David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

EXISTING CONDITIONS REPORT - SERVICING

FOR

STITTSVILLE SOUTH URBAN EXPANSION AREA

CAIVAN (STITTSVILLE SOUTH) INC. & CAIVAN (STITTSVILLE WEST) LTD.

CITY OF OTTAWA

PROJECT NO.: 21-1247

SEPTEMBER 2023 – 1ST SUBMISSION

EXISTING CONDITIONS REPORT - SERVICING
FOR

STITTSVILLE SOUTH URBAN EXPANSION AREA

CAIVAN (STITTSVILLE SOUTH) INC. & CAIVAN (STITTSVILLE WEST) LTD.

TABLE OF CONTENTS

APPENDICES

EXISTING CONDITIONS REPORT - SERVICING
FOR

STITTSVILLE SOUTH URBAN EXPANSION AREA

SEPTEMBER 2023 – 1ST SUBMISSION
CITY OF OTTAWA
PROJECT NO.: 21-1247

1.0 INTRODUCTION

Caivan (Stittsville South) Inc. and Caivan (Stittsville West) Ltd. (Caivan) have retained a Consultant Team to prepare documents to support the Stittsville South Urban Expansion Area (SSUEA)which will be implemented as an Amendment to the City of Ottawa Official Plan (OP) and removal of the Future Neighborhood Overlay on Schedule C17.

Per the City of Ottawa request, a Terms of Reference (TOR) document was prepared and validated by the City (TOR included in Appendix E for reference) to outline the servicing assessment approach for the subject lands. David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a scoped Master Servicing Study (MSS) to outline water, wastewater, and stormwater management servicing strategies for the SSUEA. In advance of preparing the MSS, an Existing Conditions Report is required to evaluate and assess existing water resources and servicing infrastructure in the vicinity of the SSUEA, and to identify constraints and opportunities that will provide the baseline conditions of an Environmental Management Plan (EMP).

2.0 STUDY AREA

2.1 Location

The properties comprising the Caivan landholdings within the SSUEA are as follows and illustrated in Figure 1:

- ~18.8 ha 6115 Flewellyn Road;
- ~16.1 ha 6070 Fernbank Road;
- ~17.4 ha 5993 Flewellyn Road
- ~12.4 ha (6030 Fernbank Road) parcel and
- ~8.8 ha of holdout land parcels (including Hydro corridor owned lands west of Faulkner Drain) within the SSUEA study area.

The noted land parcels are now designated as Urban Expansion Area in the City of Ottawa Official Plan as of November 2022. As illustrated in the following figure, the overall development area is bound by Flewellyn Road to south, Shea Road to the east, an existing urban subdivision development to the north (Stittsville South – Area 6 ("Edenwylde")) and an estate lot subdivision (Woodside Acres) to the west.

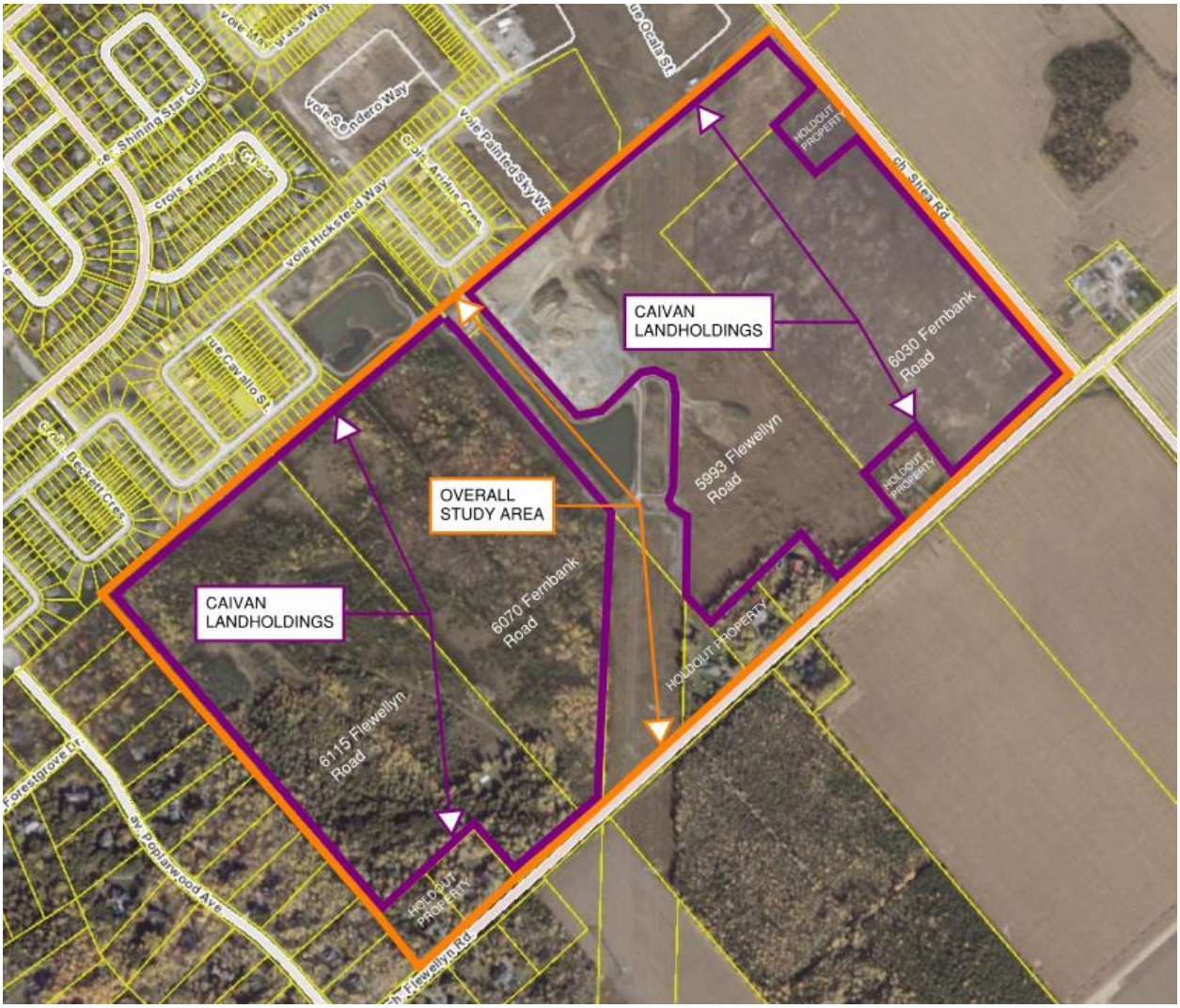


Figure 1: Stittsville South Urban Expansion Area – Location Plan

2.2 Site Characteristics

The subject site is currently undeveloped and is a mix of active/former farmland in the eastern areas and forested areas in the western portion. The overall area is bisected diagonally (north/south) by an existing a Hydro One 500kV utility corridor and an existing stormwater management facility is located centrally within the property and manages flows from a portion of the Edenwylde Subdivision.

In addition, a stormwater conveyance ditch originating from the development areas to the north, runs southward parallel to the east boundary of the Faulkner Property. The ditch officially transitions to being the Faulkner Municipal Drain (FMD) approximately 215 m north of Flewellyn Road and then conveys flows eastward along Flewellyn Road.

For the land parcel west of the Hydro corridor the terrain generally trends lower from northwest to southeast with elevations ranging from 109 m to 103 m. For land area east of

the Hydro corridor the same southeast trend existing with elevations ranging from 104 m to 102 m at Flewellyn Road. The various Existing Conditions figures provided in the Appendices demonstrate the SSUEA site contours.

3.0 BACKGROUND DOCUMENTS

There are a variation of documents and reports that have been prepared in relation to lands surrounding the site. The documents include subwatershed studies of the Jock River, covering the areas south of the site, and servicing documents for the urban area north of the site.

- City of Ottawa Sewer Design Guidelines (City of Ottawa, October 2012) & Technical Bulletins (ISDTB-2014-01, PIEDTB-2016-01, ISTB-2018-01, ISTB-2018-04 & ISTB-2019-02).
- City of Ottawa Water Distribution Guidelines (City of Ottawa, July 2010) & Technical Bulletins (ISD-2010-2, ISDTB-2014-2, ISTB-2018-02, & ISDTB-2021-03).
- Infrastructure Master Plan (City of Ottawa, 2013).
- West Urban Community – Wastewater Collection System Master Servicing Plan (RV Anderson Associates Ltd, July 2012).
- Stittsville Master Drainage Plan (A.J. Robinson, 1994).
- Low Impact Development Technical Guidance Report, Implementation in Areas with Potential Hydrogeological Constraints (Dillon Consulting and Aquafor Beech, February 2021).
- Stormwater Planning and Design Manual (Ministry of the Environment, March 2003).
- Low Impact Development Stormwater Management Guidance Manual (Ministry of the Environment, Conservation and Parks, Draft for Consultation – January 2022).
- Jock River Reach 2 & Mud Creek Subwatershed Study Marshall Macklin Monaghan / WESA, May 2009
- Amendment to the Engineer's Report for the Faulkner Municipal Drain (Robinson, December 2020) & Addendum No. 1 (Robinson, March 2021).
- Engineer's Report for the Flowing Creek Municipal Drain (A.J. Graham Engineering, December 1973).
- Flowing Creek Flood Risk Mapping from Flewellyn Road to Jock River (Rideau Valley Conservation Authority, May 8, 2017).
- Stittsville South – Area 6, City of Ottawa, Master Servicing Report & Stormwater Management Design Plan (Novatech/DSEL, December 2013).
- Stittsville South Subdivision, City of Ottawa – Detailed Servicing & Stormwater Management Report (Novatech July 2016).
- Sanitary Pump Station Pre-Design Report, Stittsville South (Novatech, July 2015)
- Stittsville South Subdivision, City of Ottawa – Shea Road Sanitary Pump Station Design Brief (Novatech, May 6, 2016).

- Design Brief, Davidson Lands – OPA 76 Area 6a, Phase 1 (5993 Flewellyn Road) (IBI Group, February 2018).
- Design Brief, Davidson Lands – OPA 76 Area 6a, Phase 2 (5993 Flewellyn Road) (IBI Group, July 2020).

- Design Brief for the Stormwater Management Pond for the Davidson Lands (JFSA/DSEL, November 2017).
- Fernbank Community Design Plan, Master Servicing Study (Novatech, June 2009).
- Geotechnical Investigation, Proposed Residential Development 5993, 6070 & 6115 Flewellyn Road – Ottawa (Paterson (PG5570-2) January 2022).

4.0 EXISTING INFRASTRUCTURE AND SERVICING

4.1 Wastewater Servicing

A recently (2017) constructed sanitary pump station (Stittsville South Area 6 Sanitary Pumping Station – also referred to as the Shea Road Pump Station (SRPS)) associated with the recent new development to the north is located along the north boundary centrally to the land parcels being reviewed (immediately north of an existing stormwater management pond (Davidson Pond)). As per the Environmental Compliance Approval (ECA #3415-ADWLJG issued September 21, 2016. See ***Appendix B***) for the pump station, the initial firm capacity of the station was 42 L/s with recently completed pump expansions to an ultimate firm design capacity of 84 L/s (December 2022).

A 450mm diameter sanitary sewer connects to the existing Shea Road sanitary pump station. The existing 450mm diameter inlet sanitary sewer has an inlet pipe elevation of 98.72 m at the last manhole upstream of the station and wet well invert elevation of 96.50 m. The inlet sewer has a residual capacity of approximately 80% which would allow for an additional ~390 L/s of sanitary flows.

Previously, the SRPS directed forcemain flows northward to the existing Liard Street pumping station. As of December 2022 the SRPS now directs flows directly to the recently completed extension of the Fernbank Lands trunk sanitary sewer. Additionally, there is an existing low lift pumping station located on nearby Friendly Crescent which provides service to 70 dwellings and discharges to the Hartsmere Drive sanitary sewer through a 100mm diameter forcemain. Ultimately this low lift station will be decommissioned and the sanitary flows redirected to the SRPS. Timing for this decommissioning is still pending.

As per the Master Servicing Report for the *Stittsville South – Area 6* development, there is excess capacity available in the Fernbank Lands trunk sewer (see report excerpt in ***Appendix B).*** The *Area 6* study summarized that the Fernbank Trunk was designed for a peak flow of 528 L/s (*Fernbank CDP Lands – New Trunk Sewer* sanitary design sheet provided in ***Appendix B*** for reference) and had a capacity of 670 L/s (excess capacity of 142 L/s). The Area 6 report further summarized that the *Area 6* and Liard Street P.S. (monitored) flows to the Fernbank Trunk totaled approximately 85 L/s and 39 L/s respectively and would utilize a portion of this capacity. However, the original design criteria of the Fernbank Trunk system (and Area 6)

was based on older City of Ottawa design criteria. When considering the new criteria adopted by the City after those designs the excess capacity available is increased.

Table 1
Sanitary Flow Review

Network Reviewed	Area (ha)	Pop.	PF (7)	Q_{units} (L/s)	$Q_{Com/Inst}$ (L/s)	$Q_{I/I}$ (L/s)	Q_{TOT} (L/s)	Diff. (L/s)
Old City Parameters for Sanitary (1)								
Fernbank CDP Lands (2)	551.8	30,169	2.47	302.5	71.0	154.5	528.0	--
Stittsville Area 6(3)	70.74	4,502	3.29	59.94	2.37	19.81	82.1	--
Liard St P.S. (monitored) (4)	--	--	--	--	--	--	39.0	--
New City Parameters for Sanitary (5)								
Fernbank CDP Lands	551.8	30,169	2.18	213.1	39.76	182.09	435.0	-93.0
Stittsville Area 6	70.74	4,502	2.83	41.2	1.33	23.34	66.0	-16.1
Liard St P.S. (monitored) (6)	--	--	--	--	--	--	39.0	0

(1) Old City Parameters: 350 L/day; 0.28 L/s/ha infiltration; Comm./Inst. Flow = 50,000 l/ha/day
(2) Sanitary design sheet excerpt provided in Appendix B. From "Fernbank Community Design Plan – Master Servicing Study (June 2009)"
(3) Sanitary design sheet excerpt from updated IB design for Edenwylde development. From City submission 2020-04-09"
(4) Liard Street pump station – monitored flow summary from the "*West Urban Community – Wastewater Collection System Master Servicing Plan*" by RV Anderson Associates Ltd., dated July 2012 and as summarized in the Area 6 MSS.
(5) New City Parameters: 280 L/day; 0.33 L/s/ha infiltration; Comm./Inst. Flow = 28,000 l/ha/day; updated Peak Factor correction factor
(6) Same value as prior as it was monitored information.
(7) Peaking Factor

From the table above the flow summarized in the Fernbank Lands trunk is reduced from 528.0 L/s to ~435.0 L/s (-93.0 L/s) based on review with new parameters.
The Area 6 land development flows are reduced from 82.1 L/s to ~66.0 L/s (-16.1 L/s).

The *Area 6 MSS* summarized excess capacity at peak flow in the Fernbank Lands trunk at 142 L/s. With the new parameters this excess capacity increases to 235 L/s based on the above table with 105 L/s of that taken up by the Area 6 and the Liard St. P.S. flows (130 L/s capacity remaining).

Construction of the Fernbank Lands trunk extension up to the Area 6 development was completed/commissioned in December 2022.

The SRPS details are as follows:

- pump station control building complete with mechanical and electrical systems, process piping, valves, control panels, SCADA system, odour control system, swab launchers and appurtenances;
- one (1) 2400 mm diameter FRP wet well, complete with valves, couplings and appurtenances; with three (3) pumps with each pump capable of delivering 42

liters/second at a TDH of 29 meters for an ultimate firm capacity of 84 liters/second;

- wastewater flows are pumped via dual 200 mm diameter HDPE DR13.5 sanitary forcemains to a to a new discharge chamber on Fernbank Road outletting flows to the newly constructed Fernbank Sanitary Trunk Sewer (completed/commissioned in December 2022);
- one (1) 2400 mm x 1800 mm concrete by-pass chamber, complete with valves, couplings and appurtenances;
- one (1) 1800 mm diameter concrete by-pass manhole, complete with valves, couplings and appurtenances;
- one (1) 1800 mm diameter concrete emergency overflow manhole, complete with one (1) primary measuring device consisting of broad crest weir complete with ultrasonic level recorder (referred to as SAN MH 97);
- one (1) concrete encased underground dedicated commercial hydro service;
- one (1) 170 KW self-enclosed diesel generator on a reinforced concrete pad adjustment to the pump station control building, complete with diesel fuel tank, valves and controls;
- emergency sanitary sewer overflow consisting of a 600 mm diameter sewer to the adjacent Davidson Stormwater Management facility located south of the SRPS (outlet elevation 103.40 m).

4.2 Water Supply Servicing

4.2.1 Existing Water Supply Services

The SSUEL study area will be part of the City's Zone 3W of the City of Ottawa water distribution network (see Drawing 3 for reference). The pressure zone receives supply from the Campeau Drive and Glen Cairn Pump stations. The Stittsville Elevated Tank provides balancing storage during peak usage and fire flow conditions.

Existing watermains to the north of the subject lands represent the only option for water servicing. These include:

- The major water supply line in the vicinity of the development is a 400mm diameter watermain along Fernbank Road;
- An existing 250mm diameter watermain located within the Parade Drive right-of-way (ROW), immediately north of the Maguire and Faulkner land parcels. A future southbound ROW block is located between civic addresses 714 and 720 Parade Drive;
- An existing 250mm diameter watermain is located within the Aridus Crescent ROW which is north of the Davidson Lands parcel. An existing 50mm water service within a servicing block from Aridus Crescent to the SRPS pump station is also installed facilitating water supply to that facility;
- An existing 200mm diameter watermain located within the Painted Sky Way ROW at the northwest portion of the Davidson land parcel; and
- An existing 200mm diameter watermain location within the Ocala Street ROW north of the northeastern portion of the Davidson land parcel.

4.2.2 Existing Watermains and Operating Pressures

In relation to the Stittsville Area 6 development areas to the north, the water supply was reviewed for two separate analyses:

1. Stantec Consulting Ltd. prepared a hydraulic analysis of the proposed western portion of the Area 6 lands in their report titled "Stittsville Area 6 – Phase 1 & 2 – Potable Water Hydraulic Assessment (September 2, 2015). This model was based on the City up to date model that was updated for the 2013 Water Master Plans with current (in 2015) conditions and future conditions (projected 2031 conditions from the 2013 Water Master model) analyzed.
2. IBI Group prepared a hydraulic analysis as part of their "Design Brief – Davidson Lands – OPA 76 Area 6a, Phase 1" (February 2018) servicing reporting for the eastern portion of the Stittsville Area 6 lands. This analysis was based on boundary conditions provided by the City of Ottawa (see report excerpts in ***Appendix C***).

The Stantec analysis above notes that head losses under peak demands could reduce minimum pressure to below guideline requirements at higher elevations (i.e. ground elevations greater than 124m). However, future planned connections within the Fernbank Lands development area will mitigate the issue.
During average day demands ground elevations less than 106m may experience system pressures greater than the upper 80psi limit specified in City guidelines. As noted in Section

2.2, existing site elevations range from 109 m to 103 m (for areas west of the Hydro One corridor) and from 104 m to 102 m in the eastern areas. Should higher pressures be encountered in the southern areas of the development pressure reducing valves would be required.

Water servicing needs in the SSUEA will be evaluated as part of the future MSS review of the development area in consultation with City staff via the generation of hydraulic boundary conditions.

4.3 Stormwater Servicing

4.3.1 Parade Drive Stormwater Management Facility

The residential development area to the north of the Maguire/Faulkner properties is serviced via an existing 1.9 ha stormwater pond block adjacent to Parade Drive. This stormwater facility has the following characteristics:

Drainage Area = ~33.7ha
Permanent Pool Elevation = 103.50 m
Extended Detention Elevation = 103.70 m
100-Year Elevation = 105.33 m

The facility outlets to an existing ditch located east of the storm outlet. The ditch is approximately 405 m upstream of the commencement of the Faulkner Municipal Drain.

4.3.2 Davidson Stormwater Management Facility

The existing development to the north of the Davidson/Eder properties is serviced by the central "Davidson" stormwater management pond. The existing Davidson stormwater pond occupies approximately 3.2 ha of land and is partially located under the existing Hydro One tower line. The ponds are sized for their respective areas with no specific additional areas considered. This stormwater facility has the following characteristics:

Drainage Area = ~40.6 ha
Permanent Pool Elevation = 101.50 m
Extended Detention Elevation = 102.10 m
100-Year Elevation = 103.17 m

The facility outlets from the south end of its configuration to a ditched outlet that conveys the flows southwest to the Faulkner Municipal Drain.

4.3.3 Faulkner Municipal Drain

The Faulkner Municipal Drain (FMD) generally bisects the whole of the development area in half. The FMD conveys flows from north to south to the north side of Flewellyn Road (i.e. roadside ditch) then heads eastward and then southwards along the west side of Shea Road. The FMD drain begins at approximately 215 m north of Flewellyn Road (within the development lands) and ultimately discharges to Flowing Creek Municipal Drain 5.45 km away (approximately 330 m south of the intersection of Shea Road and Brownlee Road). Figure 6.1 (*Maintenance Sections and Section Drainage Areas*) from the Engineer's Report is provided in **Appendix D** for reference.

The Engineer's Report for the FMD was recently amended in December 2020 by Robinson Consultants Inc. to accommodate the changes in land use from rural, or agricultural, to urban development. Additionally, some modifications of the main drain were also documented in order to relocate a portion, lower the profile in some locations, and modify the cross-section where required in order to increase capacity and reduce erosion potential. No specific erosion thresholds are noted for the FMD in the Engineer's Report.
Subsequent to the amended Report, there was a minor addendum in March 2021 to account for an adjustment in the prescribed value for lands utilized for construction of the drain and the resultant modified value of allowances.

The FMD model will be utilized during the design of future stormwater management facilities to confirm that there will be no negative impacts to water levels or capacity of the drain in the post-development condition. JFSA has reviewed the existing conditions as a component of their "*Pre-Development Hydraulic and Hydrologic Study*" (provided in **Appendix D**) and noted some private access culverts along Flewellyn Road are close to or at capacity as summarized in the Engineer's Report Table 4.2. These culverts can be revisited in association with future consultation with the Drainage Engineer is association with the advancement of the development area.

4.3.4 Flowing Creek Municipal Drain

As noted in the prior section, the FMD outlets to the Flowing Creek Municipal Drain (FCMD) south of Brownlee Road. The Engineer's Report for FCMD was prepared by A.J. Graham Engineering Consultants Limited in December 1973 and was constructed in 1974 by the former Township of Goulbourn. There are no known issues with the FCMD.

The Rideau Valley Conservation Authority completed Flood Risk Mapping for Flowing Creek in May 2017 (covering from Flewellyn Road to the confluence with the Jock River). The RVCA report makes reference to some possible shallow field flood areas southwest of Akins/Shea Road, however, it goes on to detail the 'considerable uncertainty' as to how this may occur and whether there would be any material impact to the adjacent FMD (see RVCA report excerpts in ***Appendix D*** for reference). However, it is presumed that the Drainage Engineer for the FMD has considered this potentiality based on their recent FMD improvements and knowledge of the FCMD Flood Risk Mapping results.

4.3.5 Site Drainage

For the Caivan landholdings west of the Hydro one corridor the site topography generally drains eastward and southward with drainage ultimately being conveyed to the FMD which bisects the development area.

Similarly, the development area east of the Hydro One corridor also drains eastward and southward to the portion of the FMD along the northern Flewellyn Road right-of-way.

JFSA has reviewed the development area's existing conditions as a component of their "*Pre-Development Hydraulic and Hydrologic Study*" provided in **Appendix D** for reference.

There are no minor storm sewer systems that the development area is tributary to.

5.0 OPPORTUNITIES AND CONSTRAINTS

5.1 Drainage Network

The review of site topography has generally shown that surface water is conveyed to adjacent perimeter roadside ditches and the Faulkner Municipal Drain.

As a component of the review of storm servicing for the future MSS, any adjustment to drainage boundaries or outlets will require consultation with appropriate agencies. Generally speaking, the development only has one viable stormwater outlet which is the FMD and stormwater management facilities will be located at the southern boundary of study area due to site topography. Therefore any adjustments will need to be coordinated with the Drainage Engineer and any processes completed in accordance with the Drainage Act. This includes consideration of the Flowing Creek Municipal Drain (FCMD) (which the FMD connects to) and ultimately the Jock River.

Lands which comprise the SSUEA are not restricted by floodplain areas from any major watercourses. Preliminary review of the FMD HEC-RAS modelling associated with the recently updated Engineer's Report (see Section 4.3.3) has indicated that there may be private access culverts on the FMD along Flewellyn Road that could constrain flows during the 100-year event and these will be further assessed in future design stages in consultation with the Drainage Engineer.

5.2 Water Quantity Control

Water quantity controls for the development area will be impacted by various site constraints (i.e. infiltration potential, development density, etc) as well as downstream capacities. At minimum, post-development peak flows within the FMD are not to exceed pre-development levels for all storms up to the 100-year event. Generally this will require review of the FMD and FCMD based on the on-site controls implemented and also manage runoff volumes so as not to create downstream impacts. Prior consultation with the RVCA for other development areas tributary to the Jock River has indicated that there are no quantity control required within the Jock River Reach 2 subwatershed. Updated subwatershed reporting is currently a work in progress.

5.3 Water Quality Control

Water quality control for the development area will have to be in accordance with the Jock River Reach 2 & Mud Creek Subwatershed Study. Similar to the adjacent development areas recently advanced, this would mean that the requirement is for an enhanced protection level (80% TSS removal) of water quality treatment.

5.4 Infiltration

The Hydrogeological review completed by Paterson Group characterized the hydrogeological condition of the SSUEA with respect to bedrock and surficial geology, aquifers, aquitards, horizontal and vertical flow patterns, existing groundwater use, and aquifer vulnerability. The report generally summarizes that the overburden and bedrock within the SSUEA have hydraulic conductivity values ranging from 4.2×10^{-6} m/sec to 2.2×10^{-5} m/sec (moderate hydraulic conductivity) and 4.3×10^{-7} m/sec to 1.6×10^{-4}, respectively (refer to the *Table 2* summary from the Paterson report in ***Appendix D***). Field saturated conductivity values from Paterson's *Table 3* are also provided. Highest surficial field saturated values were observed

within the southwestern portion of the subject site indicating that this area will have more permeable characteristics than the northeastern areas and as such are more conducive for providing LID measures for water balance and could be considered for optimizing the rate of infiltration via typical lot level and conveyance Best Management Practices (BMPs).

JFSA has reviewed the development area's existing conditions as a component of their "*Pre-Development Hydraulic and Hydrologic Study*" provided in **Appendix D** for reference. JFSA's water budget modelling considered the shallow infiltration results, as reported by Paterson, in their analysis. The JFSA detailed PCSWMM model was run for 39 year, from 1967 to 2007, using hourly rainfall data from Environment Canada's Ottawa International Airport monitoring station. Table 1 from the JFSA report are provided in ***Appendix D*** for reference. The table outlines the water budget breakdown of the development area of the SSUEA. Based on the simulations, JFSA assessed that the eastern portion of the development area (east of the Faulkner Drain) will have 17% of the annual rainfall resulting in runoff with 63% evaporating and 20% infiltrating.

Mapping from the Mississippi-Rideau Source Protection Plan indicates that some portions of the development area may fall under the fringes of the Significant Groundwater Recharge Area (SGRA) mapping. The site review by Paterson has indicated that the high Rock Quality Designation (RQD) of the bedrock within the site area supports an interpretation that the significance of the recharge to the bedrock aquifer is minimal.

5.5 Existing Servicing Infrastructure

The following opportunities and constraints have been identified for the SSUEA and will be reviewed in further detail in a future MSS.

5.5.1 Wastewater Servicing

Wastewater servicing for the SSUEA is governed by the capacity of the SRPS (and its forcemains) and ultimately by the available residual capacity in the existing recently completed Fernbank Lands Sanitary Trunk sewer. As per the Master Servicing Report for the Stittsville South – Area 6 development, there is excess capacity available in the Fernbank Lands trunk sewer. The Area 6 study summarized that the Fernbank Trunk was designed for a peak flow of 528 L/s and had a capacity of 670 L/s (excess capacity of 142 L/s). The prior sanitary system flows were based on older City of Ottawa parameters. When evaluations flows based on updated parameters in Technical Bulletin ISTB-2018-01 the excess capacity is theoretically increased to 235 L/s.

The existing SRPS also has an emergency overflow outlet (internal weir elevation of 103.40m – see Novatech Drawing No. 113004-PS-SVC in ***Appendix B***) to the adjacent "Davidson" stormwater management pond to the south. This overflow will have to be assessed at detailed design to determine if a new overflow is required based on projected underside of footing elevations during the future MSS preparation.

As noted in Section 4.1 the existing sanitary sewer inlet at the SRPS is at an invert elevation of 98.72m. Existing ground elevations in the southeast portion of the SSUEA are as low as ~101.60m which imposes some constraint in terms of fill import required to facilitate a gravity system that would conveys sanitary flows all the way to the SRPS approximately 1km away.

5.5.2 Water Servicing

Based on prior analyses undertaken for development areas within Area 6 to the north of the subject site, lower water pressures are anticipated during peak hours in areas with ground elevations of 124m or higher and high pressures during average day demands for areas with ground elevations lower than 106m. A future detailed analysis to be prepared in conjunction with the MSS will determine where mitigation may be required within the watermain network.

5.5.3 Stormwater Servicing

There are currently no existing or planned stormwater management facilities associated with the SSUEA lands. The overall site currently drains to the Faulkner Municipal Drain via sheet drainage and various periphery roadside drainage ditches. The FMD poses a constraint for the development area given that it bisects the central portion of the development area while topography for the lands areas on either site have the same northwest to southeast drainage pattern. This drainage pattern does provide the opportunity to have a wet pond facility adjacent to the FMD as an outlet(s) at the southern boundary of the development areas but detailed review during MSS preparation will fully assess whether one or two facilities would ultimately be required.

6.0 SUMMARY AND CONCLUSIONS

6.1 Wastewater Servicing

The sanitary flows from the SSUEA will require conveyance by sanitary pumping to convey flows to the Fernbank Lands Trunk sewer. Gravity flows to the existing SSUEA are possible but are likely constrained by the extent of fill importation required to facilitate sufficient sewer cover on a gravity system in the lower (southern) areas of the SSUEA based on site topography. This includes having appropriate freeboard over the sanitary overflow for the SRPS.

The MSS should evaluate proposed servicing alternatives should fill importation be deemed excessive (i.e. new pumping facility, relocation of the SRPS, etc). In addition, the MSS should review the SRPS sanitary overflow condition and assess whether a new overflow elevation to another location (i.e. a new SWM facility) is warranted to further mitigate site grading conditions.

6.2 Water Servicing

At the Master Servicing Study stage the water supply for the SSUEA will be assessed via a hydraulic assessment of the proposed distribution network in order to confirm sufficient water supply is available, and within the required pressure ranges, under future demands during average day, peak hour and fire flow conditions. Watermain boundary conditions will be requested from the City of Ottawa and the analysis will be completed in accordance with the most current design guidelines and technical bulletins.

6.3 Stormwater Servicing

There are currently no planned stormwater management facilities associated within the SSUEA. The local drainage for the subject area is ultimately conveyed by the FMD which bisects the SSSUEA lands.

The site topography has natural gradients from the northwest to the southeast lending to the practical implementation of stormwater management facility/facilities in the southern areas of the site, with an outlet to the FMD. It is anticipated that any proposed facility/facilities could provide both quantity and quality control to meet required targets. Quantity control would be required to maintain the integrity of the FMD and mitigate any increases in water levels within that system. The MSS will detail the target requirements of the facilities.

A review of options for adjustments to the FMD, where it bisects the site, can be reviewed as part of the MSS but there appears to be limited opportunities due to the location of the FMD in relation to holdout properties not under control by the proponent.

Analyses completed by Paterson Group and JFSA have shown areas of moderate hydraulic conductivity. The MSS will quantify the post-development water balance to summarize that a water balance condition is met.

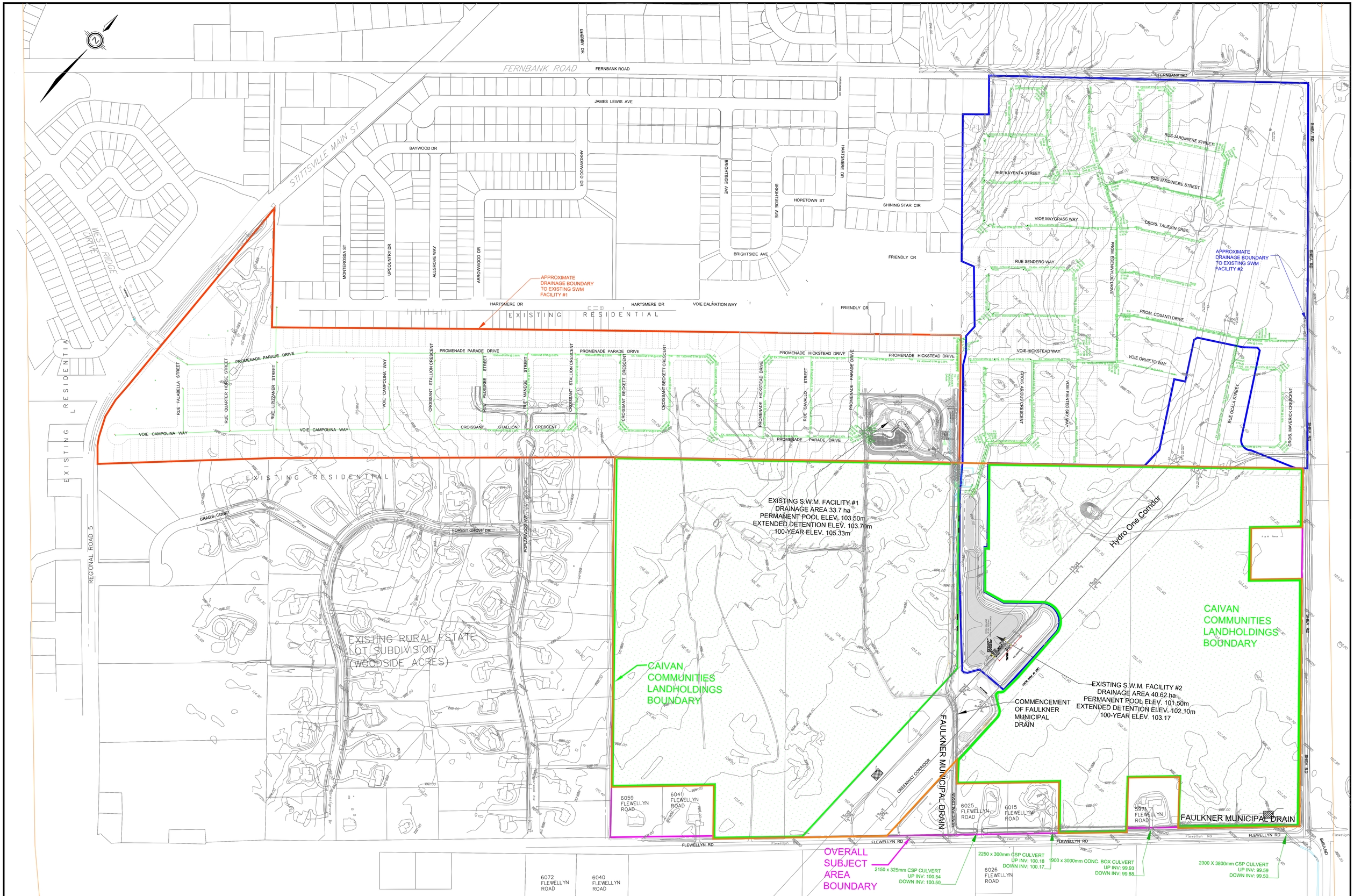
Prepared by,
David Schaeffer Engineering Ltd.

Per: Kevin L. Murphy, P.Eng.

20230912_stittsville_south_exconditions_final.docx

APPENDIX A

DRAWINGS



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

STITTSVILLE SOUTH URBAN EXPANSION AREA

STORM SERVICING EXISTING CONDITIONS

CITY OF OTTAWA

LEGEND

- EXISTING STORM MANHOLE
- EXISTING STORM SEWER
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

PROJECT No.:	21-1247
DATE:	Sep 2023
SCALE:	1:2000
DRAWING:	1

FORCEMAIN CONNECTION POINT AS OF DECEMBER 2022

CONSTRUCTED AS OF DECEMBER 2022

EX. LIARD STREET SANITARY PUMP STATION

EX. FRIENDLY CRESCENT SANITARY PUMP STATION TO BE DECOMMISSIONED IN FUTURE WITH FLOWS DIRECTED TO SHEA ROAD PUMP STATION

EX. SHEA ROAD SANITARY PUMP STATION (57 Aridius Crescent)

- one (1) 2400 mm diameter FRP wet well,
- houses three (3) pumps with each pump capable of delivering 42 litres /second at a TDH of 29 metres for an ultimate firm capacity of 84 litres/second;(commissioned as of December 2022)
- wastewater flows are pumped via approximately 815.0 metres of dual 200 mm diameter HDPE DR13.5 sanitary forcemains to a discharge chamber at Fernbank Road outletting flows to the Fernbank Sanitary Trunk Sewer.
- one (1) 170 KW self - enclosed diesel generator complete with diesel fuel tank, valves and controls;
- emergency sanitary sewer overflow consisting of a 600 mm diameter sewer to the adjacent SWM Facility #2 (to the south).

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

OVERALL SUBJECT AREA BOUNDARY

FAULKNER MUNICIPAL DRAIN

EXISTING RESIDENTIAL

EXISTING RURAL ESTATE LOT SUBDIVISION (WOODSIDE ACRES)

FERNBANK ROAD

STITTSVILLE MAIN ST

REGIONAL ROAD 5

SHEA RD

Hydro One Corridor

GREENWAY CORRIDOR

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

STITTSVILLE SOUTH URBAN EXPANSION AREA

SANITARY EX. CONDITIONS

CITY OF OTTAWA

LEGEND

- EX. SANITARY MANHOLE
- EX. SANITARY SEWER
- EX. SANITARY FORCEMAIN
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

PROJECT No.:	21-1247
DATE:	Jan 2023
SCALE:	1:2000
DRAWING:	2

EXISTING 400mm WM. CONSTRUCTED AS PART OF THE EDENWYLDE SUBDIVISION.

FERNBANK ROAD

JAMES LEWIS AVE

BAYWOOD DR

STITTSVILLE MAIN ST

WEST RIDGE DRIVE

MONTEROSSA ST

UPCOUNTRY DR

ALLGROVE WAY

ARROWWOOD DR

BRIGHTSIDE AVE

HOPETOWN ST

SHINING STAR CIR

HARTSMERE DR

FRIENDLY CR

VOIE DALMATION WAY

EXISTING RESIDENTIAL

RUE FALABELLA STREET

RUE QUARTER HORSE STREET

RUE LIPIZZANER STREET

PROMENADE PARADE DRIVE

VOIE CAMPOLINA WAY

CROISSANT STALLION CRESCENT

RUE PEDIGREE STREET

RUE MANEGE STREET

CROISSANT BECKETT CRESCENT

PROMENADE HICKSTEAD DRIVE

RUE CAVALLO STREET

PROMENADE PARADE DRIVE

PROMENADE HICKSTEAD DRIVE

RUE JARDINIERE STREET

RUE KAYENTA STREET

VIOE MAYGRASS WAY

CROIS. TALIESIN CRES.

RUE SENDERO WAY

PROM. EDENWYLDE DRIVE

PROM. COSANTI DRIVE

VOIE HICKSTEAD WAY

VOIE ORVIETO WAY

CROIS. ARDUS CRESCENT

VOIE HAVEN SKY WAY

RUE OCALA STREET

CROIS MAVERICK CRESCENT

SHEA RD

REGIONAL ROAD 5

BRADS COURT

FOREST GROVE DR

POPLAR GROVE AVE

EXISTING RURAL ESTATE LOT SUBDIVISION (WOODSIDE ACRES)

Hydro One Corridor

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

FAULKNER MUNICIPAL DRAIN

GREENWAY CORRIDOR

NATURAL CHANNEL

6059 FLEWELLYN ROAD

6041 FLEWELLYN ROAD

6025 FLEWELLYN ROAD

6015 FLEWELLYN ROAD

5971 FLEWELLYN ROAD

6072 FLEWELLYN ROAD

6040 FLEWELLYN ROAD

6026 FLEWELLYN ROAD

FLEWELLYN RD

OVERALL SUBJECT AREA BOUNDARY

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

STITTSVILLE SOUTH URBAN EXPANSION AREA
WATERMAIN EXISTING CONDITIONS FIGURE
CITY OF OTTAWA

LEGEND

- EXISTING WATERMAIN
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

PROJECT No.:	21-1247
DATE:	Sep 2023
SCALE:	1:2000
DRAWING:	3

APPENDIX B

WASTEWATER

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 3415-ADQLJG
Issue Date: September 21, 2016

Stittsville South Inc. and 1384341 Ontario Ltd.
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario
K2C 0P9

Site Location: Stittsville South Area 6 Sanitary Pumping Station
5970 Fernbank Road and part of 5993 Flewellyn Road
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

Sanitary Pump Station and Forcemain

- one (1) 3000 mm diameter and 8.65 metre deep wet well with provision for three (3) submersible non-clog wastewater pumps, each pump designed for 42 litres/second at a Total Dynamic Head (TDH) of 29 metres, complete with trash basket, pipe rails, level regulation, force air blower unit and appurtenances;

- two (2) pumps will be initially installed with each pump capable of delivering 42 litres/second at a TDH of 29 metres for an initial firm capacity of 42 litres/second;

- the third pump will be added through an amendment to the ECA once development flows approach 42 litres/second to bring the pump station to its ultimate firm capacity of 84 litres/second;

- approximately 870 metres of dual 200 mm diameter HDPE DR13.5 sanitary forcemains originating at the pump station control building and terminating at the existing sanitary sewer on Fernbank Road;

- one (1) 2400 mm x 1800 mm concrete discharge manhole, complete with Swab Catcher, replacing the existing sanitary MH 401 on Fernbank Road. Dual forcemains will discharge to this new manhole;

- pump station control building complete with mechanical and electrical systems, process piping, valves, control panels, SCADA system, odour control system, swab launchers and appurtenances;

- one (1) 170 KW self-enclosed diesel generator (to be registered under Environmental Activity and Sector Registry (EASR)) on a reinforced concrete pad adjustment to the pump station control building complete with diesel fuel tank, valves and controls;

- one (1) 2400 mm x 1800 mm concrete by-pass chamber complete with valves, couplings and appurtenances;

Sanitary Sewers Pump Station

- approximately 4.8 metres of 450 mm diameter sanitary sewer @ 2.55% from Sanitary MH 99 to wet well;

- approximately 18 metres of 200 mm diameter sanitary forcemain HDPE 13.5 from SAN MH 99 to By-pass Chamber;

- approximately 18.7 metres of 600 mm diameter sanitary sewer from SAN MH 99 to SAN MH 97;

Interim Emergency Sanitary Sewer Overflow

approximately 26.6 metres of 250 mm diameter sanitary sewer from sanitary MH 97 to the existing Faulkner Ditch. Elevation of emergency overflow in sanitary MH 97 is 104.27m;

Permanent Emergency Sanitary Sewer Overflow

the permanent Emergency Sanitary Sewer Overflow will discharge to the future Davidson Stormwater Management Facility which is anticipated to be constructed within the next 2-4 years;

- the permanent emergency sanitary sewer overflow will consist of 3 metres of 600 mm diameter sewer from sanitary MH 97 to the future stormwater management facility. The elevation of the emergency overflow in MH 97 is 103.40m;

- provision to adjust the elevation of the permanent emergency sanitary overflow in MH 97 within a range of 102.80m to 103.70m based on the final 100-year water level in the future Davidson Stormwater Management Facility;

- one (1) primary measuring device in MH 97 consisting of a broad crest weir complete with ultrasonic level recorder;

- once permanent emergency sanitary sewer overflow is established, the interim overflow will be abandoned;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the application from the Stittsville South Inc. and 1384341 Ontario Ltd., dated March 03, 2016, and all other supporting documents, final plans and specifications prepared by Novatech.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

"E. Coli" refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"Emergency Situation" means a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the sanitary sewage pumping station or an unforeseen flow condition that may result in:

a) danger to the health or safety of any person; or
b) injury or damage to any property, or serious risk of injury or damage to any property.

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Event" in the context the sanitary sewage pumping station located outside a Sewage Treatment Plant, means an action or occurrence, at the sanitary sewage pumping station that causes a Sewage Pumping Station Overflow. An Event ends when there is no recurrence of a Sewage Pumping Station Overflow in the 12-hour period following the last Sewage Pumping Station Overflow. Two Events are separated by at least 12 hours during which there has been no recurrence of a Sewage Pumping Station Overflow;

"Limited Operational Flexibility" (LOF) means the modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Notice of Modifications" means the form entitled “Notice of Modifications to Sewage Works” included in Schedule "A";

"Owner" means the Stittsville South Inc. and 1384341 Ontario Ltd., and includes their successors and assignees;

"Professional Engineer" means a person entitled to practise as a Professional Engineer in the Province of Ontario under a licence issued under the Professional Engineers Act;

"Sewage Pumping Station Overflow" means any discharge from a sanitary sewage pumping station located outside a Sewage Treatment Plant that does not undergo any treatment or only receives partial treatment before it is discharged to the environment;

"Substantial Completion" has the same meaning as “substantial performance” in the Construction Lien Act;

"Water Supervisor" means the person appointed as Water Supervisor of the Ottawa office of the Ministry;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) The designation of the The City of Ottawa as the operating authority of the site on the application for approval of the Works does not relieve the Owner from the responsibility of complying with any and all of the Conditions of this Approval.

(3) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(4) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(5) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(6) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(7) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the

Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the new Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B17 shall be included in the notification to the Director;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the Director.

4. UPON SUBSTANTIAL COMPLETION OF THE SEWAGE PUMPING STATION

(1) Upon Substantial Completion of the sewage pumping station, the Owner shall prepare a statement, certified by a Professional Engineer, that the sewage pumping station was constructed in accordance with this Approval, and shall make the written statement available to the Ministry, upon request.

(2) Within **one (1) year** of Substantial Completion of the sewage pumping station, a set of as-built drawings showing the sewage pumping station "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the sewage pumping station for the operational life of the sewage pumping station.

5. SEWAGE PUMPING STATION OVERFLOW

(1) Any Sewage Pumping Station Overflow is prohibited, except:

(a) in an Emergency Situation;

(b) where the Sewage Pumping Station Overflow is a direct and unavoidable result of a planned maintenance procedure, the Owner notified the Water Supervisor **fifteen (15) days** prior to the Sewage Pumping Station Overflow and the Water Supervisor has given written consent of the Sewage Pumping Station Overflow; or,

(c) where the Sewage Pumping Station Overflow is planned for research or training purposes, the discharger notified the Water Supervisor **fifteen (15) days** prior to the Sewage Pumping Station Overflow and the Water Supervisor has given written consent of the Sewage Pumping Station Overflow.

(2) The Owner shall forthwith notify the Spills Action Centre (SAC) at 1-800-268-6060 or e-mail at moe.sac.moe@ontario.ca and the Medical Officer of Health of every Sewage Pumping Station Overflow Event. This notice shall include, at a minimum, the following information:

(a) the date and time at which the Event(s) started,

(b) duration of the Event(s);

(c) the location of the Event(s);

(d) the measured or estimated volume of the Event(s) (unless the Event(s) is/are ongoing); and

(e) the reason for the Event (s).

(3) The Owner shall submit Sewage Pumping Station Overflow Event Reports to the Ministry's local office on an Annual basis, no later than forty-five (45) days following the end of the calendar year. Event Reports shall be in an electronic format specified by the Ministry. In each Event Report the Owner shall include, at a minimum, the following information on any Event(s) that occurred during the preceding year:

(a) the date and time at which the Event(s) started,

(b) duration of the Event(s);

(c) the location of the Event**(s**);

(d) the measured or estimated volume of the Event(s) (unless the Event(s) is/are ongoing); and

(e) the reason for the Event(s).

(4) The Owner shall use best efforts to collect a representative sample consisting of a minimum of two (2) grab samples of the Sewage Pumping Station Overflow and have it analysed for parameters outlined in Table 1 of Condition 7 (2) using the protocols specified in Condition 7 (3), one at the beginning of the Event and the second approximately near the end of the Event, to best reflect the effluent quality of such Sewage Pumping Station Overflow.

(5) The Owner shall maintain a record of all Sewage Pumping Station Overflow(s), which shall contain, at a minimum, the types of information set out in Condition 5 (2 (a)) to 5 (2 (e)) in respect of each Sewage Pumping Station Overflow.

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval and the Act and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual within **six (6) months** of Substantial Completion of the sewage pumping station, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the sewage pumping station;

(b) inspection programs, including frequency of inspection, for the sewage pumping station and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the sewage pumping station;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the Water Supervisor; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the sewage pumping station for the operational life of the sewage pumping station. The Owner shall make the manual available to the Ministry, upon request.

(4) The Owner shall make all manuals, plans, records, data, procedures and supporting documentation available to the Ministry, upon request.

7. MONITORING AND RECORDING

The Owner shall, upon the issuance of this Approval, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected at the following sampling points, at the frequency specified, by means of

the specified sample type and analysed for each parameter listed and all results recorded:

Table 1 - Monitoring during a Sewage Pumping Station Overflow Event (Samples to be collected from the Sewage Pumping Station Overflow sewer near the sewage pumping station)	
Sample Type	Grab
Parameters	BOD5, Total Suspended Solids, Total Phosphorus, E. Coli (E. Coli samples may be limited to overflows occurring between Apr 1 and Oct 31)

(3) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

8. REPORTING

(1) **Fifteen (15) days** prior to the date of a planned Sewage Pumping Station Overflow being conducted pursuant to Condition 5 and as soon as possible for an unplanned Sewage Pumping Station Overflow, the Owner shall notify the Water Supervisor in writing of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the Sewage Pumping Station Overflow.

(2) In addition to the obligations under Part X of the Environmental Protection Act, (which includes contacting the Spills Action Centre (SAC) at 1-800-268-6060 or e-mail at moe.sac.moe@ontario.ca), the Owner shall, within **ten (10) working days** of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, Bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, (with the exception of a sanitary sewage discharged during an Event), submit a full written report of the occurrence to the Water Supervisor describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The Owner shall prepare and submit a report to the Water Supervisor on an annual basis. The reports shall contain the following information:

(a) a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule A, Section 1 (Limited Operational Flexibility) with a status report on the implementation of each modification;

(b) a report summarizing all modifications completed as a result of Schedule A, Section 3.

9. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule "A" of this Approval, as amended.

(2) The sewage pumping station works proposed under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the sewage pumping station works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the sewage pumping station works that result in an increase of the Rated Capacity of the sewage pumping station works;

(b) Modifications to the sewage pumping station works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall;

(c) Modifications to the sewage pumping station works approved under s.9 of the EPA, and

(d) Modifications to the sewage pumping station works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, as deemed necessary in consultation with the Water Supervisor, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any alteration made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with including those arising from the Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act and Greenbelt Act.

(8) Prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the sewage pumping station works and submit it to the Water Supervisor.

10. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

11. RECORD KEEPING

The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

Schedule "A"

Limited Operational Flexibility Criteria for Modifications to Sewage Works

1. The modifications to a sewage pumping station approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage pumping station works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Adding or replacing equipment where new equipment is located within an existing sewage pumping station site, provided that the facility Rated Capacity is not exceeded and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:
   i. any effluent from the pilot system is discharged to the inlet of the sewage pumping station or hauled off-site for proper disposal,
   ii. any effluent from the pilot system discharged to the inlet of the sewage pumping station or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
   iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and Water Supervisor three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are not required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Conforms with the Limited Operational Flexibility as per the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;

2. The Owner consents to the modification; and
3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.
I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print)	Owner representative's title (Print)
Owner Representative's Signature	Date (mm/dd/yy)

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the sewage pumping station is constructed in accordance with the Approval and that record drawings of the sewage pumping station "as constructed" are maintained for future reference.

5. Conditions 5 and 7 are included to indicate that Sewage Pumping Station Overflow of untreated and/or partially treated sewage to the environment is prohibited, save in certain limited circumstances where the failure to do so could result in greater injury to the public interest than the Sewage Pumping Station Overflow itself, or where the Sewage Pumping Station Overflow can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Sewage Pumping Station Overflow Event(s).

6. Condition 6 is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual for the sewage pumping station governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the sewage pumping station. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works.

7. Condition 8 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

8. Condition 9 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These Conditions are also included to ensure that a Professional Engineer has reviewed the proposed Modifications and attests that the Modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed Modifications comply with the Ministry's requirements stipulated in the Terms and Conditions of this Approval, Ministry policies, guidelines, and industry engineering standards and best management practices.

9. Condition 10 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

10. Condition 11 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

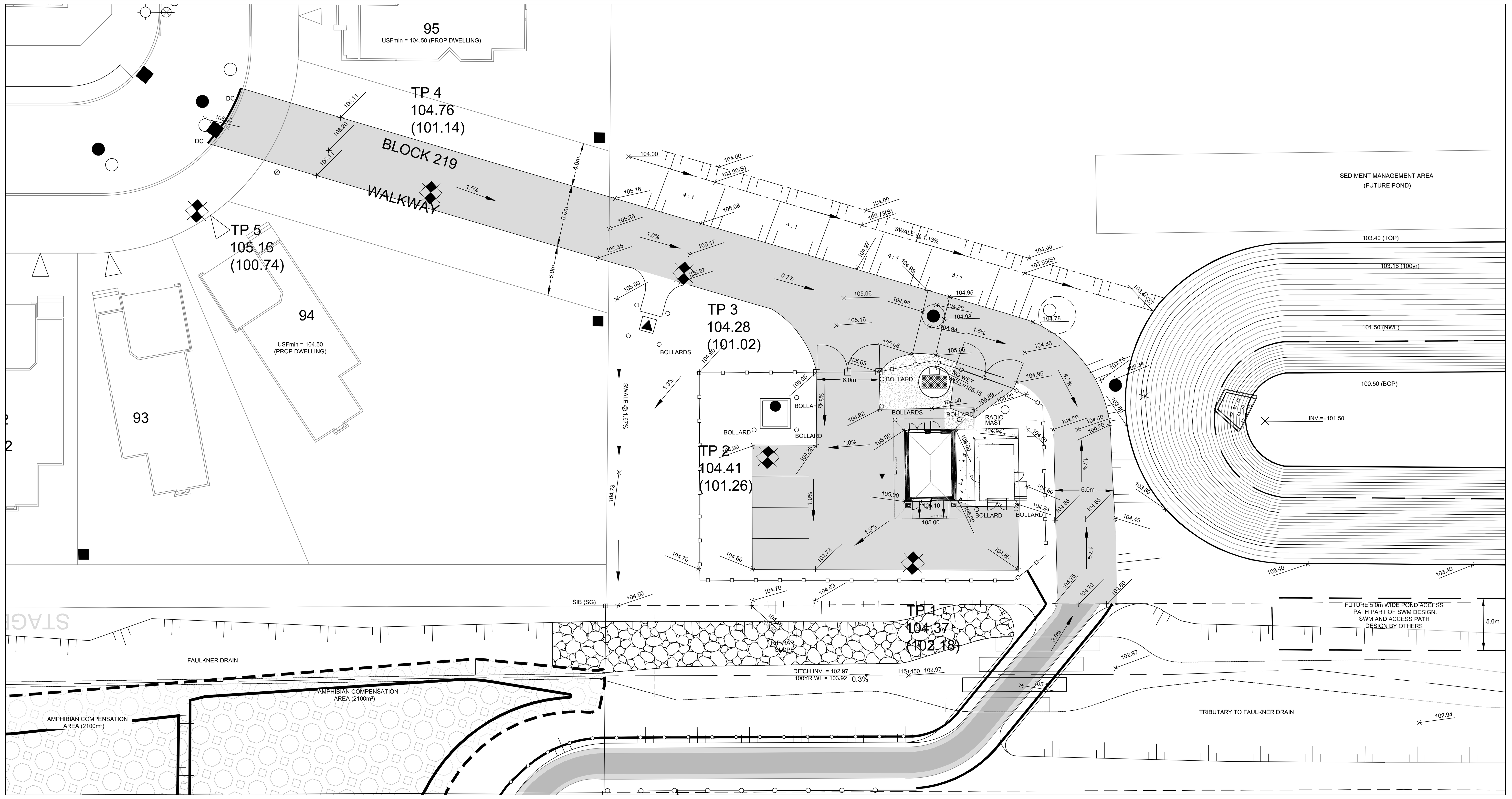
The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 21st day of September, 2016

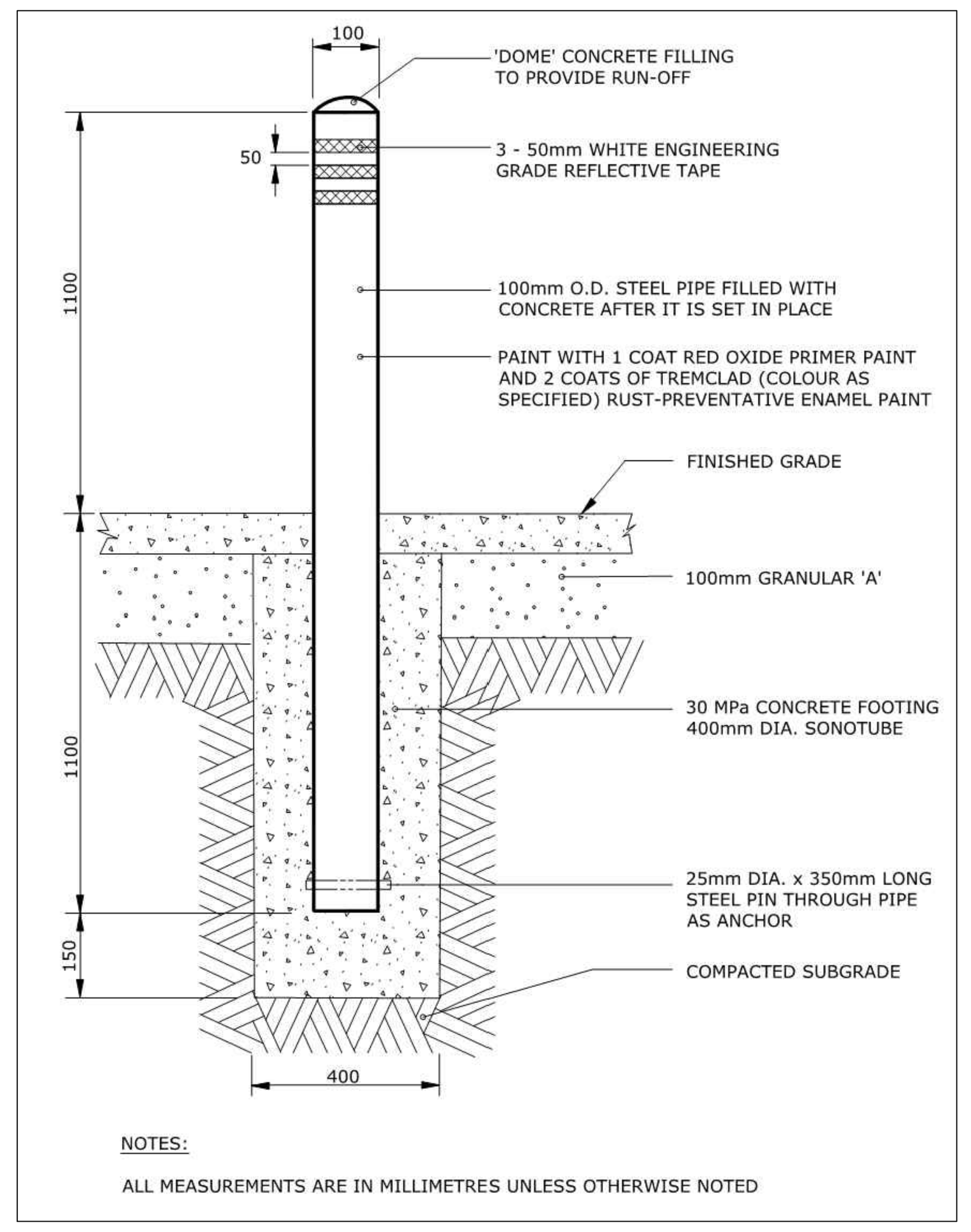
Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MS/

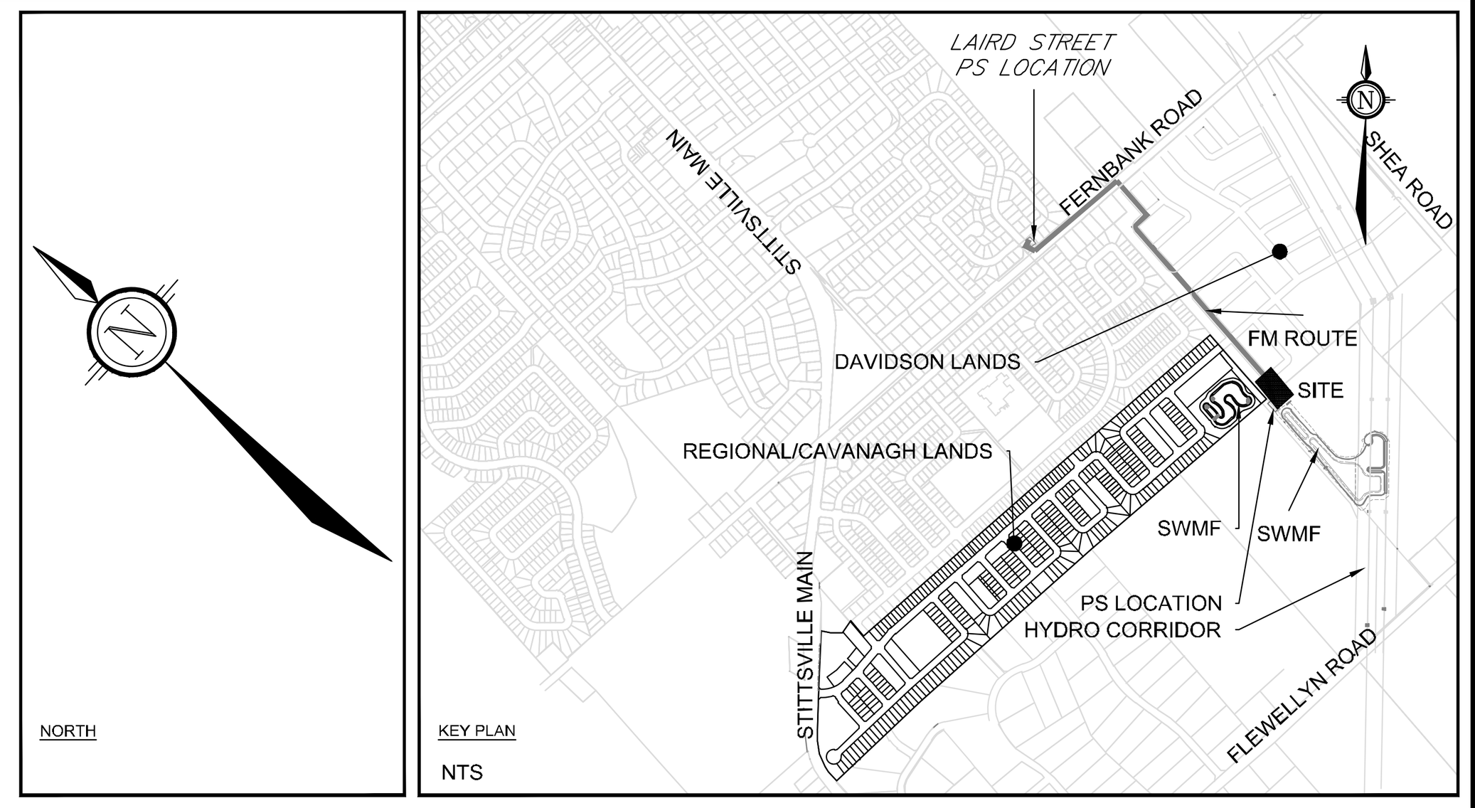
c: District Manager, MOECC Ottawa office
Greg McDonald, Novatech
Charles Warnock, Program Manager, City of Ottawa, Development Review
Linda Carkner, Program Manager, City of Ottawa, Infrastructure Services



PUMP STATION GRADING

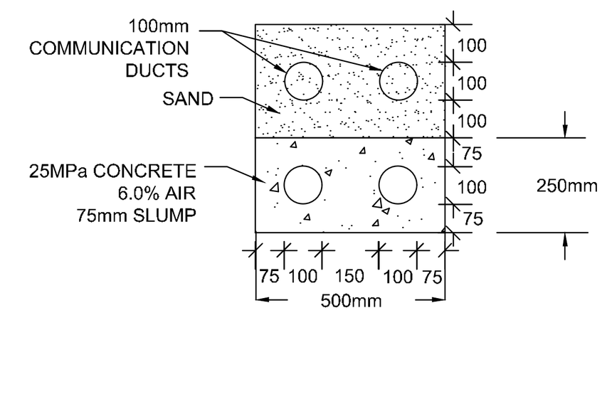


BOLLARD DETAIL

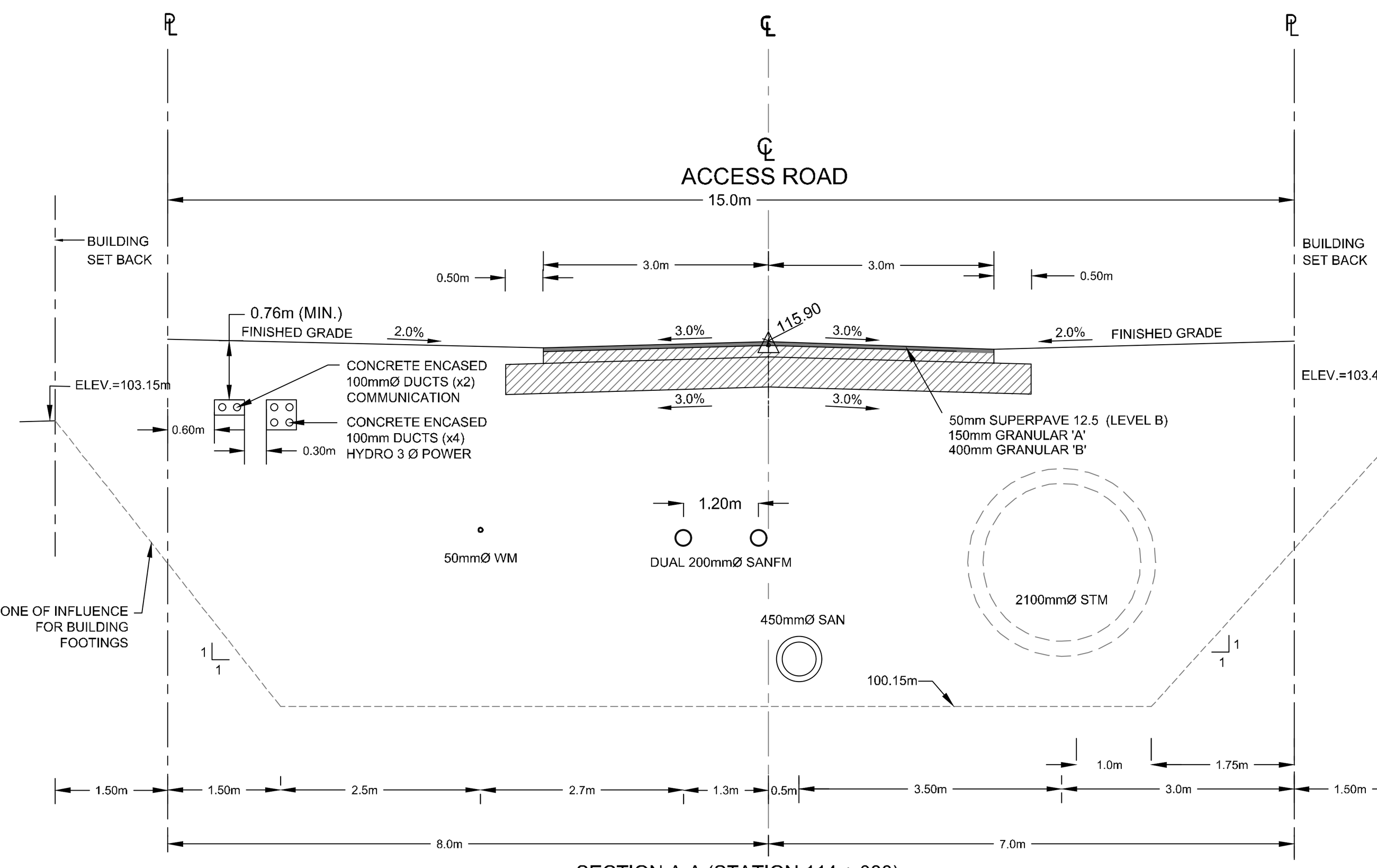


LEGEND

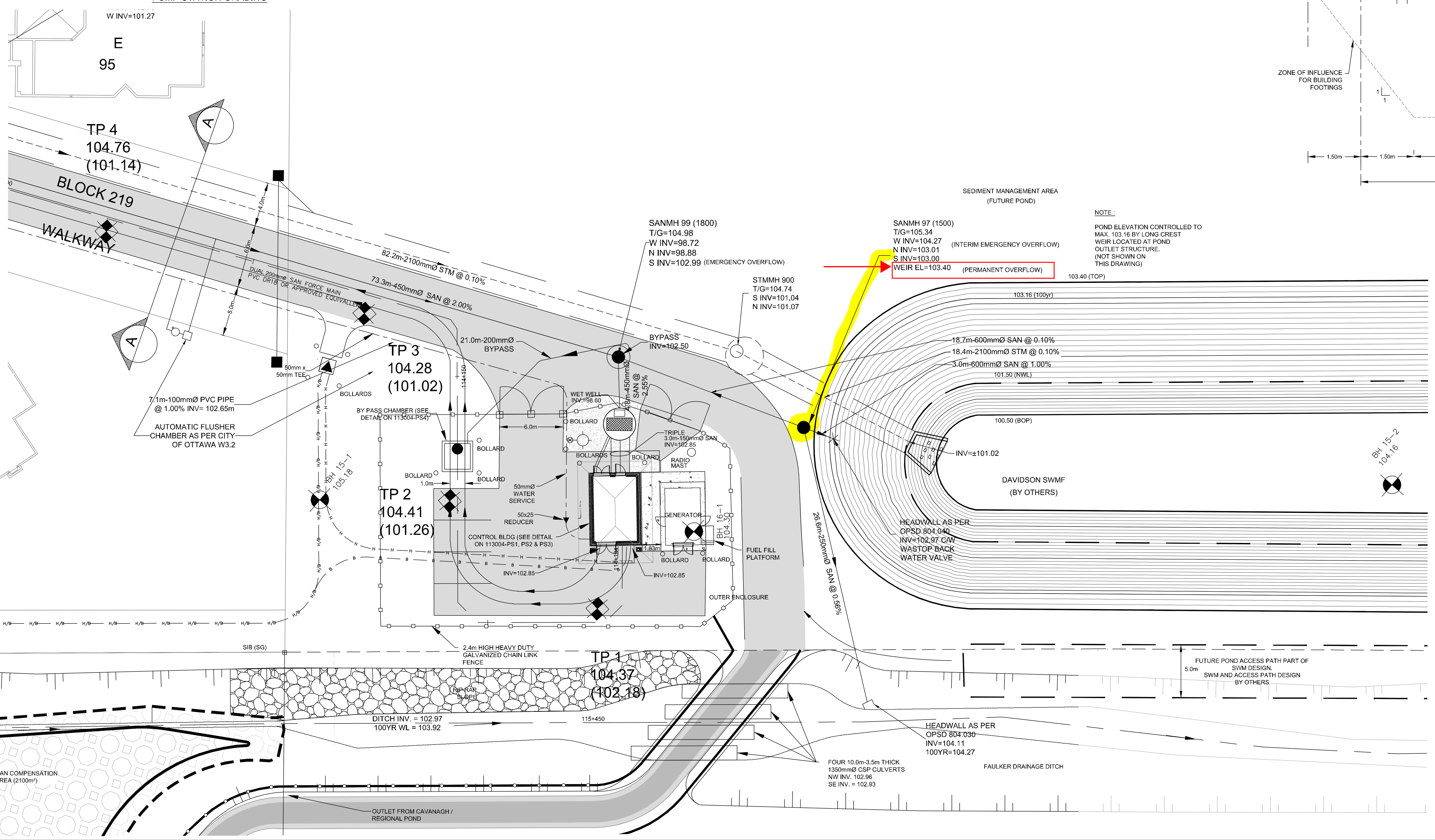
- SANMH — PROPOSED SANITARY MH & SEWER
- 200mmØ — PROPOSED DUAL 200mmØ SANITARY FORCEMAIN
- STMMH — PROPOSED STORM MH & SEWER
- DIRECTION OF FLOW
- PROPOSED CONCRETE ENCASED 3Ø HYDRO SERVICE
- PROPOSED HYDRO TRANSFORMER
- PROPOSED FENCE LINE
- GAS — PROPOSED GAS
- TEST PIT (REFER TO HOULE CHEVRIER ENG. LTD. PROJECT No. 12-478 AND 14-420)
- BORE HOLES (REFER TO HOULE CHEVRIER ENG. LTD. PROJECT No. 64153.53)
- TEST PITS DUG OCTOBER 18TH, 2016

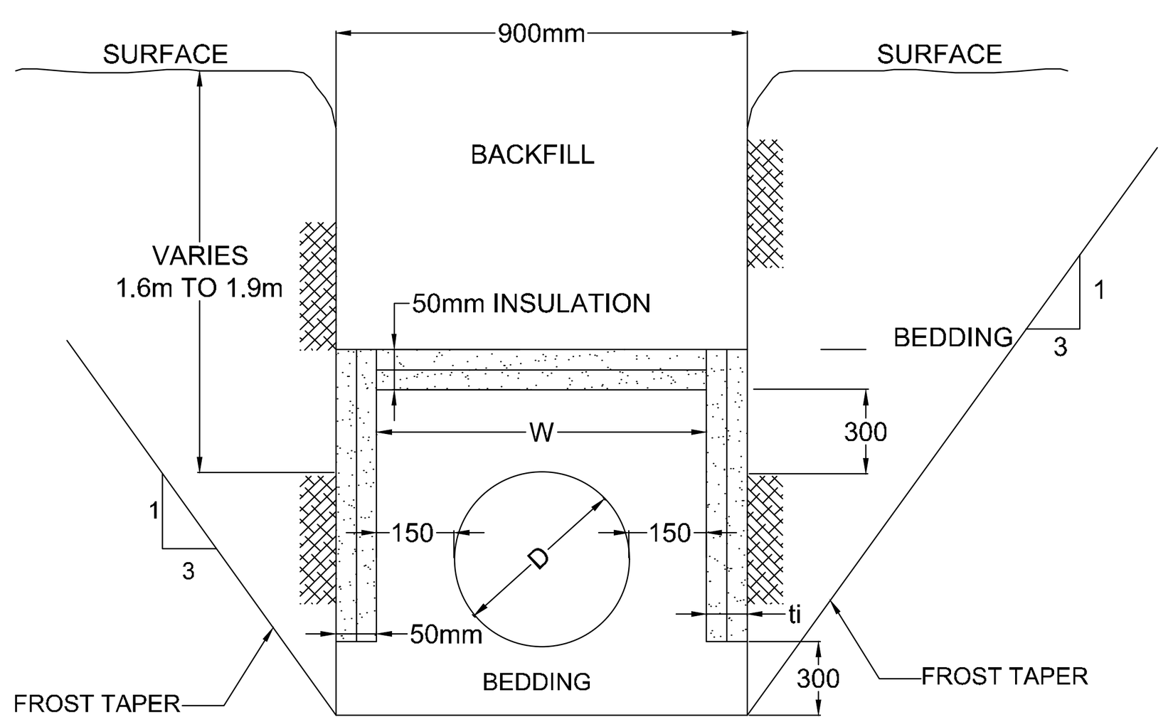


CONCRETE ENCASED HYDRO
SCALE: 1:20

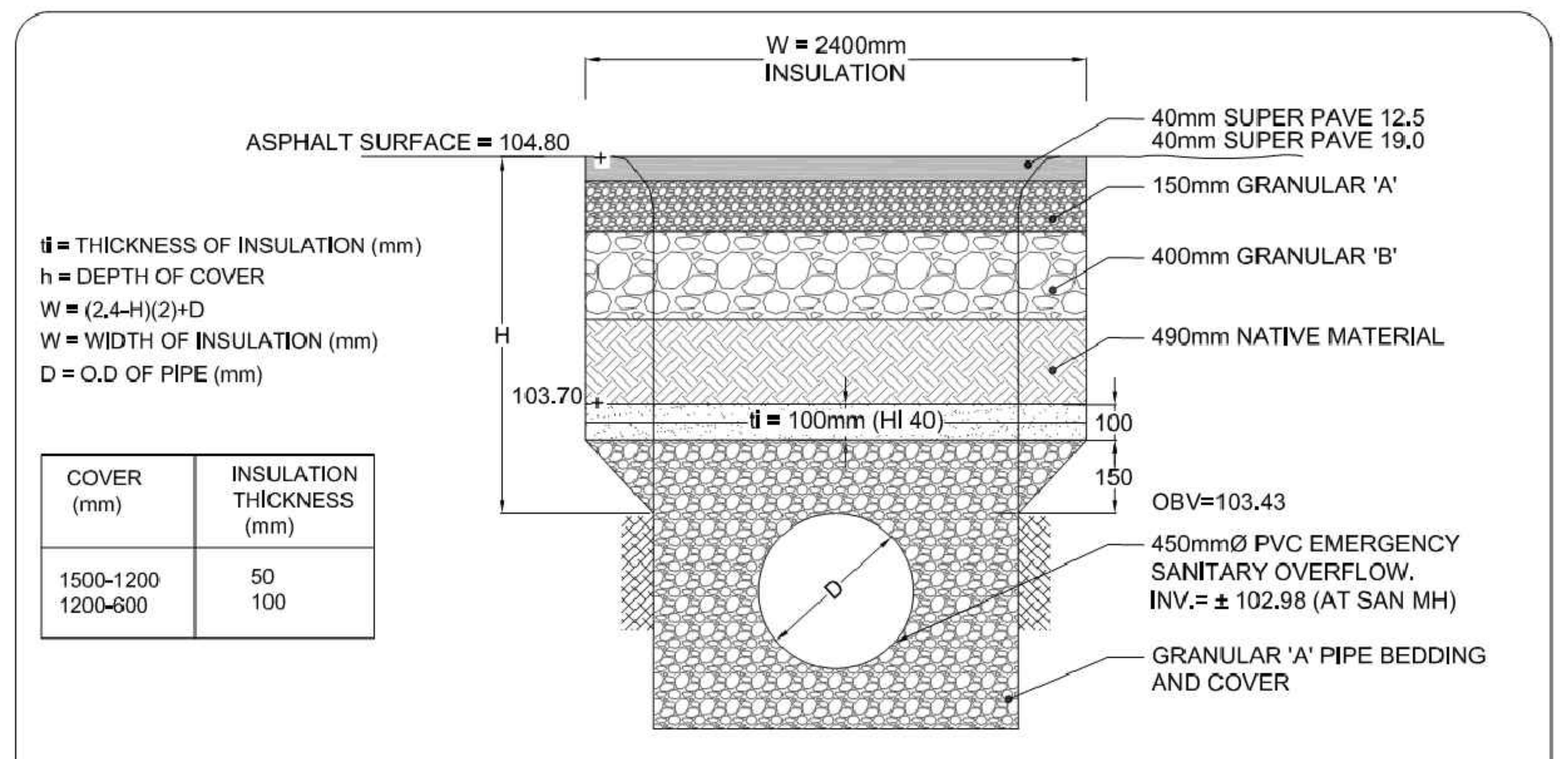


SECTION A-A (STATION 114 + 080)
PUMP STATION EASEMENT
SCALE: 1:75





SANITARY FORCEMAIN INSULATION DETAIL
STA 114+110 TO 114+156
N.T.S.



COVER (mm)	INSULATION THICKNESS (mm)
1500-1200	50
1200-600	100

NOTES:

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 50mm
2. THICKNESS OF INSULATION IS 50mm (min.)
3. INSULATE ALL PIPES AS SPECIFIED WITH MIN 50mm (MIN) x 1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION. (SEE ABOVE DETAIL).
4. THE THICKNESS OF INSULATION SLAB SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER (ROUNDED TO THE NEAREST 25mm INCREMENT).

TYPICAL INSULATION DETAIL - SANITARY OVERFLOW
N.T.S.

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
14.	AS BUILT	SEP 06/18	GJM
13.	REVISED GRADES FROM SANMH 99 TO FAULKNER DRAIN	JUN 23/17	GJM
12.	ISSUED FOR MYLARS	FEB 23/17	GJM
11.	ISSUED FOR LAYOUT	JAN 13/17	GJM
10.	REVISED SANMH 99 AND 101 INVERTS	NOV 17/16	GJM
9.	AUTOMATIC FLUSHER CHAMBER ADDED	SEPT 09/16	BHS
8.	ADDENDUM No. 4	JUL 05/16	GJM
7.	REVISED MANHOLES 97 AND 99. 200mm BYPASS ADDED	JUN 22/16	GJM
6.	ISSUED FOR TENDER	MAY 25/16	GJM
5.	ISSUED FOR ENVIRONMENTAL COMPLIANCE APPROVAL	MAY 04/16	GJM
4.	ISSUED WITH MINOR ADJUSTMENTS	MAR 29/16	GJM
3.	ISSUED FOR 75% DESIGN	MAR 14/16	GJM
2.	50 % DESIGN	DEC 22/15	GJM
1.	ISSUED WITH PUMP STATION PRE-DESIGN REPORT	JUNE 24/15	GJM

SCALE
1 : 250
(UNLESS NOTED)

DESIGN: GJM/BHB
CHECKED: GJM
DRAWN: MWC
CHECKED: GJM
APPROVED: GJM

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
STITTSVILLE SOUTH - AREA 6

DRAWING NAME
SHEA ROAD SANITARY PUMP STATION - SITE SERVICING AND GRADING

PROJECT No. 113004-00
REV: REV # 14
DRAWING No. 113004-PS-SVC

TABLE D-1: FERNBANK CDP LANDS - NEW TRUNK SEWER
SANITARY SEWER DESIGN SHEET (2031)

AREA			RESIDENTIAL																COMMERCIAL		INSTITUTIONAL		C+I	INFILTRATION			Total Flow (l/s)	PIPE					
			LOW DENSITY			MEDIUM DENSITY			HIGH DENSITY			MIXED USE			TOTAL								Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)							
ID	From	To	Area (ha)	Pop.	Accum. Pop.	Area (ha)	Pop.	Accum. Pop.	Area (ha)	Pop.	Accum. Pop.	Area (ha)	Pop.	Accum. Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accum. Area (ha)	Area (ha)	Accum. Area (ha)						Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
1	902	904	9.85	910	910	0.36	54	54	0.00	0	0	0.00	0	0	964	964	3.8	14.9	0.00	0.00	0.78	0.78	0.7	16.07	16.07	4.5	20.1	250	0.24	154	30.4	0.60	66.0%
2	904	908	11.65	1076	1986	3.10	465	519	0.00	0	0	0.00	0	0	1541	2505	3.5	35.6	0.00	0.00	0.91	1.69	1.5	22.29	38.36	10.7	47.8	300	0.24	306	49.4	0.68	96.7%
3	906	908	7.45	688	688	0.00	0	0	0.00	0	0	0.00	0	0	688	688	3.9	10.9	0.00	0.00	2.63	2.63	2.3	14.51	14.51	4.1	17.2	250	1.50	373	76.0	1.50	22.7%
4	908	912	4.45	411	3085	1.67	251	770	0.00	0	0	0.00	0	0	662	3855	3.3	52.3	0.63	0.63	0.00	4.32	4.3	16.43	69.30	19.4	76.0	300	0.61	396	78.8	1.08	96.4%
5	910	912	10.35	956	956	0.00	0	0	0.00	0	0	0.00	0	0	956	956	3.8	14.8	0.00	0.00	0.83	0.83	0.7	19.34	19.34	5.4	20.9	250	0.24	320	30.4	0.60	68.8%
6	912	920	11.15	1030	5071	0.00	0	770	0.00	0	0	0.00	0	0	1030	5841	3.2	75.3	0.00	0.63	2.50	7.65	7.2	18.11	106.75	29.9	112.4	450	0.15	207	115.2	0.70	97.5%
7	914	916	16.35	1511	1511	0.90	135	135	0.00	0	0	0.00	0	0	1646	1646	3.7	24.3	0.00	0.00	0.45	0.45	0.4	25.23	25.23	7.1	31.8	300	0.25	152	50.4	0.69	63.0%
8	916	920	10.45	966	2477	0.00	0	135	0.00	0	0	0.00	0	0	966	2612	3.5	37.0	0.00	0.00	0.85	1.30	1.1	15.69	40.92	11.5	49.5	375	0.20	314	81.8	0.72	60.6%
9	918	920	5.55	513	513	0.49	74	74	0.00	0	0	0.00	0	0	587	587	3.9	9.4	0.00	0.00	6.14	6.14	5.3	16.04	16.04	4.5	19.2	250	0.85	363	57.2	1.13	33.5%
	920	922	0.00	0	8061	0.00	0	979	0.00	0	0	0.00	0	0	0	9040	3.0	109.8	0.00	0.63	0.00	15.09	13.6	0.00	163.71	45.8	169.3	525	0.18	265	190.3	0.85	88.9%
10	922	924	12.20	1127	9188	0.09	14	993	0.00	0	0	0.00	0	0	1141	10181	2.9	121.5	0.00	0.63	1.52	16.61	15.0	27.31	191.02	53.5	190.0	525	0.23	290	215.2	0.96	88.3%
	924	934	0.00	0	9188	0.00	0	993	0.00	0	0	0.00	0	0	0	10181	2.9	121.5	0.00	0.63	0.00	16.61	15.0	0.00	191.02	53.5	190.0	525	0.79	669	398.8	1.78	47.6%
11	926	930	4.95	457	457	8.40	1260	1260	0.00	0	0	3.45	279	279	1996	1996	3.6	29.0	1.99	1.99	0.82	0.82	2.4	26.79	26.79	7.5	38.9	375	0.14	530	68.4	0.60	56.9%
12	928	930	9.35	864	864	3.55	533	533	0.00	0	0	0.00	0	0	1397	1397	3.7	20.9	0.00	0.00	3.85	3.85	3.3	22.72	22.72	6.4	30.7	200	7.00	55	90.5	2.79	33.9%
13	930	932	1.65	152	1473	2.95	443	2236	0.00	0	0	0.00	0	279	595	3988	3.3	53.9	0.34	2.33	0.80	5.47	6.8	10.54	60.05	16.8	77.4	450	0.11	308	99.1	0.60	78.2%
14	932	934	0.00	0	1473	0.00	0	2236	0.00	0	0	7.12	577	856	577	4565	3.3	60.7	3.56	5.89	6.10	11.57	15.2	17.52	77.57	21.7	97.6	525	0.10	455	141.9	0.63	68.8%
15	934	972	2.90	268	10929	1.80	270	3499	0.00	0	0	1.21	98	954	636	15382	2.8	172.4	0.61	7.12	0.40	28.58	31.0	15.08	283.67	79.4	282.8	600	0.26	1007	326.6	1.12	86.6%
16	936	938	7.58	700	700	0.70	105	105	0.00	0	0	0.00	0	0	805	805	3.9	12.6	0.00	0.00	2.17	2.17	1.9	14.42	14.42	4.0	18.5	250	1.00	108	62.0	1.22	29.8%
17	938	940	8.05	744	1444	1.00	150	255	0.00	0	0	4.41	357	357	1251	2056	3.6	29.8	2.21	2.21	0.83	3.00	4.5	25.14	39.56	11.1	45.4	300	0.35	156	59.7	0.82	76.0%
18	940	952	6.35	587	2031	0.99	149	404	0.00	0	0	0.00	0	357	736	2792	3.5	39.2	0.00	2.21	0.00	3.00	4.5	10.51	50.07	14.0	57.8	300	0.75	310	87.4	1.20	66.1%
19	942	944	7.25	670	670	4.70	705	705	0.00	0	0	0.00	0	0	1375	1375	3.7	20.6	0.00	0.00	12.67	12.67	11.0	34.19	34.19	9.6	41.2	250	0.90	516	58.9	1.16	70.0%
20	944	946	12.20	1127	1797	1.00	150	855	0.00	0	0	0.00	0	0	1277	2652	3.5	37.5	0.00	0.00	0.82	13.49	11.7	20.35	54.54	15.3	64.4	375	0.20	511	81.8	0.72	78.8%
21	946	948	4.15	383	2180	4.22	633	1488	0.00	0	0	0.00	0	0	1016	3668	3.4	50.0	0.00	0.00	3.87	17.36	15.1	17.22	71.76	20.1	85.2	375	0.50	243	129.3	1.13	65.9%
	948	950	0.00	0	2180	0.00	0	1488	0.00	0	0	0.00	0	0	0	3668	3.4	50.0	0.00	0.00	0.00	17.36	15.1	0.00	71.76	20.1	85.2	450	0.15	195	115.2	0.70	74.0%
22	950	952	5.05	467	2647	0.30	45	1533	0.00	0	0	0.00	0	0	512	4180	3.3	56.2	0.00	0.00	3.24	20.6	17.9	11.43	83.19	23.3	97.3	450	0.15	221	115.2	0.70	84.5%
23	952	972	4.15	383	5061	5.50	825	2762	0.00	0	0	0.00	0	357	1208	8180	3.0	100.8	0.00	2.21	0.00	23.60	22.4	22.72	155.98	43.7	166.8	450	0.54	282	218.6	1.33	76.3%
24	954	956	7.70	711	711	2.90	435	435	0.00	0	0	6.70	543	543	1689	1689	3.6	24.9	3.35	3.35	0.79	0.79	3.6	22.81	22.81	6.4	34.9	375	0.15	330	70.8	0.62	49.3%
25	956	958	10.70	989	1700	0.00	0	435	0.00	0	0	0.00	0	543	989	2678	3.5	37.8	0.00	3.35	6.27	7.06	9.0	23.45	46.26	13.0	59.8	450	0.20	411	133.0	0.81	44.9%
	958	960	0.00	0	1700	0.00	0	435	0.00	0	0	0.00	0	543	0	2678	3.5	37.8	0.00	3.35	0.00	7.06	9.0	0.00	46.26	13.0	59.8	450	0.15	177	115.2	0.70	51.9%
26	960	966	7.75	716	2416	0.00	0	435	0.00	0	0	0.00	0	543	716	3394	3.4	46.7	0.00	3.35	0.00	7.06	9.0	11.51	57.77	16.2	71.9	450	0.15	82	115.2	0.70	62.4%
27	962	964	2.55	236	236	4.70	705	705	5.04	680	680	0.00	0	0	1621	1621	3.7	24.0	0.00	0.00	0.00	0.00	0.0	20.97	20.97	5.9	29.9	250	0.35	479	36.7	0.72	81.4%
	964	966	0.00	0	236	0.00	0	705	0.00	0	680	0.00	0	0	0	1621	3.7	24.0	0.00	0.00	0.00	0.00	0.0	0.00	20.97	5.9	29.9	250	1.00	298	62.0	1.22	48.2%
28	966	970	1.80	166	2818	5.25	788	1928	0.00	0	680	0.00	0	543	954	5969	3.2	76.7	0.00	3.35	8.89	15.95	16.8	22.38	101.12	28.3	121.8	525	0.15	249	173.8	0.78	70.1%
29	968	970	6.90	638	638	0.00	0	0	0.00	0	0	0.00	0	0	638	638	3.9	10.1	0.00	0.00	0.99	0.99	0.9	11.03	11.03	3.1	14.1	200	0.32	82	19.4	0.60	72.7%
	970	972	0.00	0	3456	0.00	0	1928	0.00	0	680	0.00	0	543	0	6607	3.1	83.8	0.00	3.35	0.00	16.94	17.6	0.00	112.15	31.4	132.8	600	0.15	178	248.1	0.85	53.5%
	972	974	0.00	0	19446	0.00	0	8189	0.00	0	680	0.00	0	1854	0	30169	2.5	302.5	0.00	12.68	0.00	69.12	71.0	0.00	551.8	154.5	528.0	825	0.20	586	669.7	1.21	78.8%
	974	Ex	0.00	0	19446	0.00	0	8189	0.00	0	680	0.00	0	1854	0	30169	2.5	302.5	0.00	12.68	0.00	69.12	71.0	0.00	551.80	154.5	528.0	825	0.20	66	669.7	1.21	78.8%
			210.48			**54.57**			**5.04**			**22.89**																					

Design Parameters:

Avg Flow/Person =	350	l/day	Pipe Friction n = 0.013		**Units/Net ha**	**Pop/Unit**	
Comm./Inst. Flow =	50,000	l/ha/day	Residential Peaking Factor = Harmon Equation (max 4, min 2)	Low Density Residential =	28	3.30	
Infiltration =	0.28	l/s/ha	Peaking Factor Comm./Inst. = 1.5	Medium Density Residential =	60	2.50	(Multi Family Residential)
				High Density Residential =	75	1.80	
				Mixed Use =	90	1.80	(50% of mixed use area is residential)

Project: Fernbank CDP (101108)
Designed: KJM
Checked: MAB
Dwg. Reference: 101108-SAN
Date: May 8, 2009

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

SANITARY SEWER DESIGN SHEET

Davidson Lands
City of Ottawa
Name of Clien/Developer

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL													
STREET	AREA ID	FROM MH	TO MH	w/ Units (Ha)	SF	SD	TH	APT	w/o Units (Ha)	IND	CUM	FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	FLOW (L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
PHASE 2																																
Kayenta Street	142A	MH142A	MH143A	0.40	4	4				24.4	24.4	4.00	0.40								0.4	0.40	0.11		0.51	48.39	83.80	200	2.00	1.492	47.88	98.95%
Maygrass Way	146A	MH146A	MH143A	0.29	1	4				14.2	14.2	4.00	0.23								0.29	0.29	0.08		0.31	64.01	39.65	200	3.50	1.974	63.70	99.51%
Maygrass Way	143A	MH143A	MH144A	0.41		6	4			27.0	65.6	4.00	1.06								0.41	1.10	0.31		1.37	60.24	60.76	200	3.10	1.858	58.87	97.72%
Kayenta Street	139A	MH139A	MH140A	0.20		4				10.8	10.8	4.00	0.18								0.2	0.20	0.06		0.23	59.26	40.89	200	3.00	1.827	59.03	99.61%
	140A	MH140A	MH141A	0.07	1					3.4	14.2	4.00	0.23								0.07	0.27	0.08		0.31	51.89	9.57	200	2.30	1.600	51.59	99.41%
	141A	MH141A	MH144A	0.38		6	3			24.3	38.5	4.00	0.62								0.38	0.65	0.18		0.81	51.89	78.46	200	2.30	1.600	51.09	98.45%
Kayenta Street	144A	MH144A	MH145A	0.05			1			2.7	106.8	4.00	1.73								0.05	1.80	0.50		2.23	47.16	13.99	200	1.90	1.454	44.93	95.26%
PHASE 1																																
Kayenta Street	145A	MH145A	MH155A	0.24	1		4			14.2	121.0	4.00	1.96								0.24	2.04	0.57		2.53	47.16	54.00	200	1.90	1.454	44.63	94.63%
Kayenta Street	159A	MH159A	MH153A	0.35	1	2	5			22.3	22.3	4.00	0.36								0.35	0.35	0.10		0.46	51.89	35.93	200	2.30	1.600	51.43	99.11%
	153A	MH153A	MH154A	0.52	2	8	3			36.5	58.8	4.00	0.95								0.52	0.87	0.24		1.20	51.89	69.86	200	2.30	1.600	50.70	97.69%
	154A	MH154A	MH155A	0.25	2					6.8	65.6	4.00	1.06								0.25	1.12	0.31		1.38	54.10	13.93	200	2.50	1.668	52.72	97.46%
Block 159	155A	MH155A	MH156A	0.03						0.0	186.6	4.00	3.02								0.03	3.19	0.89		3.92	45.26	40.50	200	1.75	1.396	41.35	91.35%
	156A	MH156A	MH103A	0.03						0.0	186.6	4.00	3.02								0.03	3.22	0.90		3.93	45.26	41.32	200	1.75	1.396	41.34	91.33%
Edenwylde Drive	100A	MH100A	MH101A	0.63	3		16			53.4	53.4	4.00	0.87								0.63	0.63	0.18		1.04	43.28	68.32	200	1.60	1.335	42.24	97.59%
	101A	MH101A	MH102A	0.23	1		3			11.5	64.9	4.00	1.05								0.23	0.86	0.24		1.29	28.63	29.78	200	0.70	0.883	27.34	95.49%
	102A	MH102A	MH103A	0.34	2		8			28.4	93.3	4.00	1.51								0.34	1.20	0.34		1.85	48.39	43.19	200	2.00	1.492	46.54	96.18%
Edenwylde Drive	103A	MH103A	MH104A	0.23			7			18.9	298.8	4.00	4.84								0.23	4.65	1.30		6.14	45.26	30.98	200	1.75	1.396	39.12	86.43%
Jardiniere Street	122A	MH122A	MH120A	0.21			5			13.5	13.5	4.00	0.22								0.21	0.21	0.06		0.28	28.63	40.37	200	0.70	0.883	28.35	99.03%
	120A	MH120A	MH121A	0.05			1			2.7	16.2	4.00	0.26								0.05	0.26	0.07		0.34	28.63	9.56	200	0.70	0.883	28.29	98.83%
	121A	MH121A	MH126A	0.41			12			32.4	48.6	4.00	0.79								0.41	0.67	0.19		0.98	35.89	86.22	200	1.10	1.107	34.91	97.28%
Jardiniere Street	123A	MH123A	MH124A	0.36			11			29.7	29.7	4.00	0.48								0.36	0.36	0.10		0.58	32.46	67.99	200	0.90	1.001	31.88	98.21%
	124A	MH124A	MH125A	0.17			3			8.1	37.8	4.00	0.61								0.17	0.53	0.15		0.76	21.64	12.58	200	0.40	0.667	20.88	96.48%
	125A	MH125A	MH126A	0.31			10			27.0	64.8	4.00	1.05								0.31	0.84	0.24		1.29	21.64	43.85	200	0.40	0.667	20.36	94.06%
Jardiniere Street	126A	MH126A	MH127A	0.47			14			37.8	151.2	4.00	2.45								0.47	1.98	0.55		3.00	26.50	97.91	200	0.60	0.817	23.50	88.66%
External Commercial	135A	MH135A	MH127A							0.0	0.0	4.00	0.00			2.73	2.73			2.37	2.73	2.73	0.76		3.13	26.50	12.08	200	0.60	0.817	23.37	88.17%
Jardiniere Street	127A	MH127A	MH128A	0.02						0.0	151.2	4.00	2.45				2.73			2.37	0.02	4.73	1.32		6.14	20.24	11.48	200	0.35	0.624	14.10	69.65%
	128A	MH128A	MH129A	0.09						0.0	151.2	4.00	2.45				2.73			2.37	0.09	4.82	1.35		6.17	20.24	61.77	200	0.35	0.624	14.07	69.52%
	129A	MH129A	MH130A	0.03						0.0	151.2	4.00	2.45				2.73			2.37	0.03	4.85	1.36		6.18	20.24	11.48	200	0.35	0.624	14.07	69.48%
	130A	MH130A	MH131A	0.70			26			70.2	221.4	4.00	3.59				2.73			2.37	0.7	5.55	1.55		7.51	20.24	91.95	200	0.35	0.624	12.73	62.89%
	131A	MH131A	MH132A	0.48			15			40.5	261.9	4.00	4.24				2.73			2.37	0.48	6.03	1.69		8.30	20.24	71.17	200	0.35	0.624	11.94	58.99%
	132A	MH132A	MH104A	0.04						0.0	261.9	4.00	4.24				2.73			2.37	0.04	6.07	1.70		8.31	20.24	28.10	200	0.35	0.624	11.93	58.93%
Edenwylde Drive	104A	MH104A	MH105A	0.44			11			29.7	590.4	3.94	9.41				2.73			2.37	0.44	11.16	3.12		14.91	55.26	67.20	300	0.30	0.757	40.35	73.02%
	105A	MH105A	MH106A							0.0	590.4	3.94	9.41				2.73			2.37	0	11.16	3.12		14.91	55.26	11.41	300	0.30	0.757	40.35	73.02%
PHASE 2																																
Maygrass Way	147A	MH147A	CAP	0.43	7					23.8	23.8	4.00	0.39								0.43	0.43	0.12		0.51	56.95	60.75	200	2.77	1.756	56.45	99.11%
PHASE 1																																
Maygrass Way		CAP	MH148A							0.0	23.8	4.00	0.39								0	0.43	0.12		0.51	56.95	12.00	200	2.77	1.756	56.44	99.11%
	148B	MH148A	MH149A	0.40	6					20.4	44.2	4.00	0.72								0.4	0.83	0.23		0.95	50.75	69.93	200	2.20	1.565	49.80	98.13%
	149A	MH149A	MH150A	0.18	2					6.8	51.0	4.00	0.83								0.18	1.01	0.28		1.11	50.75	11.43	200	2.20	1.565	49.64	97.81%
	150A	MH150A	MH151A	0.51	1	1	12			38.5	89.5	4.00	1.45								0.51	1.52	0.43		1.88	41.91	68.53	200	1.50	1.292	40.03	95.52%
	151A	MH151A	MH152A	0.55		9	7			43.2	132.7	4.00	2.15								0.55	2.07	0.58		2.73	41.91	65.09	200	1.50	1.292	39.18	93.49%
	152A	MH152A	MH157A	0.63	1	10	5			43.9	176.6	4.00	2.86								0.63	2.70	0.76		3.62	37.48	87.29	200	1.20	1.156	33.86	90.35%
	---	MH157A	MH106A							0.0	176.6	4.00	2.86								0	2.70	0.76		3.62	100.85	8.35	300	1.00	1.382	97.24	96.41%
PHASE 2																																
Taliesin Crescent	200A	MH200A	MH201A	0.56			18			48.6	48.6	4.00	0.79								0.56	0.56	0.16		0.94	27.59	59.89	200	0.65	0.851	26.64	96.58%
	201A	MH201A	MH202A	0.46			16			43.2	91.8	4.00	1.49								0.46	1.02	0.29		1.77	21.64	63.75	200	0.40	0.667	19.87	91.81%
		MH202A	CAP106AE							0.0	91.8	4.00	1.49								0	1.02	0.29		1.77	21.64	9.65	200	0.40	0.667	19.87	91.81%
	202A	CAP106AE	MH106A	0.08			1			2.7	94.5	4.00	1.53								0.08	1.10	0.31		1.84	21.64	16.50	200	0.40	0.667	19.80	91.50%
PHASE 1																																
Edenwylde Drive	106A	MH106A	MH107A	0.28			6			16.2	877.7	3.84	13.64				2.73			2.37	0.28	15.24	4.27		20.28	50.44	79.17	300	0.25	0.691	30.17	59.80%
PHASE 2																																
Taliesin Crescent	203A	MH203A	MH204A	0.57			18			48.6	48.6	4.00	0.79								0.57	0.57	0.16		0.95	27.59	61.41	200	0.65	0.851	26.64	96.57%
	204A	MH204A	MH205A	0.37			14			37.8	86.4	4.00	1.40								0.37	0.94	0.26		1.66	21.64	50.66	200	0.40	0.667	19.98	92.31%
		MH205A	CAP 107AE							0.0	86.4	4.00	1.40								0	0.94	0.26		1.66	21.64	6.89	200	0.40	0.667	19.98	92.31%
	205A	CAP 107AE	MH107A	0.11			2			5.4	91.8	4.00	1.49								0.11	1.05	0.29		1.78	21.64	16.00	200	0.40	0.667	19.86	91.77%
PHASE 1																																
Edenwylde Drive	107A	MH107A	MH108A	0.39			11			29.7	999.2	3.80	15.38				2.73			2.37	0.39	16.68	4.67		22.42	50.44	81.58	300	0.25	0.691	28.02	55.55%

