RENFROE LAND MANAGEMENT

# 103 SCHNEIDER ROAD STORMWATER MANAGEMENT REPORT

JUNE 23, 2021



RENFROE LAND MANAGEMENT





# 103 SCHNEIDER ROAD STORMWATER MANAGEMENT REPORT

### RENFROE LAND MANAGEMENT

2<sup>ND</sup> SUBMISSION

PROJECT NO.: 211-01794-00 CLIENT REF: DATE: JUNE 23, 2021

WSP

SUITE 300 2611 QUEENSVIEW DRIVE OTTAWA, ON, CANADA K2B 8K2

T: +1 613 829-2800 F: +1 613 829-8299 WSP.COM

# REVISION HISTORY

### FIRST ISSUE

April 6 <sup>th</sup> , 2021	Draft SWM Report					
Prepared by	Reviewed by	Approved By				
кк	мн	МН				
SECOND ISSUE						
June 23 <sup>rd</sup> , 2021	SWM Report					
Prepared by	Reviewed by	Approved By				
JW	мн	МН				

## SIGNATURES

PREPARED BY

ansbrough

Julia Wansbrough, M.Sc., EIT Designer, Water Resources

June 23<sup>rd</sup>, 2021

APPROVED<sup>1</sup> BY



June 23<sup>rd</sup>, 2021

M. M. HUGHES 100501084 2021-06-23

WCE OF ONTARIO

C LLC

WSP Canada Inc. ("WSP") prepared this report solely for the use of the intended recipient, RENFROE LAND MANAGEMENT, in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report. This limitations statement is considered an integral part of this report.

The original of this digital file will be conserved by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

<sup>&</sup>lt;sup>1</sup> Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

# CONTRIBUTORS

### CLIENT

Renfroe Land Management

David Renfroe

### **WSP**

Water Resources, EIT

Julia Wansbrough

Water Resources, Team Lead

Michelle Hughes

# vsp

# TABLE OF CONTENTS

1	INTRODUCTION1
1.1	Scope1
1.2	Site Location1
1.3	Stormwater Management Plan Objectives1
1.4	Design Criteria1
2	PRE-DEVELOPMENT CONDITIONS2
2.1	General2
2.2	Rainfall Information3
2.3	Allowable Flow Rates
3	POST-DEVELOPMENT CONDITIONS4
3.1	General4
3.2	Water Quantity6
3.3	Water Quality7
3.4	Floodplain Considerations9
3.5	Temperature Considerations9
4	CONCLUSIONS

# vsp

### **TABLES**

TABLE 1: PRE-DEVELOPMENT PEAK FLOW RATE
CALCULATIONS (BASED ON $T_{D}=10$
MINUTES)
TABLE 2: PROPOSED LAND-USE AREA
BREAKDOWN5
TABLE 3: CATCHBASIN OUTFLOW CONTROL
TABLE 4: SUMMARY OF HYDROCAD MODELLING
RESULTS7
TABLE 5: SUMMARY OF SURFACE PONDING
ANALYSIS7
TABLE 6: FLOODPLAIN STORAGE COMPARISON9

### FIGURES

### **APPENDICES**

A PRE-CONSULTATION MEETING MINUTES AND TECHNICAL COMMENTS

- B CALCULATIONS & HYDROCAD OUTPUT
- C MVCA FLOODPLAIN MAP
- D CUT AND FILL ANALYSIS

# **1 INTRODUCTION**

## 1.1 SCOPE

WSP Canada Inc. was retained by Renfroe Land Management to prepare a Stormwater Management (SWM) Report for the proposed development at 103 Schneider Road in Ottawa, Ontario. This SWM report examines the potential water quality and quantity impacts of the proposed commercial development and summarizes how each will be addressed in accordance with applicable guidelines.

### **1.2 SITE LOCATION**

The site of the proposed commercial development is located at 103 Schneider Road, Ottawa, Ontario. The subject site is bounded by Carling Avenue to the south, Leggett Drive to the north, and the Kizell Drain to the east. It is noted that portions of the property are located within the 1:100 year floodplain of the Kizell Drain.

