION
- 0.50% — GRADE AND DIRECTION
- LIMIT OF TREE PRESERVATION (SOURCE: MAP 2 - TREE CONSERVATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT BY MUNCATER ENVIRONMENTAL PLANNING INC. REPORT, DATED APRIL 1ST, 2021).
- BH-1 G.S. ELEV. 91.35 GW ELEV. 89.64 — BOREHOLE NUMBER, INFORMATION AND APPROXIMATE LOCATION (PROVIDED BY KOLLAARD ASSOCIATES, MARCH 9, 2021)
- PROPOSED CULVERT
- W — PROPOSED WELL
- TW1 — TEST WELL LOCATION AND NUMBER
- MW — PROPOSED MONITORING WELL
- PROPOSED HOUSE FOOTPRINT (320m² / 3400 ft²)
- PROPOSED PARTIALLY RAISED TILE FIELD AND MANTLE (BASED ON A DESIGN FLOW OF 3,000 L/day, WITH 8 RUNS OF 15m IN IMPORTED SAND WITH A PERCOLATION RATE OF 8min/cm)

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
6.	ISSUED WITH REVISED CONCEPTUAL SWM REPORT	JUN 01/23	LAB
5.	ISSUED FOR COORDINATION	JUNE 13/22	LAB
4.	ISSUED FOR COORDINATION	MAY 5/22	LAB
3.	REVISED PER CITY COMMENTS	OCT 20/21	LAB
2.	ISSUED TO CITY OF OTTAWA	OCT 05/21	LAB
1.	ISSUED WITH CONCEPTUAL SWM REPORT	SEPT 03/21	LAB

SCALE 1:500

DESIGN RJK · CHECKED LAB · DRAWN RJK · CHECKED LAB · APPROVED SMG

FOR REVIEW ONLY

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

LOCATION
CITY OF OTTAWA
REID'S LANE SUBDIVISION

DRAWING NAME
PRELIMINARY GRADING & SITE SERVICING PLAN

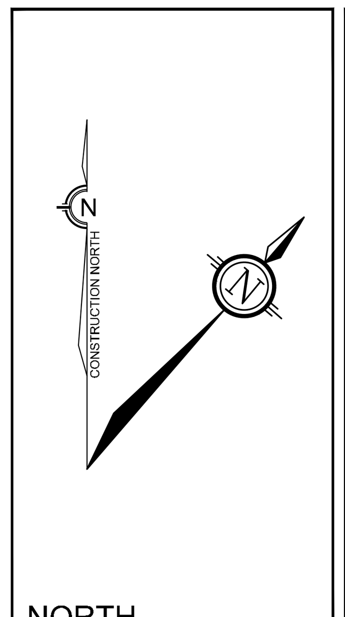
PROJECT No. 119089
REV # 6
DRAWING No. 119089-PGR

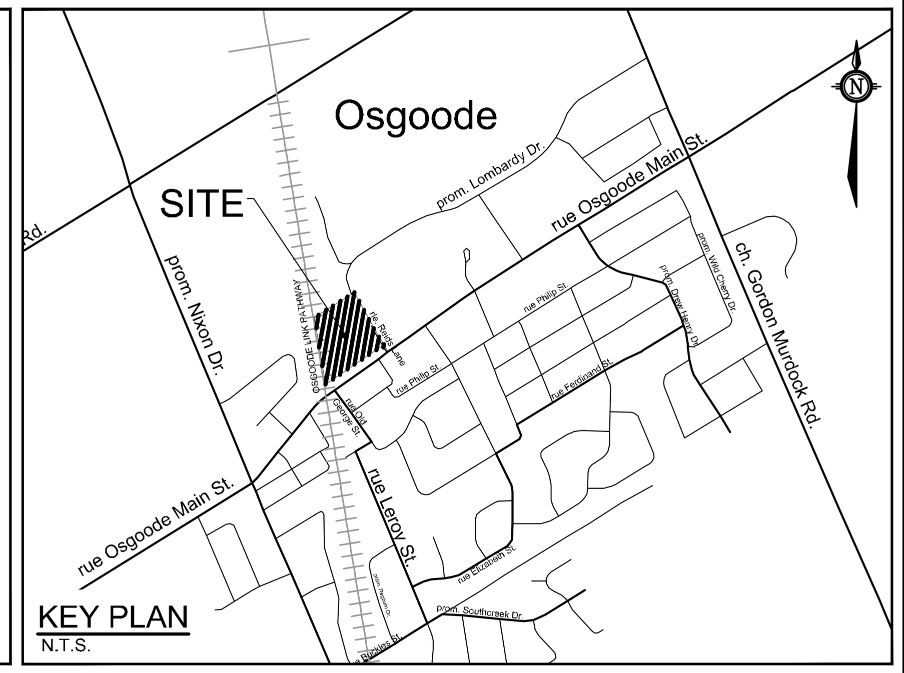
M:\2019\119089\CAD\Design\119089-PGR.dwg, PGR, May 31, 2023 - 4:07pm, rkargus