Design Parameters:

Residential			ICI Areas		
SF	3.4	p/p/u			Peak Factor
TH/SD	2.7	p/p/u	INST	50,000 L/Ha/day	1.5
APT	1.8	p/p/u	COM	50,000 L/Ha/day	1.5
Other	66	p/p/Ha	IND	35,000 L/Ha/day	MOE Chart
				17000 L/Ha/day	

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

Designed: LME

Checked:

Dwg. Reference: 37533-501

No.	Revision	Date
1.	City submission No. 1	2019-10-30
2.	City submission No. 2	2020-02-07
3.	City submission No. 3	2020-04-09

File Reference: 37533.5.7.1 **Date:** 2020-04-08 **Sheet No:** 1 of 2

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

SANITARY SEWER DESIGN SHEET

Davidson Lands
City of Ottawa
Name of Clien/Developer

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL													
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM								L/s	(%)
PHASE 2																																
Block 170	320A	MH320A	MH186A						2.08	137.3	137.3	4.00	2.22								2.08	2.08	0.58		2.81	21.64	12.44	200	0.40	0.667	18.83	87.03%
Crosanti Drive	186A	MH186A	MH187A	0.10						0.0	137.3	4.00	2.22								0.1	2.18	0.61		2.83	20.24	45.53	200	0.35	0.624	17.41	86.00%
Maverick Crescent	300A	MH300A	MH301A	0.20			4			10.8	10.8	4.00	0.18								0.2	0.20	0.06		0.23	27.56	11.47	200	0.65	0.850	27.33	99.16%
	301A	MH301A	MH302A	1.01			31			83.7	94.5	4.00	1.53								1.01	1.21	0.34		1.87	20.24	116.48	200	0.35	0.624	18.37	90.76%
	302A	MH302A	MH303A	0.07			2			5.4	99.9	4.00	1.62								0.07	1.28	0.36		1.98	20.24	11.48	200	0.35	0.624	18.27	90.23%
	303A	MH303A	MH304A	0.35			9			24.3	124.2	4.00	2.01								0.35	1.63	0.46		2.47	20.24	61.29	200	0.35	0.624	17.77	87.80%
	304A	MH304A	MH305A	0.01						0.0	124.2	4.00	2.01								0.01	1.64	0.46		2.47	20.24	14.00	200	0.35	0.624	17.77	87.79%
Maverick Crescent	300A1	MH300A	MH306A	0.75			26			70.2	70.2	4.00	1.14								0.75	0.75	0.21		1.35	27.59	92.03	200	0.65	0.851	26.24	95.12%
	306A	MH306A	MH307A	0.08						0.0	70.2	4.00	1.14								0.08	0.83	0.23		1.37	20.24	12.96	200	0.35	0.624	18.87	93.23%
Ocala Street	307A	MH307A	MH308A	0.24			5			13.5	83.7	4.00	1.36								0.24	1.07	0.30		1.66	20.24	68.00	200	0.35	0.624	18.59	91.82%
	308A	MH308A	MH305A	0.26			7			18.9	102.6	4.00	1.66								0.26	1.33	0.37		2.03	20.24	59.95	200	0.35	0.624	18.21	89.95%
Ocala Street	305A	MH305A	MH187A	0.06						0.0	226.8	4.00	3.68								0.06	3.03	0.85		4.52	20.24	50.21	200	0.35	0.624	15.72	77.65%
Crosanti Drive	187A	MH187A	MH188A	0.19						0.0	364.1	4.00	5.90								0.19	5.40	1.51		7.41	20.24	89.74	200	0.35	0.624	12.83	63.39%
	188A	MH188A	MH189A	0.80			27			72.9	437.0	4.00	7.08								0.8	6.20	1.74		8.82	20.24	103.64	200	0.35	0.624	11.43	56.45%
		MH189A	CAP	0.12			2			5.4	442.4	4.00	7.17								0.12	6.32	1.77		8.94	21.64	7.33	200	0.40	0.667	12.70	58.70%
	189A	CAP	MH108A							0.0	442.4	4.00	7.17								0	6.32	1.77		8.94	21.64	16.00	200	0.40	0.667	12.70	58.70%
PHASE 1																																
Edenwylde Drive	108A	MH108A	MH109A	0.26			5			13.5	1455.1	3.69	21.74				2.73			2.37	0.26	23.26	6.51		30.63	50.44	75.91	300	0.25	0.691	19.81	39.28%
PHASE 2																																
Orvieto Way	211A	MH211A	CAP210AE	0.65			13			35.1	35.1	4.00	0.57								0.65	0.65	0.18		0.75	27.59	86.14	200	0.65	0.851	26.84	97.28%
		CAP210AE	MH210A							0.0	35.1	4.00	0.57								0	0.65	0.18		0.75	27.59	4.00	200	0.65	0.851	26.84	97.28%
		MH210A	MH109A							0.0	35.1	4.00	0.57								0	0.65	0.18		0.75	27.59	11.31	200	0.65	0.851	26.84	97.28%
PHASE 1																																
Hickstead Way	109A	MH109A	MH110A	0.32	5					17.0	1507.2	3.68	22.46				2.73			2.37	0.32	24.23	6.78		31.61	50.44	76.01	300	0.25	0.691	18.83	37.33%
PHASE 2																																
FRIENDLY CRESCENT	EXTERNAL	EXMH181	MH230A	4.66	70					238.0	238.0	4.00	3.86								4.66	4.66	1.30		5.16	49.58	10.88	200	2.10	1.529	44.42	89.59%
Block 169		MH230A	MH231A							0.0	238.0	4.00	3.86								0	4.66	1.30		5.16	49.58	45.03	200	2.10	1.529	44.42	89.59%
Sendero Way	231A	MH231A	MH221A	0.59	10					34.0	272.0	4.00	4.41								0.59	5.25	1.47		5.88	34.22	67.09	200	1.00	1.055	28.34	82.82%
	221A	MH221A	MH222A	0.64	15					51.0	323.0	4.00	5.23								0.64	5.89	1.65		6.88	26.50	80.39	200	0.60	0.817	19.62	74.03%
	222A	MH222A	MH223A	0.17	2					6.8	329.8	4.00	5.34								0.17	6.06	1.70		7.04	34.22	11.46	200	1.00	1.055	27.18	79.42%
	223A	MH223A	MH224A	0.40	8					27.2	357.0	4.00	5.78								0.4	6.46	1.81		7.59	21.64	69.88	200	0.40	0.667	14.05	64.91%
Sendero Way	235A	MH235A	MH232A	0.56	8					27.2	27.2	4.00	0.44								0.56	0.56	0.16		0.60	34.22	61.94	200	1.00	1.055	33.62	98.25%
	232A	MH232A	MH233A	0.13	1					3.4	30.6	4.00	0.50								0.13	0.69	0.19		0.69	48.39	11.34	200	2.00	1.492	47.70	98.58%
	233A	MH233A	MH234A	0.45	10					34.0	64.6	4.00	1.05								0.45	1.14	0.32		1.37	21.64	57.60	200	0.40	0.667	20.27	93.69%
	234A	MH234A	MH224A	0.59	13					44.2	108.8	4.00	1.76								0.59	1.73	0.48		2.25	21.64	83.39	200	0.40	0.667	19.39	89.61%
Sendero Way	224A	MH224A	CAP 225AN	0.17	3					10.2	476.0	3.99	7.68								0.17	8.36	2.34		10.03	26.50	37.03	200	0.60	0.817	16.48	62.18%
		CAP 225AN	MH225A							0.0	476.0	3.99	7.68								0	8.36	2.34		10.03	26.50	6.50	200	0.60	0.817	16.48	62.18%
	225A	MH225A	MH226A	0.03						0.0	476.0	3.99	7.68								0.03	8.39	2.35		10.03	26.50	15.56	200	0.60	0.817	16.47	62.14%
	226A	MH226A	MH110A	0.02						0.0	476.0	3.99	7.68								0.02	8.41	2.35		10.04	26.50	21.49	200	0.60	0.817	16.46	62.12%
Painted Sky Way	215A	MH215A	MH216A	0.62	14					47.6	47.6	4.00	0.77								0.62	0.62	0.17		0.94	24.19	83.61	200	0.50	0.746	23.25	96.09%
	216A	MH216A	CAP 110AE	0.75	18					61.2	108.8	4.00	1.76								0.75	1.37	0.38		2.15	49.58	84.93	200	2.10	1.529	47.44	95.67%
		CAP 110AE	MH110A							0.0	108.8	4.00	1.76								0	1.37	0.38		2.15	49.58	15.00	200	2.10	1.529	47.44	95.67%
Hickstead Way	110A	MH110A	MH111A	0.36	6					20.4	2112.4	3.57	30.52				2.73			2.37	0.36	34.37	9.62		42.52	50.44	78.00	300	0.25	0.691	7.92	15.71%
Hickstead Way	176A	MH176A	MH111A	0.36	6					20.4	20.4	4.00	0.33								0.36	0.36	0.10		0.43	34.22	64.00	200	1.00	1.055	33.79	98.74%
Aridus Crescent	111A	MH111A	MH112A	0.47	10					34.0	2166.8	3.56	31.23				2.73			2.37	0.47	35.20	9.86		43.46	91.46	68.97	375	0.25	0.802	48.00	52.48%
	112A	MH112A	MH113A	0.51	10					34.0	2200.8	3.55	31.68				2.73			2.37	0.51	35.71	10.00		44.05	91.46	66.19	375	0.25	0.802	47.41	51.84%
	113A	MH113A	MH114A	0.12	1					3.4	2204.2	3.55	31.72				2.73			2.37	0.12	35.83	10.03		44.12	91.46	13.49	375	0.25	0.802	47.33	51.75%
	114A	MH114A		0.52	9					30.6	2234.8	3.55	32.12				2.73			2.37	0.52	36.35	10.18		44.67	91.46	55.98	375	0.25	0.802	46.79	51.16%
		Structure - (325	MH148A																								12.00	200	2.77			
			EXMH181																								35.00	250	0.54			
		EXMH181																									16.74	250	0.54			
		MH189A	Structure - (328																								7.33	200	0.40			
WORKS DESIGNED BY NOVATECH																																
STITTSVILLE SOUTH	EXTERNAL			32.94						2182.0	2182.0										32.94	32.94									
	175A	111	109 (0)	0.23	3					10.2	2192.2	3.55	31.57								0.23	33.17	9.29		*40.85*	141.68	*115.7*	*375*	*0.60*	1.243	100.83	71.17%
STREET NO. 11	176B	109 (0)	107 (0)	0.54	11					37.4	2229.6	3.55	32.05								0.54	33.71	9.44		*41.49*	91.46	*71.7*	*375*	*0.25*	0.802	49.97	54.63%
STREET NO. 11	177A	107 (0)	105 (0)	0.49	10					34.0	2263.6	3.54	32.49								0.49	34.20	9.58		*42.07*	91.46	*62.1*	*375*	*0.25*	0.802	49.39	54.00%
STREET NO. 11	178A	105 (0)	MH115A	0.19	1					3.4	2267.0	3.54	32.54								0.19	34.39	9.63		*42.16*	258.68	*11.0*	*375*	*2.00*	2.269	216.51	83.70%
BLOCK 263		MH115A	99 (1800)							0.0	4501.8	3.29	59.94				2.73			2.37	0	70.74	19.81		82.12	320.35	*73.3*	*450*	*1.16*	1.951	238.23	74.37%
BLOCK 263		99 (1800)	PS							0.0	4501.8	3.29	59.94				2.73			2.37	0	70.74	19.81		82.12	474.96	*4.8*	*450*	*2.55*	2.893	392.84	82.71%

Design Parameters:

Residential			ICI Areas		
SF	3.4	p/p/u			Peak Factor
TH/SD	2.7	p/p/u	INST	50,000 L/Ha/day	1.5
APT	1.8	p/p/u	COM	50,000 L/Ha/day	1.5
Other	66	p/p/Ha	IND	35,000 L/Ha/day	MOE Chart
				17000 L/Ha/day	

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

Designed: LME

Checked:

Dwg. Reference: 37533-501

No.	Revision	Date
1.	City submission No. 1	2019-10-30
2.	City submission No. 2	2020-02-07
3.	City submission No. 3	2020-04-09

File Reference: 37533.5.7.1 **Date:** 2020-04-08 **Sheet No:** 2 of 2

velocity of approximately 1.4m/s (within MOE recommended forcemain velocities of 0.8 t 2.5m/s).

According to the *West Urban Community – Wastewater Collection System Master Servicing Plan by RV Anderson Associates Ltd., dated July 2012* monitored peak flows entering the Stittsville Pump Station were 39L/s in 2010. With a capacity of 108L/s, the remaining capacity is 69L/s. Based on the aforementioned, the Liard St. Pump Station can handle the majority of the development. It is recommended that the flows at the Liard St. Pump Station continue to be monitored until extension of the Fernbank Trunk is completed (see 6.1.5 for details regarding the Future Fernbank Trunk).

6.1.4 Friendly Crescent Pump Station

The Friendly Crescent Pump Station is a low lift station, which services the properties along Friendly Crescent. The flow is pumped west to the 250mm dia. sewer along Hartsmere Drive and has an overflow that is directed to a storm outlet east of Friendly Crescent.

Novatech Engineering produced the "Design Services and Stormwater Report" in May 2000 with a detailed design of the Friendly Crescent Pump Station. The station was designed to serve 70 dwellings that discharge to the Friendly Crescent Pump Station with a peak flow of 5.77 L/s using twin Flygt effluent pumps CP3085.182 that push 6.0 L/sec at 7.15 meters total dynamic head through a 100mm diameter, 230m long forcemain.

It is proposed that the sanitary sewer-shed of Friendly Crescent Pump Station be accounted for in the servicing alternatives, in order to provide a higher level of service, by providing a gravity outlet to avoid the costs of maintaining and operating the existing pump station.

6.1.5 Future Fernbank Trunk

The Future Fernbank Trunk will be built along the Hydro One easement to accommodate the future development of the Fernbank Community Design Plans as referenced in the Master Servicing Study for the Fernbank lands. Once constructed, the Liard Street Pump Station will be decommissioned, and all flows from the Liard Street Pump Station sewer-shed and the Area 6 lands will be directed to the Fernbank Trunk through a gravity sewer. The Fernbank Trunk will convey flows to the Hazeldean Pump Station. The decommissioning work will be undertaken by the City, based on the time frame provided in Infrastructure Master Plan.

The Fernbank Trunk was designed for a peak flow of 528L/s and has a capacity of 670L/s which leaves an excess capacity of 142L/s. As per section 6.1.3 of this report, the Liard Street Pump Station had a monitored flow of 39L/s in 2010, and proposed Area 6 peak design flows is 85L/s which summates to 124L/s. Based on these flows, there is adequate capacity in the Fernbank Trunk.

Based on coordination with the Landowners within the Fernbank CDP lands, the sewer depth and size will be accounted for at the proposed subdivisions within the Fernbank Lands CDP to provide the required capacity in order to eventually decommission the Liard Street Pump station and accumulate the Area 6 flows. The cost for over-sizing and over –depth of the sewers is discussed in Section 9.2.

Table ES 3: WUC summary of flow generation scenarios

PUMPING STATION OR TRUNK SEWER	FIRM CAPACITY	EXISTING CAPACITY	CURRENT SEWER CONFIGURATION						
			FLOW [1]	Scenario 1		Scenario 2		Scenario 3	
(Year)			2010	2031	2060	2031	2060	2031	2060
	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
Richmond Pump Station	360		151	340	340	314	314	407	407
Stittsville PS	108		39	106	506	77	300	91	353
Hazeldean Pump Station	1225		832	1537	1937	1373	1596	1741	2003
Kanata West Pump Station [2]	765		152	593	689	462	555	561	678
Signature Ridge Pump Station [3]	360		54	309	423	218	302	256	351
March Pump Station	490		326	771	941	668	814	820	1008
Acres Road Pump Station	4600		2119	4186	4966	3774	4320	4437	5099
Glen Cairn Trunk		2815 to 2988	1139	2512	3008	2192	2508	2758	3137
Stittsville Trunk		519 to 972	358	485	885	444	679	572	732
Main Street Sewer		307 to 739	138	330	444	237	321	342	399
Penfield Sewer		398 to 734	170	360	474	267	351	342	437
March Ridge Trunk (Above March Forcemain)		1223	245	434	548	339	423	428	523
March Ridge Trunk (Below March Forcemain)		1016	571	1205	1489	1007	1237	1248	1531
Watts Creek Siphon		1014	571	1205	1489	1007	1237	1248	1531
Tri-Township Collector		1595 to 1803	1705	3717	4497	3199	3745	4006	4668
March Wood Trunk		1100	230	574	705	502	616	608	752
East March Trunk		550	96	172	211	141	173	187	231
North Kanata Trunk - Phase I		4047 to 4640	1705	3717	4497	3199	3745	4006	4668
Nepean Collector		190	190	197	197	193	193	234	234
Watt's Creek Trunk		5418 to 6640	1891	3914	4694	3392	3938	4240	4902

The coloured cells in the table identify the component of the current sewer system that is under capacity by the time of the projected growth in 2031 or 2060.

[1] – flow results based on the dynamic model calculation;

APPENDIX C

WATER SUPPLY

STITTSVILLE SOUTH SUBDIVISION
CITY OF OTTAWA

DETAILED SERVICING & STORMWATER MANAGEMENT REPORT

Prepared For:

ROSS BRADLEY, CINQUE TERRE HOLDINGS INC. & STITTSVILLE SOUTH INC.

Prepared By:

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

September 21, 2015
Revised July 18, 2016

Novatech File: 113004
Ref: R-2015-072

6.0 WATER SUPPLY SYSTEM

6.1 Background Information

The proposed development is located within the service area of Pressure Zone 3W of the City of Ottawa water distribution system. This zone is fed by the Glen Cairn and Campeau Drive Pump Stations. Balancing storage during peak and fire flow conditions is accomplished with use of the Stittsville Elevated Tank.

The existing water distribution system adjacent to the study area includes;

- 400mm diameter watermain on Fernbank Road
- 300mm diameter watermain on Arrowwood Drive
- 200mm diameter watermain on Hartsmere Drive
- 250mm diameter watermain on West Ridge Drive

The existing ground elevations within Area 6 are between 105m and 124m above sea level.

Novatech has retained Stantec Consulting Ltd.(Stantec) to undertake a hydraulic analysis using the City's most up to date model which had recently been updated for the 2013 Water Master Plan update. The analysis takes into account the future Fernbank CDP Lands. The Stantec findings and recommendations; '*Stittsville Area 6 - Potable Water Hydraulic Assessment Phase 1 &2'* dated September 2nd, 2015 can be found in **Appendix D**.

6.2 Previous Recommendations

As part of the *Area 6 MSR*, it was determined that the preferred water servicing alternative consists of a 250mm watermain spine, and 200mm diameter watermain feeding adjacent local roads. It was also recommended that a 300mm diameter watermain be extended from Arrowwood Drive into the proposed site as 200mm watermain for backbone continuity, and the 400mm diameter watermain on Fernbank Road be extended towards the East in order to meet the proposed 250mm diameter spine. Refer to **Figure 6.1**.

6.3 Overall Water Demand & Criteria

The water demands for Stittsville South would be estimated using the City of Ottawa's Water Distribution Design Guidelines.

6.3.1 Water Demand

The domestic demand design criteria used to determine the size of the watermains required to service the Stittsville South area are as follows:

Domestic Demand

Average Residential Domestic Flow per capita	350 L/cap/day
Capita per dwelling	3.4 persons per single 2.7 persons per townhouse 2.3 persons per stacked townhouse 2.1 persons per apartment
Maximum Day Demand	2.5 x Average Day Demand
Peak Hour Demand	2.2 x Maximum Day Demand

Commercial and Parks Demand

Commercial Capita	50,000 L/ha/day
Maximum Day Demand	1.5 x Average Day Demand
Peak Hour Demand	1.8 x Maximum Day Demand
Park Demand	1000 L/park/day

6.3.2 Fire Flow Demand

The City of Ottawa requires proposed watermain networks meet Fire Underwriters Survey fire flow requirements. However, Technical Bulletin ISDTP-2014-02 specifies that the fire flow requirement can be capped at 10,000 L/min for the following;

- Single detached dwellings, provided that there is a minimum rear yard separation of 10m between adjacent units.
- Town and row homes, provided that firewalls with a minimum of two hour fire-resistance rating that comply with OBC Div. B, Subsection 3.1.10 are used to separate home blocks into fire areas that comprise no more than the lesser of seven units, and 600m² of building area. Furthermore, there must be a minimum rear yard separation of 10m.

Based on the above, the watermain analysis has assessed the ability of the proposed network to attain a fire flow of 10,000 L/min at all locations. Fire Underwriters Survey fire flow calculations have also been included for reference in **Appendix D**.

6.3.3 Design Criteria

The design criteria used to determine the size of the watermains required to service the Stittsville South area are based on a conservative approach that considers three possible scenarios, as follows:

System Pressures

Maximum Allowable Pressure	551.6kPa (80psi)
Minimum Allowable Pressure (excluding fire flow conditions)	275.8kPa (40psi)
Minimum Allowable Pressure (including fire flow conditions)	137.9Kpa (20psi)

6.4 Watermain Analysis

Novatech has retained Stantec Consulting Ltd. to conduct a hydraulic analysis of the proposed development potential, and its effects on the City's water infrastructure. The hydraulic network model and memo 'Stittsville Area 6-Phase 1 & 2 - Potable Water Hydraulic Assessment' dated September 2nd, 2015 is included in **Appendix D**. The hydraulic network simulated average day, peak hour and maximum day plus fire flow conditions.

Stantec used the City's most up to date model that was recently updated for the 2013 Water Master Plan. Both current conditions and future conditions (anticipated 2031 conditions from the 2031 Water Master Plan model) were analyzed.

It is important to note that in the area of the proposed development, head losses under peak demands could reduce minimum pressures to below guideline requirements at higher

elevations. Future planned connections as per the Water Master Plan, within the Fernbank lands will mitigate this issue resulting in increased minimum pressures.

6.5 Discussion

6.5.1 Low Pressures

Under peak hour demands, ground elevations greater than 124m are susceptible to minimum pressures marginally below the required 40psi under 2013 existing conditions. In future 2013 conditions, minimum pressures everywhere within the proposed development are not expected to drop below required pressures.

Within the vicinity of the cul-de-sac at the end of Street Five, ground elevations are greater than 124m. In order to mitigate marginally low expected pressures, it is proposed that 25mm services be installed for Lots 23, 24, and 25 to alleviate low pressure concerns. The specifications and details of these mitigations will be provided in the detail design drawings of the Camplina Way, 113004-GP1.

It is also expected that buildings within Block 349 will experience marginally low pressures due to the ground elevations in this area. Within Block 349, jet pumps will be required where buildings are greater than two stories tall. The jet pumps will be owned and maintained by the condominium corporation. Such mitigation measures, including the jet pumps, will be finalized within servicing reports during detailed design in support of the site plan application.

Similarly, at Block 353 contains the potential for a 6 story condominium building that will likely require pressure boosting measures. Such measures include but are not limited to jet pumps within the mechanical room of the apartment block. These measures will be owned and maintained by the condominium corporation and will be finalized within servicing reports during detailed design in support of the site plan application.

Refer to the Legal Plan of Subdivision for the location of the aforementioned blocks.

6.5.2 High Pressures

Under average day demands (also known as basic day demands), ground elevations less than 106m will experience pressures greater than the required limit of 80psi. As Phase 1 and 2 of the Stittsville South subdivision do not have any finished grade elevations around residential units or street below elevation 106.00, high pressures are not a concern.

6.5.3 Fire Flow

As per Appendix B-5 through B-8 of the attached Stantec Potable Water Hydraulic Assessment, a 10,000L/min fire flow is attained in general throughout the proposed development as per ISDB-TB2014-01.However there are a few localized exceptions, where the criteria was not met as discussed below.

At node A95 (at the dead end of Campolina Way) the available fire flow is 8000L/min. The FUS long calculation for Lot 25 (worst case scenario) was calculated to be 8,000L/min; therefore, the fire demand is met. a second 250mm watermain loop (along Falabella, Campolina, Lipizzaner) was introduced to retain the minimum required fire flows of 8,000L/min.

As per ISD-TB 2014-01, at node 81, the residential configuration does not allow the 10,000 L/min fire demand to be utilized and requires the FUS long method to be utilized. As such, the fire demand at this location is 13,000 L/min. The available fire flow at residual pressure of 20 psi, is 18,000L/min; therefore, the fire demand is met.

6.6 Recommendations & Proposed Water Infrastructure

Based on the findings of 'Stittsville Area 6 - Potable Water Hydraulic Assessment' there is sufficient capacity to provide both the required domestic and emergency fire flows to the service area. In order to accomplish this, it is proposed that the 250mm diameter watermain existing west of the development would be extended through Area 6 and reconnected at Fernbank Road. This 250mm watermain would act as the spine, from which 200mm diameter watermain will feed adjacent roads. It is also recommended that an existing 300mm diameter watermain be extended as a 200mm watermain from Arrowwood Drive into the proposed site for backbone continuity, and the 400mm diameter watermain on Fernbank Road be extended towards the East in order to meet the proposed 250mm diameter spine. Elevations greater than 124m will require additional measures to increase peak hour pressures. Elevations less than 106m will require pressure reduction measures. Refer to **Figure 6.1** for sizing.

It is likely that the eastern portion of Parade (Lots 286 – 295) will be developed in advance of the Davidson Lands; hence the watermain within this portion will be deemed a dead-end. Is it anticipated that the Davidson Lands will advance within the next two years. As there are less than 50 units temporarily connected to this portion of the main, the City's guidelines are met.

HIGH DENSITY RESIDENTIAL
HYDRO CORRIDOR
COMMERCIAL
COMMUNITY FEATURE
MEDIUM DENSITY RESIDENTIAL
LOW DENSITY RESIDENTIAL
FUTURE DEVELOPMENT
SWMF

OWNERSHIP BOUNDARY
EXISTING 150mmØ WM
EXISTING 200mmØ WM
EXISTING 250mmØ WM
EXISTING 300mmØ WM
PROPOSED 50mmØ WM
PROPOSED 200mmØ WM
PROPOSED 250mmØ WM
PROPOSED 300mmØ WM
PROPOSED 400mmØ WM

FERNBANK CDP LANDS

LAYOUT TO BE CONFIRMED BY DAVIDSON PARCEL DRAFT PLAN PROCESS (BY OTHERS)

CONNECT TO EXISTING

FUTURE 400mmØ WM

400mmØ WM EXTENSION

COMMERCIAL WM CONNECTION

FERNBANK ROAD

EX. 200mmØ WM

EX. 150mmØ WM

WEST RIDGE DRIVE

STITTSVILLE MAIN STREET

SCHOOL

PARK

HARTSMERE DRIVE

FRIENDLY CRESCENT

CONNECT TO EXISTING

BELL WATER CONNECTION SUBJECT TO EASEMENT

CONNECT TO EXISTING

HYDRO CORRIDOR

SHEA ROAD

1 2 3 4 5 6

CONNECT TO EXISTING

EXTRA DEEP LOTS

MAINTAIN EXISTING TREES

CONNECTION TO PROPOSED DAVIDSON SUBDIVISION

LAYOUT TO BE CONFIRMED BY DAVIDSON PARCEL DRAFT PLAN PROCESS (BY OTHERS)

NOTE: DAVIDSON LANDS LAYOUT IS SUBJECT TO CHANGE (BY OTHERS). REFER TO CITY OF OTTAWA FILE NO. D07-16-15-0008.

SCALE 1:7000

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

STITTSVILLE SOUTH AREA 6

WATERMAIN CONCEPT PLAN

DATE JULY 2016 | JOB 113004 | FIGURE FIGURE 6.1

SHT11X17.DWG - 279mmX432mm

APPENDIX D

Hydraulic Analysis – Stantec (Retained by Novatech)

Stittsville Area 6 - Potable Water Hydraulic Assessment of Phase 1 & 2

Prepared for:
Novatech Engineering Consultants Limited

Prepared by:
Stantec Consulting Ltd.

September 2, 2015

Sign-off Sheet

This document entitled Stittsville Area 6 - Potable Water Hydraulic Assessment of Phase 1 & 2 was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Novatech Engineering Consultants Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(Signature)

Val Hoang, M.A.Sc., Engineering Intern

Reviewed by _____
(Signature)

Kevin Alemany, M.A.Sc., P.Eng.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

Stantec Consulting Ltd. (Stantec) has carried out a detailed potable water hydraulic analysis for Phases 1 and 2 of the proposed Area 6 service area located in Stittsville on behalf of Novatech Engineering Consultants Ltd. The proposed Area 6 development is located between Stittsville Main Street and Shea Road along Fernbank Road and is adjacent to the boundaries of Pressure Zone 3W of the City of Ottawa water distribution system.

A hydraulic assessment was performed using the City's most up to date model (with permission) for existing conditions to simulate Phase 1 and 2. The spine of the network is proposed to be 250mm diameter piping (which connects to existing watermains) with 200mm diameter piping making up the remainder of the internal network.

The proposed watermain to service the mixed use development has sufficient capacity to provide the required domestic demands while maintaining the City's objective pressure in the development. However, additional consideration should be taken for buildings with more than two storeys in height as they are subject to experiencing low pressures (i.e. below 40 psi) on the higher floors during peak demands. Proposed building heights, ground elevations and minimum pressure constraints need to be considered accordingly.

A fire flow assessment under maximum day demand conditions was carried out and it was determined that fire flows greater than 10,000 L/min can be achieved while maintaining a residual pressure of 20 psi throughout the development except for one dead-end location. According to the latest site plans, this dead-end location is anticipated to service units that require 8,000 L/min of fire flow per the FUS calculation, which is deemed achievable according to model results presented herein.

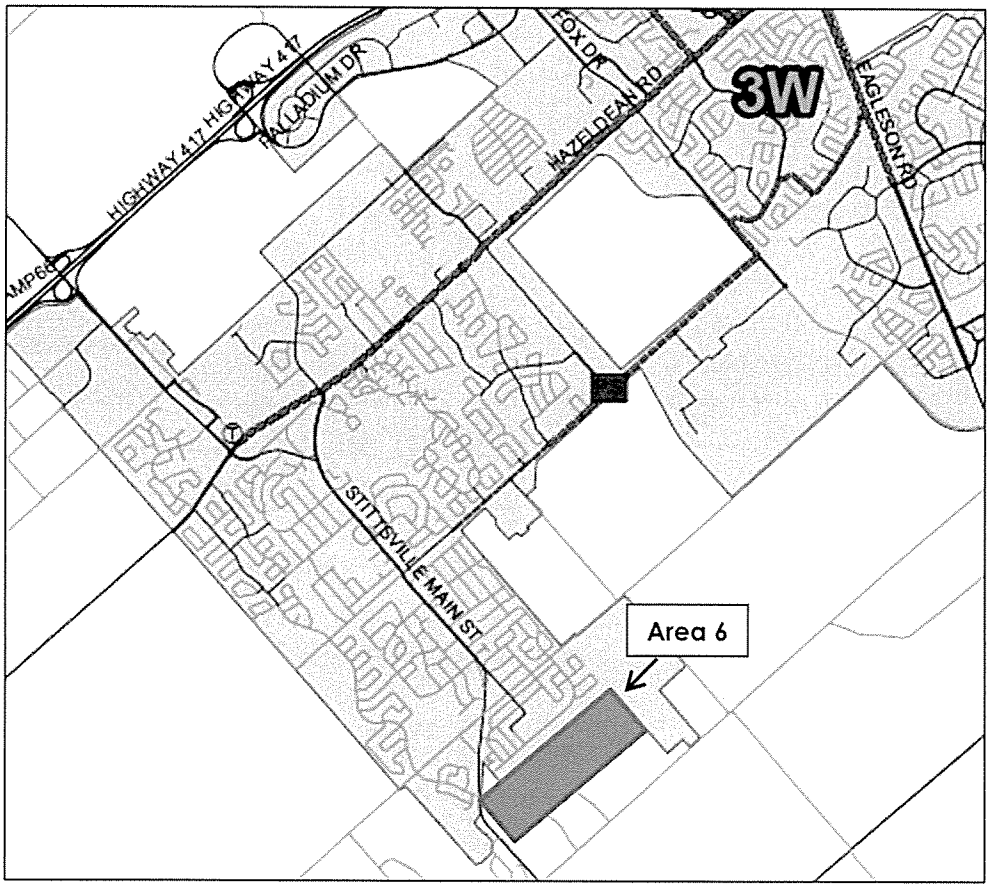
1.0 BACKGROUND

1.1 AREA OF DEVELOPMENT

Stantec Consulting Ltd. (Stantec) has undertaken a hydraulic assessment of the potable water servicing area for the proposed Area 6 Stittsville development on behalf of Novatech Engineering Consultants Ltd. This analysis specifically reviews conditions of Phase 1 and 2 as they are currently in the detailed design stage. Area 6 is a mixed-use development that includes single homes, town houses, apartment buildings and a small commercial area.

The proposed development site is located between Stittsville Main Street and Shea Road along Fernbank Road (**Figure 1-1**). It is located within the service area of Pressure Zone 3W of the City of Ottawa water distribution system. Zone 3W is fed by the Glen Cairn and Campeau Drive Pump Stations with the Stittsville Elevated Tank providing balancing storage for peak flows as well it provides storage to meet emergency and fire flow conditions.

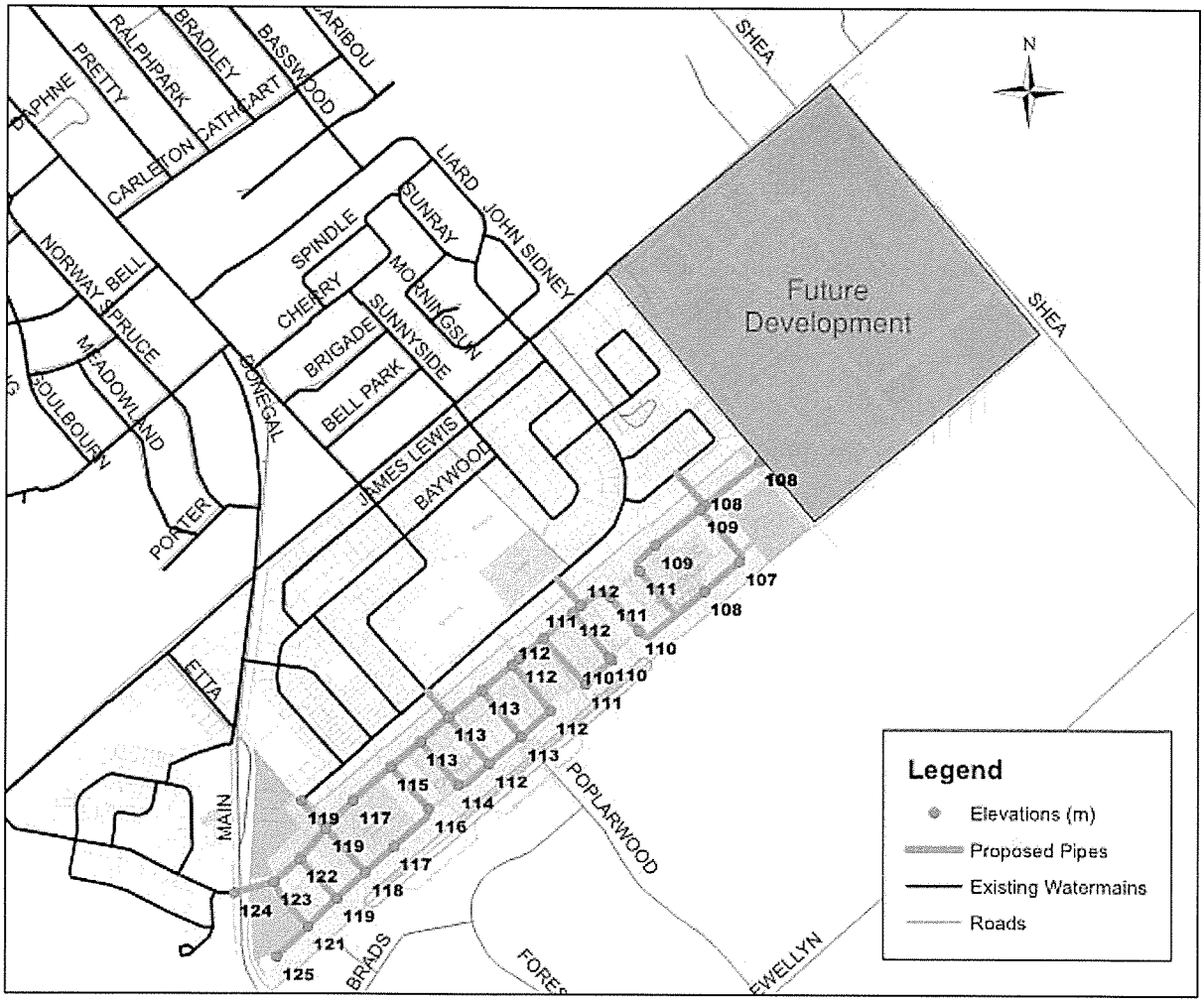
Figure 1-1: Location of Area 6



1.2 GROUND ELEVATIONS

The existing ground elevations of the proposed Area 6 development range from approximately 107m and 125m. The elevations shown on **Figure 1-2** were interpolated from an elevation topography file and assigned to the nodes in the hydraulic model.

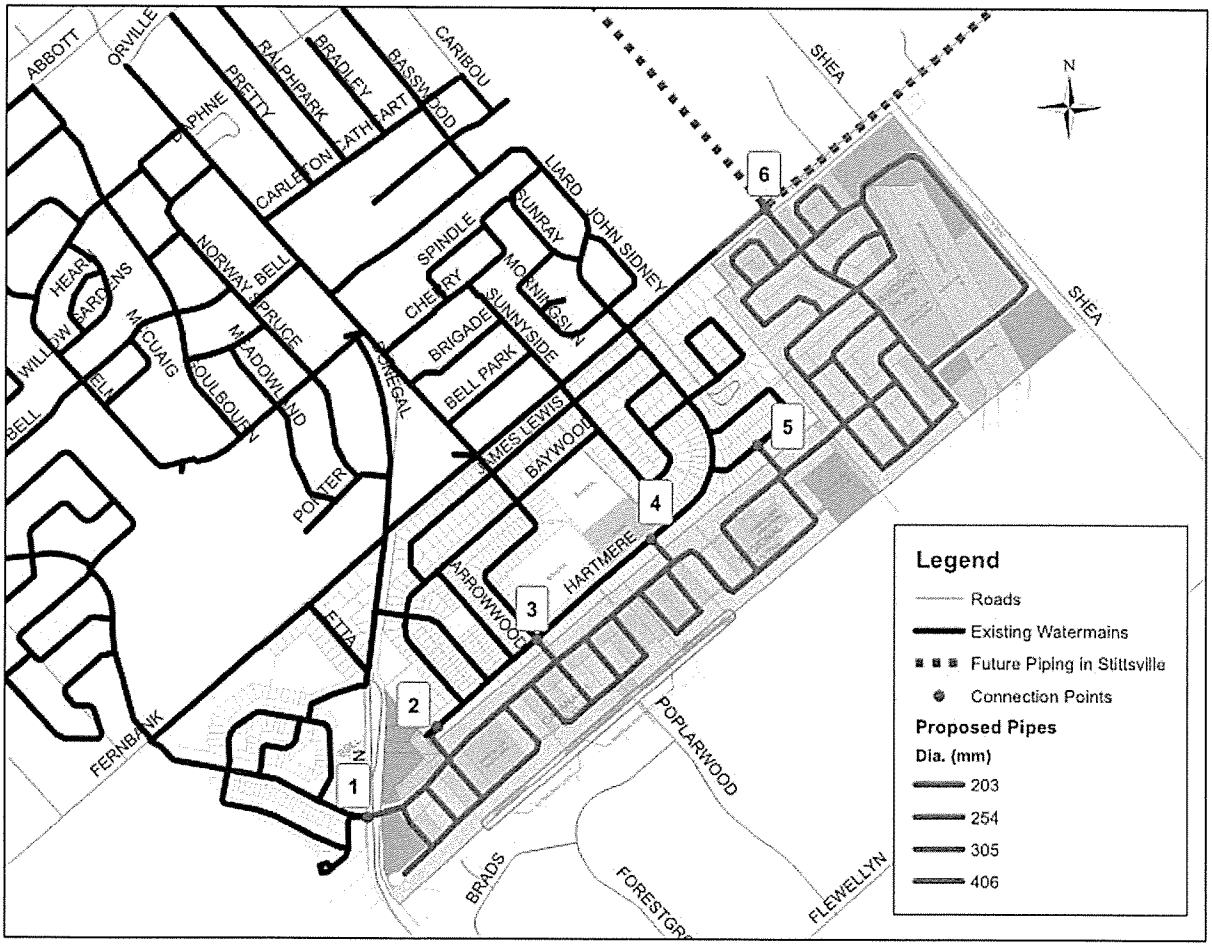
Figure 1-2: Ground Elevations (m) in Area of Proposed Development



1.3 PREVIOUS STUDIES

In 2014, Stantec performed a Zone Level hydraulic analysis for Stittsville Area 6 where the criteria described in the 2013 Water Master Plan (WMP) was used to estimate water demands for the entire development. The resulting proposed watermain network is shown in **Figure 1-3** along with the connection points of Area 6 to the existing water distribution system. Pipes within the proposed network are made up of 305mm, 250mm and 203mm in diameter.

Figure 1-3: Connection Points of Area 6 to Existing Watermains from Stantec 2014 Report



Hydraulic modelling showed that the proposed pipe sizing and alignment was capable of providing domestic demand and the City's Objective fire flow of 10,000 L/min while maintaining pressures in accordance to the City Guidelines except for one location. This location is the dead-end located in the southwest (cul-de-sac) of the development which was capable of achieving 7,000 L/min of flow. Additionally, since this location has a ground elevation greater than 124.5m, it resulted in minimum pressures slightly below the City's objective of 40 psi during peak hour demands. It was recommended that oversized services and plumbing be considered

for this location to achieve minimum pressures of 40 psi. Constraints of multi-storey buildings located in areas of high elevations should also be considered accordingly to avoid low pressure on the higher storeys.

During analysis of Phase 3 which was modeled under future 2031 conditions, it was noted that the typical operating pressures are anticipated to exceed the objective limit of 80 psi in the lands with lower elevations. Areas with ground elevations less than 106m are expected to experience pressures greater than 80 psi and require pressure reducing measures to be in accordance with the Ontario Plumbing.

1.4 PHASING & PROPOSED PIPING

Area 6 is currently proposed to be developed in 3 phases (**Figure 1-4**). Phase 1 and 2 are currently in the detailed design stage while Phase 3 is not expected to be developed in the short term and not included in this latest servicing analysis.

Phase 1 - the Cavanagh lands includes

- a connection to the existing 250mm diameter watermain on West Ridge Dr. (point 1);
- a connection the existing 203mm diameter watermain on Hartsmere Dr. (point 2).

Phase 2 - Regional lands and Bell Lands west of Cavanagh Lands includes

- an extension of 300mm diameter watermain along Arrowwood Dr. (point 3);
- a connection to the existing 203mm diameter watermain on Hartsmere Dr. (point 4); and
- a connection to the existing 203mm diameter watermain on Friendly Cres. (point 5).

Phase 3 - Davidson Lands (to be developed in future phases)

- construction of a small section of 400mm diameter pipe to connect point 6 to the existing watermain on Fernbank; this extension would represent a portion of the extended future 400mm diameter watermain along Fernbank Road towards Shea Road.

Figure 1-4: Phasing Plan

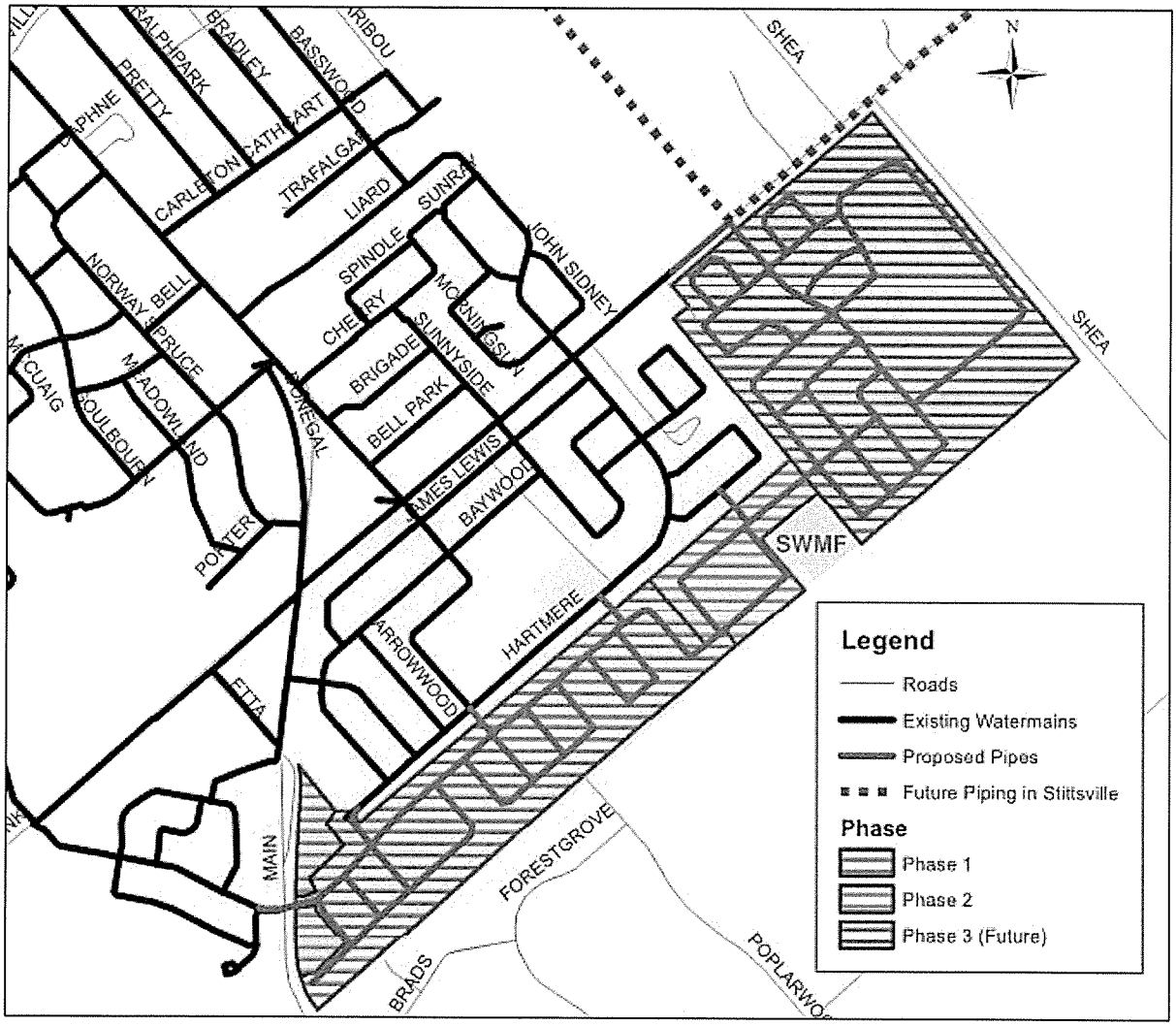


Figure 1-5 shows the connection points of the development to the existing watermain network and the connection from Phase 2 to the future development (Phase 3) on the east side of Area 6 (denoted as connection "F"). It should be noted that the watermain from connection 3 into the development (along Arrowwood Drive) as shown in **Figure 1-6** was previously proposed to be a 305mm diameter pipe (refer to **Figure 1-3**) but has been revised to 250mm and 203mm pipes to avoid oversized piping. Additionally, to increase the and minimum pressures during peak hour and fire flow at the cul-de-sac location, the surrounding pipes are recommended to be upsized from 203mm to 250mm diameter watermains.