### **1.3 STORMWATER MANAGEMENT PLAN OBJECTIVES**

The objectives of the stormwater management plan are as follows:

- → Collect and review background information
- → Determine the site-specific stormwater management requirements to ensure that the proposals are in conformance with the applicable Provincial, Municipal and Conservation Authority stormwater management and development guidelines.
- → Evaluate various stormwater management practices that meet the applicable SWM and development requirements and recommend a preferred strategy.
- → Prepare a stormwater management report documenting the strategy along with the technical information necessary for the justification and sizing of the proposed stormwater management facilities.

### **1.4 DESIGN CRITERIA**

Design criteria were confirmed through pre-consultation with the City of Ottawa held on December 15<sup>th</sup>, 2020 (meeting minutes include in **Appendix A**). Criteria for 103 Schneider Road are as follows:

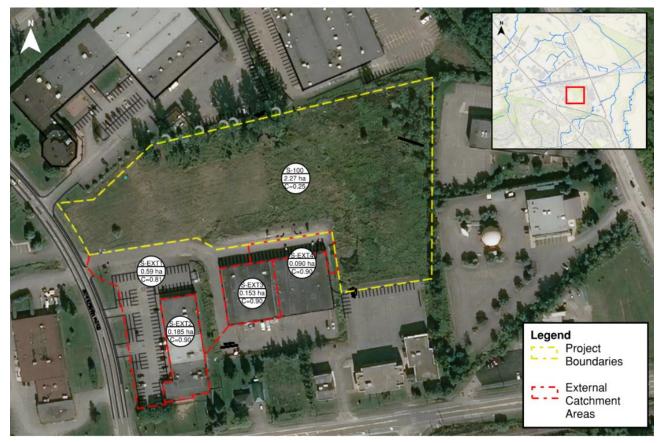
- → Stormwater Quantity- control post-development flows to pre-development levels for the 2- to 100-year storm events. The existing drainage patterns for the site should be maintained. Allowable runoff coefficient (C) shall be the lesser of pre-development conditions to a maximum of 0.5.
- → Storm Quality- enhanced level of protection per the Mississippi Valley Conservation Authority (MVCA) is required (80% TSS Removal).
- → Low Impact Development- LID techniques are recommended for stormwater management and water temperature controls

# 2 PRE-DEVELOPMENT CONDITIONS

### 2.1 GENERAL

The subject site is a 2.27 ha parcel of land comprised of undeveloped lots. Under pre-development conditions the subject site consists of mostly pervious surfaces. As such, a runoff coefficient of 0.26 is estimated for existing conditions.

Existing drainage patterns for the site were determined based on topographic survey information. The predevelopment catchment areas are as illustrated in Figure 1.



**Figure 1: Existing Conditions Catchment Areas** 

### 2.2 RAINFALL INFORMATION

The rainfall intensity is calculated in accordance with Section 5.4.2 of the Ottawa Sewer Design Guidelines (October, 2012):

Where;

$$i = \left[\frac{A}{(Td+C)^B}\right]$$

- A, B, C = regression constants for each return period (defined in section 5.4.2)
- i = rainfall intensity (mm/hour)
- Td = storm duration (minutes)

The IDF parameters/regression constants are per the Ottawa Sewer Design Guidelines (October, 2012).

### 2.3 ALLOWABLE FLOW RATES

As noted in section 1.4, relevant policies from the OSDG and pre-consultation meeting require the post-development discharge rate from the site match pre-development levels for the 2- to 100-year storm events.

Rational method was used to calculate the peak flow rates for the site including external catchments in the predevelopment conditions summarized in Table 1. Detailed calculations are provided in **Appendix B**.

#### Table 1: Pre-Development Peak Flow Rate Calculations (Based on Td= 10 minutes)

RETURN PERIOD (YEARS)	RAINFALL INTENSITY, I (MM/HOUR)	SITE PEAK FLOW RATE (M <sup>3</sup> /SEC)	EXTERNAL AREA PEAK FLOW RATE (M <sup>3</sup> /SEC)	TOTAL (M <sup>3</sup> /SEC)
2	76.8	0.13	0.19	0.32
5	104.2	0.17	0.25	0.42
10	122.1	0.20	0.29	0.49
25	144.7	0.26	0.38	0.64
50	161.5	0.33	0.46	0.79
100	178.6	0.37	0.51	0.88