LEGEND

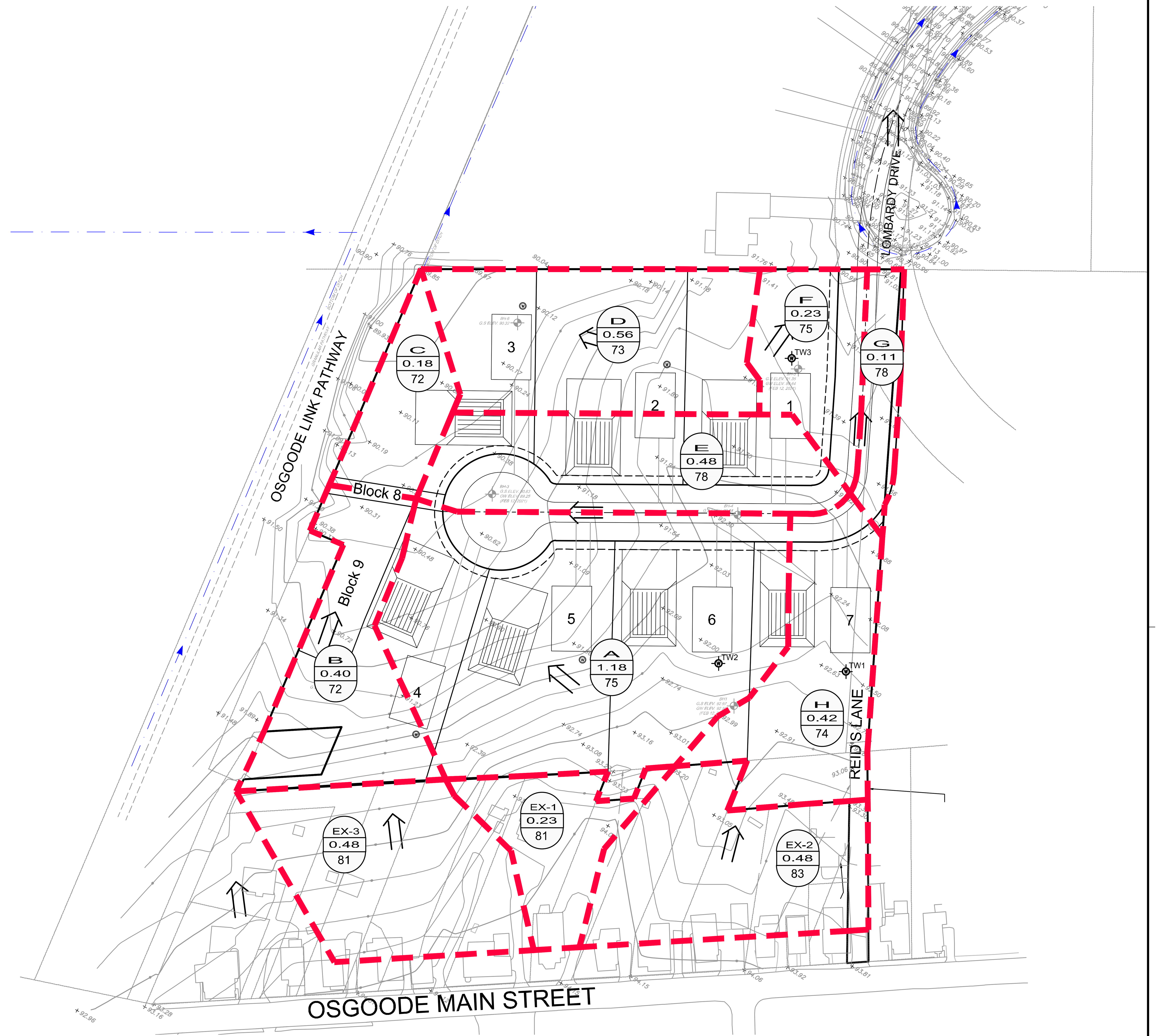
AREA ID
DRAINAGE AREA (hectares)
CURVE NUMBER
STORM DRAINAGE AREA
EXISTING DITCH
OVERLAND FLOW

TOTAL DRAINAGE AREA = 4.75 ha





PRE-DEVELOPMENT
DRAINAGE AREAS



POST-DEVELOPMENT
DRAINAGE AREAS

SOURCE REFERENCE:
LEGAL INFORMATION:
CITY OF OTTAWA LEGAL PLANS 5R-9330, 5R-13990, 4R-17009, 4R-20040 AND 4R-19665
TOPOGRAPHIC INFORMATION:
FAIRHALL MOFFATT & WOOLAND LIMITED (208-1 OSGOODE) PART OF LOTS 27 & 28 CONCESSION 1 (OSGOODE) AND PART OF LOTS 50 & 51 REGISTERED PLAN 393 / NOVEMBER 5, 2020 / MTM ZONE 9 (NAD83 ORIGINAL)

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
5.	ISSUED WITH REVISED CONCEPTUAL SWM REPORT	JUN 01/23	LAB
4.	RE-ISSUED FOR DISCUSSION	FEB 17/22	LAB
3.	RE-ISSUED FOR DISCUSSION	FEB 08/22	LAB
2.	ISSUED FOR DISCUSSION	JAN 25/22	LAB
1.	ISSUED WITH CONCEPTUAL SWM REPORT	SEPT 03/21	LAB

SCALE
1:1000
1:1000
0 10 20 30 40

DESIGN RJK
CHECKED LAB
DRAWN RJK
CHECKED LAB
APPROVED SMG

FOR REVIEW ONLY

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

LOCATION
CITY OF OTTAWA
REID'S LANE SUBDIVISION

DRAWING NAME
STORM DRAINAGE AREA PLAN

PROJECT No. 119089
REV
REV # 5
DRAWING No.
119089-STM

M:\2019\119089\CAD\Design\119089-STM.dwg, STM DA, May 31, 2023 - 4:24pm, rkargus