Figure 1-5: Connection Points to Existing System and Future Development

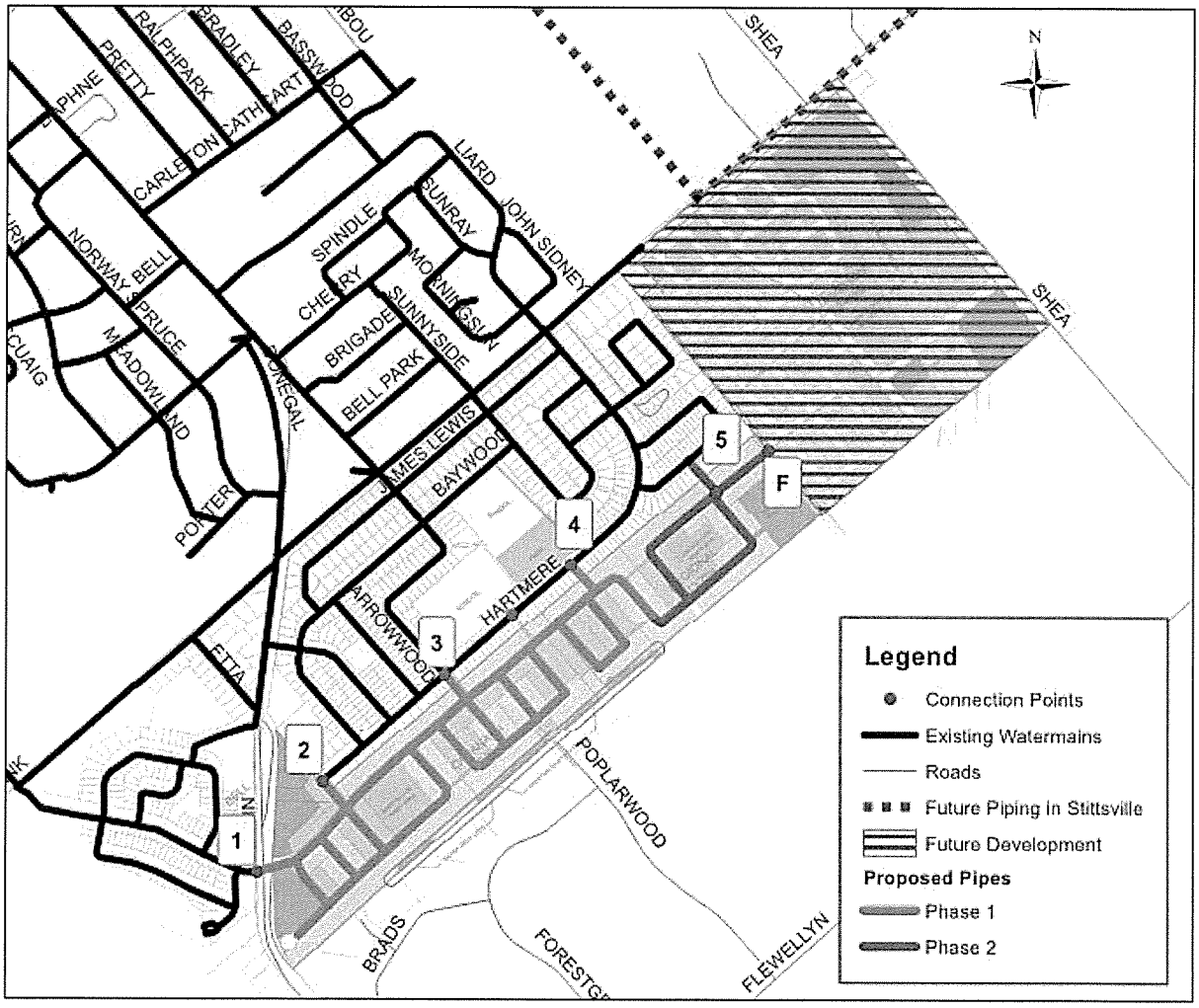
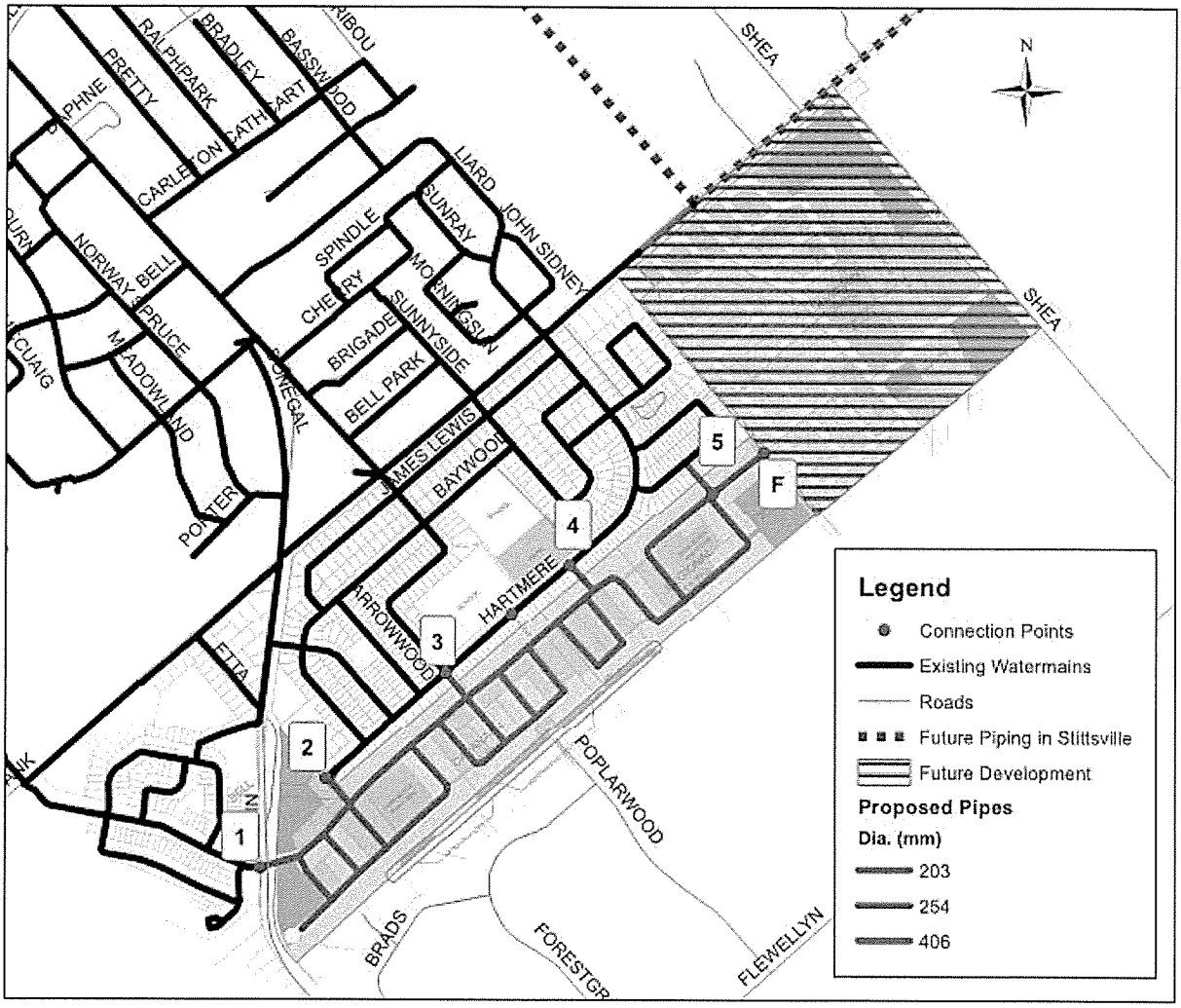


Figure 1-6: Proposed Piping Sizing and Alignment



2.0 SERVICEABILITY

2.1 ALLOWABLE PRESSURES

The City of Ottawa Water Distribution Design Guidelines state that the design objective for system pressures under normal demand conditions (i.e. average day, maximum day and peak hour) is in the range of 40 to 80 psi at the ground elevation in the streets (i.e. at hydrant level). The maximum pressure at any point in the distribution system is 100 psi; however, as per the Ontario Building/Plumbing Code, pressure relief measures are required for services when pressures greater than 80 psi are anticipated. Under emergency fire flow conditions, the minimum pressure in the distribution system is allowed to drop to 20 psi.

Multi-storey residential buildings require an additional 5 psi for every additional storey over two storeys to account for the change in elevation head and some additional headloss. For example, the minimum pressure required for a two-storey building is 40 psi whereas a three-storey building requires at least 45 psi and a four-storey building requires at least 50 psi. This is to account for the difference in elevation and additional pipe headloss.

2.2 FIRE FLOWS

The City of Ottawa requires new developments to demonstrate that the proposed watermain network can achieve the Fire Underwriters Survey (FUS) fire flow objective (using the long form calculation). The City's Technical Bulletin ISDTB-2014-02 specifies the type of development and condition that allow fire flow requirements to be capped at 10,000L/min.

Novatech has confirmed that the maximum fire flow requirement that would be required based on the planned development is 10,000L/min. FUS calculations are presented in **Appendix A**. This report assesses the ability of the network to attain a fire flow of 10,000L/min throughout the network.

3.0 WATER DEMANDS

The City of Ottawa's Water Design Guidelines were used for estimate the water demands of Phase 1 and 2 as they are in the detailed design stage of development. The average day (AVDY) demands were estimated using a residential consumption rate of 350 L/cap/d and population densities based on various unit types. **Table 3-1** shows the unit count and estimated population. For parks, a water consumption rate of 1,000L/d was applied. **Table 3-2** shows the total park area for Phase 1 and 2 and its corresponding water demand.

Maximum day (MXDY) demands were estimated by multiplying AVDY demands by a factor of 2.5 and peak hourly (PKHR) demands were estimated by multiplying MXDY demands by a factor of 2.2. **Table 3-3** shows the estimated water demands for each phase where the latest plans for Phase 1 and 2 calls for a total **650** units and an estimated population of **1,903.**

Table 3-1: Estimated Residential Population based on Unit Types

Phase	Unit Type	Persons/Unit	Units	Population
1	Single Family	3.4	269	914
	Town Houses	2.7	126	341
	Phase 1 Total		***395***	***1,256***
2	Single Family	3.4	69	235
	Town Houses	2.7	34	92
	Apartments	2.1	152	320
	Phase 2 Total		***255***	***647***
			650	***1,903***

Table 3-2: Non-Residential Areas

Phase	Non-Residential	Area (ha)	Demand (L/s)
1	Park	1.33	0.77
2		0.82	0.47

Table 3-3: Estimated Water Demand

Phase	Population	BSDY (L/s)	MXDY (L/s)	PKHR (L/s)
1	1,256	5.08	12.71	27.96
2	1,903	7.70	19.25	42.34

4.0 HYDRAULIC MODELLING RESULTS

4.1 HYDRAULIC MODEL SET-UP

With the permission of the City, Stantec performed the hydraulic analysis using the City's 2013 Water Master Plan (WMP) model. Stantec assessed the anticipated pressures in the Area 6 development and reviewed potential upgrades/upsizing of existing watermains (if any) in order to meet minimum servicing requirements.

The software package used to carry out the analysis was H_2OMAP Water by Innovyze. The model was tested under three different domestic demand conditions: basic day (BSDY), peak hour (PKHR) and one emergency condition: maximum day plus fire (MXDY+FF). For the analysis herein, Stantec adjusted the previous model that was used for the 2014 hydraulic analysis to correspond to the updated changes of Phase 1 and 2.

New watermains were added to the hydraulic model to simulate the proposed distribution system. Hazen-Williams coefficients ("C-Factors") were applied to the new watermain in accordance with the City of Ottawa's Water Distribution Design Guidelines (**Table 4-1**):

Table 4-1: C-Factors Used for Applied Watermain Based on Pipe Diameter

Pipe Diameter (mm)	C-Factor
150	100
200 to 300	110
350 to 600	120
> 600	130

4.2 BASIC DAY AND PEAK HOUR DEMANDS

Steady-state modelling under 2013 (existing) conditions was used to model basic day and peak hour scenarios. **Table 4-2** shows the pressure observed during hydraulic modelling under BSDY and PKHR demands. It can be seen that maximum pressures do not exceed the City's objective of 80 psi in Phase 1 and 2.

During the previous 2014 study, one location within Area 6 with a ground elevation greater than 124m (cul-de-sac) was susceptible to minimum pressure marginally below 40 psi under peak hour. As such for this analysis herein, the pipes surrounding this area were upsized from 200mm to 250mm diameter watermains to increase the minimum pressures to the City's objective. Hydraulic modelling results show that in doing so, the minimum pressure at the cul-de-sac is at 40 psi and satisfies the City's guidelines. It is recommended that pressure testing be performed to confirm that pressures to not drop below 40 psi in this location.

Table 4-2: Residual Pressure during BSDY and PKHR Demands

Phase	BSDY	PKHR
	Max. Pressure (psi)	Min. Pressure (psi)
1	72	40
2	76	40

Multi-storey buildings require an additional 5 psi for every additional storey over two storeys to account for the change in elevation head and additional headloss. Based on a resulting minimum hydraulic gradeline of 153m under peak demand conditions in Area 6, the following are the "cut-off" elevations for various multiple storey buildings, above which, pressures would fall below the minimum pressure guideline objective:

Two storeys: ground elev. greater than 124.5m results in pressures less than 40 psi.
Three storeys: ground elev. greater than 121.0m results in equivalent pressures less than 40 psi.
Four storeys: ground elev. greater than 117.5m results in equivalent pressures less than 40 psi.

4.3 MAXIMUM DAY + FIRE FLOW

The City of Ottawa's design guidelines for water distribution systems require a minimum pressure of 20 psi to be maintained at all points in the distribution system under a condition of maximum day and fire flow demand. A hydraulic analysis was accomplished using a steady-state maximum day demand scenario along with the automated fire flow simulation feature of the software.

During 2013 conditions for Phase 1 and 2, the proposed network was able to supply fire flows greater than 10,000 L/min while maintaining a residual pressure of 20 psi at all locations in Area 6 except one location in the southwest of the development. This location was modelled as a dead-end and the available fire flow was approximately 8,000 L/min at a residual pressure of 20 psi. However, the latest site plan shows this area is anticipated to service single family homes and as per the FUS fire flow calculated for this unit type, the required fire flow is 8,000 L/min (**Appendix A**). See **Appendix B** for available fire flows as each location.

5.0 CONCLUSION

The proposed mixed residential development is located in an area of the City's water distribution system that has sufficient capacity to provide both the required domestic and emergency fire flows to the majority of the service area using the proposed piping alignment and sizing proposed.

During existing conditions, Phases 1 and 2 are expected to operate in objective range of 40 - 80 psi under BSDY and PKHR demands. It is recommended, however, that the dead-end location (cul-de-sac) located in the southwest portion of the development be checked for pressures to confirm minimum pressures do not drop below 40 psi.

A fire flow analysis was performed and it was determined that a fire flow greater than 10,000 L/min is achievable at all locations except for one dead-end located in the southwest portion of the development. Site plans show that location is anticipated to service single family homes and will require an FUS fire flow of 8,000L/min which is achievable.

Appendix A FUS FIRE FLOW CALCULATIONS

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS

Fire Flow Calculations - Towns (w/o Party Walls) (6 Unit Row)

As per Fire Underwriter's Survey Guidelines

PROJECT: Area 6 Lands **DATE: Aug 2015**
JOB#: 113004

		[yes/no]			
C	**Coefficient related to type of construction**				
	• Wood frame	y	1.5		
	• Ordinary construction		1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2) ***	***1,200***	<==>	12,917 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***11,432 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible	y	-25%		
	• Limited combustible		-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				8,574 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3	no	50%	***0 L/min***	(2)
	Exposure surcharge (cumulative (%), 2 sides)	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**75%**
				6,430 L/min	
	Fire Wall Separation	N/A			
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***6,430 L/min***	(3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***15,000 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***250 L/s***
	or	***3,303 IGPM***

BY: *Adam Lambros*

* Largest Block Size

NOVATECH
ENGINEERING
CONSULTANTS LTD.
ENGINEERS & PLANNERS

Fire Flow Calculations - Towns (w/o Party Walls) (Blocks 344&343)

As per Fire Underwriter's Survey Guidelines

PROJECT: Area 6 Lands **DATE: Aug 2015**

JOB#: 113004

		[yes/no]			
C	**Coefficient related to type of construction**				
	• Wood frame	y	1.5		
	• Ordinary construction		1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2) ***	***1,000***	<==>	10,764 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***10,436 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible	y	-25%		
	• Limited combustible		-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				7,827 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3	no	50%	***0 L/min***	(2)
	Exposure surcharge (cumulative (%), 2 sides)	[yes/no]			
	0 - 3 m	yes	25%	1 side	25%
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m	yes	5%	1 side	5%
			Cumulative Total		**60%**
				4,696 L/min	
	Fire Wall Separation	N/A			
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***4,696 L/min***	(3)
	REQUIRED FIRE FLOW [(1) - (2) + (3)]			***13,000 L/min***	
	(2,000 L/min < Fire Flow < 45,000 L/min)		***or***	***216.67 L/s***	
			or	***2,862 IGPM***	

BY: *Adam Lambros*

* Largest Block Size

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS

Fire Flow Calculations - Single Residential Unit (At Cul-De-Sac)

As per Fire Underwriter's Survey Guidelines

PROJECT: Area 6 Lands **DATE: Aug 2015**
JOB#: 113004

		[yes/no]			
C	**Coefficient related to type of construction**				
	• Wood frame	y	1.5		
	• Ordinary construction		1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2) ***	***360***	<==>	3,875 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***6,261 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible	y	-25%		
	• Limited combustible		-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				4,696 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3	no	50%	***0 L/min***	(2)
	Exposure surcharge (cumulative (%), 2 sides)	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m		20%		
	10.1 - 20 m		15%		
	20.1 - 30 m		10%		
	30.1- 45 m	yes	5%	2 side	10%
			Cumulative Total		**60%**
				2,818 L/min	
	Fire Wall Separation	N/A			
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***2,818 L/min***	(3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***8,000 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***133.33 L/s***
	or	***1,761 IGPM***

BY: *Adam Lambros*
* Largest Size Unit

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS

Fire Flow Calculations - Single Residential Unit (3,000sqft +)

As per Fire Underwriter's Survey Guidelines

PROJECT: Area 6 Lands **DATE: Aug 2015**
JOB#: 113004

		[yes/no]			
C	**Coefficient related to type of construction**				
	• Wood frame	y	1.5		
	• Ordinary construction		1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2) ***	***360***	<==>	3,875 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***6,261 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible	y	-25%		
	• Limited combustible		-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				4,696 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3	no	50%	***0 L/min***	(2)
	Exposure surcharge (cumulative (%), 2 sides)	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**75%**
				3,522 L/min	
	Fire Wall Separation	N/A			
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***3,522 L/min***	(3)

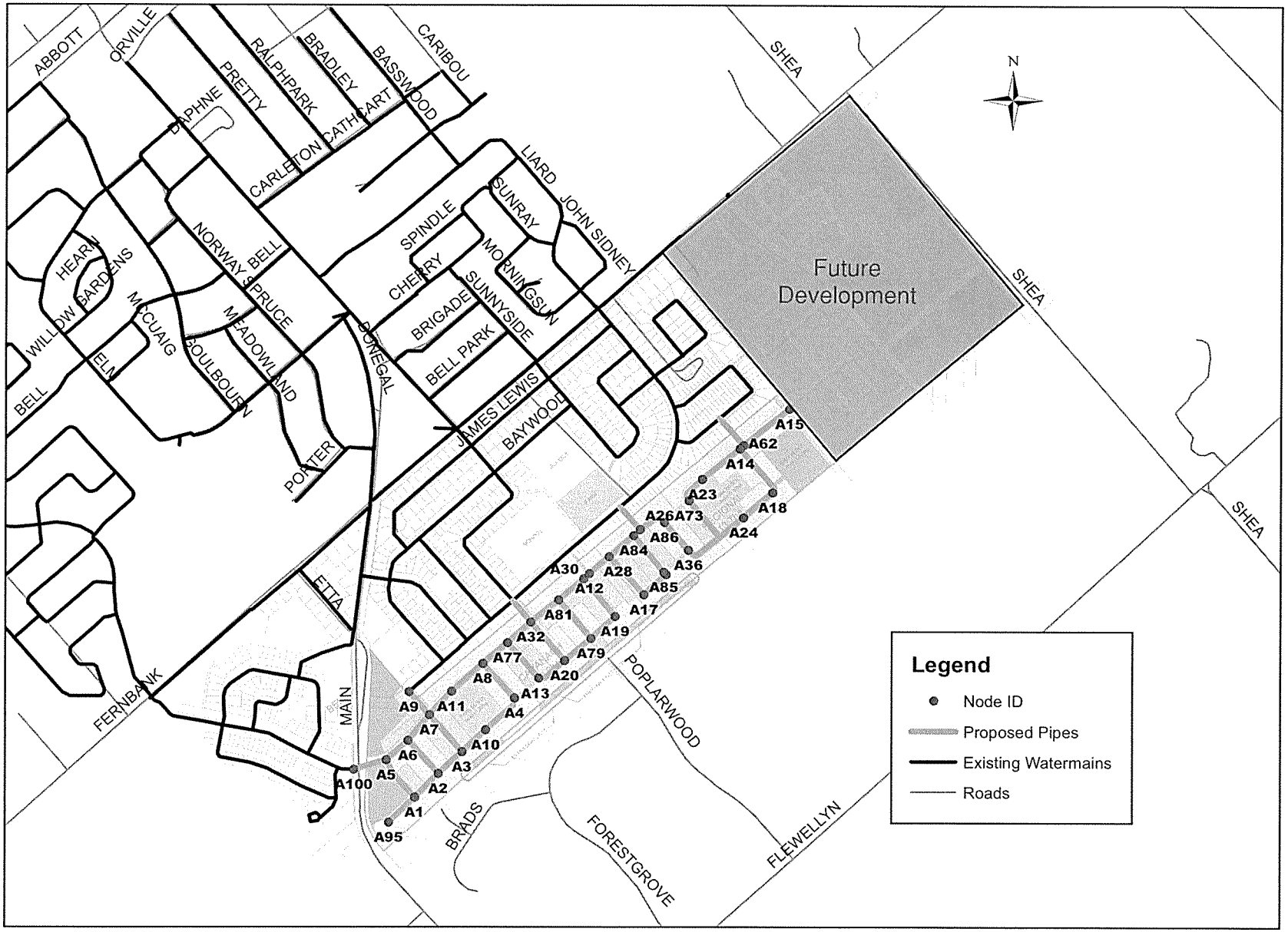
REQUIRED FIRE FLOW [(1) - (2) + (3)]		***8,000 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***133.33 L/s***
	or	***1,761 IGPM***

BY: *Adam Lambros*

* Largest Unit Size

Appendix B HYDRAULIC MODELLING RESULTS

Figure B-1: Node IDs



PHASE 1

	BSDY				PKHR			
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
A100	0.195	124.0	160.7	52	1.075	124.0	153.3	42
A6	0.195	122.2	160.7	55	1.075	122.2	153.3	44
A3	0.195	118.3	160.7	60	1.075	118.3	153.3	50
A10	0.385	117.4	160.7	62	0.385	117.4	153.3	51
A7	0.195	119.0	160.7	59	1.075	119.0	153.3	49
A11	0.385	116.8	160.7	62	0.385	116.8	153.3	52
A4	0.195	115.9	160.7	64	1.075	115.9	153.3	53
A13	0.195	113.5	160.7	67	1.075	113.5	153.3	57
A8	0.195	114.6	160.7	66	1.075	114.6	153.3	55
A77	0.195	113.5	160.7	67	1.075	113.5	153.3	57
A20	0.195	112.5	160.7	69	1.075	112.5	153.3	58
A79	0.195	112.6	160.7	68	1.075	112.6	153.3	58
A19	0.195	111.8	160.7	70	1.075	111.8	153.3	59
A32	0.195	112.9	160.7	68	1.075	112.9	153.3	57
A81	0.195	112.7	160.7	68	1.075	112.7	153.3	58
A30	0.195	111.7	160.7	70	1.075	111.7	153.3	59
A28	0.195	110.9	160.7	71	1.075	110.9	153.3	60
A17	0.195	110.5	160.7	71	1.075	110.5	153.3	61
A22	0.195	110.2	160.7	72	1.075	110.2	153.3	61
A26	0.195	111.8	160.7	70	1.075	111.8	153.3	59
A84	0.195	111.8	160.7	70	1.075	111.8	153.3	59
A85	0.195	110.2	160.7	72	1.075	110.2	153.3	61
A86	0.195	111.0	160.7	71	1.075	111.0	153.3	60
A36*	0.195	110.0	160.7	72	1.075	110.0	153.3	62
A12	0.195	111.7	160.7	70	1.075	111.7	153.3	59
A1	0.195	121.0	160.7	56	1.075	121.0	153.3	46
A2	0.195	119.0	160.7	59	1.075	119.0	153.3	49
A95**	0.195	125.0	160.7	51	1.075	125.0	153.3	40
A5	0.055	123.2	160.7	53	0.056	123.2	153.3	43
A9	0.055	119.1	160.7	59	0.056	119.1	153.3	49

*Node A36 is a connection to Phase 2; does remain a dead-end

**Node A95 is a dead-end located southwest of the development

PHASE 1
MXDY+FF

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (Lpm)	Residual Pressure (psi)	Available Flow at Hydrant (Lpm)	Available Flow Pressure (psi)
A1	0.489	49	155.4	10,000	23	13,000	20
A10	0.385	54	155.4	10,000	27	13,000	20
A100	0.489	45	155.4	10,000	24	13,000	20
A11	0.385	55	155.4	10,000	35	16,000	20
A12	0.489	62	155.4	10,000	42	17,000	20
A13	0.489	60	155.4	10,000	35	15,000	20
A17	0.489	64	155.4	10,000	33	13,000	20
A19	0.489	62	155.4	10,000	37	15,000	20
A2	0.489	52	155.4	10,000	29	15,000	20
A20	0.489	61	155.4	10,000	40	16,000	20
A22	0.489	64	155.4	10,000	33	13,000	20
A26	0.489	62	155.4	10,000	40	16,000	20
A28	0.489	63	155.4	10,000	42	17,000	20
A3	0.489	53	155.4	10,000	30	15,000	20
A30	0.489	62	155.4	10,000	42	18,000	20
A32	0.489	60	155.4	10,000	43	19,000	20
A36*	0.489	65	155.4	10,000	17	12,000	20
A4	0.489	56	155.4	10,000	29	13,000	20
A5	0.056	46	155.4	10,000	26	13,000	20
A6	0.489	47	155.4	10,000	27	14,000	20
A7	0.489	52	155.4	10,000	33	16,000	20
A77	0.489	60	155.4	10,000	41	18,000	20
A79	0.489	61	155.4	10,000	39	16,000	20
A8	0.489	58	155.4	10,000	39	17,000	20
A81	0.489	61	155.4	10,000	42	18,000	20
A84	0.489	62	155.4	10,000	40	16,000	20
A85	0.489	64	155.4	10,000	34	13,000	20
A86	0.489	63	155.4	10,000	36	14,000	20
A9	0.056	52	155.4	10,000	31	15,000	20
A95**	0.489	43	155.4	10,000	-2	8,000	20

*Node A36 is a connection to Phase 2; does remain a dead-end
**Node A95 is a dead-end located southwest of the development

PHASE 2

	BSDY				PKHR			
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
A100	0.195	124.0	160.7	52	1.075	124.0	152.9	41
A6	0.195	122.2	160.7	55	1.075	122.2	152.9	44
A3	0.195	118.3	160.7	60	1.075	118.3	152.9	49
A10	0.385	117.4	160.7	62	0.385	117.4	152.9	50
A7	0.195	119.0	160.7	59	1.075	119.0	152.9	48
A11	0.385	116.8	160.7	62	0.385	116.8	152.9	51
A4	0.195	115.9	160.7	64	1.075	115.9	152.9	53
A13	0.195	113.5	160.7	67	1.075	113.5	152.9	56
A8	0.195	114.6	160.7	66	1.075	114.6	152.9	54
A77	0.195	113.5	160.7	67	1.075	113.5	152.9	56
A20	0.195	112.5	160.7	69	1.075	112.5	152.9	57
A79	0.195	112.6	160.7	68	1.075	112.6	152.9	57
A19	0.195	111.8	160.7	69	1.075	111.8	152.9	58
A32	0.195	112.9	160.7	68	1.075	112.9	152.9	57
A81	0.195	112.7	160.7	68	1.075	112.7	152.9	57
A30	0.195	111.7	160.7	70	1.075	111.7	152.9	59
A28	0.195	110.9	160.7	71	1.075	110.9	152.9	60
A17	0.195	110.5	160.7	71	1.075	110.5	152.9	60
A22	0.195	110.2	160.7	72	1.075	110.2	152.9	61
A26	0.195	111.8	160.7	69	1.075	111.8	152.9	58
A84	0.195	111.8	160.7	69	1.075	111.8	152.9	58
A85	0.195	110.2	160.7	72	1.075	110.2	152.9	61
A86	0.195	111.0	160.7	71	1.075	111.0	152.9	59
A36	0.195	110.0	160.7	72	1.075	110.0	152.9	61
A12	0.195	111.7	160.7	70	1.075	111.7	152.9	59
A1	0.195	121.0	160.7	56	1.075	121.0	152.9	45
A2	0.195	119.0	160.7	59	1.075	119.0	152.9	48
A95**	0.195	125.0	160.7	51	1.075	125.0	152.9	40
A5	0.647	123.2	160.7	53	3.556	123.2	152.9	42
A9	0.647	119.1	160.7	59	3.556	119.1	152.9	48
A24	0.237	107.7	160.7	75	0.237	107.7	152.8	64
A73	0.264	110.6	160.7	71	1.454	110.6	152.8	60
A23	0.237	109.4	160.7	73	0.237	109.4	152.8	62
A18	0.264	107.0	160.7	76	1.454	107.0	152.8	65
A62	0.264	107.7	160.7	75	1.454	107.7	152.9	64
A14	0.264	108.9	160.7	74	1.454	108.9	152.9	62
A15	0	107.5	160.7	76	0.061	107.5	152.9	64
A21	0.264	109.6	160.7	73	1.454	109.6	152.8	61

**Node A95 is a dead-end located southwest of the development

PHASE 2
MXDY+FF

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (Lpm)	Residual Pressure (psi)	Available Flow at Hydrant (Lpm)	Available Flow Pressure (psi)
A1	0.489	49	155.3	10,000	30	13,000	20
A10	0.385	54	155.3	10,000	31	13,000	20
A100	0.489	44	155.3	10,000	27	12,000	20
A11	0.385	55	155.3	10,000	38	16,000	20
A12	0.489	62	155.2	10,000	45	17,000	20
A13	0.489	59	155.3	10,000	38	15,000	20
A14	0.661	66	155.2	10,000	42	15,000	20
A15	0	68	155.2	10,000	33	12,000	20
A17	0.489	64	155.2	10,000	37	13,000	20
A18	0.661	69	155.2	10,000	43	15,000	20
A19	0.489	62	155.2	10,000	40	15,000	20
A2	0.489	52	155.3	10,000	34	14,000	20
A20	0.489	61	155.3	10,000	43	16,000	20
A21	0.489	65	155.2	10,000	41	15,000	20
A22	0.237	64	155.2	10,000	37	13,000	20
A23	0.237	65	155.2	10,000	34	12,000	20
A24	0.489	68	155.2	10,000	42	15,000	20
A26	0.489	62	155.2	10,000	44	17,000	20
A28	0.489	63	155.2	10,000	45	17,000	20
A3	0.489	52	155.3	10,000	35	15,000	20
A30	0.489	62	155.2	10,000	45	18,000	20
A32	0.489	60	155.3	10,000	46	19,000	20
A36	0.489	64	155.2	10,000	42	15,000	20
A4	1.616	56	155.3	10,000	32	13,000	20
A5	0.489	46	155.3	10,000	29	13,000	20
A6	0.661	47	155.3	10,000	30	13,000	20
A62	0.489	68	155.2	10,000	44	15,000	20
A7	0.661	52	155.3	10,000	36	15,000	20
A73	0.489	63	155.2	10,000	32	12,000	20
A77	0.489	59	155.3	10,000	44	18,000	20
A79	0.489	61	155.3	10,000	42	16,000	20
A8	0.489	58	155.3	10,000	42	17,000	20
A81	0.489	61	155.3	10,000	45	18,000	20
A84	0.489	62	155.2	10,000	44	17,000	20
A85	0.489	64	155.2	10,000	37	13,000	20
A86	1.616	63	155.2	10,000	43	16,000	20
A9	0.489	51	155.3	10,000	34	14,000	20
A95**	0.489	43	155.3	10,000	5.1	8,000	20

**Node A95 is a dead-end located southwest of the development

2 WATER SUPPLY

2.1 Existing Conditions

The proposed development is located within the service area of Pressure Zone 3W of the City of Ottawa water distribution system. The zone is fed by the Glen Cairn and Campeau Drive Pump Stations, both of which are remote from the site. Balancing storage during peak and fire flow conditions is provided by the Stittsville Elevated Tank. There are several existing watermains adjacent to the site including 200 mm diameter watermains on both Fernbank Road and Friendly Crescent and a 200 mm diameter watermain in Fernbank Road, west of the site. As part of the development of the adjacent Stittsville South lands a 250 mm watermain will be extended along Hickstead Drive which extends to Street No. 3 in Phase 1. **Figure 2.1** shows the location of the existing Water Plan adjacent to the site.

2.2 Serviceability Study

A conceptual water plan for the Stittsville South Area 6 area was included in the 2013 MSR study. A copy of the recommended plan, Watermain Concept Plan – Figure 6.1 from that report is included in **Appendix A**. The main elements of the recommended plan for the subject site include an extension of the proposed 250 mm diameter main spine through the subject site from the west (Regional Lands) and connecting to the existing watermain on Fernbank Road to the north.

2.3 Design Criteria

2.3.1 Water Demands

Water demands have been calculated for the full development including Phase 1. Per unit population density and consumption rates are taken from Tables 4.1 and 4.2 at the Ottawa Design Guidelines – Water Distribution and are summarized as follows:

- Single Family 3.4 person per unit
- Townhouse and Semi-Detached 2.7 person per unit
- Average Apartment 1.8 person per unit
- Residential Average Day Demand 350 l/cap/day
- Residential Peak Daily Demand 875 l/cap/day
- Residential Peak Hour Demand 1,925 l/cap/day
- ICI Average Day Demand 50,000 l/gross ha/day
- ICI Peak Daily Demand 75,000 l/gross ha/day
- ICI Peak Hour Demand 135,000 l/gross ha/day

Residential units in Phase 1 consist of single family, semi-detached and street townhouses. A future commercial site which is not part of this development is located at the north corner of the site adjacent to Fernbank and Shea Roads, the water demands for this site is included in the design. A watermain demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

	Full Development	Phase 1
• Average Day	10.85 l/s	6.39 l/s
• Maximum Day	25.53 l/s	14.39 l/s
• Peak Hour	55.25 l/s	30.76 l/s

2.3.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.3.3 Fire Flow Rates

The Fire Underwriters Survey (FUS) method of calculating fire flow requirements is to be used in accordance with the Ottawa Design Guidelines – Water Distribution. In the FUS method, wood frame buildings with separations less than three meters are considered one fire area. Buildings in the Davidson Lands Development are wood frame buildings, with separation less than three meters. An example is on Street No. 11 between lots 73 and 81 in which the 9 single family lots all have separations less than three meters thus making one fire area. A FUS calculation for this area is included in **Appendix A.** The calculations predict that the fire flow requirement needs to be 22,000 l/min which is impractical to supply with local watermains.

In the recent Technical Bulletin 'ISDTB-2014-02, Revisions to Ottawa Design Guidelines – Water', the fire flow requirements for single detached dwellings and traditional town and row houses can be capped at 10,000 l/min provided that there is a minimum separation of 10 meters between the backs of adjacent units and that the town and row house blocks are limited to 600 square meters of building areas and seven dwelling units. Since the residential units in the Davidson Lands meet the requirements of ISDTB-2014-02, the fire flow rate of 10,000 l/min (166.7 l/s) is used in the fire flow analysis.

There are no details for the future commercial site at the north of the development. Since the site is bisected by the Hydro One corridor there is a limit on the size of the building that can be placed on the site therefore a fire flow rate of 12,000 l/min (200 l/s) for the external commercial development is used in our fire flow analysis.

2.3.4 Boundary Conditions

The City of Ottawa has provided hydraulic boundary conditions at two locations; one at the existing main on Fernbank Road at Hartsmere Drive and the other at the southwest intersection of Friendly Crescent and Hartsmere Drive. Two separate conditions were given for the max day plus fire

scenario, one for the 167 l/s residential fire flow and a separate one for the 200 l/s commercial fire flow. A copy of the boundary conditions is included in **Appendix A** and summarized as follows:

	CONNECTION 1 FERNBANK ROAD	CONNECTION 2 FRIENDLY CRESCENT
Max HGL (Basic Day)	160.4 m	160.4 m
Peak Hour	151.1 m	150.8 m
Max Day + Fire (167 l/s Fire Flow)	142.3 m	135.2 m
Max Day + Fire (200 l/s Fire Flow)	137.5m	127.8 m

2.3.5 Hydraulic Model

A computer model for the overall Davidson Lands along with a separate model 1 containing only Phase 1 has been developed using the H20 MAP Version 6.0 program produced by MWH Soft Inc. The model includes the existing watermains and boundary conditions at Fernbank Road and Friendly Crescent.

2.4 Proposed Water Plan

2.4.1 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions for the overall development and Phase 1 only. Water pipes are sized to provide sufficient pressure and to deliver the required fire flows. During the design stage all mains are tested at the minimum 150 mm diameter size, while the pressure criteria is met with the minimum sized mains the fire flow requirement is not achieved at all locations. The main sizes are increased in an iterative process until the fire flow results are sufficient for both the overall sub-division and Phase 1.

Results of the hydraulic model are include in **Appendix A** and summarized as follows:

Scenario	**Overall**	**Phase 1 Only**
Basic Day (Max HGL) Pressure Range	454.5 to 534.8 kPa	459.5 to 535.9 kPa
Peak Hour Pressure Range	359.6 to 438.4 kPa	367.1 to 440.9 kPa
Max Day + 167 l/s Fire Flow Minimum Flow	163.9 l/s	150.5 l/s
Max Day + 200 l/s Fire Flow Minimum Flow	247.3 l/s	208.8 l/s

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure	All notes in both analysis have basic day pressures under 552 kPa, therefore pressure reducing control is not required for this development.
Minimum Pressure	All nodes in the model exceed the minimum value of 276 kPa (40 psi).

Fire Flow

All residential nodes exceed the fire flow requirement of 166.7 l/s in the overall development. The fire flow for the commercial site exceeds the 200 l/s requirement using the boundary condition for the 200 l/s flow.

Under the Phase 1 analysis, there is one location at Node J24 at the south intersection of Maygrass Way and Kayenta Street where the fire flow is less than the requirement. The Phase 1 fire flow at Node 24 is 150.5 l/s which is within 90% of the 166.7 l/s requirement, the fire flow at this node increases to 204.0 l/s when the adjacent Phase 2 is constructed.

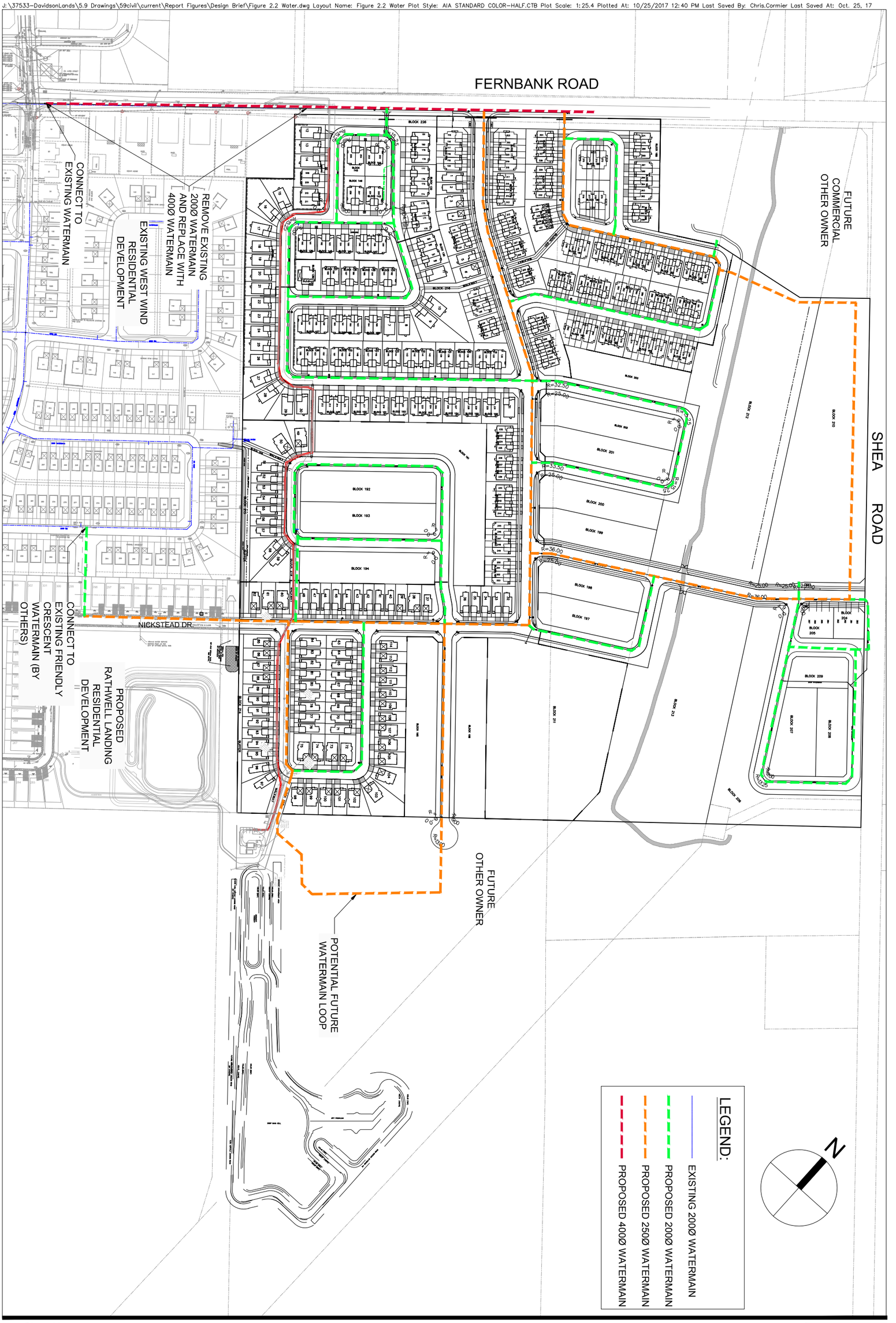
2.4.2 Watermain Layout

Figure 2.2 shows the proposed Water Plan for both Phase 1 and the balance of the sub-division.

In the 2013 MSR, a 400 mm watermain is proposed on Fernbank Road along the frontage of the Davidson Lands connecting to an existing 200 mm watermain that is shown on Figure 2.1. With the boundary conditions provided at Fernbank and Hartsmere Drive as shown in Section 2.3.4., the fire flows in the site range from 99.4 l/s to 146.4 l/s, in order to achieve the required fire flows the existing 200 mm watermain is required to be replaced and the 400 mm watermain will be extended to Hartsmere Drive.

A 250 mm watermain will be extended from the adjacent Stittsville South development along Hickstead Way and Edenwylde Drive to connect to the 400 mm main on Fernbank Road. For Phase 1 a second connection is required to the 400 mm main on Fernbank Road that will extend through Kayenta Street which is part of Phase 2. In order to service future Phases 2 and 3, a 250 mm watermain is required to connect to the 400 mm watermain on Fernbank Road at Jardiniere Street, this 250 mm main will, in a future phase cross the hydro corridor and a 250 mm main will be extended along Cosanti Drive connecting to the 250 mm main on Edenwylde Drive.

J:\37533-DavidsonLands\5.9 Drawings\59civil\current\Report Figures\Design Brief\Figure 2.2 Water.dwg Layout Name: Figure 2.2 Water Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 1:25.4 Plotted At: 10/25/2017 12:40 PM Last Saved By: Chris.Cormier Last Saved At: Oct. 25, 17



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 2.2	PROPOSED WATER PLAN	DESIGN BRIEF DAVIDSON LANDS-OPA 76 AREA 6a PHASE 1 STITTSVILLE SOUTH	N.T.S.

IBI

APPENDIX D

STORMWATER

J.F. Sabourin and Associates Inc.
52 Springbrook Drive,
Ottawa, ON K2S 1B9
T 613-836-3884 F 613-836-0332

jfsa.com

Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

January 30, 2023 Project Number: P2267

David Schaeffer Engineering Limited
120 Iber Road, Unit 103
Stittsville, ON
K2S 1E9

Attention: **Kevin Murphy, P.Eng.**

Subject: **Caivan – Stittsville Lands (5993, 6070 & 6115 Flewellyn Road): Pre-Development Hydraulic and Hydrologic Study**

Introduction

As set out in the Terms of References for the Caivan Stittsville Lands (5993, 6070 & 6115 Flewellyn Road), drafted by David Schaeffer Engineering Ltd (DSEL) on June 9, 2022, the pre-development hydraulic and hydrologic conditions of the proposed development site are required to be assessed. The following memo will assess the existing major flow patterns within and around the site, and outline the findings of a detailed pre-development water budget analysis based on hydrologic modelling using site-based soil data and historical rainfall data.

Site Overview

The subject lands are bound by Flewellyn Road to the south, Shea Road to the east, an existing urban subdivision development to the north (Stittsville South – Area 6) and an estate lot subdivision to the west. The area is also bisected by the Faulkner Municipal Drain and a Hydro One power transmission corridor. For this study, the overall development area has been broken into two sections (referred to as east and west) bisected by the municipal drain and hydro corridor. The property parcel of 5993 Flewellyn Road (east) is cleared of trees and vegetation, while the west parcels (comprising 6070 & 6115 Flewellyn Road) are treed with patches of grassed areas. **Figure 1** provides an overview of the development site relative to the Faulkner drain and major roads.

Pre-Development Drainage

1m LiDAR flown in 2020 by the City of Ottawa has been obtained to determine the existing primary flow patterns within the site. This topographic data was imported into GIS software with watershed delineation tools applied to determine the drainage areas and primary flow paths within the site. **Figure 2** provides an overview of the primary existing subwatersheds and flow paths within the site.

From this analysis, it is seen that for the eastern lands, the site primarily consists of 2 major drainage areas both of which discharge to the Faulkner Drain on Flewellyn Road. For the west property, the drainage patterns are slightly more complex but approximately half of the lands discharge to the Faulkner Drain on Flewellyn road, while the remaining half discharges to the Faulkner drain which divides the east and west properties. Note that there is no external drainage area that flows across either site.

N

Legend

Development Area

Municipal Drain

SCALE: 1:6000

0 100 200 300 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

DSEL

Caivan - Stittsville Lands

Figure 1: Site Overview

PROJECT	P2267
DRAWN	TE
DATE	JAN 2023

C:\OneDrive\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2267-21\Design\GIS\20230125-Report Figures

N

Legend

- Drainage Areas
- Development Area
- Municipal Drain
- Primary Flow Paths
- Drainage Pattern

SCALE: 1:6000

0 100 200 300 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

DSEL

Caivan - Stittsville Lands

Figure 2: Existing Drainage Patterns

PROJECT	P2267
DRAWN	TE
DATE	JAN 2023

C:\OneDrive\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2267-21\Design\GIS\20230125-Report Figures

Pre-Development Water Budget Analysis

A continuous SWMHYMO model has been developed to assess the site's pre-development water budget. This model makes use of site-based infiltration testing results as well as local climatic conditions, the following sections outline each of these items in detail.

Soil Infiltration / CN

Paterson Group completed Guelph Permeameter testing throughout the site, to determine the site's soil infiltration rates. From this analysis, soils were tested at both shallow depths (approximately 0.3 m - 0.5 m below ground) and deeper depths (0.5 m >). Based on Paterson's site testing the majority of the site consist of Brown Silty Sand to Sandy Silt with some localized pockets of silty clay with sand. Overall the site was found to have soil infiltration rates in the range of **26 mm/hr** to **76 mm/hr.** The localized infiltration results of this testing have been mapped in GIS and an inverse distance weighting algorithm was applied to provide a complete infiltration map of the site, **Figure 3** provides an overview of this mapping. A full summary of Paterson's site infiltration testing can be found in **Attachment A**. Based on Paterson's Site investigation the soils present are considered a "Type C" hydrologic soil group.

The latest available (2021) aerial mapping for the City of Ottawa was used to discretize the various land use conditions throughout the development site. **Figure B1** in **Attachment B** provides a visual overview of the study area. This land use data was merged with the underlying soil types to derive a Curve Number (CN), based on applicable values outlined in Tables A2 and A3 in the SWMHYMO Manual. Each Curve Number was then weighted based on the total area within a given subcatchment to determine the weighted CN for that subcatchment, see **Table B1** in **Attachment B**. Based on this analysis the site has a CN* of **65** and **61** for the lands East and West of the Faulkner Drain respectively.

Time to Peak

The time-to-peak values have been calculated based on existing topography using the City of Ottawa LiDAR. Flow paths have been discretized based on the topographic data using GIS tools and the longest major flow path was identified; **Figure B2** in **Attachment B** outlines the flow path discretization. The upstream and downstream topographic elevations and flow lengths were identified and used in the calculations. For this natural subcatchment, the Federal Aviation Administration (FFA) method was determined to be the most appropriate method to calculate the Time to Peak. **Table B2 in Attachment B** provides full details of these calculations, along with other time-to-peak values using alternative t_p calculation methods.

Continuous Simulations

A continuous SWMHYMO model was developed to assess the site's water budget under pre-development conditions. This model was run using 36 years of hourly rainfall data from the Ottawa International Airport from 1967 to 2003 (excluding missing 2001 rainfall data), the average annual evaporation, infiltration and runoff volumes from the subject site were computed and compared. Note that this rain gauge is generally only operational for the months of April-November. Outside of this window precipitation is more likely to be in the form of snowfall and the soils are also more likely to be frozen, making it difficult to simulate such conditions with a hydrologic model using conventional City parameters, as such, this period has not been considered in the analysis.

BH 26-21
Brown Silty Clay w/ Sand
26 mm/hr

BH 37-21
Brown Silty Sand to Sandy Silt
72 mm/hr

BH 23-21
Brown Silty Clay w/ Sand
39 mm/hr

BH 11-21
Brown Silty Sand
60 mm/hr

BH 31-21
Brown Silty Sand to Sandy Silt
47 mm/hr

BH 22-21
Brown Silty Sand
47 mm/hr

BH 7-21
Brown Silty Sand
47 mm/hr

BH 17-21
Brown Silty Sand to Sandy Silt
74 mm/hr

BH 15-21
Brown Silty Sand to Sandy Silt
31 mm/hr

BH 2-21
Brown Silty Sand
76 mm/hr

BH 1-21
Brown Silty Sand
56 mm/hr

N

Legend

- Development Area
- Infiltration Locations

Infiltration (mm/hr)

- 25.00
- 30.00
- 35.00
- 40.00
- 45.00
- 50.00
- 55.00
- 60.00
- 65.00
- 70.00
- 75.00
- 80.00

SCALE: 1:6000

0 100 200 300 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

DSEL

Caivan - Stittsville Lands

Figure 3: Infiltration

PROJECT	P2267
DRAWN	TE
DATE	JAN 2023

Simulation Results

The complete SWMHYMO modelling input and output files have been provided in **Attachment B**. **Table B3** provides the full summary of the SWMHYMO modelling, based on the 39 years of data, and outlines the maximum, minimum and average volumes and percentages of precipitation that evaporate infiltrate and runs off the site, **Table 1** below is an excerpt this summary.

Table 1: Pre-Development Water Budget based on Continuous Simulations

Precipitation	Evaporation		Infiltration		Runoff	
(mm)	(mm)	(%)	(mm)	(%)	(mm)	(%)
589.1	370.7	63%	116.9	20%	101.6	17%

Based on the continuous simulations using 39 years of historical rainfall data it was determined that for the total development site, approximately **17%** of the annual rainfall will result in runoff, **63%** will evaporate and **20%** will infiltrate.