# **3 POST-DEVELOPMENT CONDITIONS**

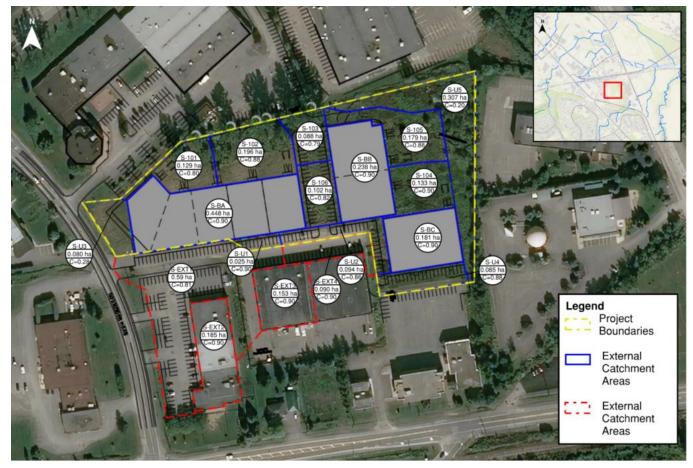
### 3.1 GENERAL

The proposed Schneider Road project is a commercial development in Ottawa. Post-development condition details are shown in Figure 2 including land uses and estimated stormwater sub-catchments.

The development proposal includes 3 new buildings.

Vehicular access to the site will be provided by private roads from Schneider Road. Similar to existing conditions, the majority of the runoff will discharge to the Kizell drain. Allowances have been made for the safe conveyance of flows from the external catchments.

An estimated area breakdown for the new site layout is provided in Table 2.



**Figure 2: Proposed Conditions Catchment Areas** 

### Table 2: Proposed Land-Use Area Breakdown

CATCHMENT ID	AREA (ha)	% COVERAGE OF PROJECT AREA	RUNOFF COEFFICIENT
External Drainage Areas			
S-EXT1	0.590		0.81
S-EXT2	0.185		0.90
S-EXT3	0.153		0.90
S-EXT4	0.090		0.90
Sub Total	1.020		0.85
Un-Controlled Drainage Areas			
S-U1	0.025	1%	0.90
S-U2	0.094	4%	0.66
S-U3	0.08	4%	0.28
S-U5	0.307	14%	0.20
Controlled Drainage Areas to Enhanced Grass	s Swale		
S-U4	0.085	4%	0.88
Controlled Drainage Areas			
S-101	0.129	6%	0.80
S-102	0.196	9%	0.88
S-103	0.088	4%	0.79
S-104	0.133	6%	0.90
S-105	0.179	8%	0.88
S-106	0.102	5%	0.82
S-BA	0.448	20%	0.90
S-BB	0.238	11%	0.90
S-BC	0.161	7%	0.90
TOTAL PROJECT AREA	2.27		
TOTAL (INCL. EXTERNAL DRAINAGE)	3.28		

To meet stormwater management objectives, as defined by the design criteria outlined in Section 1.4, the following components have been proposed:

- $\rightarrow$  Surface storage with inlet control devices
- $\rightarrow$  Active storage within Stormtech chambers below parking lot, with orifice flow control devices on outlets.
- $\rightarrow$  OGS unit
- $\rightarrow$  Enhanced grassed swale

The application and sizing of these proposed stormwater management facilities is outlined in the following sections.

### 3.2 WATER QUANTITY

As noted previously, it is required that the post-development discharge rate from the site match pre-development levels for the 2- to 100-year storm events.

Proposed features to achieve these targets include;

- → Surface storage with inlet control devices
- → Stormtech subsurface storage chambers to control runoff from roof areas, with orifice flow control devices on outlets.

HydroCAD software has been used to model the behaviour of the proposed SWM system and determine its response under various storm events. The software uses Modified Rational Method to calculate flow rates and related storage values. In addition, the software helps identify the critical duration for different components of the system. The critical storm duration (100-year) for peak discharge from the from the site occurs at 10 minutes, but the maximum storage in the subsurface chambers utilized occurs at 87 minutes. The critical storm duration for maximum storage at each storage node was also verified to ensure adequate storage volume.

Per Table 2, five uncontrolled drainage areas have been included in the model; S-U1-S-U5. Given grading constraints it has not been possible to configure the drainage system to collect runoff at these locations around the edge of the site, and runoff from these areas will therefore drain directly offsite onto surrounding lands. These uncontrolled areas are included in the analysis however, and the proposed system over-controls as required to ensure <u>net</u> runoff rates (including discharge from the uncontrolled areas) complies with the applicable targets.