Existing Hydraulic Conditions

Robinson Consulting Inc completed an updated hydraulic model of the Faulkner Drain as a part of their December 2020 *"Amendment to the Engineer's Report for the Faulkner Municipal Drain"*. As a part of this study, modifications were proposed to the existing Faulkner Municipal Drain which included relocating a portion of the drain, lowering the drain profile, and modifying the cross-section of the drain to increase the capacity and reduce the potential for erosion of the steep banks. This study also considered the upgrading/replacement of 3 culverts within the drain. At the time of drafting this memo, these updates are either completed or currently under construction, as such can be reflective of current conditions.

Based on Table 4.2 of the Robinsons report there are three existing culverts that act as residential entrances on Flewellyn Road (Culverts 4+882.90, 5+055.00 & 5+185.40) that are either close to or have slightly less than the required capacity to safely convey the full 100-year flow. The culverts are likely controlling water levels along this portion of Flewellyn Road, as such these culverts should be revisited in the future to ensure that peak water levels are contained within the Faulkner Municipal drain.

Conclusion

In summary, a detailed topographic study has been undertaken on the site to identify all major flow paths within the development under existing conditions. From this analysis, it was found that for the eastern lands, the site primarily consists of 2 major drainage areas both of which discharge to the Faulkner Drain on Flewellyn Road. For the western lands, the drainage patterns are slightly more complex but approximately half of the lands discharge to the Faulkner Drain on Flewellyn Road, while the remaining half discharges to the Faulkner Drain where it divides the east and west properties.

Continuous hydrologic modelling has been completed which has made use of soil infiltration testing completed by Paterson Group to determine the site's predevelopment water budget. Based on this analysis it was determined that for the total development site, approximately **17%** of the annual rainfall will result in runoff, **63%** will evaporate and **20%** will infiltrate.

Based on Table 4.2 of the Robinsons report there are three existing culverts that act as residential entrances on Flewellyn Road (Culverts 4+882.90, 5+055.00 & 5+185.40) that are either close to or have slightly less than the required capacity to safely convey the full 100-year flow. The culverts are likely controlling water levels along this portion of Flewellyn Road, as such these culverts should be revisited in the future to ensure that peak water levels are contained within the Faulkner Municipal drain.

Yours truly,
J.F Sabourin and Associates Inc.

Jonathon Burnett, B.Eng, P.Eng
Water Resources Engineer

cc: J.F Sabourin, M.Eng, P.Eng
Director of Water Resources Projects

Figures

Figure 1: Site Overview
Figure 2: Existing Drainage Patterns
Figure 3: Soil Infiltration Map

Tables

Table 1A: Existing Water Budget Summary

Attachments

Attachment A: Paterson Group Soil Infiltration Testing
Attachment B: Water Budget Analysis

J.F. Sabourin and Associates Inc.
52 Springbrook Drive,
Ottawa, ON K2S 1B9
T 613-836-3884 F 613-836-0332

jfsa.com

Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment A

Paterson Group Soil infiltration Testing

Table 1 - Overburden Field Saturated Hydraulic Conductivity Results and Estimated Infiltration Rates				
Test Completed Adjacent to Borehole ID	**Infiltration Testing Elevation (m asl)**	**Material**	**K_{fs} (m/s)**	**Unfactored Infiltration Rate (mm/hr)***
BH1-21	103.90	Brown Silty Sand	2.10E-06	56
	103.63	Brown Silty Sand	1.90E-06	56
BH2-21	106.95	Brown Silty Sand	6.40E-06	76
	106.65	Brown Silty Sand	5.30E-07	39
BH7-21	106.74	Brown Silty Sand	1.10E-06	47
	106.44	Brown Silty Sand	1.60E-06	52
BH11-21	104.68	Brown Silty Sand	2.70E-06	60
	104.38	Brown Silty Sand	1.60E-06	52
BH15-21	102.70	Brown Silty Sand to Sandy Silt	2.10E-07	31
	102.48	Brown Silty Sand to Sandy Silt	≤ 8.1E-09	≤ 13
BH17-21	106.74	Brown Silty Sand to Sandy Silt	5.90E-06	74
	106.44	Brown Silty Sand to Sandy Silt	4.10E-06	67
BH22-21	102.58	Brown Silty Sand	1.10E-06	47
	102.28	Brown Silty Sand	1.60E-06	52
BH23-21	102.33	Brown Silty Clay w/ Sand	5.30E-07	39
	101.70	Brown Silty Clay	≤ 8.1E-09	≤ 13
BH26-21	102.74	Brown Silty Clay w/ Sand	1.10E-07	26
	102.44	Brown Silty Clay w/ Sand	1.10E-07	26
BH29-21	101.87	Brown Silty Sand to Sandy Silt	5.30E-07	39
	101.57	Brown Silty Sand to Sandy Silt	2.70E-07	33
BH31-21	103.19	Brown Silty Sand to Sandy Silt	1.10E-06	47
	102.89	Brown Silty Sand to Sandy Silt	1.35E-07	27
BH37-21	103.21	Brown Silty Sand to Sandy Silt	5.30E-06	72
	102.91	Brown Silty Sand to Sandy Silt	5.90E-06	74

***The infiltration rates do not include a safety correction factor. Based on our testing results, a safety correction factor can range between 2.5 to ≥ 3.5.**

PARADE DRIVE

SHEA ROAD

FLEWELLYN ROAD

5993, 6070 & 6115 FLEWELLYN ROAD

CB 1
T/G=105.90

FH
T/S=106.93

MH 2
T/G=106.03

MH 1
T/G=105.42

BH 1A-22
107.31
(105.69)

BH 3-21
108.41
[106.86]

TP 15
106.80
[104.06]

BH 4-22
105.71
[102.10]

BH 11-21
104.98
(102.44)

BH 4-21
108.95
(106.72)

TP 5
108.36
[106.90]

BH 1-22
107.31
[104.97]

TP 4
108.49
[107.06]

BH 10-21
105.70
(102.86)

TP 16
104.62
[101.53]

BH 32-21
103.74
(101.38)

BH 33-21
104.70
[101.96]

BH 24-21
103.07
[98.65]

BH 5-21
108.38
(106.76)

HA 1-22
106.78

BH 7-21
107.04
(104.07)

BH 5-22
105.70
[103.41]

BH 12-21
104.05
(101.79)

TP 17
103.90
[102.12]

BH 37-21
103.54
(100.87)

BH 26-21
103.04
(100.88)

TP 6
107.91
[105.02]

BH 18-21
105.06
(102.39)

BH 38-21
103.62
(100.98)

BH 21-21
102.92
(100.69)

TP 3
102.10
[100.49]

BH 13-21
103.54
(101.94)

BH 36-21
102.79
(99.89)

BH 2-21
107.19
[104.98]

TP 7
106.31
[102.94]

BH 8-21
105.91
(104.31)

TP 14
105.60
(104.63)

BH 17-21
104.42
(102.26)

BH 25-21
102.73
(101.56)

TP 18
103.42
[102.10]

BH 27-21
102.71
(99.28)

BH 31-21
103.43
(97.31)

BH 6-21
106.32
(104.77)

TP 2
105.06
[103.42]

TP 13
104.30
[103.39]

BH 16-21
104.19
(102.69)

TP 8
105.48
[103.33]

BH 9-21
104.62
(103.40)

BH 14-21
103.28
(100.94)

BH 34-21
102.65
[97.44]

BH 30-21
102.44
(97.62)

BH 20-21
102.25
(98.06)

BH 23-21
102.38
(100.55)

TP 1
105.94
(105.50)

BH 2-22
103.58
[102.82]

TP 11
103.01
[101.52]

TP 12
103.21
[100.24]

BH 29-21
102.31
(98.35)

BH 3-22
102.25
[98.82]

BH 22-21
102.98
(99.50)

BH 19-21
101.85
(99.01)

BH 35-21
105.03
(101.52)

TP 9
104.47
[102.87]

BH 1-21
104.29
[102.10]

TP 10
103.62
[102.86]

BH 15-21
103.08
(101.81)

BH 3A-22
102.25
(99.10)

BH 28-21
101.85
(97.96)

BH 22A-21
102.98
[97.01]

Preliminary
10/21/2022 3:18:50 PM

LEGEND:

- HAND AUGER LOCATION (CURRENT INVESTIGATION)
- BOREHOLE WITH MONITORING WELL LOCATION (CURRENT INVESTIGATION)
- BOREHOLE WITH PIEZOMETER LOCATION (PATERSON GROUP REPORT; PG5570-2, JAN 20, 2022)
- BOREHOLE WITH MONITORING WELL LOCATION (PATERSON GROUP REPORT; PG5570-2, JAN 20, 2022)
- TEST PIT LOCATION\ (PATERSON GROUP REPORT; PG5570-1, JAN 3, 2021)

104.29 GROUND SURFACE ELEVATION (m)

[102.10] BEDROCK SURFACE ELEVATION (m)

(102.39) PRACTICAL REFUSAL TO AUGERING / EXCAVATION ELEVATION (m)

BASE PLAN PROVIDED BY KILGOUR & ASSOCIATES.

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:4000

0 50 100 150 200 250m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7S9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
2	BH 1-22 - BH 5-22 & HA1-22 ADDED TO PLAN	10/03/2022	KP
1	BH 1-21 - BH 38-21 ADDED TO PLAN	01/20/2022	OC

CAIVAN COMMUNITIES

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
5993, 6070 & 6115 FLEWELLYN ROAD
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:4000	Date: 01/2022
Drawn by: JM	Report No.: PG5570-2, REVISION 1
Checked by: KP	Dwg. No.: PG5570-1
Approved by: DJG	Revision No.: 2

p:\autocad drawings\geotechnical\pg55xx\pg5570\pg5570-1 tht\p (rev.02) report rev.1.dwg

11x17

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment B

Water Budget Analysis

N

Legend

- Development Area
- Impervious (SWM)
- Mature Forest
- Pasture and Shrubs
- Urban Lawn/ Shallow Rooted Crops

SCALE: 1:6000

0 100 200 300 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

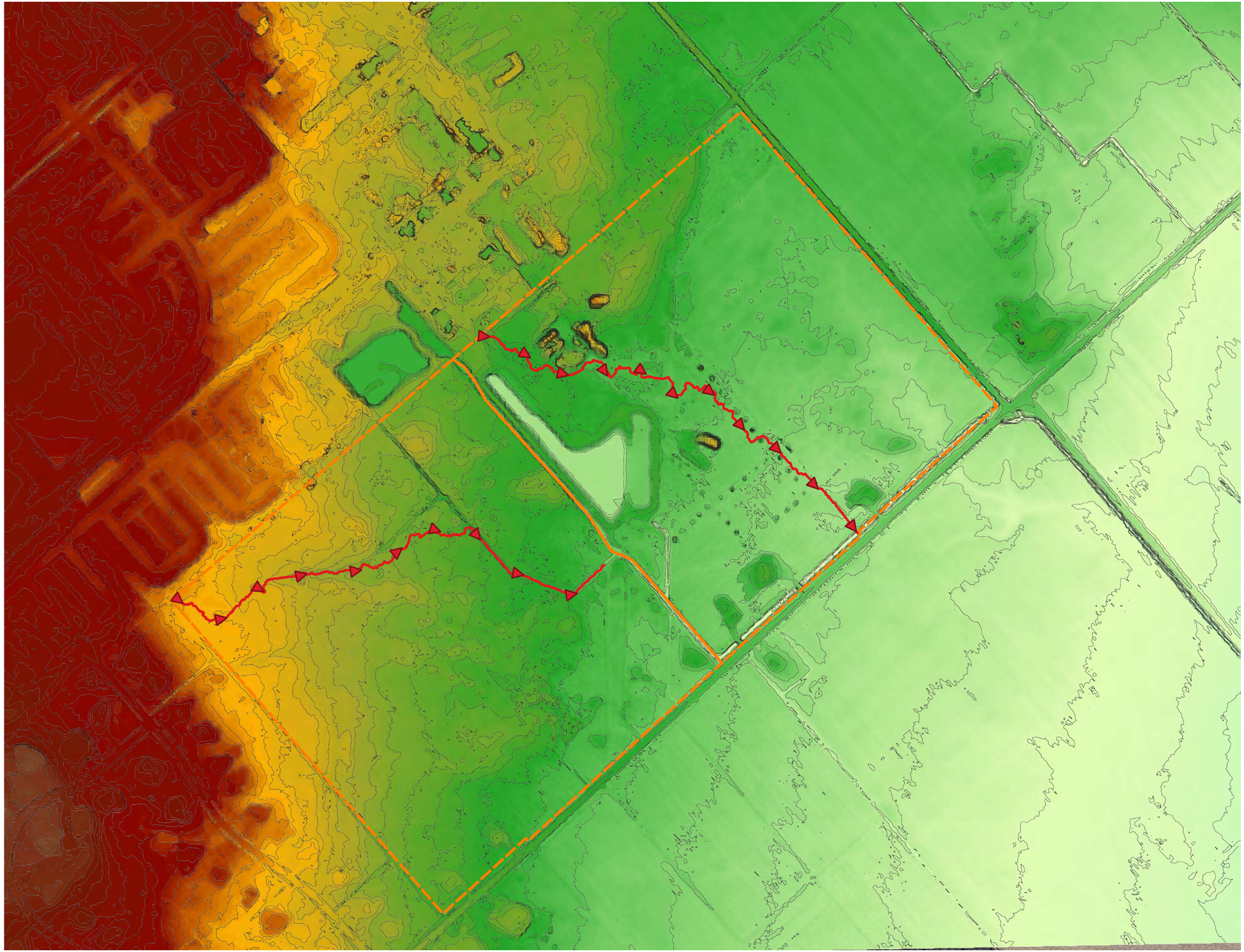
DSEL

Caivan - Stittsville Lands

Figure B1: Land Use

PROJECT	P2267
DRAWN	TE
DATE	JAN 2023

C:\OneDrive\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2267-21\Design\GIS\20230125-Report Figures



N

Legend

- Development Area
- Flow Lengths

Terrain (m)

- 98
- 100
- 103
- 106
- 109
- 112
- 115
- 118
- 121
- 124

SCALE: 1:6000

0 100 200 300 m

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com

DSEL

Caivan - Stittsville Lands

Figure B2: Flow Lengths

PROJECT	P2267
DRAWN	TE
DATE	JAN 2023

C:\OneDrive\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\2267-21\Design\GIS\20230125-Report Figures

Table B1: Calculation of SCS Curve Number (CN) and Modified Curve Number (CN*)

EAST (39.345 ha)							
Area (ha)	Land Type	Soil Name	Soil Condition	Soil Group	CN	% of Catchment	Weighted CN
15.625	Urban Lawn/Shallow Rooted Crops	Fine Sandy Loam	C	Fair	79	39.7%	31.4
22.565	Pasture and Shrubs	Fine Sandy Loam	C	Fair	70	57.4%	40.1
1.155	Impervious (SWM)	Fine Sandy Loam	C	Fair	99	2.9%	2.9
						CN	**74.4**
						CN*	**65**

WEST (39.847 ha)							
Area (ha)	Land Type	Soil Name	Soil Condition	Soil Group	CN	% of Catchment	Weighted CN
24.901	Mature Forest	Fine Sandy Loam	C	Fair	73	62.5%	45.6
14.946	Pasture and Shrubs	Fine Sandy Loam	C	Fair	70	37.5%	26.3
						CN	**71.9**
						CN*	**61**

Table B2: Time to Peak Calculations

Parameter	Units	East	West
Area	ha	39.35	39.85
CN*	-	65	61
Ptotal to calc C from CN, use 2 yr 3 hr Chicago stom	P(mm)	33.2	33.2
	Ia(mm)	4.67	4.67
	RV(mm)	4.8	4.3
Ptotal to calc C from CN, use 2 yr 24 hr SCS stom	P(mm)	52.77	52.77
	RV(mm)	12.3	11.0
C (From Chicago storm)	-	0.15	0.13
C (From SCS storm)	-	0.23	0.21
Length of Channel	m	1012	976
	ft	3320	3201
Elevation of Head Water	m	104.35	109.56
	ft	342	359
Elevation of Outlet	m	100.16	102.45
	ft	329	336
Average Slope	m/m	0.41%	0.73%
	ft/ft	0.41%	0.73%
Kirpich			
Time of Concentration	mins	33	26
Time to Peak	min	22	17
Time to Peak	Hours	0.37	0.29
FAA (From Chicago storm)			
Time of Concentration	mins	133	110
Time to Peak	mins	88	73
Time to Peak	Hours	1.47	1.22
FAA (From SCS storm)			
Time of Concentration	mins	121	101
Time to Peak	mins	80	67
Time to Peak	Hours	1.34	1.12
Barnsby Williams			
Time of Concentration	mins	48	41
Time to Peak	mins	32	28
Time to Peak	Hours	0.53	0.46
SCS			
Time of Concentration	mins	199	159
Time to Peak	mins	133	106
Time to Peak	Hours	2.21	1.77
Selected Method			
FAA (From Chicago storm)			
Time to Peak	min	88	73
Time to Peak	Hours	1.47	1.22

Note:

All methods calculated as per Appendix A of the SWMHYMO manual

Time to Peak calculated as 2/3 Time of concentration

```
20     Metric units / ID Numbers OFF
*#*************************************************************************
*#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
*#*************************************************************************
*#  Project Name  : [Caivan Stittsville West properties]
*#  Project Number: [2267]
*#  Date          : [2021/12/14]
*#  Modeller      : [JB]
*#  Company       : J.F. Sabourin and Associates
*#  License #     : 2549237
*#*************************************************************************
*#*************************************************************************
START               TZERO=[1967.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[67]
*%                   [""] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
*# Ottawa International Airport (1967 - 2003)
READ AES DATA       AES_FILENAME=["6106000.123"],
                    IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|-------------------------------------------------------|
COMPUTE API         APII=[50], APIK=[0.90]/day
*#########################################################################
*# Pre Development Condition - Using NASHHYD and CN
*#########################################################################
CONTINUOUS NASHYD   NHYD=["EastPre"], DT=[15]min, AREA=[39.35](ha),
                    DWF=[0](cms), CN/C=[65],IA=[5.5](mm),
                    N=[3], TP=[1.47]hrs,
                    Continuous simulation parameters:
                      IaRECper=[6](hrs),SMIN=[ -1 ](mm),  SMAX=[ -1 ](mm),
                      SK=[0.025]/(mm), InterEventTime=[ 12 ](hrs)
                    Baseflow simulation parameters:
                      BaseFlowOption=[1] , InitGWResVol=[ 0.0 ](mm), GWResK=[ 0.935
                      ](mm/day/mm)
                      VHydCond=[ 0.07  ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
CONTINUOUS NASHYD   NHYD=["WestPre"], DT=[15]min, AREA=[39.85](ha),
                    DWF=[0](cms), CN/C=[61], IA=[5.5](mm),
                    N=[3], TP=[1.22]hrs,
                    Continuous simulation parameters:
                      IaRECper=[6](hrs),SMIN=[ -1 ](mm),  SMAX=[ -1 ](mm),
                      SK=[0.025]/(mm), InterEventTime=[ 12 ](hrs)
                    Baseflow simulation parameters:
                      BaseFlowOption=[1] , InitGWResVol=[ 0.0 ](mm), GWResK=[ 0.935
                      ](mm/day/mm)
                      VHydCond=[ 0.07  ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD             NHYDsum=["Pre"], NHYDs to add=["WestPre"+"EastPre"]
*#########################################################################
*# Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
*#########################################################################
CONTINUOUS NASHYD   NHYD=["InfEastPre"], DT=[15]min, AREA=[39.35](ha),
                    DWF=[0](cms), CN/C=[99.99],IA=[5.5](mm),
                    N=[3], TP=[1.47]hrs,
                    Continuous simulation parameters:
                      IaRECper=[6](hrs),SMIN=[ -1 ](mm),  SMAX=[ -1 ](mm),
                      SK=[0.025]/(mm), InterEventTime=[ 12 ](hrs)
                    Baseflow simulation parameters:
                      BaseFlowOption=[1] , InitGWResVol=[ 0.0 ](mm), GWResK=[ 0.935
                      ](mm/day/mm)
                      VHydCond=[ 0.07  ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
CONTINUOUS NASHYD   NHYD=["InfWestPre"], DT=[15]min, AREA=[39.85](ha),
                    DWF=[0](cms), CN/C=[99.99], IA=[5.5](mm),
                    N=[3], TP=[1.22]hrs,
                    Continuous simulation parameters:
                      IaRECper=[6](hrs),SMIN=[ -1 ](mm),  SMAX=[ -1 ](mm),
                      SK=[0.025]/(mm), InterEventTime=[ 12 ](hrs)
                    Baseflow simulation parameters:
                      BaseFlowOption=[1] , InitGWResVol=[ 0.0 ](mm), GWResK=[ 0.935
                      ](mm/day/mm)
```

```
                      VHydCond=[ 0.07  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             NHYDsum=["InfPre"], NHYDs to add=["InfWestPre"+"InfEastPre"]
*%-----------------|---------------------------------------------------------|
*#########################################################################
*# STORMS
*#########################################################################
START               TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[68]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[69]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[70]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[71]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[72]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[73]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[74]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[75]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[76]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[77]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[78]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[79]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[80]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[81]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[82]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[83]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[84]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[85]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[86]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[87]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[88]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[89]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[90]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[91]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[92]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[93]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[94]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[95]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[96]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[97]
*%-----------------|---------------------------------------------------------|
START               TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[98]
*%-----------------|---------------------------------------------------------|
```

```
START                TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[99]
*%-----------------|-------------------------------------------------------|
START                TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[100]
*%-----------------|-------------------------------------------------------|
*% MISSING FROM AES RAINFALL DATA
*%START                TZERO=[2001.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[101]
*%-----------------|-------------------------------------------------------|
START                TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[102]
*%-----------------|-------------------------------------------------------|
START                TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[103]
*%-----------------|-------------------------------------------------------|
FINISH
```

```
00001>  ================================================================================
00002>
00003>  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   5555   =========
00004>  S       W   W   MM MM   H   H    Y Y    MM MM   O   O          2   2   0   0  11   5
00005>  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2   0   0  11   5       Ver 5.500
00006>      S   W W W   M   M   H   H     Y     M   M   O   O        222   0   0  11   555     FEB  2015
00007>  SSSSS    W W    M   M   H   H     Y     M   M    OOO        2     0   0  11     5     =========
00008>                                                              2     0   0  11     5     # 2549237
00009>          StormWater Management HYdrologic Model              222     000    11   555     =========
00010>
00011>  ********************************************************************************
00012>  ********************  SWMHYMO Ver 5.500  ***************************************
00013>  ********************  A single event and continuous hydrologic simulation model  ***
00014>  ********************     based on the principles of HYMO and its successors      ***
00015>  ********************          OTTHYMO-83 and OTTHYMO-89.                         ***
00016>  ********************************************************************************
00017>  ********************* Distributed by:  J.F. Sabourin and Associates Inc.          ***
00018>  ********************                  Ottawa,  Ontario: (613) 836-3884           ***
00019>  ********************                  Gatineau, Quebec: (819) 243-6858           ***
00020>  ********************                  E-Mail: swmhymo@jfsa.com                   ***
00021>  ********************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  ++++++++++++++++++ Licensed user: JFSAinc.                    ++++++++++++++++++
00025>  ++++++++++++++++++          Ottawa                 SERIAL#:2549237            ++++++++++++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  ********************  ++++++ PROGRAM ARRAY DIMENSIONS ++++++  ********************
00030>  ********************  Maximum value for ID numbers  :    11  ********************
00031>  ********************  Max. number of rainfall points: 105408 ********************
00032>  ********************  Max. number of flow points   : 105408 ********************
00033>  ********************************************************************************
00034>
00035>
00036>  ******************************  S U M M A R Y   O U T P U T  ************************
00037>  ********************************************************************************
00038>  *                    RUN DATE: 2023-01-25     TIME: 12:51:43     RUN COUNTER: 000842  *
00039>  ********************************************************************************
00040>  * Input   file: C:\Temp\202301-Pre_Dev-WB\STIT-Pre_v01.1-WB.dat                  *
00041>  * Output  file: C:\Temp\202301-Pre_Dev-WB\STIT-Pre_v01.1-WB.out                  *
00042>  * Summary file: C:\Temp\202301-Pre_Dev-WB\STIT-Pre_v01.1-WB.sum                  *
00043>  * User comments:                                                                *
00044>  * 1:_____________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________*
00047>  ********************************************************************************
00048>
00049>
00050> #*******************************************************************************
00051> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00052> #*******************************************************************************
00053> #  Project Name  : [Caivan Stittsville West properties]
00054> #  Project Number: [2267]
00055> #  Date          : [2021/12/14]
00056> #  Modeller      : [JB]
00057> #  Company       : J.F. Sabourin and Associates
00058> #  License #     : 2549237
00059> #*******************************************************************************
00060> #*******************************************************************************
00061>   ** END OF RUN :   66
00062>
00063>  ********************************************************************************
00064>
00065>
00066>
00067>
00068>
00069>  RUN#:COMMAND#
00070> R0067:C00001-------------------------------------------------------------------------
00071>      START
00072>       [TZERO =    .00 hrs on 19670101]
00073>       [METOUT=   2    (1=imperial, 2=metric output)]
00074>       [NSTORM=   0 ]
00075>       [NRUN  = 0067 ]
00076> #*******************************************************************************
00077> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00078> #*******************************************************************************
00079> #  Project Name  : [Caivan Stittsville West properties]
00080> #  Project Number: [2267]
00081> #  Date          : [2021/12/14]
00082> #  Modeller      : [JB]
00083> #  Company       : J.F. Sabourin and Associates
00084> #  License #     : 2549237
00085> #*******************************************************************************
00086> #*******************************************************************************
00087> # Ottawa International Airport (1967 - 2003)
00088> R0067:C00002-------------------------------------------------------------------------
00089>  *  READ AES DATA
00090>       [Filename  = 6106000.123                                              ]
00091>       [Start_date= 1967.0101: End_date= 1967.1231]
00092>       [DT= 60.min: Length= 3984.hrs: WetHrs=  257: DryHrs= 3727: PTOT= 386.90)
00093>       Maximum average rainfall intensities over
00094>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00095>        24.60    17.65    13.20     7.25     3.83     2.36     1.73     1.32      .90    mm/hr
00096>        24.60    35.20    39.60    43.50    46.00    56.60    62.30    63.20    64.90    mm
00097>      19670921 19670921 19670921 19670921 19670921 19670921 19670922 19670922 19670923 19670924  date
00098>      Number of rainfall events per following interevent time
00099>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00100>          80       65       56       40       32       29       24       20       18
00101>      Number of events with at least the following durations
00102>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00103>           79       42       29       14        3        0        0        0        0
00104> R0067:C00003-------------------------------------------------------------------------
00105>      COMPUTE API
00106>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00107>       [APImax= 76.77: APIavg= 24.81: APImin=  3.06)
00108> ###############################################################################
00109> # Pre Development Condition - Using NASHHYD and CN
00110> ###############################################################################
00111> R0067:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00112>      CONTINUOUS NASHYD     15.0 01:EastPre      39.35     .238 1967.0921_19:30   86.42 .223     .000
00113>       [CN= 65.0: N= 3.00: Tp= 1.47]
00114>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00115>       [InterEventTime=  12.00]
00116> R0067:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00117>      CONTINUOUS NASHYD     15.0 01:WestPre      39.85     .231 1967.0921_19:00   84.65 .219     .000
00118>       [CN= 61.0: N= 3.00: Tp= 1.22]
00119>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00120>       [InterEventTime=  12.00]
00121> R0067:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00122>      ADD HYD               15.0 02:WestPre      39.85     .231 1967.0921_19:00   84.65  n/a     .000
00123>                        +    15.0 02:EastPre      39.35     .238 1967.0921_19:30   86.42  n/a     .000
00124>                    SUM=     15.0 01:Pre          79.20     .468 1967.0921_19:15   85.53  n/a     .000
00125> ###############################################################################
00126> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
00127> ###############################################################################
00128> R0067:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00129>      CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35    1.023 1967.0921_18:45  173.24 .448     .000
00130>       [CN=100.0: N= 3.00: Tp= 1.47]
00131>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00132>       [InterEventTime=  12.00]
00133> R0067:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00134>      CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85    1.162 1967.0921_18:30  173.24 .448     .000
00135>       [CN=100.0: N= 3.00: Tp= 1.22]
00136>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00137>       [InterEventTime=  12.00]
00138> R0067:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00139>      ADD HYD               15.0 02:InfWestPre    39.85    1.162 1967.0921_18:30  173.24  n/a     .000
00140>                        +    15.0 02:InfEastPre    39.35    1.023 1967.0921_18:45  173.24  n/a     .000
00141>                    SUM=     15.0 01:InfPre        79.20    2.176 1967.0921_18:30  173.24  n/a     .000
00142> ###############################################################################
00143> # STORMS
00144> ###############################################################################
00145>   ** END OF RUN :   67
00146>
00147>  ********************************************************************************
00148>
00149>
00150>
00151>
00152>
00153>  RUN#:COMMAND#
00154> R0068:C00001-------------------------------------------------------------------------
00155>      START
00156>       [TZERO =    .00 hrs on 19680101]
00157>       [METOUT=   2    (1=imperial, 2=metric output)]
00158>       [NSTORM=   0 ]
00159>       [NRUN  = 0068 ]
00160> #*******************************************************************************
00161> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00162> #*******************************************************************************
00163> #  Project Name  : [Caivan Stittsville West properties]
00164> #  Project Number: [2267]
00165> #  Date          : [2021/12/14]
00166> #  Modeller      : [JB]
00167> #  Company       : J.F. Sabourin and Associates
00168> #  License #     : 2549237
00169> #*******************************************************************************
00170> #*******************************************************************************
00171> # Ottawa International Airport (1967 - 2003)
00172> R0068:C00002-------------------------------------------------------------------------
00173>  *  READ AES DATA
00174>       [Filename  = 6106000.123                                              ]
00175>       [Start_date= 1968.0101: End_date= 1968.1230]
00176>       [DT= 60.min: Length= 8784.hrs: WetHrs=  413: DryHrs= 8371: PTOT= 592.80)
00177>       Maximum average rainfall intensities over
00178>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00179>        33.30    17.05    11.37     6.23     3.74     1.87     1.26      .95      .70    mm/hr
00180>        33.30    34.10    34.10    37.40    44.90    44.90    45.40    45.40    50.20    mm
00181>      19680817 19680817 19680817 19680808 19680817 19680818 19680817 19680808 19680820  date
00182>      Number of rainfall events per following interevent time
00183>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00184>          137      105       93       84       72       63       48       43       36
00185>      Number of events with at least the following durations
00186>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00187>          136       76       49       18        5        0        0        0        0
00188> R0068:C00003-------------------------------------------------------------------------
00189>      COMPUTE API
00190>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00191>       [APImax= 67.52: APIavg= 16.69: APImin=  .27)
00192> ###############################################################################
00193> # Pre Development Condition - Using NASHHYD and CN
00194> ###############################################################################
00195> R0068:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00196>      CONTINUOUS NASHYD     15.0 01:EastPre      39.35     .219 1968.0818_ 6:15  109.87 .185     .000
00197>       [CN= 65.0: N= 3.00: Tp= 1.47]
00198>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00199>       [InterEventTime=  12.00]
00200> R0068:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00201>      CONTINUOUS NASHYD     15.0 01:WestPre      39.85     .231 1968.0818_ 6:00  107.93 .182     .000
00202>       [CN= 61.0: N= 3.00: Tp= 1.22]
00203>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00204>       [InterEventTime=  12.00]
00205> R0068:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00206>      ADD HYD               15.0 02:WestPre      39.85     .231 1968.0818_ 6:00  107.93  n/a     .000
00207>                        +    15.0 02:EastPre      39.35     .219 1968.0818_ 6:15  109.87  n/a     .000
00208>                    SUM=     15.0 01:Pre          79.20     .450 1968.0818_ 6:00  108.89  n/a     .000
00209> ###############################################################################
00210> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
00211> ###############################################################################
00212> R0068:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00213>      CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35    1.014 1968.0818_ 6:00  236.12 .398     .000
00214>       [CN=100.0: N= 3.00: Tp= 1.47]
00215>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00216>       [InterEventTime=  12.00]
00217> R0068:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00218>      CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85    1.224 1968.0818_ 5:45  236.12 .398     .000
00219>       [CN=100.0: N= 3.00: Tp= 1.22]
00220>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00221>       [InterEventTime=  12.00]
00222> R0068:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00223>      ADD HYD               15.0 02:InfWestPre    39.85    1.224 1968.0818_ 5:45  236.12  n/a     .000
00224>                        +    15.0 02:InfEastPre    39.35    1.014 1968.0818_ 6:00  236.12  n/a     .000
00225>                    SUM=     15.0 01:InfPre        79.20    2.205 1968.0818_ 5:45  236.12  n/a     .000
00226> ###############################################################################
00227> # STORMS
00228> ###############################################################################
00229>   ** END OF RUN :   68
00230>
00231>  ********************************************************************************
00232>
00233>
00234>
00235>
00236>
00237>  RUN#:COMMAND#
00238> R0069:C00001-------------------------------------------------------------------------
00239>      START
00240>       [TZERO =    .00 hrs on 19690101]
00241>       [METOUT=   2    (1=imperial, 2=metric output)]
00242>       [NSTORM=   0 ]
00243>       [NRUN  = 0069 ]
00244> #*******************************************************************************
00245> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00246> #*******************************************************************************
00247> #  Project Name  : [Caivan Stittsville West properties]
00248> #  Project Number: [2267]
00249> #  Date          : [2021/12/14]
00250> #  Modeller      : [JB]
00251> #  Company       : J.F. Sabourin and Associates
00252> #  License #     : 2549237
00253> #*******************************************************************************
00254> #*******************************************************************************
00255> # Ottawa International Airport (1967 - 2003)
00256> R0069:C00002-------------------------------------------------------------------------
00257>  *  READ AES DATA
00258>       [Filename  = 6106000.123                                              ]
00259>       [Start_date= 1969.0101: End_date= 1969.1231]
00260>       [DT= 60.min: Length= 8760.hrs: WetHrs=  469: DryHrs= 8291: PTOT= 569.80)
00261>       Maximum average rainfall intensities over
00262>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00263>        21.10    16.25    10.83     7.78     3.93     2.10     1.40     1.09      .75    mm/hr
00264>        21.10    32.50    32.50    46.70    47.20    50.30    50.30    52.10    54.00    mm
00265>      19690818 19690818 19690818 19690819 19690819 19690819 19690819 19690819 19690819  date
00266>      Number of rainfall events per following interevent time
00267>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00268>          157      119      107       92       72       58       49       43       32
00269>      Number of events with at least the following durations
00270>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00271>          156       84       58       21        5        0        0        0        0
00272> R0069:C00003-------------------------------------------------------------------------
00273>      COMPUTE API
00274>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00275>       [APImax= 56.77: APIavg= 16.04: APImin=  .06)
00276> ###############################################################################
00277> # Pre Development Condition - Using NASHHYD and CN
00278> ###############################################################################
00279> R0069:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00280>      CONTINUOUS NASHYD     15.0 01:EastPre      39.35     .215 1969.0819_ 3:00   90.65 .159     .000
00281>       [CN= 65.0: N= 3.00: Tp= 1.47]
00282>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00283>       [InterEventTime=  12.00]
00284> R0069:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00285>      CONTINUOUS NASHYD     15.0 01:WestPre      39.85     .223 1969.0819_ 2:45   88.71 .156     .000
00286>       [CN= 61.0: N= 3.00: Tp= 1.22]
00287>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00288>       [InterEventTime=  12.00]
00289> R0069:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00290>      ADD HYD               15.0 02:WestPre      39.85     .223 1969.0819_ 2:45   88.71  n/a     .000
00291>                        +    15.0 02:EastPre      39.35     .215 1969.0819_ 3:00   90.65  n/a     .000
00292>                    SUM=     15.0 01:Pre          79.20     .436 1969.0819_ 3:00   89.68  n/a     .000
00293> ###############################################################################
00294> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
00295> ###############################################################################
00296> R0069:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00297>      CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     .890 1969.0818_23:00  210.71 .370     .000
00298>       [CN=100.0: N= 3.00: Tp= 1.47]
00299>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00300>       [InterEventTime=  12.00]
00301> R0069:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00302>      CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85    1.061 1969.0818_22:45  210.72 .370     .000
00303>       [CN=100.0: N= 3.00: Tp= 1.22]
00304>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00305>       [InterEventTime=  12.00]
00306> R0069:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm-----RVmm-R.C.---DWFcms
00307>      ADD HYD               15.0 02:InfWestPre    39.85    1.061 1969.0818_22:45  210.72  n/a     .000
00308>                        +    15.0 02:InfEastPre    39.35     .890 1969.0818_23:00  210.72  n/a     .000
00309>                    SUM=     15.0 01:InfPre        79.20    1.951 1969.0818_22:45  210.72  n/a     .000
00310> ###############################################################################
00311> # STORMS
00312> ###############################################################################
00313>   ** END OF RUN :   69
00314>
00315>  ********************************************************************************
00316>
00317>
00318>
00319>
00320>
00321>  RUN#:COMMAND#
00322> R0070:C00001-------------------------------------------------------------------------
00323>      START
00324>       [TZERO =    .00 hrs on 19700101]
00325>       [METOUT=   2    (1=imperial, 2=metric output)]
00326>       [NSTORM=   0 ]
00327>       [NRUN  = 0070 ]
00328> #*******************************************************************************
00329> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00330> #*******************************************************************************
00331> #  Project Name  : [Caivan Stittsville West properties]
00332> #  Project Number: [2267]
00333> #  Date          : [2021/12/14]
00334> #  Modeller      : [JB]
00335> #  Company       : J.F. Sabourin and Associates
00336> #  License #     : 2549237
00337> #*******************************************************************************
00338> #*******************************************************************************
00339> # Ottawa International Airport (1967 - 2003)
00340> R0070:C00002-------------------------------------------------------------------------
00341>  *  READ AES DATA
00342>       [Filename  = 6106000.123                                              ]
00343>       [Start_date= 1970.0101: End_date= 1970.1231]
00344>       [DT= 60.min: Length= 8016.hrs: WetHrs=  373: DryHrs= 7643: PTOT= 558.90)
00345>       Maximum average rainfall intensities over
00346>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00347>        35.30    18.30    12.20     6.10     3.63     1.81     1.21     1.46      .99    mm/hr
00348>        35.30    36.60    36.60    36.60    43.50    43.50    43.50    69.90    71.20    mm
00349>      19700926 19700926 19700926 19700927 19700817 19700817 19700818 19700926 19700927  date
00350>      Number of rainfall events per following interevent time
00351>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00352>          148      127      109       84       72       60       53       40       29
00353>      Number of events with at least the following durations
00354>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00355>          147       79       40       15        3        0        0        0        0
00356> R0070:C00003-------------------------------------------------------------------------
00357>      COMPUTE API
00358>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00359>       [APImax= 76.00: APIavg= 17.31: APImin=  .23)
00360> ###############################################################################
```

```
00361> # Pre Development Condition - Using NASHYD and CN
00362> ##############################################################################
00363> R0070:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00364>      CONTINUOUS NASHYD    15.0 01:EastPre      39.35     .295 1970.0926_22:15   89.80 .161     .000
00365>        [CN= 65.0: N= 3.00: Tp= 1.47]
00366>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00367>        [InterEventTime=  12.00]
00368> R0070:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00369>      CONTINUOUS NASHYD    15.0 01:WestPre      39.85     .311 1970.0926_22:00   88.22 .158     .000
00370>        [CN= 61.0: N= 3.00: Tp= 1.22]
00371>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00372>        [InterEventTime=  12.00]
00373> R0070:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00374>      ADD HYD              15.0 02:WestPre      39.85     .311 1970.0926_22:00   88.22  n/a     .000
00375>                       +   15.0 02:EastPre      39.35     .295 1970.0926_22:15   89.80  n/a     .000
00376>                     SUM=  15.0 01:Pre          79.20     .600 1970.0926_22:00   89.00  n/a     .000
00377> ##############################################################################
00378> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00379> ##############################################################################
00380> R0070:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00381>      CONTINUOUS NASHYD    15.0 01:InfEastPre   39.35    1.108 1970.0926_22:00  200.34 .358     .000
00382>        [CN=100.0: N= 3.00: Tp= 1.47]
00383>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00384>        [InterEventTime=  12.00]
00385> R0070:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00386>      CONTINUOUS NASHYD    15.0 01:InfWestPre   39.85    1.329 1970.0926_21:45  200.34 .358     .000
00387>        [CN=100.0: N= 3.00: Tp= 1.22]
00388>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00389>        [InterEventTime=  12.00]
00390> R0070:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00391>      ADD HYD              15.0 02:InfWestPre   39.85    1.329 1970.0926_21:45  200.34  n/a     .000
00392>                       +   15.0 02:InfEastPre   39.35    1.108 1970.0926_22:00  200.34  n/a     .000
00393>                     SUM=  15.0 01:InfPre       79.20    2.409 1970.0926_22:00  200.34  n/a     .000
00394> ##############################################################################
00395> # STORMS
00396> ##############################################################################
00397>   ** END OF RUN :   70
00398>
00399> ******************************************************************************************************************
00400>
00401>
00402>
00403>
00404>
00405>  RUN#:COMMAND#
00406> R0071:C00001------------------------------------------------------------------------------------------------------
00407>      START
00408>        [TZERO =    .00 hrs on 19710101]
00409>        [METOUT=  2    (1=imperial, 2=metric output)]
00410>        [NSTORM=  0 ]
00411>        [NRUN  = 0071 ]
00412> ******************************************************************************
00413> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00414> ******************************************************************************
00415> #  Project Name  : [Caivan Stittsville West properties]
00416> #  Project Number: [2267]
00417> #  Date          : [2021/12/14]
00418> #  Modeller      : [JB]
00419> #  Company       : J.F. Sabourin and Associates
00420> #  License #     : 2549237
00421> ******************************************************************************
00422> ******************************************************************************
00423> # Ottawa International Airport (1967 - 2003)
00424> R0071:C00002------------------------------------------------------------------------------------------------------
00425>   *  READ AES DATA
00426>        [Filename  = 6106000.123                                                 ]
00427>        [Start_date= 1971.0101: End_date= 1971.1231]
00428>        [DT= 60.min: Length= 8760.hrs: WetHrs=  412: DryHrs= 8348: PTOT= 522.10)
00429>        Maximum average rainfall intensities over
00430>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00431>        24.60    16.60    11.67     6.13     3.09     1.56     1.06      .79      .54     mm/hr
00432>        24.60    33.20    35.00    36.80    37.10    37.40    38.00    38.00    38.90     mm
00433>      19710810 19710810 19710810 19710810 19710810 19710810 19710811 19710812 19710830  date
00434>      Number of rainfall events per following interevent time
00435>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00436>         156      123      113       93       72       61       52       42       33
00437>      Number of events with at least the following durations
00438>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00439>         155       81       59       21        2        0        0        0        0
00440> R0071:C00003------------------------------------------------------------------------------------------------------
00441>      COMPUTE API
00442>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00443>        {APImax=  62.22: APIavg= 14.84: APImin=   .36}
00444> ##############################################################################
00445> # Pre Development Condition - Using NASHYD and CN
00446> ##############################################################################
00447> R0071:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00448>      CONTINUOUS NASHYD    15.0 01:EastPre      39.35     .216 1971.0810_16:45   68.80 .132     .000
00449>        [CN= 65.0: N= 3.00: Tp= 1.47]
00450>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00451>        [InterEventTime=  12.00]
00452> R0071:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00453>      CONTINUOUS NASHYD    15.0 01:WestPre      39.85     .220 1971.0810_16:30   67.79 .130     .000
00454>        [CN= 61.0: N= 3.00: Tp= 1.22]
00455>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00456>        [InterEventTime=  12.00]
00457> R0071:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00458>      ADD HYD              15.0 02:WestPre      39.85     .220 1971.0810_16:30   67.79  n/a     .000
00459>                       +   15.0 02:EastPre      39.35     .216 1971.0810_16:45   68.80  n/a     .000
00460>                     SUM=  15.0 01:Pre          79.20     .433 1971.0810_16:30   68.29  n/a     .000
00461> ##############################################################################
00462> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00463> ##############################################################################
00464> R0071:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00465>      CONTINUOUS NASHYD    15.0 01:InfEastPre   39.35    1.003 1971.0810_16:30  160.66 .308     .000
00466>        [CN=100.0: N= 3.00: Tp= 1.47]
00467>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00468>        [InterEventTime=  12.00]
00469> R0071:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00470>      CONTINUOUS NASHYD    15.0 01:InfWestPre   39.85    1.162 1971.0810_16:15  160.66 .308     .000
00471>        [CN=100.0: N= 3.00: Tp= 1.22]
00472>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00473>        [InterEventTime=  12.00]
00474> R0071:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00475>      ADD HYD              15.0 02:InfWestPre   39.85    1.162 1971.0810_16:15  160.66  n/a     .000
00476>                       +   15.0 02:InfEastPre   39.35    1.003 1971.0810_16:30  160.66  n/a     .000
00477>                     SUM=  15.0 01:InfPre       79.20    2.161 1971.0810_16:15  160.66  n/a     .000
00478> ##############################################################################
00479> # STORMS
00480> ##############################################################################
00481>   ** END OF RUN :   71
00482>
00483> ******************************************************************************************************************
00484>
00485>
00486>
00487>
00488>
00489>  RUN#:COMMAND#
00490> R0072:C00001------------------------------------------------------------------------------------------------------
00491>      START
00492>        [TZERO =    .00 hrs on 19720101]
00493>        [METOUT=  2    (1=imperial, 2=metric output)]
00494>        [NSTORM=  0 ]
00495>        [NRUN  = 0072 ]
00496> ******************************************************************************
00497> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00498> ******************************************************************************
00499> #  Project Name  : [Caivan Stittsville West properties]
00500> #  Project Number: [2267]
00501> #  Date          : [2021/12/14]
00502> #  Modeller      : [JB]
00503> #  Company       : J.F. Sabourin and Associates
00504> #  License #     : 2549237
00505> ******************************************************************************
00506> ******************************************************************************
00507> # Ottawa International Airport (1967 - 2003)
00508> R0072:C00002------------------------------------------------------------------------------------------------------
00509>   *  READ AES DATA
00510>        [Filename  = 6106000.123                                                 ]
00511>        [Start_date= 1972.0101: End_date= 1972.1230]
00512>        [DT= 60.min: Length= 8760.hrs: WetHrs=  489: DryHrs= 8271: PTOT= 784.30)
00513>        Maximum average rainfall intensities over
00514>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00515>        37.30    19.15    12.97     8.15     4.50     2.53     2.00     1.71     1.17     mm/hr
00516>        37.30    38.30    38.90    48.90    54.00    60.70    72.10    82.20    84.20     mm
00517>      19720712 19720712 19720807 19720808 19720808 19720808 19720713 19720714 19720715  date
00518>      Number of rainfall events per following interevent time
00519>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00520>         170      133      122       86       76       60       45       41       31
00521>      Number of events with at least the following durations
00522>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00523>         169       96       58       21        5        0        0        0        0
00524> R0072:C00003------------------------------------------------------------------------------------------------------
00525>      COMPUTE API
00526>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00527>        {APImax=108.88: APIavg= 21.70: APImin=   .00}
00528> ##############################################################################
00529> # Pre Development Condition - Using NASHYD and CN
00530> ##############################################################################
00531> R0072:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00532>      CONTINUOUS NASHYD    15.0 01:EastPre      39.35     .438 1972.0808_ 0:00  191.56 .244     .000
00533>        [CN= 65.0: N= 3.00: Tp= 1.47]
00534>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00535>        [InterEventTime=  12.00]
00536> R0072:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00537>      CONTINUOUS NASHYD    15.0 01:WestPre      39.85     .465 1972.0807_23:45  188.98 .241     .000
00538>        [CN= 61.0: N= 3.00: Tp= 1.22]
00539>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00540>        [InterEventTime=  12.00]

00541> R0072:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00542>      ADD HYD              15.0 02:WestPre      39.85     .465 1972.0807_23:45  188.98  n/a     .000
00543>                       +   15.0 02:EastPre      39.35     .438 1972.0808_ 0:00  191.56  n/a     .000
00544>                     SUM=  15.0 01:Pre          79.20     .891 1972.0807_23:45  190.26  n/a     .000
00545> ##############################################################################
00546> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00547> ##############################################################################
00548> R0072:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00549>      CONTINUOUS NASHYD    15.0 01:InfEastPre   39.35    1.280 1972.0807_23:45  342.97 .437     .000
00550>        [CN=100.0: N= 3.00: Tp= 1.47]
00551>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00552>        [InterEventTime=  12.00]
00553> R0072:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00554>      CONTINUOUS NASHYD    15.0 01:InfWestPre   39.85    1.501 1972.0807_23:30  342.97 .437     .000
00555>        [CN=100.0: N= 3.00: Tp= 1.22]
00556>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00557>        [InterEventTime=  12.00]
00558> R0072:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00559>      ADD HYD              15.0 02:InfWestPre   39.85    1.501 1972.0807_23:30  342.97  n/a     .000
00560>                       +   15.0 02:InfEastPre   39.35    1.280 1972.0807_23:45  342.97  n/a     .000
00561>                     SUM=  15.0 01:InfPre       79.20    2.755 1972.0807_23:45  342.97  n/a     .000
00562> ##############################################################################
00563> # STORMS
00564> ##############################################################################
00565>   ** END OF RUN :   72
00566>
00567> ******************************************************************************************************************
00568>
00569>
00570>
00571>
00572>
00573>  RUN#:COMMAND#
00574> R0073:C00001------------------------------------------------------------------------------------------------------
00575>      START
00576>        [TZERO =    .00 hrs on 19730101]
00577>        [METOUT=  2    (1=imperial, 2=metric output)]
00578>        [NSTORM=  0 ]
00579>        [NRUN  = 0073 ]
00580> ******************************************************************************
00581> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00582> ******************************************************************************
00583> #  Project Name  : [Caivan Stittsville West properties]
00584> #  Project Number: [2267]
00585> #  Date          : [2021/12/14]
00586> #  Modeller      : [JB]
00587> #  Company       : J.F. Sabourin and Associates
00588> #  License #     : 2549237
00589> ******************************************************************************
00590> ******************************************************************************
00591> # Ottawa International Airport (1967 - 2003)
00592> R0073:C00002------------------------------------------------------------------------------------------------------
00593>   *  READ AES DATA
00594>        [Filename  = 6106000.123                                                 ]
00595>        [Start_date= 1973.0101: End_date= 1973.1231]
00596>        [DT= 60.min: Length= 8760.hrs: WetHrs=  549: DryHrs= 8211: PTOT= 744.90)
00597>        Maximum average rainfall intensities over
00598>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00599>        30.00    17.25    12.33     7.10     3.63     1.89     1.28      .96      .96     mm/hr
00600>        30.00    34.50    37.00    42.60    43.60    45.40    46.00    46.00    69.20     mm
00601>      19730611 19730808 19730808 19730808 19730808 19730808 19730616 19730616 19730616 19731005  date
00602>      Number of rainfall events per following interevent time
00603>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00604>         200      164      143      108       79       61       54       43       37
00605>      Number of events with at least the following durations
00606>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00607>         200      102       66       20        4        0        0        0        0
00608> R0073:C00003------------------------------------------------------------------------------------------------------
00609>      COMPUTE API
00610>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00611>        {APImax= 78.26: APIavg= 20.56: APImin=   .06}
00612> ##############################################################################
00613> # Pre Development Condition - Using NASHYD and CN
00614> ##############################################################################
00615> R0073:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00616>      CONTINUOUS NASHYD    15.0 01:EastPre      39.35     .355 1973.0808_21:00  142.52 .191     .000
00617>        [CN= 65.0: N= 3.00: Tp= 1.47]
00618>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00619>        [InterEventTime=  12.00]
00620> R0073:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00621>      CONTINUOUS NASHYD    15.0 01:WestPre      39.85     .372 1973.0808_20:45  139.70 .188     .000
00622>        [CN= 61.0: N= 3.00: Tp= 1.22]
00623>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00624>        [InterEventTime=  12.00]
00625> R0073:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00626>      ADD HYD              15.0 02:WestPre      39.85     .372 1973.0808_20:45  139.70  n/a     .000
00627>                       +   15.0 02:EastPre      39.35     .355 1973.0808_21:00  142.52  n/a     .000
00628>                     SUM=  15.0 01:Pre          79.20     .724 1973.0808_21:00  141.10  n/a     .000
00629> ##############################################################################
00630> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00631> ##############################################################################
00632> R0073:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00633>      CONTINUOUS NASHYD    15.0 01:InfEastPre   39.35    1.261 1973.0808_20:45  309.11 .415     .000
00634>        [CN=100.0: N= 3.00: Tp= 1.47]
00635>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00636>        [InterEventTime=  12.00]
00637> R0073:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00638>      CONTINUOUS NASHYD    15.0 01:InfWestPre   39.85    1.473 1973.0808_20:30  309.11 .415     .000
00639>        [CN=100.0: N= 3.00: Tp= 1.22]
00640>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00641>        [InterEventTime=  12.00]
00642> R0073:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00643>      ADD HYD              15.0 02:InfWestPre   39.85    1.473 1973.0808_20:30  309.11  n/a     .000
00644>                       +   15.0 02:InfEastPre   39.35    1.261 1973.0808_20:45  309.11  n/a     .000
00645>                     SUM=  15.0 01:InfPre       79.20    2.726 1973.0808_20:45  309.11  n/a     .000
00646> ##############################################################################
00647> # STORMS
00648> ##############################################################################
00649>   ** END OF RUN :   73
00650>
00651> ******************************************************************************************************************
00652>
00653>
00654>
00655>
00656>
00657>  RUN#:COMMAND#
00658> R0074:C00001------------------------------------------------------------------------------------------------------
00659>      START
00660>        [TZERO =    .00 hrs on 19740101]
00661>        [METOUT=  2    (1=imperial, 2=metric output)]
00662>        [NSTORM=  0 ]
00663>        [NRUN  = 0074 ]
00664> ******************************************************************************
00665> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00666> ******************************************************************************
00667> #  Project Name  : [Caivan Stittsville West properties]
00668> #  Project Number: [2267]
00669> #  Date          : [2021/12/14]
00670> #  Modeller      : [JB]
00671> #  Company       : J.F. Sabourin and Associates
00672> #  License #     : 2549237
00673> ******************************************************************************
00674> ******************************************************************************
00675> # Ottawa International Airport (1967 - 2003)
00676> R0074:C00002------------------------------------------------------------------------------------------------------
00677>   *  READ AES DATA
00678>        [Filename  = 6106000.123                                                 ]
00679>        [Start_date= 1974.0101: End_date= 1974.1231]
00680>        [DT= 60.min: Length= 8760.hrs: WetHrs=  320: DryHrs= 8440: PTOT= 386.20)
00681>        Maximum average rainfall intensities over
00682>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00683>        20.60    15.40    10.37     5.18     2.98     1.63     1.08      .81      .54     mm/hr
00684>        20.60    30.80    31.10    31.10    35.70    39.00    39.00    39.00    39.00     mm
00685>      19740718 19740719 19740719 19740719 19740305 19740305 19740306 19740306 19740307  date
00686>      Number of rainfall events per following interevent time
00687>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00688>         129      105       93       77       63       50       38       33       23
00689>      Number of events with at least the following durations
00690>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00691>         128       66       32       10        3        0        0        0        0
00692> R0074:C00003------------------------------------------------------------------------------------------------------
00693>      COMPUTE API
00694>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00695>        {APImax= 52.93: APIavg= 11.36: APImin=   .00}
00696> ##############################################################################
00697> # Pre Development Condition - Using NASHYD and CN
00698> ##############################################################################
00699> R0074:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00700>      CONTINUOUS NASHYD    15.0 01:EastPre      39.35     .127 1974.0719_ 1:45   42.84 .111     .000
00701>        [CN= 65.0: N= 3.00: Tp= 1.47]
00702>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00703>        [InterEventTime=  12.00]
00704> R0074:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00705>      CONTINUOUS NASHYD    15.0 01:WestPre      39.85     .129 1974.0719_ 1:30   41.96 .109     .000
00706>        [CN= 61.0: N= 3.00: Tp= 1.22]
00707>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00708>        [InterEventTime=  12.00]
00709> R0074:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00710>      ADD HYD              15.0 02:WestPre      39.85     .129 1974.0719_ 1:30   41.96  n/a     .000
00711>                       +   15.0 02:EastPre      39.35     .127 1974.0719_ 1:45   42.84  n/a     .000
00712>                     SUM=  15.0 01:Pre          79.20     .255 1974.0719_ 1:45   42.40  n/a     .000
00713> ##############################################################################
00714> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00715> ##############################################################################
00716> R0074:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00717>      CONTINUOUS NASHYD    15.0 01:InfEastPre   39.35     .790 1974.0719_ 1:30  105.03 .272     .000
00718>        [CN=100.0: N= 3.00: Tp= 1.47]
00719>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00720>        [InterEventTime=  12.00]
```

```
00721> R0074:c00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00722>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .916 1974.0719_ 1:15  105.03 .272     .000
00723>        [CN=100.0: N= 3.00: Tp= 1.22]
00724>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00725>        [InterEventTime=  12.00]
00726> R0074:c00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00727>      ADD HYD              15.0 02:InfWestPre    39.85     .916 1974.0719_ 1:15  105.03  n/a     .000
00728>                       +   15.0 02:InfEastPre    39.35     .790 1974.0719_ 1:30  105.03  n/a     .000
00729>                     SUM=  15.0 01:InfPre       79.20    1.704 1974.0719_ 1:30  105.03  n/a     .000
00730> ##########################################################################
00731> # STORMS
00732> ##########################################################################
00733>   ** END OF RUN :   74
00734>
00735> **************************************************************************************************
00736>
00737>
00738>
00739>
00740>
00741>  RUN#:COMMAND#
00742> R0075:C00001------------------------------------------------------------------------------------------
00743>       START
00744>        [TZERO =    .00 hrs on 19750101]
00745>        [METOUT=   2     (1=imperial, 2=metric output)]
00746>        [NSTORM=   0 ]
00747>        [NRUN  = 0075 ]
00748> **************************************************************************
00749> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00750> **************************************************************************
00751> #  Project Name  : [Caivan Stittsville West properties]
00752> #  Project Number: [2267]
00753> #  Date          : [2021/12/14]
00754> #  Modeller      : [JB]
00755> #  Company       : J.F. Sabourin and Associates
00756> #  License #     : 2549237
00757> **************************************************************************
00758> ##########################################################################
00759> # Ottawa International Airport (1967 - 2003)
00760> R0075:C00002------------------------------------------------------------------------------------------
00761>   *  READ AES DATA
00762>        [Filename  = 6106000.123                                                    ]
00763>        [Start_date= 1975.0101: End_date= 1975.1231]
00764>        [DT= 60.min: Length= 8760.hrs: WetHrs=  344: DryHrs= 8416: PTOT= 535.50)
00765>        Maximum average rainfall intensities over
00766>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00767>         34.80    18.40    12.53     6.32     3.33     1.73     1.15      .87      .62     mm/hr
00768>         34.80    36.00    37.60    37.90    40.00    41.50    41.50    41.80    44.40     mm
00769>        19750708 19750720 19750720 19750720 19750721 19750721 19750721 19750721 19750928  date
00770>        Number of rainfall events per following interevent time
00771>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00772>           136      118       99       78       61       49       40       33       25
00773>        Number of events with at least the following durations
00774>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00775>           135       70       40       17        1        0        0        0        0
00776> R0075:c00003------------------------------------------------------------------------------------------
00777>       COMPUTE API
00778>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00779>        [APImax= 73.23: APIavg= 15.16: APImin=   .00]
00780> ##########################################################################
00781> # Pre Development Condition - Using NASHYD and CN
00782> ##########################################################################
00783> R0075:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00784>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .226 1975.0720_18:00   89.74 .168     .000
00785>        [CN= 65.0: N= 3.00: Tp= 1.47]
00786>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00787>        [InterEventTime=  12.00]
00788> R0075:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00789>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .231 1975.0720_17:45   88.19 .165     .000
00790>        [CN= 61.0: N= 3.00: Tp= 1.22]
00791>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00792>        [InterEventTime=  12.00]
00793> R0075:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00794>      ADD HYD              39.85     .231 1975.0720_17:45   88.19  n/a     .000
00795>                       +   15.0 02:EastPre       39.35     .226 1975.0720_18:00   89.74  n/a     .000
00796>                     SUM=  15.0 01:Pre          79.20     .457 1975.0720_17:45   88.96  n/a     .000
00797> ##########################################################################
00798> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00799> ##########################################################################
00800> R0075:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00801>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.031 1975.0720_17:30  196.76 .367     .000
00802>        [CN=100.0: N= 3.00: Tp= 1.47]
00803>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00804>        [InterEventTime=  12.00]
00805> R0075:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00806>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.228 1975.0708_17:45  196.76 .367     .000
00807>        [CN=100.0: N= 3.00: Tp= 1.22]
00808>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00809>        [InterEventTime=  12.00]
00810> R0075:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00811>      ADD HYD              15.0 02:InfWestPre    39.85    1.228 1975.0708_17:45  196.76  n/a     .000
00812>                       +   15.0 02:InfEastPre    39.35    1.031 1975.0720_17:30  196.76  n/a     .000
00813>                     SUM=  15.0 01:InfPre       79.20    2.218 1975.0708_18:00  196.76  n/a     .000
00814> ##########################################################################
00815> # STORMS
00816> ##########################################################################
00817>   ** END OF RUN :   75
00818>
00819> **************************************************************************************************
00820>
00821>
00822>
00823>
00824>
00825>  RUN#:COMMAND#
00826> R0076:C00001------------------------------------------------------------------------------------------
00827>       START
00828>        [TZERO =    .00 hrs on 19760101]
00829>        [METOUT=   2     (1=imperial, 2=metric output)]
00830>        [NSTORM=   0 ]
00831>        [NRUN  = 0076 ]
00832> **************************************************************************
00833> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00834> **************************************************************************
00835> #  Project Name  : [Caivan Stittsville West properties]
00836> #  Project Number: [2267]
00837> #  Date          : [2021/12/14]
00838> #  Modeller      : [JB]
00839> #  Company       : J.F. Sabourin and Associates
00840> #  License #     : 2549237
00841> **************************************************************************
00842> **************************************************************************
00843> # Ottawa International Airport (1967 - 2003)
00844> R0076:C00002------------------------------------------------------------------------------------------
00845>   *  READ AES DATA
00846>        [Filename  = 6106000.123                                                    ]
00847>        [Start_date= 1976.0101: End_date= 1976.1230]
00848>        [DT= 60.min: Length= 8064.hrs: WetHrs=  389: DryHrs= 7675: PTOT= 492.40)
00849>        Maximum average rainfall intensities over
00850>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00851>         14.00     8.90     6.43     4.65     2.35     1.39      .97      .80      .60     mm/hr
00852>         14.00    17.80    19.30    27.90    28.20    33.30    35.10    46.60    57.50     mm
00853>        19760828 19760828 19760828 19760828 19760828 19760920 19760519 19760520 19760921  date
00854>        Number of rainfall events per following interevent time
00855>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00856>           173      139      123       96       76       59       44       38       28
00857>        Number of events with at least the following durations
00858>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00859>           172       80       46       13        1        0        0        0        0
00860> R0076:C00003------------------------------------------------------------------------------------------
00861>       COMPUTE API
00862>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00863>        [APImax= 59.67: APIavg= 15.32: APImin=   .02]
00864> ##########################################################################
00865> # Pre Development Condition - Using NASHYD and CN
00866> ##########################################################################
00867> R0076:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00868>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .117 1976.0519_23:15   60.12 .122     .000
00869>        [CN= 65.0: N= 3.00: Tp= 1.47]
00870>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00871>        [InterEventTime=  12.00]
00872> R0076:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00873>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .112 1976.0519_23:15   58.79 .119     .000
00874>        [CN= 61.0: N= 3.00: Tp= 1.22]
00875>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00876>        [InterEventTime=  12.00]
00877> R0076:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00878>      ADD HYD              15.0 02:WestPre       39.85     .112 1976.0519_23:15   58.79  n/a     .000
00879>                       +   15.0 02:EastPre       39.35     .117 1976.0519_23:15   60.12  n/a     .000
00880>                     SUM=  15.0 01:Pre          79.20     .229 1976.0519_23:15   59.45  n/a     .000
00881> ##########################################################################
00882> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00883> ##########################################################################
00884> R0076:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00885>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .391 1976.0828_23:00  143.78 .292     .000
00886>        [CN=100.0: N= 3.00: Tp= 1.47]
00887>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00888>        [InterEventTime=  12.00]
00889> R0076:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00890>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .409 1976.0828_22:45  143.78 .292     .000
00891>        [CN=100.0: N= 3.00: Tp= 1.22]
00892>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00893>        [InterEventTime=  12.00]
00894> R0076:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00895>      ADD HYD              15.0 02:InfWestPre    39.85     .409 1976.0828_22:45  143.78  n/a     .000
00896>                       +   15.0 02:InfEastPre    39.35     .391 1976.0828_23:00  143.78  n/a     .000
00897>                     SUM=  15.0 01:InfPre       79.20     .798 1976.0828_22:45  143.78  n/a     .000
00898> ##########################################################################
00899> # STORMS
00900> ##########################################################################
00901>   ** END OF RUN :   76
00902>
00903> **************************************************************************************************
00904>
00905>
00906>
00907>
00908>
00909>  RUN#:COMMAND#
00910> R0077:C00001------------------------------------------------------------------------------------------
00911>       START
00912>        [TZERO =    .00 hrs on 19770101]
00913>        [METOUT=   2     (1=imperial, 2=metric output)]
00914>        [NSTORM=   0 ]
00915>        [NRUN  = 0077 ]
00916> **************************************************************************
00917> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00918> **************************************************************************
00919> #  Project Name  : [Caivan Stittsville West properties]
00920> #  Project Number: [2267]
00921> #  Date          : [2021/12/14]
00922> #  Modeller      : [JB]
00923> #  Company       : J.F. Sabourin and Associates
00924> #  License #     : 2549237
00925> **************************************************************************
00926> **************************************************************************
00927> # Ottawa International Airport (1967 - 2003)
00928> R0077:C00002------------------------------------------------------------------------------------------
00929>   *  READ AES DATA
00930>        [Filename  = 6106000.123                                                    ]
00931>        [Start_date= 1977.0101: End_date= 1977.1231]
00932>        [DT= 60.min: Length= 8016.hrs: WetHrs=  511: DryHrs= 7505: PTOT= 677.60)
00933>        Maximum average rainfall intensities over
00934>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00935>         21.30    15.20    10.40     6.53     3.30     1.65     1.38     1.06      .73     mm/hr
00936>         21.30    30.40    31.20    39.20    39.60    39.60    49.60    51.00    52.40     mm
00937>        19770717 19770717 19770717 19770901 19770902 19770902 19770314 19770315 19770718  date
00938>        Number of rainfall events per following interevent time
00939>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00940>           188      156      139      107       82       61       52       41       28
00941>        Number of events with at least the following durations
00942>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
00943>           187       89       58       21        5        1        0        0        0
00944> R0077:c00003------------------------------------------------------------------------------------------
00945>       COMPUTE API
00946>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
00947>        [APImax= 74.28: APIavg= 20.62: APImin=  1.62)
00948> ##########################################################################
00949> # Pre Development Condition - Using NASHYD and CN
00950> ##########################################################################
00951> R0077:c00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00952>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .224 1977.0902_ 0:00  110.65 .163     .000
00953>        [CN= 65.0: N= 3.00: Tp= 1.47]
00954>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
00955>        [InterEventTime=  12.00]
00956> R0077:c00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00957>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .233 1977.0901_23:45  108.42 .160     .000
00958>        [CN= 61.0: N= 3.00: Tp= 1.22]
00959>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
00960>        [InterEventTime=  12.00]
00961> R0077:c00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00962>      ADD HYD              15.0 02:WestPre       39.85     .233 1977.0901_23:45  108.42  n/a     .000
00963>                       +   15.0 02:EastPre       39.35     .224 1977.0902_ 0:00  110.65  n/a     .000
00964>                     SUM=  15.0 01:Pre          79.20     .451 1977.0901_23:45  109.53  n/a     .000
00965> ##########################################################################
00966> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
00967> ##########################################################################
00968> R0077:c00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00969>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .943 1977.0901_23:45  247.00 .365     .000
00970>        [CN=100.0: N= 3.00: Tp= 1.47]
00971>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00972>        [InterEventTime=  12.00]
00973> R0077:c00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00974>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.083 1977.0901_23:30  247.00 .365     .000
00975>        [CN=100.0: N= 3.00: Tp= 1.22]
00976>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
00977>        [InterEventTime=  12.00]
00978> R0077:c00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00979>      ADD HYD              15.0 02:InfWestPre    39.85    1.083 1977.0901_23:30  247.00  n/a     .000
00980>                       +   15.0 02:InfEastPre    39.35     .943 1977.0901_23:45  247.00  n/a     .000
00981>                     SUM=  15.0 01:InfPre       79.20    2.008 1977.0901_23:45  247.00  n/a     .000
00982> ##########################################################################
00983> # STORMS
00984> ##########################################################################
00985>   ** END OF RUN :   77
00986>
00987> **************************************************************************************************
00988>
00989>
00990>
00991>
00992>
00993>  RUN#:COMMAND#
00994> R0078:C00001------------------------------------------------------------------------------------------
00995>       START
00996>        [TZERO =    .00 hrs on 19780101]
00997>        [METOUT=   2     (1=imperial, 2=metric output)]
00998>        [NSTORM=   0 ]
00999>        [NRUN  = 0078 ]
01000> **************************************************************************
01001> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01002> **************************************************************************
01003> #  Project Name  : [Caivan Stittsville West properties]
01004> #  Project Number: [2267]
01005> #  Date          : [2021/12/14]
01006> #  Modeller      : [JB]
01007> #  Company       : J.F. Sabourin and Associates
01008> #  License #     : 2549237
01009> **************************************************************************
01010> **************************************************************************
01011> # Ottawa International Airport (1967 - 2003)
01012> R0078:C00002------------------------------------------------------------------------------------------
01013>   *  READ AES DATA
01014>        [Filename  = 6106000.123                                                    ]
01015>        [Start_date= 1978.0101: End_date= 1978.1231]
01016>        [DT= 60.min: Length= 8040.hrs: WetHrs=  407: DryHrs= 7633: PTOT= 638.80)
01017>        Maximum average rainfall intensities over
01018>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01019>         36.00    18.15    12.10     6.05     3.04     1.62     1.13      .87      .58     mm/hr
01020>         36.00    36.30    36.30    36.30    36.50    38.80    40.60    41.60    41.60     mm
01021>        19780618 19780618 19780618 19780618 19780619 19780619 19780412 19780620 19780621  date
01022>        Number of rainfall events per following interevent time
01023>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01024>           167      135      126      103       76       60       53       45       31
01025>        Number of events with at least the following durations
01026>          1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01027>           166       78       48       17        1        0        0        0        0
01028> R0078:c00003------------------------------------------------------------------------------------------
01029>       COMPUTE API
01030>        [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01031>        [APImax= 65.36: APIavg= 19.25: APImin=   .25)
01032> ##########################################################################
01033> # Pre Development Condition - Using NASHYD and CN
01034> ##########################################################################
01035> R0078:c00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01036>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .263 1978.0618_18:15   87.81 .137     .000
01037>        [CN= 65.0: N= 3.00: Tp= 1.47]
01038>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01039>        [InterEventTime=  12.00]
01040> R0078:c00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01041>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .279 1978.0618_18:00   85.92 .135     .000
01042>        [CN= 61.0: N= 3.00: Tp= 1.22]
01043>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01044>        [InterEventTime=  12.00]
01045> R0078:c00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01046>      ADD HYD              15.0 02:WestPre       39.85     .279 1978.0618_18:00   85.92  n/a     .000
01047>                       +   15.0 02:EastPre       39.35     .263 1978.0618_18:15   87.81  n/a     .000
01048>                     SUM=  15.0 01:Pre          79.20     .540 1978.0618_18:00   86.86  n/a     .000
01049> ##########################################################################
01050> # Pre Development Condition - Using NASHYD and CN - No INFILTRATION
01051> ##########################################################################
01052> R0078:c00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01053>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.103 1978.0618_18:00  230.33 .361     .000
01054>        [CN=100.0: N= 3.00: Tp= 1.47]
01055>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01056>        [InterEventTime=  12.00]
01057> R0078:c00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01058>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.330 1978.0618_17:45  230.33 .361     .000
01059>        [CN=100.0: N= 3.00: Tp= 1.22]
01060>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01061>        [InterEventTime=  12.00]
01062> R0078:c00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01063>      ADD HYD              15.0 02:InfWestPre    39.85    1.330 1978.0618_17:45  230.33  n/a     .000
01064>                       +   15.0 02:InfEastPre    39.35    1.103 1978.0618_18:00  230.33  n/a     .000
01065>                     SUM=  15.0 01:InfPre       79.20    2.395 1978.0618_18:00  230.33  n/a     .000
01066> ##########################################################################
01067> # STORMS
01068> ##########################################################################
01069>   ** END OF RUN :   78
01070>
01071> **************************************************************************************************
01072>
01073>
01074>
01075>
01076>
01077>  RUN#:COMMAND#
01078> R0079:C00001------------------------------------------------------------------------------------------
01079>       START
01080>        [TZERO =    .00 hrs on 19790101]
```

```
01081>       [METOUT=  2    (1=imperial, 2=metric output)]
01082>       [NSTORM=  0 ]
01083>       [NRUN  = 0079 ]
01084> #*************************************************************************
01085> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01086> #*************************************************************************
01087> #  Project Name  : [Caivan Stittsville West properties]
01088> #  Project Number: [2267]
01089> #  Date          : [2021/12/14]
01090> #  Modeller      : [JB]
01091> #  Company       : J.F. Sabourin and Associates
01092> #  License #     : 2549237
01093> #*************************************************************************
01094> #*************************************************************************
01095> # Ottawa International Airport (1967 - 2003)
01096> R0079:C00002----------------------------------------------------------------------------
01097>   *  READ AES DATA
01098>       [Filename  = 6106000.123                                              ]
01099>       [Start_date= 1979.0101: End_date= 1979.1231]
01100>       (DT= 60.min: Length= 8760.hrs: WetHrs=  546: DryHrs= 8214: PTOT= 866.50)
01101>       Maximum average rainfall intensities over
01102>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01103>        34.90    22.00    14.67     7.33     5.14     2.63     1.75     1.31      .88    mm/hr
01104>        34.90    44.00    44.00    44.00    61.70    63.00    63.00    63.00    63.00    mm
01105>       19790916 19790616 19790616 19790616 19790914 19790915 19790915 19790915 19790917  date
01106>       Number of rainfall events per following interevent time
01107>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01108>          205      160      140      114       92       61       52       43       35
01109>       Number of events with at least the following durations
01110>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01111>          204       98       68       23        4        0        0        0        0
01112> R0079:C00003----------------------------------------------------------------------------
01113>       COMPUTE API
01114>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01115>       [APImax= 78.45: APIavg= 23.13: APImin=   .13]
01116> ##########################################################################
01117> # Pre Development Condition - Using NASHHYD and CN
01118> ##########################################################################
01119> R0079:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01120>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35      .382 1979.0616_15:00  198.36 .229     .000
01121>       [CN= 65.0: N= 3.00: Tp= 1.47)
01122>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01123>       [InterEventTime=  12.00]
01124> R0079:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01125>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85      .406 1979.0616_14:45  194.39 .224     .000
01126>       [CN= 61.0: N= 3.00: Tp= 1.22]
01127>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01128>       [InterEventTime=  12.00]
01129> R0079:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01130>      ADD HYD              15.0 02:WestPre       39.85      .406 1979.0616_14:45  194.39  n/a     .000
01131>                       +   15.0 02:EastPre       39.35      .382 1979.0616_15:00  198.36  n/a     .000
01132>                     SUM=  15.0 01:Pre          79.20      .785 1979.0616_15:00  196.37  n/a     .000
01133> ##########################################################################
01134> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01135> ##########################################################################
01136> R0079:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01137>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     1.379 1979.0616_15:00  400.19 .462     .000
01138>       [CN=100.0: N= 3.00: Tp= 1.47]
01139>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01140>       [InterEventTime=  12.00]
01141> R0079:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01142>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     1.653 1979.0616_14:45  400.19 .462     .000
01143>       [CN=100.0: N= 3.00: Tp= 1.22)
01144>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01145>       [InterEventTime=  12.00]
01146> R0079:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01147>      ADD HYD              15.0 02:InfWestPre    39.85     1.653 1979.0616_14:45  400.19  n/a     .000
01148>                       +   15.0 02:InfEastPre    39.35     1.379 1979.0616_15:00  400.19  n/a     .000
01149>                     SUM=  15.0 01:InfPre       79.20     3.018 1979.0616_14:45  400.19  n/a     .000
01150> ##########################################################################
01151> # STORMS
01152> ##########################################################################
01153>   ** END OF RUN :   79
01154>
01155> **************************************************************************************************
01156>
01157>
01158>
01159>
01160>
01161>  RUN#:COMMAND#
01162> R0080:C00001----------------------------------------------------------------------------
01163>      START
01164>       [TZERO =    .00 hrs on 19800101]
01165>       [METOUT=  2    (1=imperial, 2=metric output)]
01166>       [NSTORM=  0 ]
01167>       [NRUN  = 0080 ]
01168> #*************************************************************************
01169> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01170> #*************************************************************************
01171> #  Project Name  : [Caivan Stittsville West properties]
01172> #  Project Number: [2267]
01173> #  Date          : [2021/12/14]
01174> #  Modeller      : [JB]
01175> #  Company       : J.F. Sabourin and Associates
01176> #  License #     : 2549237
01177> #*************************************************************************
01178> #*************************************************************************
01179> # Ottawa International Airport (1967 - 2003)
01180> R0080:C00002----------------------------------------------------------------------------
01181>   *  READ AES DATA
01182>       [Filename  = 6106000.123                                              ]
01183>       [Start_date= 1980.0101: End_date= 1980.1230]
01184>       (DT= 60.min: Length= 8760.hrs: WetHrs=  427: DryHrs= 8333: PTOT= 622.00)
01185>       Maximum average rainfall intensities over
01186>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01187>        15.00     9.20     6.50     4.72     3.23     1.83     1.35     1.01      .86    mm/hr
01188>        15.00    18.40    19.50    28.30    38.80    43.80    48.60    48.60    62.00    mm
01189>       19800830 19800830 19801025 19801025 19800321 19800322 19801026 19801027 19800902  date
01190>       Number of rainfall events per following interevent time
01191>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01192>          175      141       64      129      107       64       47       42       25
01193>       Number of events with at least the following durations
01194>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01195>          174       88       50       13        3        0        0        0        0
01196> R0080:C00003----------------------------------------------------------------------------
01197>       COMPUTE API
01198>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01199>       [APImax= 68.74: APIavg= 17.50: APImin=   .06]
01200> ##########################################################################
01201> # Pre Development Condition - Using NASHHYD and CN
01202> ##########################################################################
01203> R0080:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01204>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35      .113 1980.0901_21:30   88.71 .143     .000
01205>       [CN= 65.0: N= 3.00: Tp= 1.47)
01206>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01207>       [InterEventTime=  12.00]
01208> R0080:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01209>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85      .115 1980.0901_21:15   86.82 .140     .000
01210>       [CN= 61.0: N= 3.00: Tp= 1.22)
01211>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01212>       [InterEventTime=  12.00]
01213> R0080:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01214>      ADD HYD              15.0 02:WestPre       39.85      .115 1980.0901_21:15   86.82  n/a     .000
01215>                       +   15.0 02:EastPre       39.35      .113 1980.0901_21:30   88.71  n/a     .000
01216>                     SUM=  15.0 01:Pre          79.20      .227 1980.0901_21:30   87.76  n/a     .000
01217> ##########################################################################
01218> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01219> ##########################################################################
01220> R0080:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01221>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35      .454 1980.1025_18:15  210.11 .338     .000
01222>       [CN=100.0: N= 3.00: Tp= 1.47]
01223>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01224>       [InterEventTime=  12.00]
01225> R0080:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01226>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85      .494 1980.1025_17:45  210.11 .338     .000
01227>       [CN=100.0: N= 3.00: Tp= 1.22]
01228>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01229>       [InterEventTime=  12.00]
01230> R0080:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01231>      ADD HYD              15.0 02:InfWestPre    39.85      .494 1980.1025_17:45  210.11  n/a     .000
01232>                       +   15.0 02:InfEastPre    39.35      .454 1980.1025_18:15  210.11  n/a     .000
01233>                     SUM=  15.0 01:InfPre       79.20      .940 1980.1025_18:00  210.11  n/a     .000
01234> ##########################################################################
01235> # STORMS
01236> ##########################################################################
01237>   ** END OF RUN :   80
01238>
01239> **************************************************************************************************
01240>
01241>
01242>
01243>
01244>
01245>  RUN#:COMMAND#
01246> R0081:C00001----------------------------------------------------------------------------
01247>      START
01248>       [TZERO =    .00 hrs on 19810101]
01249>       [METOUT=  2    (1=imperial, 2=metric output)]
01250>       [NSTORM=  0 ]
01251>       [NRUN  = 0081 ]
01252> #*************************************************************************
01253> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01254> #*************************************************************************
01255> #  Project Name  : [Caivan Stittsville West properties]
01256> #  Project Number: [2267]
01257> #  Date          : [2021/12/14]
01258> #  Modeller      : [JB]
01259> #  Company       : J.F. Sabourin and Associates
01260> #  License #     : 2549237
01261> #*************************************************************************
01262> #*************************************************************************
01263> # Ottawa International Airport (1967 - 2003)
01264> R0081:C00002----------------------------------------------------------------------------
01265>   *  READ AES DATA
01266>       [Filename  = 6106000.123                                              ]
01267>       [Start_date= 1981.0101: End_date= 1981.1231]
01268>       (DT= 60.min: Length= 8760.hrs: WetHrs=  641: DryHrs= 8119: PTOT= 936.40)
01269>       Maximum average rainfall intensities over
01270>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01271>        35.30    31.85    25.23    15.70     8.03     4.58     3.22     2.41     1.61    mm/hr
01272>        35.30    63.70    75.70    94.20    96.40   110.00   115.90   115.90   115.90    mm
01273>       19810805 19810805 19810805 19810805 19810805 19810805 19810806 19810806 19810807  date
01274>       Number of rainfall events per following interevent time
01275>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01276>          242      188      156      122       93       70       57       45       27
01277>       Number of events with at least the following durations
01278>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01279>          241      129       79       29        4        0        0        0        0
01280> R0081:C00003----------------------------------------------------------------------------
01281>       COMPUTE API
01282>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01283>       [APImax=116.15: APIavg= 25.69: APImin=   .26]
01284> ##########################################################################
01285> # Pre Development Condition - Using NASHHYD and CN
01286> ##########################################################################
01287> R0081:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01288>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     1.216 1981.0805_ 4:15  226.21 .242     .000
01289>       [CN= 65.0: N= 3.00: Tp= 1.47)
01290>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01291>       [InterEventTime=  12.00]
01292> R0081:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01293>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     1.206 1981.0805_ 3:30  222.76 .238     .000
01294>       [CN= 61.0: N= 3.00: Tp= 1.22]
01295>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01296>       [InterEventTime=  12.00]
01297> R0081:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01298>      ADD HYD              15.0 02:WestPre       39.85     1.206 1981.0805_ 3:30  222.76  n/a     .000
01299>                       +   15.0 02:EastPre       39.35     1.216 1981.0805_ 4:15  226.21  n/a     .000
01300>                     SUM=  15.0 01:Pre          79.20     2.402 1981.0805_ 4:15  224.48  n/a     .000
01301> ##########################################################################
01302> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01303> ##########################################################################
01304> R0081:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01305>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     2.274 1981.0805_ 3:00  399.82 .427     .000
01306>       [CN=100.0: N= 3.00: Tp= 1.47]
01307>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01308>       [InterEventTime=  12.00]
01309> R0081:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01310>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     2.577 1981.0805_ 2:45  399.82 .427     .000
01311>       [CN=100.0: N= 3.00: Tp= 1.22]
01312>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01313>       [InterEventTime=  12.00]
01314> R0081:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01315>      ADD HYD              15.0 02:InfWestPre    39.85     2.577 1981.0805_ 2:45  399.82  n/a     .000
01316>                       +   15.0 02:InfEastPre    39.35     2.274 1981.0805_ 3:00  399.82  n/a     .000
01317>                     SUM=  15.0 01:InfPre       79.20     4.809 1981.0805_ 2:45  399.82  n/a     .000
01318> ##########################################################################
01319> # STORMS
01320> ##########################################################################
01321>   ** END OF RUN :   81
01322>
01323> **************************************************************************************************
01324>
01325>
01326>
01327>
01328>
01329>  RUN#:COMMAND#
01330> R0082:C00001----------------------------------------------------------------------------
01331>      START
01332>       [TZERO =    .00 hrs on 19820101]
01333>       [METOUT=  2    (1=imperial, 2=metric output)]
01334>       [NSTORM=  0 ]
01335>       [NRUN  = 0082 ]
01336> #*************************************************************************
01337> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01338> #*************************************************************************
01339> #  Project Name  : [Caivan Stittsville West properties]
01340> #  Project Number: [2267]
01341> #  Date          : [2021/12/14]
01342> #  Modeller      : [JB]
01343> #  Company       : J.F. Sabourin and Associates
01344> #  License #     : 2549237
01345> #*************************************************************************
01346> #*************************************************************************
01347> # Ottawa International Airport (1967 - 2003)
01348> R0082:C00002----------------------------------------------------------------------------
01349>   *  READ AES DATA
01350>       [Filename  = 6106000.123                                              ]
01351>       [Start_date= 1982.0101: End_date= 1982.1231]
01352>       (DT= 60.min: Length= 8760.hrs: WetHrs=  436: DryHrs= 8324: PTOT= 596.10)
01353>       Maximum average rainfall intensities over
01354>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01355>        19.80    10.75     7.60     5.83     3.36     1.68     1.12     1.01      .80    mm/hr
01356>        19.80    21.50    22.80    35.00    40.30    40.30    40.30    48.70    57.30    mm
01357>       19820801 19820901 19820825 19820825 19820825 19820826 19820826 19820825 19820825  date
01358>       Number of rainfall events per following interevent time
01359>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01360>          154      122      112       89       74       58       47       41       32
01361>       Number of events with at least the following durations
01362>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01363>          153       84       59       16        4        1        0        0        0
01364> R0082:C00003----------------------------------------------------------------------------
01365>       COMPUTE API
01366>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01367>       [APImax= 56.86: APIavg= 16.78: APImin=   .03]
01368> ##########################################################################
01369> # Pre Development Condition - Using NASHHYD and CN
01370> ##########################################################################
01371> R0082:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01372>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35      .173 1982.0825_12:30   74.40 .125     .000
01373>       [CN= 65.0: N= 3.00: Tp= 1.47]
01374>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01375>       [InterEventTime=  12.00]
01376> R0082:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01377>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85      .166 1982.0825_12:15   72.84 .122     .000
01378>       [CN= 61.0: N= 3.00: Tp= 1.22]
01379>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01380>       [InterEventTime=  12.00]
01381> R0082:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01382>      ADD HYD              15.0 02:WestPre       39.85      .166 1982.0825_12:15   72.84  n/a     .000
01383>                       +   15.0 02:EastPre       39.35      .173 1982.0825_12:30   74.40  n/a     .000
01384>                     SUM=  15.0 01:Pre          79.20      .339 1982.0825_12:30   73.62  n/a     .000
01385> ##########################################################################
01386> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01387> ##########################################################################
01388> R0082:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01389>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35      .741 1982.0825_11:45  188.40 .316     .000
01390>       [CN=100.0: N= 3.00: Tp= 1.47]
01391>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01392>       [InterEventTime=  12.00]
01393> R0082:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01394>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85      .817 1982.0825_11:30  188.40 .316     .000
01395>       [CN=100.0: N= 3.00: Tp= 1.22]
01396>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01397>       [InterEventTime=  12.00]
01398> R0082:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01399>      ADD HYD              15.0 02:InfWestPre    39.85      .817 1982.0825_11:30  188.40  n/a     .000
01400>                       +   15.0 02:InfEastPre    39.35      .741 1982.0825_11:45  188.40  n/a     .000
01401>                     SUM=  15.0 01:InfPre       79.20     1.550 1982.0825_11:45  188.40  n/a     .000
01402> ##########################################################################
01403> # STORMS
01404> ##########################################################################
01405>   ** END OF RUN :   82
01406>
01407> **************************************************************************************************
01408>
01409>
01410>
01411>
01412>
01413>  RUN#:COMMAND#
01414> R0083:C00001----------------------------------------------------------------------------
01415>      START
01416>       [TZERO =    .00 hrs on 19830101]
01417>       [METOUT=  2    (1=imperial, 2=metric output)]
01418>       [NSTORM=  0 ]
01419>       [NRUN  = 0083 ]
01420> #*************************************************************************
01421> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01422> #*************************************************************************
01423> #  Project Name  : [Caivan Stittsville West properties]
01424> #  Project Number: [2267]
01425> #  Date          : [2021/12/14]
01426> #  Modeller      : [JB]
01427> #  Company       : J.F. Sabourin and Associates
01428> #  License #     : 2549237
01429> #*************************************************************************
01430> #*************************************************************************
01431> # Ottawa International Airport (1967 - 2003)
01432> R0083:C00002----------------------------------------------------------------------------
01433>   *  READ AES DATA
01434>       [Filename  = 6106000.123                                              ]
01435>       [Start_date= 1983.0101: End_date= 1983.1231]
01436>       (DT= 60.min: Length= 8760.hrs: WetHrs=  461: DryHrs= 8299: PTOT= 587.30)
01437>       Maximum average rainfall intensities over
01438>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01439>        10.40     9.70     7.53     5.43     3.27     2.32     1.67     1.32      .92    mm/hr
01440>        10.40    19.40    22.60    32.60    39.20    55.70    60.00    63.20    66.30    mm
```

```
01441>       19831004 19830921 19830921 19831005 19831005 19831005 19831006 19831006 19831008  date
01442>       Number of rainfall events per following interevent time
01443>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01444>          169      130      114       97       78       53       48       44       34
01445>       Number of events with at least the following durations
01446>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01447>          168       88       54       24        4        0        0        0        0
01448> R0083:C00003-----------------------------------------------------------------------------------------------
01449>      COMPUTE API
01450>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01451>       [APImax= 79.30: APIavg= 16.56: APImin=  .05]
01452> ##############################################################################
01453> # Pre Development Condition - Using NASHHYD and CN
01454> ##############################################################################
01455> R0083:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01456>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .215 1983.1005_17:15   78.00 .133     .000
01457>       [CN= 65.0: N= 3.00: Tp= 1.47]
01458>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01459>       [InterEventTime=  12.00]
01460> R0083:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01461>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .204 1983.1005_16:30   76.54 .130     .000
01462>       [CN= 61.0: N= 3.00: Tp= 1.22]
01463>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01464>       [InterEventTime=  12.00]
01465> R0083:C00006-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01466>      ADD HYD              15.0 02:WestPre       39.85     .204 1983.1005_16:30   76.54  n/a     .000
01467>                       +   15.0 02:EastPre      39.35     .215 1983.1005_17:15   78.00  n/a     .000
01468>                     SUM=  15.0 01:Pre          79.20     .416 1983.1005_17:00   77.26  n/a     .000
01469> ##############################################################################
01470> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01471> ##############################################################################
01472> R0083:C00007-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01473>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .663 1983.1005_16:30  174.51 .297     .000
01474>       [CN=100.0: N= 3.00: Tp= 1.47]
01475>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01476>       [InterEventTime=  12.00]
01477> R0083:C00008-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01478>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .735 1983.1005_16:00  174.51 .297     .000
01479>       [CN=100.0: N= 3.00: Tp= 1.22]
01480>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01481>       [InterEventTime=  12.00]
01482> R0083:C00009-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01483>      ADD HYD              15.0 02:InfWestPre    39.85     .735 1983.1005_16:00  174.51  n/a     .000
01484>                       +   15.0 02:InfEastPre    39.35     .663 1983.1005_16:30  174.51  n/a     .000
01485>                     SUM=  15.0 01:InfPre       79.20    1.391 1983.1005_16:15  174.51  n/a     .000
01486> ##############################################################################
01487> # STORMS
01488> ##############################################################################
01489>  ** END OF RUN :  83
01490>
01491> ********************************************************************************************************
01492>
01493>
01494>
01495>
01496>
01497>  RUN#:COMMAND#
01498> R0084:C00001-----------------------------------------------------------------------------------------------
01499>      START
01500>       [TZERO =     .00 hrs on 19840101]
01501>       [METOUT=   2    (1=imperial, 2=metric output)]
01502>       [NSTORM=   0 ]
01503>       [NRUN  = 0084 ]
01504> ********************************************************************************
01505> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01506> ********************************************************************************
01507> #  Project Name  : [Caivan Stittsville West properties]
01508> #  Project Number: [2267]
01509> #  Date          : [2021/12/14]
01510> #  Modeller      : [JB]
01511> #  Company       : J.F. Sabourin and Associates
01512> #  License #     : 2549237
01513> ********************************************************************************
01514> ********************************************************************************
01515> # Ottawa International Airport (1967 - 2003)
01516> R0084:C00002-----------------------------------------------------------------------------------------------
01517>  *  READ AES DATA
01518>       [Filename  = 6106000.123                                                  ]
01519>       [Start_date= 1984.0101: End_date= 1984.1230]
01520>       [DT= 60.min: Length= 8760.hrs: WetHrs=  308: DryHrs= 8452: PTOT= 459.40)
01521>       Maximum average rainfall intensities over
01522>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01523>        17.80     9.70     7.57     4.33     3.01     1.84     1.58     1.19     1.00    mm/hr
01524>        17.80    19.40    22.70    26.00    36.10    44.10    56.80    57.00    72.00    mm
01525>       19840812 19840812 19840812 19840812 19840806 19840812 19840813 19840813 19840814  date
01526>       Number of rainfall events per following interevent time
01527>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01528>          108       87       81       68       59       46       39       34       26
01529>       Number of events with at least the following durations
01530>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01531>          107       60       39       11        4        0        0        0        0
01532> R0084:C00003-----------------------------------------------------------------------------------------------
01533>      COMPUTE API
01534>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01535>       [APImax= 86.65: APIavg= 13.22: APImin=  .00]
01536> ##############################################################################
01537> # Pre Development Condition - Using NASHHYD and CN
01538> ##############################################################################
01539> R0084:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01540>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .173 1984.0813_ 7:45   82.99 .181     .000
01541>       [CN= 65.0: N= 3.00: Tp= 1.47]
01542>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01543>       [InterEventTime=  12.00]
01544> R0084:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01545>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .177 1984.0813_ 7:15   81.76 .178     .000
01546>       [CN= 61.0: N= 3.00: Tp= 1.22]
01547>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01548>       [InterEventTime=  12.00]
01549> R0084:C00006-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01550>      ADD HYD              15.0 02:WestPre       39.85     .177 1984.0813_ 7:15   81.76  n/a     .000
01551>                       +   15.0 02:EastPre      39.35     .173 1984.0813_ 7:45   82.99  n/a     .000
01552>                     SUM=  15.0 01:Pre          79.20     .348 1984.0813_ 7:30   82.37  n/a     .000
01553> ##############################################################################
01554> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01555> ##############################################################################
01556> R0084:C00007-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01557>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .595 1984.0812_ 8:00  178.56 .389     .000
01558>       [CN=100.0: N= 3.00: Tp= 1.47]
01559>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01560>       [InterEventTime=  12.00]
01561> R0084:C00008-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01562>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .713 1984.0812_ 7:45  178.56 .389     .000
01563>       [CN=100.0: N= 3.00: Tp= 1.22]
01564>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01565>       [InterEventTime=  12.00]
01566> R0084:C00009-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01567>      ADD HYD              15.0 02:InfWestPre    39.85     .713 1984.0812_ 7:45  178.56  n/a     .000
01568>                       +   15.0 02:InfEastPre    39.35     .595 1984.0812_ 8:00  178.56  n/a     .000
01569>                     SUM=  15.0 01:InfPre       79.20    1.292 1984.0812_ 7:45  178.56  n/a     .000
01570> ##############################################################################
01571> # STORMS
01572> ##############################################################################
01573>  ** END OF RUN :  84
01574>
01575> ********************************************************************************************************
01576>
01577>
01578>
01579>
01580>
01581>  RUN#:COMMAND#
01582> R0085:C00001-----------------------------------------------------------------------------------------------
01583>      START
01584>       [TZERO =     .00 hrs on 19850101]
01585>       [METOUT=   2    (1=imperial, 2=metric output)]
01586>       [NSTORM=   0 ]
01587>       [NRUN  = 0085 ]
01588> ********************************************************************************
01589> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01590> ********************************************************************************
01591> #  Project Name  : [Caivan Stittsville West properties]
01592> #  Project Number: [2267]
01593> #  Date          : [2021/12/14]
01594> #  Modeller      : [JB]
01595> #  Company       : J.F. Sabourin and Associates
01596> #  License #     : 2549237
01597> ********************************************************************************
01598> ********************************************************************************
01599> # Ottawa International Airport (1967 - 2003)
01600> R0085:C00002-----------------------------------------------------------------------------------------------
01601>  *  READ AES DATA
01602>       [Filename  = 6106000.123                                                  ]
01603>       [Start_date= 1985.0101: End_date= 1985.1231]
01604>       [DT= 60.min: Length= 8760.hrs: WetHrs=  354: DryHrs= 8406: PTOT= 559.90)
01605>       Maximum average rainfall intensities over
01606>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01607>        19.00    13.60     9.07     5.27     2.63     1.35     1.10      .82      .60    mm/hr
01608>        19.00    27.20    27.20    31.60    31.60    32.30    39.60    39.60    43.10    mm
01609>       19850716 19850617 19850617 19850618 19850618 19850224 19850619 19850619 19850225  date
01610>       Number of rainfall events per following interevent time
01611>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01612>          124       99       96       85       77       57       49       41       31
01613>       Number of events with at least the following durations
01614>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01615>          123       70       40       14        5        0        0        0        0
01616> R0085:C00003-----------------------------------------------------------------------------------------------
01617>      COMPUTE API
01618>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01619>       [APImax= 52.83: APIavg= 15.86: APImin=  .20]
01620> ##############################################################################
01621> # Pre Development Condition - Using NASHHYD and CN
01622> ##############################################################################
01623> R0085:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01624>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .109 1985.0618_ 0:00   85.30 .152     .000
01625>       [CN= 65.0: N= 3.00: Tp= 1.47]
01626>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01627>       [InterEventTime=  12.00]
01628> R0085:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01629>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .113 1985.0617_23:45   83.69 .149     .000
01630>       [CN= 61.0: N= 3.00: Tp= 1.22]
01631>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01632>       [InterEventTime=  12.00]
01633> R0085:C00006-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01634>      ADD HYD              15.0 02:WestPre       39.85     .113 1985.0617_23:45   83.68  n/a     .000
01635>                       +   15.0 02:EastPre      39.35     .109 1985.0618_ 0:00   85.30  n/a     .000
01636>                     SUM=  15.0 01:Pre          79.20     .218 1985.0617_23:45   84.49  n/a     .000
01637> ##############################################################################
01638> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01639> ##############################################################################
01640> R0085:C00007-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01641>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .691 1985.0617_23:45  218.00 .389     .000
01642>       [CN=100.0: N= 3.00: Tp= 1.47]
01643>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01644>       [InterEventTime=  12.00]
01645> R0085:C00008-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01646>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .817 1985.0617_23:30  218.00 .389     .000
01647>       [CN=100.0: N= 3.00: Tp= 1.22]
01648>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01649>       [InterEventTime=  12.00]
01650> R0085:C00009-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01651>      ADD HYD              15.0 02:InfWestPre    39.85     .817 1985.0617_23:30  218.00  n/a     .000
01652>                       +   15.0 02:InfEastPre    39.35     .691 1985.0617_23:45  218.00  n/a     .000
01653>                     SUM=  15.0 01:InfPre       79.20    1.500 1985.0617_23:45  218.00  n/a     .000
01654> ##############################################################################
01655> # STORMS
01656> ##############################################################################
01657>  ** END OF RUN :  85
01658>
01659> ********************************************************************************************************
01660>
01661>
01662>
01663>
01664>
01665>  RUN#:COMMAND#
01666> R0086:C00001-----------------------------------------------------------------------------------------------
01667>      START
01668>       [TZERO =     .00 hrs on 19860101]
01669>       [METOUT=   2    (1=imperial, 2=metric output)]
01670>       [NSTORM=   0 ]
01671>       [NRUN  = 0086 ]
01672> ********************************************************************************
01673> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01674> ********************************************************************************
01675> #  Project Name  : [Caivan Stittsville West properties]
01676> #  Project Number: [2267]
01677> #  Date          : [2021/12/14]
01678> #  Modeller      : [JB]
01679> #  Company       : J.F. Sabourin and Associates
01680> #  License #     : 2549237
01681> ********************************************************************************
01682> ********************************************************************************
01683> # Ottawa International Airport (1967 - 2003)
01684> R0086:C00002-----------------------------------------------------------------------------------------------
01685>  *  READ AES DATA
01686>       [Filename  = 6106000.123                                                  ]
01687>       [Start_date= 1986.0101: End_date= 1986.1231]
01688>       [DT= 60.min: Length= 8040.hrs: WetHrs=  520: DryHrs= 7520: PTOT= 849.40)
01689>       Maximum average rainfall intensities over
01690>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01691>        18.30    17.80    13.57     7.07     4.93     2.93     2.32     1.82     1.31    mm/hr
01692>        18.30    35.60    40.70    42.40    59.20    70.40    83.50    87.20    94.40    mm
01693>       19860729 19860729 19860729 19860729 19860729 19860912 19860912 19860912 19860913  date
01694>       Number of rainfall events per following interevent time
01695>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01696>          201      161      149      118       88       61       51       47       30
01697>       Number of events with at least the following durations
01698>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01699>          200      107       73       22        1        0        0        0        0
01700> R0086:C00003-----------------------------------------------------------------------------------------------
01701>      COMPUTE API
01702>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01703>       [APImax= 97.05: APIavg= 25.30: APImin=  .17]
01704> ##############################################################################
01705> # Pre Development Condition - Using NASHHYD and CN
01706> ##############################################################################
01707> R0086:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01708>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .462 1986.0912_ 0:15  187.30 .221     .000
01709>       [CN= 65.0: N= 3.00: Tp= 1.47]
01710>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01711>       [InterEventTime=  12.00]
01712> R0086:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01713>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .483 1986.0912_ 6:30  184.33 .217     .000
01714>       [CN= 61.0: N= 3.00: Tp= 1.22]
01715>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01716>       [InterEventTime=  12.00]
01717> R0086:C00006-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01718>      ADD HYD              15.0 02:WestPre       39.85     .483 1986.0912_ 6:30  184.33  n/a     .000
01719>                       +   15.0 02:EastPre      39.35     .462 1986.0912_ 0:15  187.30  n/a     .000
01720>                     SUM=  15.0 01:Pre          79.20     .933 1986.0912_ 6:30  185.80  n/a     .000
01721> ##############################################################################
01722> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01723> ##############################################################################
01724> R0086:C00007-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01725>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.126 1986.0729_16:00  349.35 .411     .000
01726>       [CN=100.0: N= 3.00: Tp= 1.47]
01727>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01728>       [InterEventTime=  12.00]
01729> R0086:C00008-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01730>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.285 1986.0729_15:45  349.35 .411     .000
01731>       [CN=100.0: N= 3.00: Tp= 1.22]
01732>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01733>       [InterEventTime=  12.00]
01734> R0086:C00009-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01735>      ADD HYD              15.0 02:InfWestPre    39.85    1.285 1986.0729_15:45  349.35  n/a     .000
01736>                       +   15.0 02:InfEastPre    39.35    1.126 1986.0729_16:00  349.35  n/a     .000
01737>                     SUM=  15.0 01:InfPre       79.20    2.396 1986.0729_15:45  349.35  n/a     .000
01738> ##############################################################################
01739> # STORMS
01740> ##############################################################################
01741>  ** END OF RUN :  86
01742>
01743> ********************************************************************************************************
01744>
01745>
01746>
01747>
01748>
01749>  RUN#:COMMAND#
01750> R0087:C00001-----------------------------------------------------------------------------------------------
01751>      START
01752>       [TZERO =     .00 hrs on 19870101]
01753>       [METOUT=   2    (1=imperial, 2=metric output)]
01754>       [NSTORM=   0 ]
01755>       [NRUN  = 0087 ]
01756> ********************************************************************************
01757> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01758> ********************************************************************************
01759> #  Project Name  : [Caivan Stittsville West properties]
01760> #  Project Number: [2267]
01761> #  Date          : [2021/12/14]
01762> #  Modeller      : [JB]
01763> #  Company       : J.F. Sabourin and Associates
01764> #  License #     : 2549237
01765> ********************************************************************************
01766> ********************************************************************************
01767> # Ottawa International Airport (1967 - 2003)
01768> R0087:C00002-----------------------------------------------------------------------------------------------
01769>  *  READ AES DATA
01770>       [Filename  = 6106000.123                                                  ]
01771>       [Start_date= 1987.0101: End_date= 1987.1231]
01772>       [DT= 60.min: Length= 7344.hrs: WetHrs=  491: DryHrs= 6853: PTOT= 639.90)
01773>       Maximum average rainfall intensities over
01774>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01775>        20.00    13.90    14.03     7.05     4.83     2.44     1.77     1.34      .93    mm/hr
01776>        20.00    27.80    42.10    42.30    58.00    58.60    63.60    64.20    67.00    mm
01777>       19870724 19870724 19870724 19870724 19870724 19870725 19870725 19870726 19870727  date
01778>       Number of rainfall events per following interevent time
01779>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01780>          207      163      107       85       58       46       36       27
01781>       Number of events with at least the following durations
01782>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01783>          206      100       59       16        2        0        0        0        0
01784> R0087:C00003-----------------------------------------------------------------------------------------------
01785>      COMPUTE API
01786>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01787>       [APImax= 75.38: APIavg= 21.40: APImin=  1.18]
01788> ##############################################################################
01789> # Pre Development Condition - Using NASHHYD and CN
01790> ##############################################################################
01791> R0087:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01792>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .298 1987.0724_15:45   92.27 .144     .000
01793>       [CN= 65.0: N= 3.00: Tp= 1.47]
01794>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01795>       [InterEventTime=  12.00]
01796> R0087:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01797>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .303 1987.0724_15:45   90.24 .141     .000
01798>       [CN= 61.0: N= 3.00: Tp= 1.22]
01799>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01800>       [InterEventTime=  12.00]
```

```
01801> R0087:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01802>     ADD HYD                15.0 02:WestPre      39.85     .303 1987.0724_15:45   90.24  n/a     .000
01803>                        +    15.0 02:EastPre      39.35     .298 1987.0724_15:45   92.27  n/a     .000
01804>                    SUM=    15.0 01:Pre          79.20     .601 1987.0724_15:45   91.25  n/a     .000
01805> ##############################################################################
01806> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01807> ##############################################################################
01808> R0087:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01809>     CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.041 1987.0724_15:30  198.26 .310     .000
01810>       [CN=100.0: N= 3.00: Tp= 1.47]
01811>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01812>       [InterEventTime=  12.00]
01813> R0087:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01814>     CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.152 1987.0724_15:15  198.26 .310     .000
01815>       [CN=100.0: N= 3.00: Tp= 1.22]
01816>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01817>       [InterEventTime=  12.00]
01818> R0087:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01819>     ADD HYD                15.0 02:InfWestPre    39.85    1.152 1987.0724_15:15  198.26  n/a     .000
01820>                        +    15.0 02:InfEastPre    39.35    1.041 1987.0724_15:30  198.26  n/a     .000
01821>                    SUM=    15.0 01:InfPre        79.20    2.181 1987.0724_15:30  198.26  n/a     .000
01822> ##############################################################################
01823> # STORMS
01824> ##############################################################################
01825>   ** END OF RUN :   87
01826>
01827> ********************************************************************************************************************
01828>
01829>
01830>
01831>
01832>
01833>  RUN#:COMMAND#
01834> R0088:C00001------------------------------------------------------------------------------------------------------
01835>       START
01836>       [TZERO =    .00 hrs on 19880101]
01837>       [METOUT=  2    (1=imperial, 2=metric output)]
01838>       [NSTORM=  0 ]
01839>       [NRUN  = 0088 ]
01840> ********************************************************************************
01841> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01842> ********************************************************************************
01843> #  Project Name  : [Caivan Stittsville West properties]
01844> #  Project Number: [2267]
01845> #  Date          : [2021/12/14]
01846> #  Modeller      : [JB]
01847> #  Company       : J.F. Sabourin and Associates
01848> #  License #     : 2549237
01849> ********************************************************************************
01850> ********************************************************************************
01851> # Ottawa International Airport (1967 - 2003)
01852> R0088:C00002------------------------------------------------------------------------------------------------------
01853>   *  READ AES DATA
01854>       [Filename  = 6106000.123                                                  ]
01855>       [Start_date= 1988.0101: End_date= 1988.1230]
01856>       (DT= 60.min: Length= 8760.hrs: WetHrs=  486: DryHrs= 8274: PTOT= 643.20)
01857>       Maximum average rainfall intensities over
01858>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01859>        25.50    18.20    12.77     7.37     3.78     1.91     1.27      .95      .94    mm/hr
01860>        25.50    36.40    38.30    44.20    45.40    45.80    45.80    45.80    67.40    mm
01861>  19880917 19880726 19880625 19880625 19880625 19880625 19880625 19880625 19880626 19880625  date
01862>       Number of rainfall events per following interevent time
01863>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01864>          183      141      121       85       68       56       48       41       25
01865>       Number of events with at least the following durations
01866>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01867>          182      101       70       19        3        0        0        0        0
01868> R0088:C00003------------------------------------------------------------------------------------------------------
01869>       COMPUTE API
01870>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01871>       (APImax= 66.19: APIavg= 18.05: APImin=  .03)
01872> ##############################################################################
01873> # Pre Development Condition - Using NASHHYD and CN
01874> ##############################################################################
01875> R0088:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01876>     CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .366 1988.0625_14:00  106.79 .166     .000
01877>       [CN= 65.0: N= 3.00: Tp= 1.47]
01878>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01879>       [InterEventTime=  12.00]
01880> R0088:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01881>     CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .383 1988.0625_13:45  104.72 .163     .000
01882>       [CN= 61.0: N= 3.00: Tp= 1.22]
01883>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01884>       [InterEventTime=  12.00]
01885> R0088:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01886>     ADD HYD                15.0 02:WestPre       39.85     .383 1988.0625_13:45  104.72  n/a     .000
01887>                        +    15.0 02:EastPre       39.35     .366 1988.0625_14:00  106.79  n/a     .000
01888>                    SUM=    15.0 01:Pre           79.20     .747 1988.0625_13:45  105.75  n/a     .000
01889> ##############################################################################
01890> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01891> ##############################################################################
01892> R0088:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01893>     CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.214 1988.0625_13:30  224.71 .349     .000
01894>       [CN=100.0: N= 3.00: Tp= 1.47]
01895>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01896>       [InterEventTime=  12.00]
01897> R0088:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01898>     CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    1.397 1988.0625_13:30  224.71 .349     .000
01899>       [CN=100.0: N= 3.00: Tp= 1.22]
01900>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01901>       [InterEventTime=  12.00]
01902> R0088:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01903>     ADD HYD                15.0 02:InfWestPre    39.85    1.397 1988.0625_13:30  224.71  n/a     .000
01904>                        +    15.0 02:InfEastPre    39.35    1.214 1988.0625_13:30  224.71  n/a     .000
01905>                    SUM=    15.0 01:InfPre        79.20    2.611 1988.0625_13:30  224.71  n/a     .000
01906> ##############################################################################
01907> # STORMS
01908> ##############################################################################
01909>   ** END OF RUN :   88
01910>
01911> ********************************************************************************************************************
01912>
01913>
01914>
01915>
01916>
01917>  RUN#:COMMAND#
01918> R0089:C00001------------------------------------------------------------------------------------------------------
01919>       START
01920>       [TZERO =    .00 hrs on 19890101]
01921>       [METOUT=  2    (1=imperial, 2=metric output)]
01922>       [NSTORM=  0 ]
01923>       [NRUN  = 0089 ]
01924> ********************************************************************************
01925> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01926> ********************************************************************************
01927> #  Project Name  : [Caivan Stittsville West properties]
01928> #  Project Number: [2267]
01929> #  Date          : [2021/12/14]
01930> #  Modeller      : [JB]
01931> #  Company       : J.F. Sabourin and Associates
01932> #  License #     : 2549237
01933> ********************************************************************************
01934> ********************************************************************************
01935> # Ottawa International Airport (1967 - 2003)
01936> R0089:C00002------------------------------------------------------------------------------------------------------
01937>   *  READ AES DATA
01938>       [Filename  = 6106000.123                                                  ]
01939>       [Start_date= 1989.0101: End_date= 1989.1231]
01940>       (DT= 60.min: Length= 8040.hrs: WetHrs=  421: DryHrs= 7619: PTOT= 522.50)
01941>       Maximum average rainfall intensities over
01942>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01943>        22.70    12.60     8.93     5.75     3.03     1.67     1.14      .86      .59    mm/hr
01944>        22.70    25.20    26.80    34.50    36.30    40.20    40.90    41.50    42.50    mm
01945>  19890727 19890727 19890727 19890727 19890727 19891020 19891021 19891022 19891022  date
01946>       Number of rainfall events per following interevent time
01947>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01948>          170      137      120      101       71       52       40       36       29
01949>       Number of events with at least the following durations
01950>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
01951>          169       81       49       17        4        0        0        0        0
01952> R0089:C00003------------------------------------------------------------------------------------------------------
01953>       COMPUTE API
01954>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
01955>       (APImax= 54.64: APIavg= 16.01: APImin=  .02)
01956> ##############################################################################
01957> # Pre Development Condition - Using NASHHYD and CN
01958> ##############################################################################
01959> R0089:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01960>     CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .144 1989.0727_16:30   66.36 .127     .000
01961>       [CN= 65.0: N= 3.00: Tp= 1.47]
01962>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
01963>       [InterEventTime=  12.00]
01964> R0089:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01965>     CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .145 1989.0727_16:00   64.85 .124     .000
01966>       [CN= 61.0: N= 3.00: Tp= 1.22]
01967>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
01968>       [InterEventTime=  12.00]
01969> R0089:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01970>     ADD HYD                15.0 02:WestPre       39.85     .145 1989.0727_16:00   64.85  n/a     .000
01971>                        +    15.0 02:EastPre       39.35     .144 1989.0727_16:30   66.36  n/a     .000
01972>                    SUM=    15.0 01:Pre           79.20     .288 1989.0727_16:15   65.60  n/a     .000
01973> ##############################################################################
01974> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
01975> ##############################################################################
01976> R0089:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01977>     CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .822 1989.0727_16:15  165.82 .317     .000
01978>       [CN=100.0: N= 3.00: Tp= 1.47]
01979>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01980>       [InterEventTime=  12.00]

01981> R0089:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01982>     CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .969 1989.0727_15:45  165.82 .317     .000
01983>       [CN=100.0: N= 3.00: Tp= 1.22]
01984>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
01985>       [InterEventTime=  12.00]
01986> R0089:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01987>     ADD HYD                15.0 02:InfWestPre    39.85     .969 1989.0727_15:45  165.82  n/a     .000
01988>                        +    15.0 02:InfEastPre    39.35     .822 1989.0727_16:15  165.82  n/a     .000
01989>                    SUM=    15.0 01:InfPre        79.20    1.784 1989.0727_16:00  165.82  n/a     .000
01990> ##############################################################################
01991> # STORMS
01992> ##############################################################################
01993>   ** END OF RUN :   89
01994>
01995> ********************************************************************************************************************
01996>
01997>
01998>
01999>
02000>
02001>  RUN#:COMMAND#
02002> R0090:C00001------------------------------------------------------------------------------------------------------
02003>       START
02004>       [TZERO =    .00 hrs on 19901101]
02005>       [METOUT=  2    (1=imperial, 2=metric output)]
02006>       [NSTORM=  0 ]
02007>       [NRUN  = 0090 ]
02008> ********************************************************************************
02009> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02010> ********************************************************************************
02011> #  Project Name  : [Caivan Stittsville West properties]
02012> #  Project Number: [2267]
02013> #  Date          : [2021/12/14]
02014> #  Modeller      : [JB]
02015> #  Company       : J.F. Sabourin and Associates
02016> #  License #     : 2549237
02017> ********************************************************************************
02018> ********************************************************************************
02019> # Ottawa International Airport (1967 - 2003)
02020> R0090:C00002------------------------------------------------------------------------------------------------------
02021>   *  READ AES DATA
02022>       [Filename  = 6106000.123                                                  ]
02023>       [Start_date= 1990.0101: End_date= 1990.1231]
02024>       (DT= 60.min: Length= 7344.hrs: WetHrs=  618: DryHrs= 6726: PTOT= 727.80)
02025>       Maximum average rainfall intensities over
02026>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02027>        20.60    12.25     9.60     5.55     4.43     2.25     1.50     1.21     1.06    mm/hr
02028>        20.60    24.50    28.80    33.30    53.20    54.00    54.00    58.30    76.10    mm
02029>  19900720 19900720 19900828 19900828 19900720 19900720 19900720 19900722 19900723  date
02030>       Number of rainfall events per following interevent time
02031>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02032>          225      170      153      121       94       68       55       47       33
02033>       Number of events with at least the following durations
02034>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02035>          224      116       72       30        6        0        0        0        0
02036> R0090:C00003------------------------------------------------------------------------------------------------------
02037>       COMPUTE API
02038>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02039>       (APImax= 74.68: APIavg= 23.47: APImin=  3.11)
02040> ##############################################################################
02041> # Pre Development Condition - Using NASHHYD and CN
02042> ##############################################################################
02043> R0090:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02044>     CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .335 1990.0720_14:15  128.16 .176     .000
02045>       [CN= 65.0: N= 3.00: Tp= 1.47]
02046>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02047>       [InterEventTime=  12.00]
02048> R0090:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02049>     CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .336 1990.0720_14:00  126.49 .174     .000
02050>       [CN= 61.0: N= 3.00: Tp= 1.22]
02051>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02052>       [InterEventTime=  12.00]
02053> R0090:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02054>     ADD HYD                15.0 02:WestPre       39.85     .336 1990.0720_14:00  126.49  n/a     .000
02055>                        +    15.0 02:EastPre       39.35     .335 1990.0720_14:15  128.16  n/a     .000
02056>                    SUM=    15.0 01:Pre           79.20     .670 1990.0720_14:15  127.32  n/a     .000
02057> ##############################################################################
02058> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02059> ##############################################################################
02060> R0090:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02061>     CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .726 1990.0720_ 6:15  265.07 .364     .000
02062>       [CN=100.0: N= 3.00: Tp= 1.47]
02063>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02064>       [InterEventTime=  12.00]
02065> R0090:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02066>     CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .851 1990.0720_ 6:00  265.07 .364     .000
02067>       [CN=100.0: N= 3.00: Tp= 1.22]
02068>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02069>       [InterEventTime=  12.00]
02070> R0090:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02071>     ADD HYD                15.0 02:InfWestPre    39.85     .851 1990.0720_ 6:00  265.07  n/a     .000
02072>                        +    15.0 02:InfEastPre    39.35     .726 1990.0720_ 6:15  265.07  n/a     .000
02073>                    SUM=    15.0 01:InfPre        79.20    1.573 1990.0720_ 6:00  265.07  n/a     .000
02074> ##############################################################################
02075> # STORMS
02076> ##############################################################################
02077>   ** END OF RUN :   90
02078>
02079> ********************************************************************************************************************
02080>
02081>
02082>
02083>
02084>
02085>  RUN#:COMMAND#
02086> R0091:C00001------------------------------------------------------------------------------------------------------
02087>       START
02088>       [TZERO =    .00 hrs on 19910101]
02089>       [METOUT=  2    (1=imperial, 2=metric output)]
02090>       [NSTORM=  0 ]
02091>       [NRUN  = 0091 ]
02092> ********************************************************************************
02093> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02094> ********************************************************************************
02095> #  Project Name  : [Caivan Stittsville West properties]
02096> #  Project Number: [2267]
02097> #  Date          : [2021/12/14]
02098> #  Modeller      : [JB]
02099> #  Company       : J.F. Sabourin and Associates
02100> #  License #     : 2549237
02101> ********************************************************************************
02102> ********************************************************************************
02103> # Ottawa International Airport (1967 - 2003)
02104> R0091:C00002------------------------------------------------------------------------------------------------------
02105>   *  READ AES DATA
02106>       [Filename  = 6106000.123                                                  ]
02107>       [Start_date= 1991.0101: End_date= 1991.1231]
02108>       (DT= 60.min: Length= 8040.hrs: WetHrs=  485: DryHrs= 7555: PTOT= 555.80)
02109>       Maximum average rainfall intensities over
02110>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02111>        11.30     6.05     4.40     3.77     2.32     1.59     1.28     1.08      .79    mm/hr
02112>        11.30    12.10    13.20    22.60    27.80    38.20    46.00    51.60    56.80    mm
02113>  19910409 19910409 19910409 19910410 19911016 19910422 19910410 19910410 19910423  date
02114>       Number of rainfall events per following interevent time
02115>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02116>          192      153      142      113       90       60       51       44       34
02117>       Number of events with at least the following durations
02118>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02119>          191       92       57       19        4        0        0        0        0
02120> R0091:C00003------------------------------------------------------------------------------------------------------
02121>       COMPUTE API
02122>       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02123>       (APImax= 71.51: APIavg= 16.87: APImin=  .26)
02124> ##############################################################################
02125> # Pre Development Condition - Using NASHHYD and CN
02126> ##############################################################################
02127> R0091:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02128>     CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .154 1991.0410_ 4:00   66.42 .120     .000
02129>       [CN= 65.0: N= 3.00: Tp= 1.47]
02130>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02131>       [InterEventTime=  12.00]
02132> R0091:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02133>     CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .156 1991.0410_ 3:45   65.09 .117     .000
02134>       [CN= 61.0: N= 3.00: Tp= 1.22]
02135>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02136>       [InterEventTime=  12.00]
02137> R0091:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02138>     ADD HYD                15.0 02:WestPre       39.85     .156 1991.0410_ 3:45   65.09  n/a     .000
02139>                        +    15.0 02:EastPre       39.35     .154 1991.0410_ 4:00   66.42  n/a     .000
02140>                    SUM=    15.0 01:Pre           79.20     .309 1991.0410_ 4:00   65.75  n/a     .000
02141> ##############################################################################
02142> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02143> ##############################################################################
02144> R0091:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02145>     CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .477 1991.0410_ 4:00  157.28 .283     .000
02146>       [CN=100.0: N= 3.00: Tp= 1.47]
02147>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02148>       [InterEventTime=  12.00]
02149> R0091:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02150>     CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .541 1991.0410_ 3:45  157.28 .283     .000
02151>       [CN=100.0: N= 3.00: Tp= 1.22]
02152>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02153>       [InterEventTime=  12.00]
02154> R0091:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02155>     ADD HYD                15.0 02:InfWestPre    39.85     .541 1991.0410_ 3:45  157.28  n/a     .000
02156>                        +    15.0 02:InfEastPre    39.35     .477 1991.0410_ 4:00  157.28  n/a     .000
02157>                    SUM=    15.0 01:InfPre        79.20    1.012 1991.0410_ 3:45  157.28  n/a     .000
02158> ##############################################################################
02159> # STORMS
02160> ##############################################################################
```