The model was developed and tested in an iterative manner, to determine the necessary storage volumes and flow control rates from individual features. A summary of the minimum requirements follows:

- The Stormtech Chamber servicing building A (S-BA) shall provide a total minimum volume of 210 m<sup>3</sup>.
   Outflow from the chamber shall be controlled with a 75 mm orifice plate.
- The Stormtech Chamber servicing Buildings B and C (S-BB, S-BC) shall provide a total minimum volume of 185 m<sup>3</sup>. Outflow from the chamber shall be controlled with a 75 mm orifice plate.

Storage areas were defined using "pond" nodes in the model, with appropriate stage-storage relationships based on the volumes available in each area. Outflow controls from each storage node were defined using orifice control at catch basin lead pipes. Orifice sizes are shown in Table 3.

LOCATION	ORIFICE SIZE (mm)
CBMH105	75
CB01	75
CB02	75
CBMH107	75
CB03	75
CB04	100

### Table 3: Catchbasin Outflow Control

A summary of the modelling results is provided in Table 4 and detailed output from the modelling is included in **Appendix B**.

Please note the it is acknowledged that modelled 2-year discharge rate from the site is slightly higher than the existing conditions discharge rate. However, the modified rational method model does not take in to account the proposed improvements to the enhanced grass swale at the eastern edge of the site that will provide additional quantity control.

RETURN PERIOD	PEAK DISCHARGE RATE (M <sup>3</sup> /SEC)	TARGET RELEASE RATE (M <sup>3</sup> /SEC)	MAX STORAGE UTILIZED IN TANK A (M <sup>3</sup> )	MAX STORAGE UTILIZED IN TANK B (M <sup>3</sup> )
2-Year	0.33	0.32	73	64
5-Year	0.42	0.42	103	112
10-Year	0.48	0.49	122	133
25-Year	0.55	0.64	147	160
50-Year	0.69	0.79	188	165
100-Year	0.76	0.88	210	185

### Table 4: Summary of HydroCAD Modelling Results

To determine peak ponding depths at catchbasin (CB) locations on the surface, reference has been made to model output at each respective storage node. As noted above, ponding depths have been simulated in the model at each CB location by routing runoff from the contributing sub-catchment area to a storage node defined with a stage-storage relationship describing ponding volume available on the surface (based on proposed grading), and with outflow controlled by a stage-discharge rating curve based on a standard 600 mm square CB grate (per City of Ottawa standards).

As shown in Table 5, the model results provide maximum water depths and volume at each location, and these depths have been converted to ponding elevation for plotting maximum anticipated extents of ponding on the Civil Grading Plan.

AREA ID	LOCATION	INVERT (M)	100-YEAR ELEV. (M)	HEAD (M)	Q <sub>100</sub> (L/SEC)	MAX VOLUME (M <sup>3</sup> )
S-102	CB01	74.23	76.14	1.88	14	60
S-103	CB02	74.12	76.12	2.00	15	14
S-105	CB03	73.91	75.75	1.84	14	52
S-106	CB04	74.22	76.79	2.57	31	6
S-104	CB05	74.03	75.73	1.70	14	33
S-101	CBMH105	74.45	76.16	1.71	14	31

#### **Table 5: Summary of Surface Ponding Analysis**

### 3.3 WATER QUALITY

As noted previously, a single outlet location at the Kizell drain is proposed for this site and runoff will be released through orifice control at the outlet. A suitably sized oil and grit separator (OGS) unit is proposed to achieve minimum 80% TSS removal ("Enhanced" level, per development criteria) for runoff from the at-grade parking and asphalt areas.

It is assumed that runoff from the proposed rooftop areas, walkways and pervious uncontrolled areas will be free of typical sediment-generating activities and therefore runoff will leave them effectively unchanged and can be considered clean for the purposes of water quality assessment.

Note that runoff from the S-U4 catchment will be directed to the proposed enhanced grass swale at the eastern edge of the site. Enhanced grass swales are vegetated open channels that convey, treat and attenuate stormwater runoff.

Flat bottoms and vegetation in the swale decrease the velocity of the water, allowing for sedimentation, filtration through the root zone and soil, evapotranspiration, and infiltration into the underlying soil (TRCA, 2010).

The enhanced grassed swale has been designed according to the below design guidance (TRCA,2010):

- Shape: Grass swales should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will
  generally evolve into parabolic swales over time, so the initial trapezoidal cross section design should be
  checked for capacity and conveyance assuming it is a parabolic cross section. Swale length between culverts
  should be 5 meters or greater;
- Bottom Width: Grass swales should be designed with a bottom width between 0.75 and 3.0 meters. The design
  width should allow for shallow flows and adequate water quality treatment, while preventing flows from
  concentrating and creating gullies;
- Longitudinal Slope: Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3%;
- Length: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length;
- Flow Depth: The maximum flow depth should correspond to two-thirds the height of the vegetation. Vegetation
  in some grass swales may reach heights of 150 mm; therefore, a maximum flow depth of 100 mm is
  recommended during a 4-hour, 25 mm Chicago storm event; and
- Side Slopes: The side slopes should be as flat as possible to aid in providing pre-treatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.
- Drainage Area and Runoff Volume: The conveyance capacity should match the drainage area. Sheet flow to the grass swale is preferable. If drainage areas are greater than 2 hectares, high discharge through the swale may not allow for filtering and infiltration, and may create erosive conditions. Typical ratios of impervious drainage area to swale area range from 5:1 to 10:1.

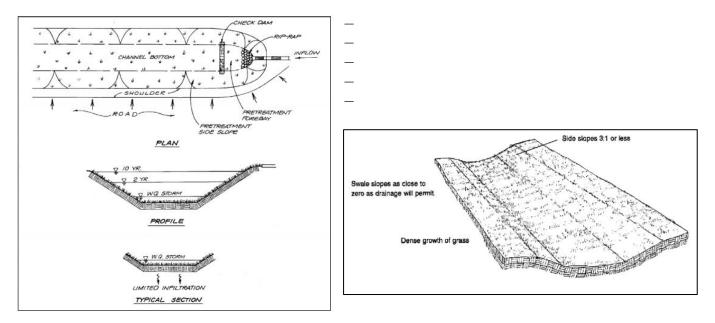


Figure 3: Plan, Profile and Section Views of Grass Swale (ref: TRCA, 2010)

### 3.4 FLOODPLAIN CONSIDERATIONS

Cut and fill analysis has been completed using Civil3D software, through comparison of existing and proposed 3D surfaces- as well as the 100-year floodplain elevation. To estimate the loss of floodplain storage within the site, a surface was created to represent the 100-year water elevation extending through the site (Elev. 74.89 m) and a comparison between the existing surface and the floodplain elevation was done.

The attached drawings (SK-1, SK-2) in **Appendix B** illustrate the proposed site plan design and highlight the floodline in both proposed and existing conditions. Drawings SK-3-7 (**Appendix B**) provide a series of cross-sections cut through the site to further demonstrate the difference between existing and proposed surfaces, and the proposed floodplain compensation in post-development conditions. Table 5 below summarizes the floodplain storage available in existing and proposed conditions, showing compliance with MVCA floodplain compensation requirements.

### Table 6: Floodplain Storage Comparison

### ORIGINAL/DESIGN SURFACE COMPARISON

Original Surface	OG	Floodplain Storage	560 m <sup>3</sup>
Proposed Surface	100 YEAR ELEV.	Available	630 m³

### 3.5 TEMPERATURE CONSIDERATIONS

Several features have been incorporated into the SWM strategy to mitigate concerns related to temperature of runoff into the Kizell Drain.

- Provision of an enhanced grass swale as a first drainage path for runoff from the external catchments and SU-4, will help cool runoff as it passes along/through naturally vegetated media, and infiltrate flows from asphalt surfaces.
- Configuration of storage units with an open bottom to promote additional infiltration will also help address temperature control issues.
- Cooling of stormwater as it travels through the buried pipe network.

In conjunction, the above measures are considered sufficient to address MVCA requirements related to temperature of storm runoff from the site.

# **4 CONCLUSIONS**

A stormwater management report has been prepared to support the feasibility study for the proposed 103 Schneider Road development project in the City of Ottawa. The key points are summarized below.

### WATER QUALITY

An OGS unit (suitably sized Stormceptor unit, or equivalent) is proposed downstream of the orifice control for the Kizell Drain outlet to meet MOE Enhanced treatment standards (80% TSS removal). In addition, the enhanced grass swale will provide quality control for the remaining impervious areas.