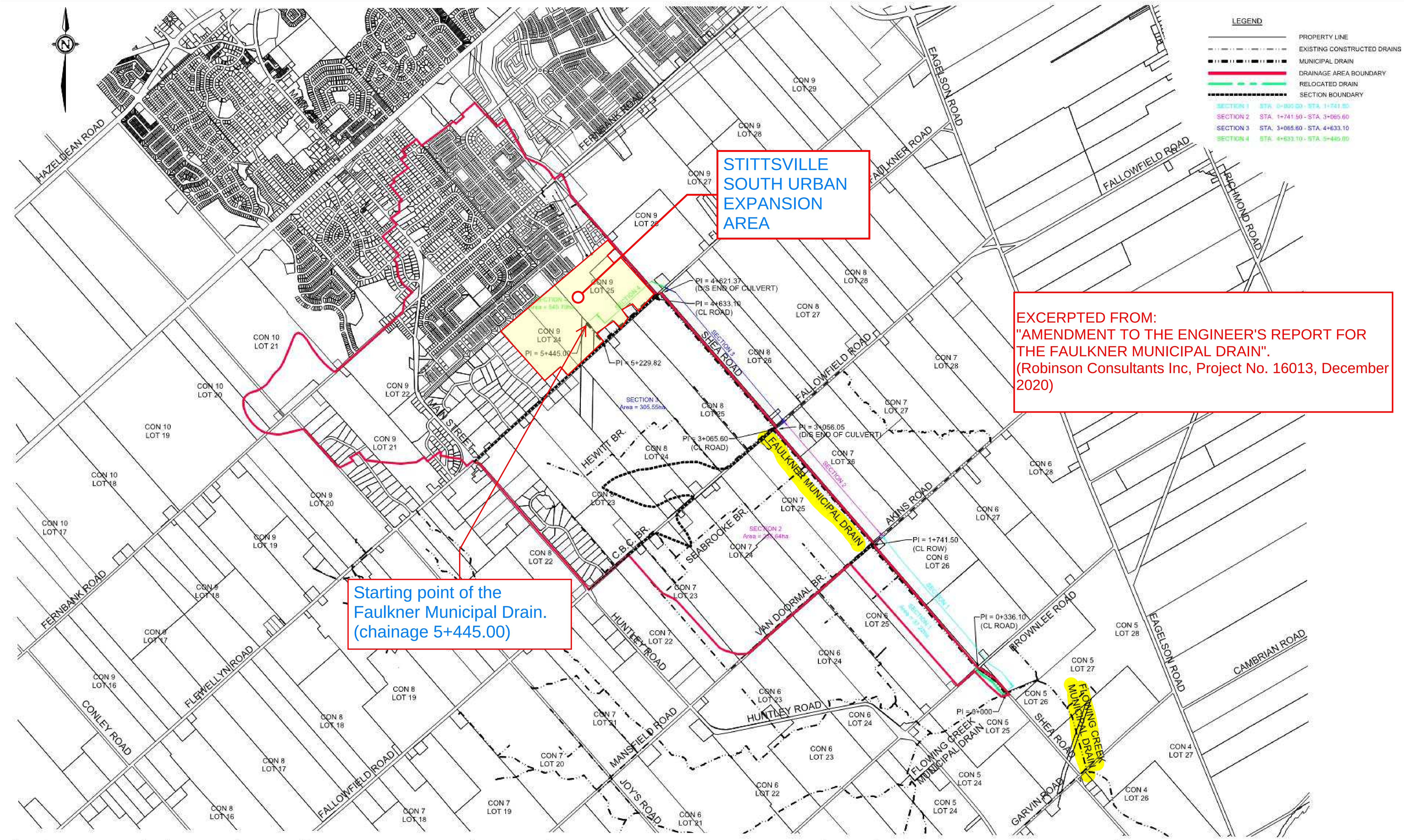
```
  ** END OF RUN :   91

 RUN#:COMMAND#
R0092:C00001-------------------------------------------------------------------------------
     START
       [TZERO =     .00 hrs on 19920101]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  = 0092 ]
##############################################################################
#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
##############################################################################
#  Project Name  : [Caivan Stittsville West properties]
#  Project Number: [2267]
#  Date          : [2021/12/14]
#  Modeller      : [JB]
#  Company       : J.F. Sabourin and Associates
#  License #     : 2549237
##############################################################################
# Ottawa International Airport (1967 - 2003)
R0092:C00002-------------------------------------------------------------------------------
  *  READ AES DATA
       [Filename  = 6106000.123                                                ]
       [Start_date= 1992.0101: End_date= 1992.1230]
       [DT= 60.min: Length= 8760.hrs: WetHrs=  550: DryHrs= 8210: PTOT= 730.20]
       Maximum average rainfall intensities over
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
        31.50    18.00    13.30     7.22     4.14     2.26     1.51     1.51     1.02    mm/hr
        31.50    36.00    39.90    43.30    49.70    54.20    54.20    72.60    73.60    mm
       19920804 19920804 19920804 19920804 19920717 19920718 19920718 19920719 19920720  date
       Number of rainfall events per following interevent time
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          221      171      154      116       95       69       52       45       36
       Number of events with at least the following durations
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          220      113       73       18        4        0        0        0        0
R0092:C00003-------------------------------------------------------------------------------
     COMPUTE API
       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
       [APImax= 97.88: APIavg= 20.27: APImin=  1.07]
##############################################################################
# Pre Development Condition - Using NASHHYD and CN
##############################################################################
R0092:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:EastPre       39.35      .519 1992.0717_19:30  137.55 .188     .000
       [CN= 65.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
       [InterEventTime=  12.00]
R0092:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:WestPre       39.85      .528 1992.0717_19:30  135.51 .186     .000
       [CN= 61.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
       [InterEventTime=  12.00]
R0092:C00006-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:WestPre       39.85      .528 1992.0717_19:30  135.51  n/a     .000
                    +     15.0 02:EastPre       39.35      .519 1992.0717_19:30  137.55  n/a     .000
                  SUM=    15.0 01:Pre           79.20     1.047 1992.0717_19:30  136.52  n/a     .000
##############################################################################
# Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
##############################################################################
R0092:C00007-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     1.280 1992.0717_19:15  273.86 .375     .000
       [CN=100.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0092:C00008-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85     1.453 1992.0804_14:45  273.86 .375     .000
       [CN=100.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0092:C00009-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:InfWestPre    39.85     1.453 1992.0804_14:45  273.86  n/a     .000
                    +     15.0 02:InfEastPre    39.35     1.280 1992.0717_19:15  273.86  n/a     .000
                  SUM=    15.0 01:InfPre        79.20     2.699 1992.0717_19:00  273.86  n/a     .000
##############################################################################
# STORMS
##############################################################################
  ** END OF RUN :   92

 RUN#:COMMAND#
R0093:C00001-------------------------------------------------------------------------------
     START
       [TZERO =     .00 hrs on 19930101]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  = 0093 ]
##############################################################################
#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
##############################################################################
#  Project Name  : [Caivan Stittsville West properties]
#  Project Number: [2267]
#  Date          : [2021/12/14]
#  Modeller      : [JB]
#  Company       : J.F. Sabourin and Associates
#  License #     : 2549237
##############################################################################
# Ottawa International Airport (1967 - 2003)
R0093:C00002-------------------------------------------------------------------------------
  *  READ AES DATA
       [Filename  = 6106000.123                                                ]
       [Start_date= 1993.0101: End_date= 1993.1231]
       [DT= 60.min: Length= 8760.hrs: WetHrs=  584: DryHrs= 8176: PTOT= 721.10]
       Maximum average rainfall intensities over
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
        12.60     6.60     4.83     3.72     3.58     2.31     1.61     1.21      .81    mm/hr
        12.60    13.20    14.50    22.30    43.00    55.50    58.10    58.10    58.10    mm
       19930703 19930703 19931127 19931128 19931128 19931128 19931128 19931128 19931129  date
       Number of rainfall events per following interevent time
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          190      154      137      111       91       73       57       48       34
       Number of events with at least the following durations
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          189      110       66       27        7        2        0        0        0
R0093:C00003-------------------------------------------------------------------------------
     COMPUTE API
       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
       [APImax= 66.42: APIavg= 20.01: APImin=  .11]
##############################################################################
# Pre Development Condition - Using NASHHYD and CN
##############################################################################
R0093:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:EastPre       39.35      .194 1993.1128_ 8:45   94.79 .131     .000
       [CN= 65.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
       [InterEventTime=  12.00]
R0093:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:WestPre       39.85      .188 1993.1128_ 8:30   92.42 .128     .000
       [CN= 61.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
       [InterEventTime=  12.00]
R0093:C00006-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:WestPre       39.85      .188 1993.1128_ 8:30   92.42  n/a     .000
                    +     15.0 02:EastPre       39.35      .194 1993.1128_ 8:45   94.79  n/a     .000
                  SUM=    15.0 01:Pre           79.20      .380 1993.1128_ 8:30   93.60  n/a     .000
##############################################################################
# Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
##############################################################################
R0093:C00007-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35      .458 1993.1128_ 8:30  235.03 .326     .000
       [CN=100.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0093:C00008-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85      .485 1993.1128_ 8:15  235.03 .326     .000
       [CN=100.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0093:C00009-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:InfWestPre    39.85      .485 1993.1128_ 8:15  235.03  n/a     .000
                    +     15.0 02:InfEastPre    39.35      .458 1993.1128_ 8:30  235.03  n/a     .000
                  SUM=    15.0 01:InfPre        79.20      .941 1993.1128_ 8:15  235.03  n/a     .000
##############################################################################
# STORMS
##############################################################################
  ** END OF RUN :   93

 RUN#:COMMAND#
R0094:C00001-------------------------------------------------------------------------------
     START
       [TZERO =     .00 hrs on 19940101]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  = 0094 ]
##############################################################################
#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
##############################################################################
#  Project Name  : [Caivan Stittsville West properties]
#  Project Number: [2267]
#  Date          : [2021/12/14]
#  Modeller      : [JB]
#  Company       : J.F. Sabourin and Associates
#  License #     : 2549237
##############################################################################
# Ottawa International Airport (1967 - 2003)
R0094:C00002-------------------------------------------------------------------------------
  *  READ AES DATA
       [Filename  = 6106000.123                                                ]
       [Start_date= 1994.0101: End_date= 1994.1231]
       [DT= 60.min: Length= 8576.hrs: WetHrs=  328: DryHrs= 8248: PTOT= 527.00]
       Maximum average rainfall intensities over
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
        22.60    11.90     8.43     5.42     2.92     1.79     1.19      .89     1.15    mm/hr
        22.60    23.80    25.30    32.50    35.00    42.90    42.90    42.90    82.60    mm
       19940629 19940629 19940627 19940625 19940625 19940625 19940626 19940626 19940628  date
       Number of rainfall events per following interevent time
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          131      110       96       75       60       46       37       32       23
       Number of events with at least the following durations
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
          130       70       46       12        1        0        0        0        0
R0094:C00003-------------------------------------------------------------------------------
     COMPUTE API
       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
       [APImax= 97.84: APIavg= 19.15: APImin=  .02]
##############################################################################
# Pre Development Condition - Using NASHHYD and CN
##############################################################################
R0094:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:EastPre       39.35      .179 1994.0627_13:00  105.31 .200     .000
       [CN= 65.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
       [InterEventTime=  12.00]
R0094:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:WestPre       39.85      .173 1994.0627_12:30  103.78 .197     .000
       [CN= 61.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
       [InterEventTime=  12.00]
R0094:C00006-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:WestPre       39.85      .173 1994.0627_12:30  103.78  n/a     .000
                    +     15.0 02:EastPre       39.35      .179 1994.0627_13:00  105.31  n/a     .000
                  SUM=    15.0 01:Pre           79.20      .349 1994.0627_12:45  104.54  n/a     .000
##############################################################################
# Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
##############################################################################
R0094:C00007-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35      .696 1994.0627_12:15  204.63 .388     .000
       [CN=100.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0094:C00008-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85      .769 1994.0627_12:00  204.63 .388     .000
       [CN=100.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0094:C00009-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:InfWestPre    39.85      .769 1994.0627_12:00  204.63  n/a     .000
                    +     15.0 02:InfEastPre    39.35      .696 1994.0627_12:15  204.63  n/a     .000
                  SUM=    15.0 01:InfPre        79.20     1.455 1994.0627_12:00  204.63  n/a     .000
##############################################################################
# STORMS
##############################################################################
  ** END OF RUN :   94

 RUN#:COMMAND#
R0095:C00001-------------------------------------------------------------------------------
     START
       [TZERO =     .00 hrs on 19950101]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  = 0095 ]
##############################################################################
#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
##############################################################################
#  Project Name  : [Caivan Stittsville West properties]
#  Project Number: [2267]
#  Date          : [2021/12/14]
#  Modeller      : [JB]
#  Company       : J.F. Sabourin and Associates
#  License #     : 2549237
##############################################################################
# Ottawa International Airport (1967 - 2003)
R0095:C00002-------------------------------------------------------------------------------
  *  READ AES DATA
       [Filename  = 6106000.123                                                ]
       [Start_date= 1995.0101: End_date= 1995.1231]
       [DT= 60.min: Length= 5112.hrs: WetHrs=  228: DryHrs= 4884: PTOT= 321.60]
       Maximum average rainfall intensities over
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
        16.90    13.25    10.27     7.70     6.32     3.31     2.21     1.65     1.10    mm/hr
        16.90    26.50    30.80    46.20    75.80    79.40    79.40    79.40    79.40    mm
       19950603 19950603 19950603 19950603 19950603 19950603 19950603 19950604 19950604  date
       Number of rainfall events per following interevent time
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
           67       55       48       38       35       29       24       22       18
       Number of events with at least the following durations
         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
           66       37       23       10        5        1        0        0        0
R0095:C00003-------------------------------------------------------------------------------
     COMPUTE API
       [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
       [APImax= 95.54: APIavg= 16.52: APImin=  .49]
##############################################################################
# Pre Development Condition - Using NASHHYD and CN
##############################################################################
R0095:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:EastPre       39.35      .640 1995.0603_ 9:45   93.16 .290     .000
       [CN= 65.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
       [InterEventTime=  12.00]
R0095:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:WestPre       39.85      .660 1995.0603_ 9:30   91.61 .285     .000
       [CN= 61.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
       [InterEventTime=  12.00]
R0095:C00006-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:WestPre       39.85      .660 1995.0603_ 9:30   91.61  n/a     .000
                    +     15.0 02:EastPre       39.35      .640 1995.0603_ 9:45   93.16  n/a     .000
                  SUM=    15.0 01:Pre           79.20     1.290 1995.0603_ 9:30   92.38  n/a     .000
##############################################################################
# Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
##############################################################################
R0095:C00007-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35      .898 1995.0603_ 9:30  158.70 .493     .000
       [CN=100.0: N= 3.00: Tp= 1.47]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0095:C00008-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85      .988 1995.0603_ 9:15  158.70 .493     .000
       [CN=100.0: N= 3.00: Tp= 1.22]
       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
       [InterEventTime=  12.00]
R0095:C00009-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
    ADD HYD               15.0 02:InfWestPre    39.85      .988 1995.0603_ 9:15  158.70  n/a     .000
                    +     15.0 02:InfEastPre    39.35      .898 1995.0603_ 9:30  158.70  n/a     .000
                  SUM=    15.0 01:InfPre        79.20     1.879 1995.0603_ 9:30  158.70  n/a     .000
##############################################################################
# STORMS
##############################################################################
  ** END OF RUN :   95

 RUN#:COMMAND#
R0096:C00001-------------------------------------------------------------------------------
     START
       [TZERO =     .00 hrs on 19960101]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  = 0096 ]
##############################################################################
#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
##############################################################################
#  Project Name  : [Caivan Stittsville West properties]
#  Project Number: [2267]
#  Date          : [2021/12/14]
#  Modeller      : [JB]
#  Company       : J.F. Sabourin and Associates
#  License #     : 2549237
```

```
02521> #*************************************************************************
02522> #*************************************************************************
02523> # Ottawa International Airport (1967 - 2003)
02524> R0096:C00002------------------------------------------------------------------------
02525>   *  READ AES DATA
02526>      [Filename  = 6106000.123                                              ]
02527>      [Start_date= 1996.0101: End_date= 1996.1230]
02528>      (DT= 60.min: Length= 6552.hrs: WetHrs=  387: DryHrs= 6165: PTOT= 512.20)
02529>      Maximum average rainfall intensities over
02530>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02531>       18.50    13.55     9.03     5.42     2.93     1.84     1.32     1.02      .70    mm/hr
02532>       18.50    27.10    27.10    32.50    35.10    44.10    47.50    49.00    50.30    mm
02533>  19960731 19960731 19960731 19960731 19960731 19961109 19961109 19961109 19961109  date
02534>      Number of rainfall events per following interevent time
02535>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02536>         132      104       93       71       59       43       36       31       24
02537>      Number of events with at least the following durations
02538>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02539>         131       72       50       19        2        1        0        0        0
02540> R0096:C00003------------------------------------------------------------------------
02541>      COMPUTE API
02542>      [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02543>      [APImax= 63.22: APIavg= 19.39: APImin=  .71]
02544> ########################################################################
02545> # Pre Development Condition - Using NASHHYD and CN
02546> ########################################################################
02547> R0096:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02548>     CONTINUOUS NASHYD     15.0 01:EastPre       39.35     .154 1996.0731_16:45   74.44 .145     .000
02549>       [CN= 65.0: N= 3.00: Tp= 1.47]
02550>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02551>       [InterEventTime=  12.00]
02552> R0096:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02553>     CONTINUOUS NASHYD     15.0 01:WestPre       39.85     .157 1996.0731_16:30   72.91 .142     .000
02554>       [CN= 61.0: N= 3.00: Tp= 1.22]
02555>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02556>       [InterEventTime=  12.00]
02557> R0096:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02558>     ADD HYD               15.0 02:WestPre       39.85     .157 1996.0731_16:30   72.91  n/a     .000
02559>                       +   15.0 02:EastPre      39.35     .154 1996.0731_16:45   74.44  n/a     .000
02560>                   SUM=    15.0 01:Pre          79.20     .307 1996.0731_16:45   73.67  n/a     .000
02561> ########################################################################
02562> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02563> ########################################################################
02564> R0096:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02565>     CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     .751 1996.0731_16:30   172.97 .338     .000
02566>       [CN=100.0: N= 3.00: Tp= 1.47]
02567>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02568>       [InterEventTime=  12.00]
02569> R0096:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02570>     CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85     .872 1996.0731_16:15   172.97 .338     .000
02571>       [CN=100.0: N= 3.00: Tp= 1.22]
02572>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02573>       [InterEventTime=  12.00]
02574> R0096:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02575>     ADD HYD               15.0 02:InfWestPre    39.85     .872 1996.0731_16:15   172.97  n/a     .000
02576>                       +   15.0 02:InfEastPre    39.35     .751 1996.0731_16:30   172.97  n/a     .000
02577>                   SUM=    15.0 01:InfPre       79.20    1.606 1996.0731_16:30   172.97  n/a     .000
02578> ########################################################################
02579> # STORMS
02580> ########################################################################
02581>  ** END OF RUN :   96
02582>
02583> ************************************************************************************************
02584>
02585>
02586>
02587>
02588>
02589>  RUN#:COMMAND#
02590> R0097:C00001------------------------------------------------------------------------
02591>      START
02592>      [TZERO =    .00 hrs on 19970101]
02593>      [METOUT=   2   (1=imperial, 2=metric output)]
02594>      [NSTORM=   0 ]
02595>      [NRUN  = 0097 ]
02596> *************************************************************************
02597> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02598> *************************************************************************
02599> #  Project Name  : [Caivan Stittsville West properties]
02600> #  Project Number: [2267]
02601> #  Date          : [2021/12/14]
02602> #  Modeller      : [JB]
02603> #  Company       : J.F. Sabourin and Associates
02604> #  License #     : 2549237
02605> *************************************************************************
02606> *************************************************************************
02607> # Ottawa International Airport (1967 - 2003)
02608> R0097:C00002------------------------------------------------------------------------
02609>   *  READ AES DATA
02610>      [Filename  = 6106000.123                                              ]
02611>      [Start_date= 1997.0101: End_date= 1997.1231]
02612>      (DT= 60.min: Length= 8040.hrs: WetHrs=  379: DryHrs= 7661: PTOT= 433.20)
02613>      Maximum average rainfall intensities over
02614>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02615>       12.50     7.60     5.67     4.43     2.91     1.68     1.12      .84      .63    mm/hr
02616>       12.50    15.20    17.00    26.60    34.90    40.40    40.40    40.40    45.30    mm
02617>  19970622 19970622 19970622 19970221 19970222 19970222 19970222 19970222 19970222  date
02618>      Number of rainfall events per following interevent time
02619>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02620>         113       92       83       67       61       55       48       43       30
02621>      Number of events with at least the following durations
02622>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02623>         112       70       46       20        4        0        0        0        0
02624> R0097:C00003------------------------------------------------------------------------
02625>      COMPUTE API
02626>      [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02627>      [APImax= 50.00: APIavg= 13.66: APImin=  .27]
02628> ########################################################################
02629> # Pre Development Condition - Using NASHHYD and CN
02630> ########################################################################
02631> R0097:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02632>     CONTINUOUS NASHYD     15.0 01:EastPre       39.35     .103 1997.0221_21:45   51.06 .118     .000
02633>       [CN= 65.0: N= 3.00: Tp= 1.47]
02634>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02635>       [InterEventTime=  12.00]
02636> R0097:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02637>     CONTINUOUS NASHYD     15.0 01:WestPre       39.85     .100 1997.0222_ 1:45   49.93 .115     .000
02638>       [CN= 61.0: N= 3.00: Tp= 1.22]
02639>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02640>       [InterEventTime=  12.00]
02641> R0097:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02642>     ADD HYD               15.0 02:WestPre       39.85     .100 1997.0222_ 1:45   49.93  n/a     .000
02643>                       +   15.0 02:EastPre      39.35     .103 1997.0221_21:45   51.06  n/a     .000
02644>                   SUM=    15.0 01:Pre          79.20     .201 1997.0221_21:45   50.49  n/a     .000
02645> ########################################################################
02646> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02647> ########################################################################
02648> R0097:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02649>     CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     .515 1997.0221_21:30   142.50 .329     .000
02650>       [CN=100.0: N= 3.00: Tp= 1.47]
02651>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02652>       [InterEventTime=  12.00]
02653> R0097:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02654>     CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85     .549 1997.0221_21:15   142.50 .329     .000
02655>       [CN=100.0: N= 3.00: Tp= 1.22]
02656>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02657>       [InterEventTime=  12.00]
02658> R0097:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02659>     ADD HYD               15.0 02:InfWestPre    39.85     .549 1997.0221_21:15   142.50  n/a     .000
02660>                       +   15.0 02:InfEastPre    39.35     .515 1997.0221_21:30   142.50  n/a     .000
02661>                   SUM=    15.0 01:InfPre       79.20    1.064 1997.0221_21:15   142.50  n/a     .000
02662> ########################################################################
02663> # STORMS
02664> ########################################################################
02665>  ** END OF RUN :   97
02666>
02667> ************************************************************************************************
02668>
02669>
02670>
02671>
02672>
02673>  RUN#:COMMAND#
02674> R0098:C00001------------------------------------------------------------------------
02675>      START
02676>      [TZERO =    .00 hrs on 19980101]
02677>      [METOUT=   2   (1=imperial, 2=metric output)]
02678>      [NSTORM=   0 ]
02679>      [NRUN  = 0098 ]
02680> *************************************************************************
02681> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02682> *************************************************************************
02683> #  Project Name  : [Caivan Stittsville West properties]
02684> #  Project Number: [2267]
02685> #  Date          : [2021/12/14]
02686> #  Modeller      : [JB]
02687> #  Company       : J.F. Sabourin and Associates
02688> #  License #     : 2549237
02689> *************************************************************************
02690> *************************************************************************
02691> # Ottawa International Airport (1967 - 2003)
02692> R0098:C00002------------------------------------------------------------------------
02693>   *  READ AES DATA
02694>      [Filename  = 6106000.123                                              ]
02695>      [Start_date= 1998.0101: End_date= 1998.1231]
02696>      (DT= 60.min: Length= 5088.hrs: WetHrs=  291: DryHrs= 4797: PTOT= 440.30)
02697>      Maximum average rainfall intensities over
02698>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02699>       15.80     8.90     7.60     4.00     2.54     1.82     1.27      .95      .76    mm/hr
02700>       15.80    17.80    22.80    24.00    30.50    43.60    45.80    45.80    54.60    mm
02701>  19980716 19980627 19980927 19980927 19980927 19980927 19980928 19980928 19980615  date
02702>      Number of rainfall events per following interevent time
02703>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02704>         126      104       95       78       63       42       37       32       21
02705>      Number of events with at least the following durations
02706>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02707>         125       64       43        8        1        0        0        0        0
02708> R0098:C00003------------------------------------------------------------------------
02709>      COMPUTE API
02710>      [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02711>      [APImax= 57.22: APIavg= 21.28: APImin=  1.69]
02712> ########################################################################
02713> # Pre Development Condition - Using NASHHYD and CN
02714> ########################################################################
02715> R0098:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02716>     CONTINUOUS NASHYD     15.0 01:EastPre       39.35     .099 1998.0927_15:15   59.11 .134     .000
02717>       [CN= 65.0: N= 3.00: Tp= 1.47]
02718>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02719>       [InterEventTime=  12.00]
02720> R0098:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02721>     CONTINUOUS NASHYD     15.0 01:WestPre       39.85     .103 1998.0927_15:00   58.17 .132     .000
02722>       [CN= 61.0: N= 3.00: Tp= 1.22]
02723>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02724>       [InterEventTime=  12.00]
02725> R0098:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02726>     ADD HYD               15.0 02:WestPre       39.85     .103 1998.0927_15:00   58.17  n/a     .000
02727>                       +   15.0 02:EastPre      39.35     .099 1998.0927_15:15   59.11  n/a     .000
02728>                   SUM=    15.0 01:Pre          79.20     .202 1998.0927_15:15   58.64  n/a     .000
02729> ########################################################################
02730> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02731> ########################################################################
02732> R0098:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02733>     CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     .500 1998.0927_ 3:30   142.49 .324     .000
02734>       [CN=100.0: N= 3.00: Tp= 1.47]
02735>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02736>       [InterEventTime=  12.00]
02737> R0098:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02738>     CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85     .547 1998.0627_ 1:45   142.49 .324     .000
02739>       [CN=100.0: N= 3.00: Tp= 1.22]
02740>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02741>       [InterEventTime=  12.00]
02742> R0098:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02743>     ADD HYD               15.0 02:InfWestPre    39.85     .547 1998.0627_ 1:45   142.49  n/a     .000
02744>                       +   15.0 02:InfEastPre    39.35     .500 1998.0927_ 3:30   142.49  n/a     .000
02745>                   SUM=    15.0 01:InfPre       79.20    1.038 1998.0927_ 3:15   142.49  n/a     .000
02746> ########################################################################
02747> # STORMS
02748> ########################################################################
02749>  ** END OF RUN :   98
02750>
02751> ************************************************************************************************
02752>
02753>
02754>
02755>
02756>
02757>  RUN#:COMMAND#
02758> R0099:C00001------------------------------------------------------------------------
02759>      START
02760>      [TZERO =    .00 hrs on 19990101]
02761>      [METOUT=   2   (1=imperial, 2=metric output)]
02762>      [NSTORM=   0 ]
02763>      [NRUN  = 0099 ]
02764> *************************************************************************
02765> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02766> *************************************************************************
02767> #  Project Name  : [Caivan Stittsville West properties]
02768> #  Project Number: [2267]
02769> #  Date          : [2021/12/14]
02770> #  Modeller      : [JB]
02771> #  Company       : J.F. Sabourin and Associates
02772> #  License #     : 2549237
02773> *************************************************************************
02774> *************************************************************************
02775> # Ottawa International Airport (1967 - 2003)
02776> R0099:C00002------------------------------------------------------------------------
02777>   *  READ AES DATA
02778>      [Filename  = 6106000.123                                              ]
02779>      [Start_date= 1999.0101: End_date= 1999.1231]
02780>      (DT= 60.min: Length= 4440.hrs: WetHrs=  247: DryHrs= 4193: PTOT= 424.40)
02781>      Maximum average rainfall intensities over
02782>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02783>       17.50    10.10     9.03     6.57     3.31     1.65     1.45     1.22      .97    mm/hr
02784>       17.50    20.20    27.10    39.40    39.70    39.70    52.20    58.60    69.50    mm
02785>  19990717 19990717 19990906 19990906 19990906 19990906 19990907 19990908 19990908  date
02786>      Number of rainfall events per following interevent time
02787>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02788>         102       80       70       63       56       39       31       28       18
02789>      Number of events with at least the following durations
02790>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02791>         101       57       31       10        1        0        0        0        0
02792> R0099:C00003------------------------------------------------------------------------
02793>      COMPUTE API
02794>      [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02795>      [APImax= 69.51: APIavg= 23.97: APImin=  1.93]
02796> ########################################################################
02797> # Pre Development Condition - Using NASHHYD and CN
02798> ########################################################################
02799> R0099:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02800>     CONTINUOUS NASHYD     15.0 01:EastPre       39.35     .160 1999.0906_10:30   66.40 .156     .000
02801>       [CN= 65.0: N= 3.00: Tp= 1.47]
02802>       [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02803>       [InterEventTime=  12.00]
02804> R0099:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02805>     CONTINUOUS NASHYD     15.0 01:WestPre       39.85     .152 1999.0906_10:15   65.46 .154     .000
02806>       [CN= 61.0: N= 3.00: Tp= 1.22]
02807>       [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02808>       [InterEventTime=  12.00]
02809> R0099:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02810>     ADD HYD               15.0 02:WestPre       39.85     .152 1999.0906_10:15   65.46  n/a     .000
02811>                       +   15.0 02:EastPre      39.35     .160 1999.0906_10:30   66.40  n/a     .000
02812>                   SUM=    15.0 01:Pre          79.20     .312 1999.0906_10:15   65.93  n/a     .000
02813> ########################################################################
02814> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02815> ########################################################################
02816> R0099:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02817>     CONTINUOUS NASHYD     15.0 01:InfEastPre    39.35     .769 1999.0906_ 9:30   151.02 .356     .000
02818>       [CN=100.0: N= 3.00: Tp= 1.47]
02819>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02820>       [InterEventTime=  12.00]
02821> R0099:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02822>     CONTINUOUS NASHYD     15.0 01:InfWestPre    39.85     .839 1999.0906_ 9:15   151.02 .356     .000
02823>       [CN=100.0: N= 3.00: Tp= 1.22]
02824>       [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02825>       [InterEventTime=  12.00]
02826> R0099:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02827>     ADD HYD               15.0 02:InfWestPre    39.85     .839 1999.0906_ 9:15   151.02  n/a     .000
02828>                       +   15.0 02:InfEastPre    39.35     .769 1999.0906_ 9:30   151.02  n/a     .000
02829>                   SUM=    15.0 01:InfPre       79.20    1.602 1999.0906_ 9:15   151.02  n/a     .000
02830> ########################################################################
02831> # STORMS
02832> ########################################################################
02833>  ** END OF RUN :   99
02834>
02835> ************************************************************************************************
02836>
02837>
02838>
02839>
02840>
02841>  RUN#:COMMAND#
02842> R0100:C00001------------------------------------------------------------------------
02843>      START
02844>      [TZERO =    .00 hrs on 20000101]
02845>      [METOUT=   2   (1=imperial, 2=metric output)]
02846>      [NSTORM=   0 ]
02847>      [NRUN  = 0100 ]
02848> *************************************************************************
02849> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02850> *************************************************************************
02851> #  Project Name  : [Caivan Stittsville West properties]
02852> #  Project Number: [2267]
02853> #  Date          : [2021/12/14]
02854> #  Modeller      : [JB]
02855> #  Company       : J.F. Sabourin and Associates
02856> #  License #     : 2549237
02857> *************************************************************************
02858> *************************************************************************
02859> # Ottawa International Airport (1967 - 2003)
02860> R0100:C00002------------------------------------------------------------------------
02861>   *  READ AES DATA
02862>      [Filename  = 6106000.123                                              ]
02863>      [Start_date= 2000.0101: End_date= 2000.1230]
02864>      (DT= 60.min: Length= 5160.hrs: WetHrs=  401: DryHrs= 4759: PTOT= 535.90)
02865>      Maximum average rainfall intensities over
02866>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02867>       14.70     9.60     8.03     6.43     3.89     1.95     1.30     1.03      .84    mm/hr
02868>       14.70    19.20    24.10    38.60    46.70    46.70    46.80    49.30    60.40    mm
02869>  20000625 20000625 20000625 20000625 20000625 20000625 20000626 20000510 20000511  date
02870>      Number of rainfall events per following interevent time
02871>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02872>         156      125      110       86       67       46       34       30       23
02873>      Number of events with at least the following durations
02874>        1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02875>         155       82       49       16        2        0        0        0        0
02876> R0100:C00003------------------------------------------------------------------------
02877>      COMPUTE API
02878>      [APIini= 50.00: APIkdy= .9000: APIkdt= .9956]
02879>      [APImax= 76.65: APIavg= 25.66: APImin=  5.70]
02880> ########################################################################
```

```
02881> # Pre Development Condition - Using NASHHYD and CN
02882> ##############################################################################
02883> R0100:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02884>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .359 2000.0625_11:00   85.69 .160     .000
02885>        [CN= 65.0: N= 3.00: Tp= 1.47]
02886>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02887>        [InterEventTime=  12.00]
02888> R0100:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02889>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .369 2000.0625_10:45   84.05 .157     .000
02890>        [CN= 61.0: N= 3.00: Tp= 1.22]
02891>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02892>        [InterEventTime=  12.00]
02893> R0100:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02894>      ADD HYD              15.0 02:WestPre       39.85     .369 2000.0625_10:45   84.05  n/a     .000
02895>                       +   15.0 02:EastPre       39.35     .359 2000.0625_11:00   85.69  n/a     .000
02896>                     SUM=   15.0 01:Pre          79.20     .728 2000.0625_10:45   84.87  n/a     .000
02897> ##############################################################################
02898> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02899> ##############################################################################
02900> R0100:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02901>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .863 2000.0625_10:45  192.84 .360     .000
02902>        [CN=100.0: N= 3.00: Tp= 1.47]
02903>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02904>        [InterEventTime=  12.00]
02905> R0100:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02906>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .960 2000.0625_10:30  192.84 .360     .000
02907>        [CN=100.0: N= 3.00: Tp= 1.22]
02908>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02909>        [InterEventTime=  12.00]
02910> R0100:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02911>      ADD HYD              15.0 02:InfWestPre    39.85     .960 2000.0625_10:30  192.84  n/a     .000
02912>                       +   15.0 02:InfEastPre    39.35     .863 2000.0625_10:45  192.84  n/a     .000
02913>                     SUM=   15.0 01:InfPre       79.20    1.820 2000.0625_10:30  192.84  n/a     .000
02914> ##############################################################################
02915> # STORMS
02916> ##############################################################################
02917>   ** END OF RUN :  101
02918>
02919> ******************************************************************************************************
02920>
02921>
02922>
02923>
02924>
02925>  RUN#:COMMAND#
02926> R0102:C00001------------------------------------------------------------------------------------------
02927>       START
02928>         [TZERO =    .00 hrs on 20020101]
02929>         [METOUT=   2    (1=imperial, 2=metric output)]
02930>         [NSTORM=   0 ]
02931>         [NRUN  = 0102 ]
02932> ##############################################################################
02933> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
02934> ##############################################################################
02935> #  Project Name  : [Caivan Stittsville West properties]
02936> #  Project Number: [2267]
02937> #  Date          : [2021/12/14]
02938> #  Modeller      : [JB]
02939> #  Company       : J.F. Sabourin and Associates
02940> #  License #     : 2549237
02941> ##############################################################################
02942> ##############################################################################
02943> # Ottawa International Airport (1967 - 2003)
02944> R0102:C00002------------------------------------------------------------------------------------------
02945>   *  READ AES DATA
02946>         [Filename  = 6106000.123                                                 ]
02947>         [Start_date= 2002.0101: End_date= 2002.1231]
02948>         [DT= 60.min: Length= 5088.hrs: WetHrs=  304: DryHrs= 4784: PTOT= 551.50)
02949>         Maximum average rainfall intensities over
02950>           1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02951>         45.00    26.75    18.40     9.48     4.74     2.48     2.08     1.56     1.04    mm/hr
02952>         45.00    53.50    55.20    56.90    56.90    59.50    74.90    74.90    74.90    mm
02953>       20020627 20020627 20020627 20020627 20020627 20020627 20020627 20020627 20020628 20020629  date
02954>       Number of rainfall events per following interevent time
02955>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02956>          100       83       78       56       47       41       36       34       25
02957>       Number of events with at least the following durations
02958>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
02959>          100       59       33       13        5        0        0        0        0
02960> R0102:C00003------------------------------------------------------------------------------------------
02961>       COMPUTE API
02962>         [APIini= 50.00: APIkdt= .9000: APIkdt= .9956]
02963>         [APImax=114.06: APIavg= 26.37: APImin=  4.40]
02964> ##############################################################################
02965> # Pre Development Condition - Using NASHHYD and CN
02966> ##############################################################################
02967> R0102:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02968>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .783 2002.0627_15:15  159.97 .290     .000
02969>        [CN= 65.0: N= 3.00: Tp= 1.47]
02970>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
02971>        [InterEventTime=  12.00]
02972> R0102:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02973>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .844 2002.0627_15:00  158.24 .287     .000
02974>        [CN= 61.0: N= 3.00: Tp= 1.22]
02975>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
02976>        [InterEventTime=  12.00]
02977> R0102:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02978>      ADD HYD              15.0 02:WestPre       39.85     .844 2002.0627_15:00  158.24  n/a     .000
02979>                       +   15.0 02:EastPre       39.35     .783 2002.0627_15:15  159.97  n/a     .000
02980>                     SUM=   15.0 01:Pre          79.20    1.625 2002.0627_15:00  159.10  n/a     .000
02981> ##############################################################################
02982> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
02983> ##############################################################################
02984> R0102:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02985>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35    1.819 2002.0627_15:00  273.41 .496     .000
02986>        [CN=100.0: N= 3.00: Tp= 1.47]
02987>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02988>        [InterEventTime=  12.00]
02989> R0102:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02990>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85    2.169 2002.0627_14:45  273.41 .496     .000
02991>        [CN=100.0: N= 3.00: Tp= 1.22]
02992>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
02993>        [InterEventTime=  12.00]
02994> R0102:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
02995>      ADD HYD              15.0 02:InfWestPre    39.85    2.169 2002.0627_14:45  273.41  n/a     .000
02996>                       +   15.0 02:InfEastPre    39.35    1.819 2002.0627_15:00  273.41  n/a     .000
02997>                     SUM=   15.0 01:InfPre       79.20    3.961 2002.0627_14:45  273.41  n/a     .000
02998> ##############################################################################
02999> # STORMS
03000> ##############################################################################
03001>   ** END OF RUN :  102
03002>
03003> ******************************************************************************************************
03004>
03005>
03006>
03007>
03008>
03009>  RUN#:COMMAND#
03010> R0103:C00001------------------------------------------------------------------------------------------
03011>       START
03012>         [TZERO =    .00 hrs on 20030101]
03013>         [METOUT=   2    (1=imperial, 2=metric output)]
03014>         [NSTORM=   0 ]
03015>         [NRUN  = 0103 ]
03016> ##############################################################################
03017> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
03018> ##############################################################################
03019> #  Project Name  : [Caivan Stittsville West properties]
03020> #  Project Number: [2267]
03021> #  Date          : [2021/12/14]
03022> #  Modeller      : [JB]
03023> #  Company       : J.F. Sabourin and Associates
03024> #  License #     : 2549237
03025> ##############################################################################
03026> ##############################################################################
03027> # Ottawa International Airport (1967 - 2003)
03028> R0103:C00002------------------------------------------------------------------------------------------
03029>   *  READ AES DATA
03030>         [Filename  = 6106000.123                                                 ]
03031>         [Start_date= 2003.0101: End_date= 2003.1231]
03032>         [DT= 60.min: Length= 4440.hrs: WetHrs=  406: DryHrs= 4034: PTOT= 554.60)
03033>         Maximum average rainfall intensities over
03034>           1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
03035>         15.10    10.00     7.13     4.28     3.18     1.86     1.25      .94      .81    mm/hr
03036>         15.10    20.00    21.40    25.70    38.20    44.60    44.90    45.10    58.30    mm
03037>       20030711 20030711 20030711 20030711 20031021 20031015 20030525 20030526 20030527  date
03038>       Number of rainfall events per following interevent time
03039>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
03040>          145      127      109       86       64       45       38       25       15
03041>       Number of events with at least the following durations
03042>         1 hr    2 hrs    3 hrs    6 hrs   12 hrs   24 hrs   36 hrs   48 hrs   72 hrs
03043>          144       80       43       13        5        1        0        0        0
03044> R0103:C00003------------------------------------------------------------------------------------------
03045>       COMPUTE API
03046>         [APIini= 50.00: APIkdt= .9000: APIkdt= .9956]
03047>         [APImax= 72.10: APIavg= 28.54: APImin=  4.70]
03048> ##############################################################################
03049> # Pre Development Condition - Using NASHHYD and CN
03050> ##############################################################################
03051> R0103:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03052>      CONTINUOUS NASHYD    15.0 01:EastPre       39.35     .235 2003.0711_18:00  111.68 .201     .000
03053>        [CN= 65.0: N= 3.00: Tp= 1.47]
03054>        [IaREC= 6.00: SMIN= 54.78: SMAX=365.23: SK= .025]
03055>        [InterEventTime=  12.00]
03056> R0103:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03057>      CONTINUOUS NASHYD    15.0 01:WestPre       39.85     .244 2003.0711_17:45  109.00 .197     .000
03058>        [CN= 61.0: N= 3.00: Tp= 1.22]
03059>        [IaREC= 6.00: SMIN= 64.50: SMAX=430.01: SK= .025]
03060>        [InterEventTime=  12.00]
03061> R0103:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03062>      ADD HYD              15.0 02:WestPre       39.85     .244 2003.0711_17:45  109.00  n/a     .000
03063>                       +   15.0 02:EastPre       39.35     .235 2003.0711_18:00  111.68  n/a     .000
03064>                     SUM=   15.0 01:Pre          79.20     .476 2003.0711_17:45  110.33  n/a     .000
03065> ##############################################################################
03066> # Pre Development Condition - Using NASHHYD and CN - No INFILTRATION
03067> ##############################################################################
03068> R0103:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03069>      CONTINUOUS NASHYD    15.0 01:InfEastPre    39.35     .778 2003.0711_17:45  231.08 .417     .000
03070>        [CN=100.0: N= 3.00: Tp= 1.47]
03071>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
03072>        [InterEventTime=  12.00]
03073> R0103:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03074>      CONTINUOUS NASHYD    15.0 01:InfWestPre    39.85     .903 2003.0711_17:30  231.08 .417     .000
03075>        [CN=100.0: N= 3.00: Tp= 1.22]
03076>        [IaREC= 6.00: SMIN=  1.39: SMAX=  9.24: SK= .025]
03077>        [InterEventTime=  12.00]
03078> R0103:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
03079>      ADD HYD              15.0 02:InfWestPre    39.85     .903 2003.0711_17:30  231.08  n/a     .000
03080>                       +   15.0 02:InfEastPre    39.35     .778 2003.0711_17:45  231.08  n/a     .000
03081>                     SUM=   15.0 01:InfPre       79.20    1.663 2003.0711_17:45  231.08  n/a     .000
03082> ##############################################################################
03083> # STORMS
03084> ##############################################################################
03085> R0103:C00002------------------------------------------------------------------------------------------
03086>   FINISH
03087> ------------------------------------------------------------------------------------------------------
03088> ******************************************************************************************************
03089>      WARNINGS / ERRORS / NOTES
03090>      -------------------------
03091> R0067:C00002  READ AES DATA
03092> *** WARNING: Requested start date is less than start date in file.
03093> *** WARNING: Missing rainfall increments were set to 0.
03094> *** WARNING: Missing rainfall increments were set to 0.
03095> *** WARNING: Missing rainfall increments were set to 0.
03096> *** WARNING: Requested start date is less than start date in file.
03097> *** WARNING: Missing rainfall increments were set to 0.
03098> *** WARNING: Missing rainfall increments were set to 0.
03099> *** WARNING: Missing rainfall increments were set to 0.
03100> *** WARNING: Missing rainfall increments were set to 0.
03101> *** WARNING: Missing rainfall increments were set to 0.
03102> *** WARNING: Missing rainfall increments were set to 0.
03103> *** WARNING: Missing rainfall increments were set to 0.
03104> *** WARNING: Requested start date is less than start date in file.
03105> *** WARNING: Missing rainfall increments were set to 0.
03106> *** WARNING: Missing rainfall increments were set to 0.
03107> *** WARNING: Missing rainfall increments were set to 0.
03108> *** WARNING: Missing rainfall increments were set to 0.
03109> *** WARNING: Missing rainfall increments were set to 0.
03110> *** WARNING: Missing rainfall increments were set to 0.
03111> *** WARNING: Missing rainfall increments were set to 0.
03112> *** WARNING: Missing rainfall increments were set to 0.
03113> *** WARNING: Missing rainfall increments were set to 0.
03114> *** WARNING: Missing rainfall increments were set to 0.
03115> *** WARNING: Requested start date is less than start date in file.
03116> *** WARNING: Missing rainfall increments were set to 0.
03117> *** WARNING: Missing rainfall increments were set to 0.
03118> *** WARNING: Missing rainfall increments were set to 0.
03119> *** WARNING: Requested start date is less than start date in file.
03120> *** WARNING: Missing rainfall increments were set to 0.
03121> *** WARNING: Missing rainfall increments were set to 0.
03122> *** WARNING: Missing rainfall increments were set to 0.
03123> *** WARNING: Missing rainfall increments were set to 0.
03124> *** WARNING: Missing rainfall increments were set to 0.
03125> *** WARNING: Missing rainfall increments were set to 0.
03126> *** WARNING: Requested start date is less than start date in file.
03127> *** WARNING: Missing rainfall increments were set to 0.
03128> *** WARNING: Missing rainfall increments were set to 0.
03129> *** WARNING: Requested start date is less than start date in file.
03130> *** WARNING: Missing rainfall increments were set to 0.
03131> *** WARNING: Requested start date is less than start date in file.
03132> *** WARNING: Missing rainfall increments were set to 0.
03133> *** WARNING: Requested start date is less than start date in file.
03134> *** WARNING: Missing rainfall increments were set to 0.
03135> *** WARNING: Requested start date is less than start date in file.
03136> *** WARNING: Missing rainfall increments were set to 0.
03137> *** WARNING: Requested start date is less than start date in file.
03138> *** WARNING: Specified end date is beyond the end date in file.
03139> *** WARNING: Missing rainfall increments were set to 0.
03140>    Simulation ended on 2023-01-25     at 12:51:51
03141> ------------------------------------------------------------------------------------------------------
03142>
```

Table B3 - Pre Development Water Budget

Year	Precipitation (mm)	Evaporation (mm)	Evaporation (%)	Infiltration (mm)	Infiltration (%)	Runoff (mm)	Runoff (%)
1967	386.9	213.7	55%	87.7	23%	85.5	22%
1968	592.8	356.7	60%	127.2	21%	108.9	18%
1969	569.8	359.1	63%	121.0	21%	89.7	16%
1970	558.9	358.6	64%	111.3	20%	89.0	16%
1971	522.1	361.4	69%	92.4	18%	68.3	13%
1972	784.3	441.3	56%	152.7	19%	190.3	24%
1973	744.9	435.8	59%	168.0	23%	141.1	19%
1974	386.2	281.2	73%	62.6	16%	42.4	11%
1975	535.5	338.7	63%	107.8	20%	89.0	17%
1976	492.4	348.6	71%	84.3	17%	59.5	12%
1977	677.6	430.6	64%	137.5	20%	109.5	16%
1978	638.8	408.5	64%	143.5	22%	86.9	14%
1979	866.5	466.3	54%	203.8	24%	196.4	23%
1980	622	411.9	66%	122.4	20%	87.8	14%
1981	936.4	536.6	57%	175.3	19%	224.5	24%
1982	596.1	407.7	68%	114.8	19%	73.6	12%
1983	587.3	412.8	70%	97.3	17%	77.3	13%
1984	459.4	280.8	61%	96.2	21%	82.4	18%
1985	559.9	341.9	61%	133.5	24%	84.5	15%
1986	849.4	500.1	59%	163.6	19%	185.8	22%
1987	639.9	441.6	69%	107.0	17%	91.3	14%
1988	643.2	418.5	65%	119.0	18%	105.8	16%
1989	522.5	356.7	68%	100.2	19%	65.6	13%
1990	727.8	462.7	64%	137.8	19%	127.3	17%
1991	555.8	398.5	72%	91.5	16%	65.8	12%
1992	730.2	456.3	62%	137.3	19%	136.5	19%
1993	721.1	486.1	67%	141.4	20%	93.6	13%
1994	527	322.4	61%	100.1	19%	104.5	20%
1995	321.6	162.9	51%	66.3	21%	92.4	29%
1996	512.2	339.2	66%	99.3	19%	73.7	14%
1997	433.2	290.7	67%	92.0	21%	50.5	12%
1998	440.3	297.8	68%	83.9	19%	58.6	13%
1999	424.4	273.4	64%	85.1	20%	65.9	16%
2000	535.9	343.1	64%	108.0	20%	84.9	16%
2002	551.5	278.1	50%	114.3	21%	159.1	29%
2003	554.6	323.5	58%	120.8	22%	110.3	20%
Average	589.1	370.7	63%	116.9	20%	101.6	17%
Min	321.6	162.9	50%	62.6	16%	42.4	11%
Max	936.4	536.6	73%	203.8	24%	224.5	29%



No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	27.05.20	ISSUED FOR AGENCY REVIEW	AJR
3	02.09.20	ISSUED FOR ECA APPLICATION	AJR
4	14.12.20	FINAL - ISSUED FOR DISTRIBUTION	AJR

LICENSED PROFESSIONAL ENGINEER A. J. ROBINSON 20/12/14 PROVINCE OF ONTARIO

Professional Engineers Ontario — Licensed Engineering Technologist — Name: L. FRANKLIN — 2020.12.14

SCALES: 150 0 300 HORIZONTAL

Robinson Consultants
350 Palladium Drive
Ottawa, Ontario K2V 1A8
(613) 592-6060 rcii.com

DESIGN LF — CHECKED AJR — DRAWN JHB — CHECKED LF — APPROVED AJR

CITY OF OTTAWA

FAULKNER MUNICIPAL DRAIN

MAINTENANCE SECTIONS and SECTION DRAINAGE AREAS

PROJECT No. 16013
CONTRACT No.
DATED DEC. 2020
DWG. No. FIG 6.1

The record of site-specific information associated with RVCA's regulatory approval process since 2006 was checked. It was found that no site-specific work affects the flood risk lines.

Drawings FL-1 and FL-2 in Appendix F depict the delineated floodplain and areas of shallow flooding.

7.2 Areas of Shallow Flooding

At a few places (Drawing FL-1), it is expected that flood water would go overbank from the channel and identifiable floodplain into the adjacent areas. However, there is considerable uncertainty as to how this would manifest itself and which area would actually be inundated by overbank water under the regulatory flood event. Many factors appear to be in the play: stream hydraulics, volume of flood water, volume of channel and floodplain storage, flood water escaping the stream as spills, amount of flood water available for spilling, local (micro) topography, shallow (sheet) flow with wet/dry fronts, rain water collected in depressions and puddles, soil and vegetation characteristics, etc. etc., and their interaction with each other. Needless to say, this is a very complex phenomenon and does not lend itself to engineering computation. While we can visualize the existence of areas of shallow flooding and can tentatively identify their probable extent, we cannot calculate with any degree of accuracy relevant parameters such as flood elevation, water depth or velocity. We tentatively call them areas of shallow flooding[11]. Such areas of shallow flooding are prone to a lesser (lesser than identifiable floodplains) albeit unspecified degree of flood risk. Even though flood risk parameters cannot be estimated, the areas of shallow flooding are nonetheless hazardous to a certain extent. As such they fall –in our judgment – within the broad category of hazardous lands as defined

[11] Our concept of areas of shallow flooding is somewhat akin to that adopted by Credit Valley Conservation. A recent document (CVC 2010; Section 5.4.3) reads: "**Floodplain Spill Areas** – There are several areas within the CVC's jurisdiction where floodplain spills occur. Spill areas are portions of the floodplain where hydraulic modeling and mapping of the riverine flood hazard indicates that flood waters are not physically contained within the valleyland and may or may not exit the watershed or subwatershed into surrounding lands. It is important to note that floodplain spill areas do not include the flood fringe, regardless of its characteristics such as flood flows and depths. Generally, the depth of flooding in spill areas cannot be readily determined as the flood depths that occur depend on a number of factors such as local and down-gradient topography, storage volume and the amount of spill flow that occurs. In addition, spills typically occur during higher flow rates of the storm event where the volume and depth of flood water is also dependent on the duration of the storm event."

Drawing FL-1 Cross-sections and regulatory flood levels

- floodplain-areas of shallow flooding demarcation line
- Study Limit
- Cross Section
- 1m LiDAR-derived contours
- 100yr Floodline / La Crue Regulatrice
- areas of shallow flooding
- Floodplain

08 MAY 2017

The information in this drawing is for information purposes only. Authoritative information on flood hazard is maintained in RVCA's GIS system and is updated from time to time based on new data.

Shea Road (Faulkner Municipal Drain along western right-of-way)

Potential area of shallow flooding adjacent to Faulkner Municipal Drain

Study Limit

RIDEAU VALLEY CONSERVATION AUTHORITY

Projection note: U.T.M. Zone 18 - NAD 83 Datum

File name: Drawing FL-1

Date Modified: 05/08/2017

N

1:10,000

0 500 1,000

Meters

Table 1 - Groundwater Level Measurement Summary															
Well ID		**BH1-21**	**BH2-21**	**BH3-21**	**BH22A-21**	**BH24-21**	**BH33-21**	**HA1-22**	**BH1-22**	**BH1A-22**	**BH2-22**	**BH3-22**	**BH3A-22**	**BH4-22**	**BH5-22**
Ground Surface Elevation (m asl)		104.29	107.19	108.41	102.98	103.07	104.7	106.78	107.31	107.31	103.58	102.25	102.25	105.71	105.7
Groundwater (GW) Measurements															
11-Jan-22	**GW Level (m bgs)**	1.22	0.82	0.89	2.49	0.67	1.84	Wells Were Not Installed At This Time							
	GW Elevation (m asl)	103.07	106.37	107.52	100.49	102.40	102.86								
11-Oct-22	**GW Level (m bgs)**	1.12	1.16	0.90	2.61	0.60	2.12	0.31	1.33	1.44	1.52	0.84	0.81	3.62	1.62
	GW Elevation (m asl)	103.17	106.03	107.52	100.37	102.47	102.59	106.48	105.99	105.87	102.06	101.42	101.44	102.10	104.09
28-Oct-22	**GW Level (m bgs)**	1.01	0.95	0.92	N/A	0.46	1.98	0.28	1.35	1.43	1.52	0.61	0.40	3.65	1.64
	GW Elevation (m asl)	103.28	106.25	107.49	N/A	102.61	102.72	106.51	105.97	105.88	102.06	101.64	101.85	102.07	104.06

Table 2 - Single Well Response Test Results Summary		
Test Hole ID	**Screened Media**	**Hydraulic Conductivity (m/sec)***
HA1-22	Brown Silty Sand w/ Trace Gravel	1.51E-05
BH1-22	Bedrock	1.53E-05
BH1A-22	Brown Silty Sand/Glacial Till	Insufficient Water Volume to Conduct Test
BH2-22	Bedrock	8.99E-06
BH3-22	Bedrock	6.29E-05
BH3A-22	Brown Silty Sand/Glacial Till	4.48E-06
BH4-22	Bedrock	8.89E-07
BH5-22	Bedrock	1.52E-05
BH1-21	Bedrock	1.23E-04
BH2-21	Bedrock	3.99E-05
BH3-21	Bedrock	2.98E-06
BH22A-21	Bedrock	4.31E-07
BH24-21	Bedrock	6.19E-05
BH33-21	Bedrock	1.60E-04

*Average value from all tests conducted at each test location

Table 3 - Overburden Field Saturated Hydraulic Conductivity Results and Estimated Infiltration Rates

Test Completed Adjacent to Borehole ID	Infiltration Testing Elevation (m asl)	Material	K_{fs} (m/s)*	Unfactored Infiltration Rate (mm/hr)**
BH1-21	103.90	Brown Silty Sand	2.10E-06	56
	103.63	Brown Silty Sand	1.90E-06	56
BH2-21	106.95	Brown Silty Sand	6.40E-06	76
	106.65	Brown Silty Sand	5.30E-07	39
BH7-21	106.74	Brown Silty Sand	1.10E-06	47
	106.44	Brown Silty Sand	1.60E-06	52
BH11-21	104.68	Brown Silty Sand	2.70E-06	60
	104.38	Brown Silty Sand	1.60E-06	52
BH15-21	102.70	Brown Silty Sand to Sandy Silt	2.10E-07	31
	102.48	Brown Silty Sand to Sandy Silt	≤ 8.1E-09	≤ 13
BH17-21	106.74	Brown Silty Sand to Sandy Silt	5.90E-06	74
	106.44	Brown Silty Sand to Sandy Silt	4.10E-06	67
BH22-21	102.58	Brown Silty Sand	1.10E-06	47
	102.28	Brown Silty Sand	1.60E-06	52
BH23-21	102.33	Brown Silty Clay w/ Sand	5.30E-07	39
	101.70	Brown Silty Clay	≤ 8.1E-09	≤ 13
BH26-21	102.74	Brown Silty Clay w/ Sand	1.10E-07	26
	102.44	Brown Silty Clay w/ Sand	1.10E-07	26
BH29-21	101.87	Brown Silty Sand to Sandy Silt	5.30E-07	39
	101.57	Brown Silty Sand to Sandy Silt	2.70E-07	33
BH31-21	103.19	Brown Silty Sand to Sandy Silt	1.10E-06	47
	102.89	Brown Silty Sand to Sandy Silt	1.35E-07	27
BH37-21	103.21	Brown Silty Sand to Sandy Silt	5.30E-06	72
	102.91	Brown Silty Sand to Sandy Silt	5.90E-06	74

***Field hydrualic conductivity (Kfs)**

****The infiltration rates do not include a safety correction factor. Based on our testing results, a safety correction factor can range between 2.5 to ≥ 3.5.**

Table 4 - Horizontal Hydraulic Gradient Summary

Well 'A'		Well 'B'				
Well ID	**GW Elevation (m asl)**	**Well ID**	**GW Elevation (m asl)**	**Distance (m)**	**Hydraulic Gradient (m/m)***	**Date**
BH3-21	107.515	BH1-22	105.985	73	0.0208	October 11, 2022
BH3-21	107.515	BH1A-22	105.87	73	0.0224	October 11, 2022
BH3-21	107.515	BH5-22	104.085	131	0.0263	October 11, 2022
BH3-21	107.515	BH4-22	102.095	206	0.0263	October 11, 2022
BH1-22	105.985	BH2-21	106.03	197	-0.0002	October 11, 2022
BH1-22	105.985	BH1-21	103.17	442	0.0064	October 11, 2022
BH1-22	105.985	BH5-22	104.085	148	0.0128	October 11, 2022
BH1-22	105.985	BH2-22	102.06	447	0.0088	October 11, 2022
BH1A-22	105.87	BH2-21	106.03	197	-0.0008	October 11, 2022
BH1A-22	105.87	BH1-21	103.17	442	0.0061	October 11, 2022
BH1A-22	105.87	BH5-22	104.085	148	0.0120	October 11, 2022
BH1A-22	105.87	BH2-22	102.06	447	0.0085	October 11, 2022
BH1A-22	105.87	BH3A-22	101.44	708	0.0063	October 11, 2022
BH2-21	106.03	BH1-21	103.17	296	0.0097	October 11, 2022
BH2-21	106.03	BH2-22	102.06	358	0.0111	October 11, 2022
BH5-22	104.085	BH4-22	102.095	137	0.0145	October 11, 2022
BH5-22	104.085	BH2-22	102.06	330	0.0061	October 11, 2022
BH2-22	102.06	BH3-22	101.415	397	0.0016	October 11, 2022
BH2-22	102.06	BH3A-22	101.44	397	0.0016	October 11, 2022
BH33-21	102.585	BH3-22	101.415	485	0.0024	October 11, 2022
BH33-21	102.585	BH3A-22	101.44	485	0.0024	October 11, 2022
BH33-21	102.585	BH22A-21	100.37	549	0.0040	October 11, 2022
BH33-21	102.585	BH24-21	102.47	307	0.0004	October 11, 2022
BH3-22	101.415	BH22A-21	100.37	296	0.0035	October 11, 2022
BH3A-22	101.44	BH22A-21	100.37	296	0.0036	October 11, 2022
BH24-21	102.47	BH22A-21	100.37	524	0.0040	October 11, 2022
BH4-22	102.095	BH3-22	101.415	584	0.0012	October 11, 2022
BH4-22	102.095	BH3A-22	101.44	584	0.0011	October 11, 2022
BH4-22	102.095	BH33-21	102.585	404	-0.0012	October 11, 2022

**Hydraulic Gradient = (GW Elevation Well 'A' - GW Elevation Well 'B') / Distance

Table 5 - Vertical Hydraulic Gradient Summary

Well 'A'			Well 'B'				
Well ID	**GW Elevation (m asl)**	**Well Depth (m)**	**Well ID**	**GW Elevation (m asl)**	**Well Depth (m)**	**Hydraulic Gradient (m/m)***	**Date**
BH1-22	105.985	98.29	BH1A-22	105.87	105.69	-0.0155	October 11, 2022
BH3-22	101.415	93.13	BH3A-22	101.44	99.1	0.0042	October 11, 2022
BH1-22	105.965	98.29	BH1A-22	105.88	105.69	-0.0115	October 28, 2022
BH3-22	101.64	93.13	BH3A-22	101.85	99.1	0.0352	October 28, 2022

*Hydraulic Gradient = (GW Elevation Well 'A' - GW Elevation Well 'B') / (Well Depth Well 'A' - Well Depth Well 'B')

PATERSON GROUP

This map is for reference only.
No policies apply within the Significant Groundwater Recharge Areas. See section 2.2 of this plan for more information

Mississippi-Rideau Source Protection Plan 2013

Mississippi-Rideau Source Protection Region
Significant Groundwater Recharge Areas

Schedule M

STITTSVILLE SOUTH URBAN EXPANSION AREA

BONNECHERE VALLEY
ADMASTON/BROMLEY
HORTON
RENFREW
MCNAB/BRAESIDE
COUNTY OF RENFREW
GREATER MADAWASKA
Québec
Ottawa River
Fitzroy Harbour
Arnprior
Galetta
Dunrobin
Kinburn
Marathon
Carp
Pakenham
Clarence Creek
Vars
RUSSELL
OTTA
MISSISSIPPI MILLS
Almonte
Appleton
CARLETON PLACE
Carleton Place
Ashton
Munster
Richmond
Kars
Osgoode
North Gower
Dwyer Hill
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
ADDINGTON HIGHLANDS
Plevna
LANARK HIGHLANDS
Lanark
McDonalds Corner
Balderson
BECKWITH
DRUMMOND/NORTH ELMSLEY
MONTAGUE
Burritts Rapids
Oxford Mills
Kemptville
Bedell
NORTH DUNDAS
SOUTH DUNDAS
NORTH GRENVILLE
NORTH FRONTENAC
Perth
PERTH
Port Elmsley
Smiths Falls
Merrickville
Glen Tay
De Witts Corners
Scotch Line
Maberly
TAY VALLEY
SMITHS FALLS
MERRICKVILLE-WOLFORD
Bishops Mills
Garretton
South Branch
COUNTY OF FRONTENAC
Stanleyville
Sharbot Lake
Bolingbroke
Crow Lake
Oconto
CENTRAL FRONTENAC
UNITED COUNTIES OF LEEDS AND GRENVILLE
North Augusta
AUGUSTA
ELIZABETHTOWN-KITLEY
Greenbush
Addison
Fairfield
Farmton
Maitland
Portland
Westport
Tichborne
Parham
WESTPORT
Crosby
Newboro
RIDEAU LAKES
Elgin
ATHENS
BROCKVILLE
Brockville
TWEED
STONE MILLS
SOUTH FRONTENAC
New York State

17 417 416 43 7 36 15 42 38 401

LEGEND

- City/Town
- Major Road
- Lower/Single Tier Municipalities
- Upper Tier Municipalities
- Water
- Source Protection Area
- Significant Groundwater Recharge Areas

0 3 6 12 18
Kilometres

Projection: Universal Transverse Mercator, NAD83, Zone 18 North

Please refer to Mississippi and Rideau Valley Assessment Reports for information on data sources and specifications for source protection data.

Produced by the Mississippi-Rideau Source Protection Region, under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2012.

While the MRSPR makes every effort to ensure that the information presented is sufficiently accurate for the intended uses of the map, there is an inherent margin of error in all mapping products, and accuracy of the mapping cannot be guaranteed for all possible uses. All end-users must therefore determine for themselves if the information is suitable for their purposes.

MAP LOCATION: Z:\Mapping\MXDs\SPP\18 Plan\SourceProtectionPlan\PlanMaps\Sch16 SGRA.mxd

APPENDIX E

TERMS OF REFERENCE

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

MEMORANDUM

DATE:	June 9, 2022
TO:	**Christopher Rogers, P.Eng.**
FROM:	Kevin L. Murphy, P. Eng.
SUBJECT:	**Caivan – Stittsville Lands (5993, 6070 & 6115 Flewellyn Road)** **New Urban Expansion Development – Terms of Reference (REVISED PER CITY COMMENTS DATED MAY 6, 2022)**
DSEL Job No.	21-1247
ATTACHMENTS:	

Chris,
As per your request to Caivan at a pre-consultation meeting held (February 7/22), the following is a proposed summary of Terms of Reference (TOR) to document the servicing strategy approach for development of the above noted parcels of land located within Stittsville.

1.0 BACKGROUND

Fotenn Consultants Inc. ("Fotenn") has previously circulated a January 27, 2022 outline for the development of Concept Plans and processes related to the above noted subject lands. Caivan Communities ("Caivan") has ownership of land parcels that are currently located in the rural area and are designated to be brought within the urban boundary through the new Official Plan process.

1.1 Study Area & Objectives

The subject lands are bound by Flewellyn Road to south, Shea Road to the east, an existing urban subdivision development to the north (Stittsville South – Area 6) and an estate lot subdivision to the west. The area is also bisected by the Faulkner Municipal Drain and a Hydro One power transmission corridor.

The main objective of the servicing review is to develop an overall servicing strategy for the Stittsville Lands that will fulfill the requirements of municipal and provincial standards. The review will consider, evaluate and assess the servicing needs of the development area as it relates to geotechnical considerations, availability of service connections and stormwater management objectives. Several development alternatives for road network layouts, parks and unit mixes will be analyzed and assessed with respect to servicing strategies with a preferred overall servicing scheme identified.

The preferred internal servicing plan will be developed to meet regulatory requirements and will be free of conflicts between the various infrastructure components (water, wastewater, storm and stormwater infrastructure). The following sections present the anticipated scope of work to be completed:

- Task 1 (Agreement on Terms of Reference),
- Task 2 (Internal Concept Plan Review Process (Input Evaluation)),
- Task 3 (Functional Servicing Report and Master Infrastructure Review).

2.0 WORK PLAN

Task 1: Agreement on Terms of Reference

Preparation and finalizing of the TOR for the proposed servicing assessment approach guiding the Concept Plan development process. This draft TOR will be circulated to the City for review/comment on the proposed scope and will form the basis of the future servicability review.

Task 2: Internal Concept Plan Review Process (Input Evaluation)

From an Overall Servicing perspective, this task will include a thorough consolidation of the documents listed in Section 2.1, investigate and quantify residual capacities and servicing constraints while keeping in mind the environmental constraints identified as part of the Task 2 process. The scope of work to complete the Concept Plan Review Process will include the following components:

2.1 Review and Consolidate

As part of the Concept Plan Review Process, a review of background reports that are concerned with the study area will be completed. The review will, at minimum, include the following reports and guidelines being considered:

- City of Ottawa Sewer Design Guidelines (City of Ottawa, October 2012) & Technical Bulletins (ISDTB-2014-01, PIEDTB-2016-01, ISTB-2018-01, ISTB-2018-04 & ISTB-2019-02)
- City of Ottawa Water Distribution Guidelines (City of Ottawa, July 2010) & Technical Bulletins (ISD-2010-2, ISDTB-2014-2, ISTB-2018-02, & ISDTB-2021-03)
- Infrastructure Master Plan (City of Ottawa, 2013)
- Low Impact Development Technical Guidance Report, Implementation in Areas with Potential Hydrogeological Constraints (Dillon Consulting and Aquafor Beech, February 2021)
- Stormwater Planning and Design Manual (Ministry of the Environment, March 2003)
- Amendment to the Engineer's Report for the Faulkner Municipal Drain (Robinson, December 2020) & Addendum No. 1 (Robinson, March 2021)
- Stittsville South – Area 6, City of Ottawa, Master Servicing Report & Stormwater Management Design Plan (Novatech/DSEL, December 2013)
- Stittsville South Subdivision, City of Ottawa – Detailed Servicing & Stormwater Management Report (Novatech July 2016)
- Sanitary Pump Station Pre-Design Report, Stittsville South (Novatech, July 2015)
- Stittsville South Subdivision, City of Ottawa – Shea Road Sanitary Pump Station Design Brief (Novatech, May 2016)
- Design Brief, Davidson Lands – OPA 76 Area 6a, Phase 1 (5993 Flewellyn Road) (IBI Group, February 2018)
- Fernbank Community Design Plan, Master Servicing Study (Novatech, June 2009)

- Geotechnical Investigation, Proposed Residential Development 5993, 6070 & 6115 Flewellyn Road – Ottawa (Paterson (PG5570-2) January 2022)
- Low Impact Development Stormwater Management Guidance Manual (Ministry of the Environment, Conservation and Parks, Draft for Consultation – January 2022)

2.2 Hydrological Modelling

Based on a review of background reports and topographic information available, a hydrologic model will be developed to estimate peak flows and hydrographs under for the various outlets from the Study Area. The analysis will be conducted with SWMHYMO under the design storm types, return periods and hydrological parameters described in the Ottawa Sewer Design Guidelines. The analysis will consider the drainage features inventoried as part of the topographical survey (open ditch, culverts, etc.) as well as any drainage divides. Surface flows will be calculated based on the existing flow patterns for the various outlets; drainage ditches, culverts and storm sewers (if applicable).

2.3 Coordination and Liaise with Other Disciplines

The Concept Plan review process will discuss findings from other disciplines including geotechnical, hydrogeology, water budget, hydrology, ecology (aquatic resources and natural areas), etc., which will establish the existing environmental conditions. The coordination will ensure that the hydrologic analysis considers natural environmental inventories and constraints. Where required, drawings prepared will note existing conditions constraints and potential opportunities, which may impact storm and stormwater servicing or other municipal infrastructure.

2.3.1 Coordinate and Liaise with Geotechnical Engineer

In consultation with the geotechnical engineer, DSEL will:

- Review specific grade raise restrictions to better understand the potential grading constraints versus potential land use;
- Review the soil's characteristics to better understand whether they are conducive to infiltration measures;
- Review the soil's structural capabilities from a support/strength perspective;
- Review the areas of either recharge or discharge potential.

2.3.2 Coordinate with the Hydrogeologist

In consultation with the hydrogeologist, the existing conditions water budget analysis will be reviewed to identify the zones conducive to infiltration measures or other low impact development (LID) strategies. These measures could potentially be used to mitigate impacts on the water budget. As part of this task, LIDAlso strategies will be reviewed, at a conceptual level, to determine their viability and effectiveness in maintaining the existing conditions water budget and potential benefits to mitigating downstream impacts.

- Prepare a conceptual LID plan which illustrates the zones noted above and how the measures will be integrated into the overall plan(s);

2.3.3 Coordinate with Biologist

In consultation with the biologist, the environmental constraints will be further reviewed to better understand their sensitivity to various land uses and their proximity to Concept Plan elements. The objectives and targets from a storm discharge perspective will be based on the on-site environmental constraints as well as the limitations of the receiving watercourses.

2.3.4 Review Topographical Survey and Complete Inventory of Existing Infrastructure

Once all constraints have been compiled a further review of topographical surveys will be completed as well as the drainage patterns identified under current conditions. As part of this task, existing services and outlets will be inventoried for wastewater, water and stormwater. The assessment of residual capacities for existing services will also be reviewed. Any additional survey data will be obtained as required to supplement as-built information.

2.4 Evaluation and Assessment of Storm Design Criteria , Objectives and Pond Alternatives

Based on the findings of the natural resource inventories, storm criteria for both water quality and quantity will be established from a consensus with other disciplines and based on requirements prevalent in the Study Area. Once adopted by the consultant team, the storm criteria will be presented and confirmed by regulatory agencies. Review and comment on potential end-of-pipe solutions that would satisfy the storm criteria and the most suitable approach and siting (based on topography, soil type etc) for the Concept Plans. Based on the siting of the facilities, establish footprint of the end-of-pipe facilities in accordance with the guidance described in Section 4 of the MECP SWMPDM. This includes evaluation of potential capacity of the existing Area 6 SWM pond to optimize use of that infrastructure.

Pond sizing will be established conservatively and not be downsized based on the finding of LID options reviewed to establish water balance.

2.5 Coordination with Drainage Engineer for requirements relating to the Faulkner Municipal Drain.

Consulation will be undertaken with the City's Municipal Drain Group to assess any requirements under the Ontario Drainage Act for the Faulkner Municipal Drain in terms of drainage outlets and land use changes proposed. The consultation will serve as the basis for any amendments to the existing Engineer's Report that may be required.

2.6 Concept Plan Summary Discussions & Preferred Plan Selection

The preceding evaluations considered along with the Concept Plans reviewed will determine a preferred plan which will be brought forward for the more detailed review and assessment of servicing in Task 3.

Task 3: Functional Servicing Report and Master Infrastructure Review

After the completion of Task 2, the Consulting Team will have developed several Concept Plans based on the findings and any other discipline inputs compiled to date from the Team with a preferred option selected. This will include environmental, stormwater, geotechnical and transportation. For the preferred Concept Plan the municipal servicing constraints criteria (see Task 3.1) will be investigated for the preparation of the servicing analysis. Review will also include comment on suitable servicing routes via either servicing blocks and/or the establishment of right-of-way corridors that have appropriate cross-sections to accommodate the various elements of servicing infrastructure required.

3.1 Evaluation of Municipal Servicing Requirements for the Preferred Concept Plan

DSEL will evaluate infrastructure servicing alternatives for the Concept Plans prepared by considering each option and providing the Team with inputs using the general criteria outlined below in order to resolve the preferred Concept as described in the Fotenn outline memo previously circulated. The tasks envisioned to be included in a Site Servicing and Stormwater Management Report area as follows:

3.1.1 Grading

1. Develop a macro level Grading Plan for the Concept Plans based on the constraints identified by the geotechnical engineer. Grading will be developed in accordance with the criteria described in the Design Guidelines.

3.1.2 Identify and Assess Capacity of Existing Conveyance Systems

1. Based on topographical maps/surveys and servicing reports of existing developments adjacent to the limits of the Study Area, free flowing capacity of watercourses (i.e. Faulkner Drain), roadside ditches and water crossings (if any) will be reviewed.

3.1.3 Water Infrastructure

1. Confirm pressure objectives with the City along feedermains under both domestic and fire flow conditions. Connections will be to the development areas to the north of the Study Area. Coordination with the Water Master Plan to be undertaken with City staff.

2. Calculate domestic demands (average, maximum day and peak hour) based on “system level parameters” (expectation being there will be in excess of 3,000 persons) under the build-out condition of the proposed land use for the selected Concept Plans. The preferred parameters will be provided by the City.

3. Calculate required design fire flow for concurrence by City staff.

4. Calculate theoretical domestic demands for potential phases of development based on a phasing strategy. Develop and populate a base water model for the preferred Concept Plan.

5. Acquire hydraulic boundary conditions at each of the connection points of the existing water distribution system. Proposed connection locations to be concurred with by City Staff.

6. Evaluate the performance of the distribution system against municipal requirements under domestic demand conditions for the Concept Plan. Assess and identify deficiencies and develop system upgrades, if required, to meet municipal requirements from both pressure and demand criteria.

7. Evaluate the performance of the proposed distribution system under a maximum day plus fire flow conditions for the Concept Plans supply characteristics of the pressure zone in accordance with Technical Bulletins.

8. Prepare a Water Servicing Plan for the preferred Concept Plan.

3.1.4 Wastewater Infrastructure

1. Based on the sanitary sewer outlets inventoried as part of Task 2, assess residual capacities. Coordination Wasterwater Master Plan to be undertaken with City Staff.

2. Develop peak wastewater flows based on the land use and population projections for the different land uses associated with the Concept Plans as per the Sewer Design Guidelines.

3. Prepare a Sanitary Drainage Area Plan and Design Sheets for the preferred Concept Plan.

4. Review trunk sanitary sewer routes, establish preliminary invert elevations based on topography and existing outlets. Prepare Sanitary Servicing Plan and assess impact of phasing on infrastructure. Identify servicing constraints, potential crossing conflicts and adjust, as required once the Storm Servicing Plan has been completed.

5. Assess residual capacities, beyond the Study Area population.

6. Review Shea Road Sanitary Pump Station for capacity and potential upgrades. Coordination with the Wastewater Master Plan Project Manager to be undertaken in order to assess conceptual pumping upgrates that will be required to accommodate the expansion area.:

   a. Summarize the existing pump station parameters.

   b. Review of potential component upgrades as well as overflow requirements.

   c. Review electrical changes needed to accommodate higher HP pumps and high-level electrical overview.

d. Transient analysis review.

7. Summarize findings for Wastewater Component within reporting.

3.1.5 Storm Servicing and Stormwater Management

1. Based on the prior Task findings, confirm storm design criteria (quantity and quality) with the RVCA, MECP and the City and discuss potential impacts.

2. Review topographic survey and maps. Based on the storm sewer outlets inventoried as part of prior tasks, confirm outlet locations and inverts, and assess residual capacities and drainage patterns, etc.

3. Review existing conditions hydrological analysis to establish the baseline condition.

4. Finalize capacity assessment of existing surface outlets using desktop calculations.

5. Determine minor and major system drainage boundaries for the Concept Plans based on residual capacities of the existing outlets.

6. Carry out post-development Water Budget based on the Concept Plan. Identify and assess water budget deficits for the preferred Concept Plan.

7. In consultation with the hydrogeologist:

- Investigate, at the conceptual level, the integration of low impact development (LID) strategies within the Study Area based on inputs from the hydrogeologist
- evaluate potential infiltration measures, and
- assess conceptually the performance of the LID strategies and infiltration measures with respect to the potential water budget deficits.

8. Based on the minor and major system boundaries, prepare post-development Storm Drainage Area Plan and Servicing Layout for the preferred Concept Plan. Identify servicing constraints, potential crossing conflicts and adjust, as required.

9. Coordinate with the City Drainage Group regarding the Faulkner Drain and any requirements under the Ontario Drainage Act.

10. Prepare Storm Sewer Design Sheets and Drainage Area Plans for the preferred Concept Plan with appropriate runoff coefficients, assessment of trunk storm sewer inverts etc as per Sewer Design Guidelines.

11. Review and finalize potential end-of-pipe solutions that would satisfy the storm criteria (water quality and quantity) and the most suitable approach and siting (based on topography, soil type etc) for the preferred Concept Plan. Based on the siting of the facilities, establish footprint of the end-of-pipe facilities in accordance with the guidance described in Section 4 of the MECP SWMPDM.

12. Carry out a hydraulic grade line (HGL) analysis of the proposed storm sewer system to evaluate the freeboard between the potential underside of footings and the 1:100 year storm. The analysis is to include the evaluation under the climate change event in accordance with the OSDG.

13. Assess impact of phasing on proposed storm infrastructure.

14. Summarize findings for Stormwater Management within the reporting

3.1.6 Water Budget

1. In consultation with the hydrogeological/geotechnical engineer, JFSA/DSEL will prepare a pre- and post-development water balance review (infiltration, runoff and evapotranspiration) for the site in accordance with the methodology summarized in Section 3.2 of the MECP's "Stormwater Management Planning & Design Manual, March 2003". This will include consideration of *Table 3.1 – Hydrologic*

Cycle Component Values and evaluation of 39 years of historical rainfall data from the Ottawa Airport via continuous hydrologic SWMHYMO model simulations. As per 4.7.1 (3.b) of the draft Official Plan.

2. Findings above will also be correlated to the mitigation of potential downstream impacts of the development.

3.1.7 Opinion of Probable Cost and Phasing

1. Coordination with other disciplines to finalize phasing for the Concept Plan in regard to servicing constraints.
2. Prepare an opinion of probable cost for municipal servicing for the prefered Concept Plan.

Kevin L. Murphy, P.Eng.

DSEL

david schaeffer engineering ltd.