### WATER QUANTITY

Controlled runoff on site will be controlled on the surface using orifice plates on the catch basin lead pipes, and on the outlets of the proposed Stormtech underground storage chambers.

### FLOODPLAIN COMPENSATION

Per MVCA requirements, adequate floodplain storage has been made available on the proposed site to match existing conditions.

This report has demonstrated the proposed SWM strategy will address stormwater management related impacts from this project and meet the applicable design requirements.



# PRE-CONSULTATION MEETING MINUTES AND TECHNICAL COMMENTS

### 101A, 103 and 105A Schneider Road Pre-Consultation Meeting Minutes Meeting Date: December 15, 2020

Attendee	Role	Organization
Lisa Stern	Planner	City of Ottawa
Josiane Gervais	Transportation PM	
Justyna Garbos	Parks	
Adam Palmer	Forestry	
Justin Armstrong	Engineering PM	
Erica Ogden	Planner	Mississippi Valley CA
David Renfroe		Applicant

Additional comments have been provided by email from Urban Design and CREO.

### Comments from the Applicant:

- 1. Will be providing an expansion to 101 Schneider, and two industrial buildings and an office/warehouse at 103 Schneider.
- 2. Proposing a public park for workers adjacent to Schneider.
- **3.** Proposing to realign access as well as modify the internal circulation. Proposing a one-way access around 101(A) Schneider to allow trucks to come back out to Schneider vs. Carling. Proposing access into the 105 Schneider site.

### Planning Comments:

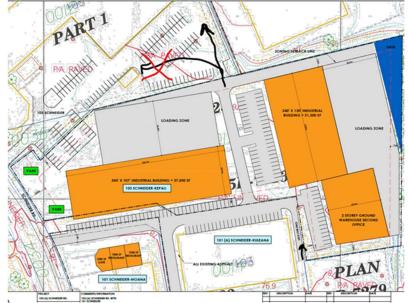
- This is a Complex Site Plan Control Application subject to manager approval and public consultation. The application form, timeline and fees can be found <u>here</u>. A portion of the site is regulated by the Mississippi Valley Conservation Authority, as such CA fees are required.
- 2. The subject lands are designated Urban Employment Area within the City's Official Plan and are zoned General Industrial Subzone 6 (IG6), 101A Schneider Road is zoned IG6(300) which allows for additional restaurant and service uses.
- 3. The site will be considered one site for zoning purposes.
- 4. Please show the entire property on the plans.
- 5. A consent application is required to formalize any lot line adjustments or easements that are required for access.
- 6. The site is located within 300m of a rail line, as such a noise and vibration study will be required. Emphasis should be placed on outdoor amenity space and patios.
- 7. Please show pedestrian pathways on a site plan and ensure that there are no conflicts with vehicle movements.
- 8. Please provide landscape plans. Hard surfacing should be minimized, including loading areas. Parking and drive aisles should be further broken up by additional landscaping. Landscaped areas should be provided along the north and east lot lines as well as the Schneider Road frontage.
- 9. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the <u>Parkland Dedication Bylaw</u>.
- 10. Please consult with the Ward Councillor prior to submission.

### **Engineering Comments:**

1. See attached memo

### Transportation Comments:

- 1. Follow Traffic Impact Assessment Guidelines
  - a. A TIA is required. The Scoping report can be submitted directly to josiane.gervais@ottawa.ca
  - b. Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
  - c. Request base mapping asap if RMA is required. Contact Engineering Services (<u>https://ottawa.ca/en/city-hall/planning-and-development/engineering-services</u>)
- 2. ROW protection on Carling Ave between March Road and Herzberg is 44.5m even. Subject to unequal widening, the 44.5m is measured from the existing south ROW limit. The required property line should be shown on the site plan.
- 3. The 101 Schneider Rd property falls within 600m of the Teron/March Road BRT transit station.
- 4. Corner triangles as per OP Annex 1 Road Classification and Rights-of-Way at the following locations on the final plan will be required (measure on the property line/ROW protected line; no structure above or below this triangle): Local Road to Arterial Road: 5 m x 5 m
- 5. Sight triangle as per Zoning by-law is 6 m x 6 m measure on the curb line.
- 6. Utilizing the existing access on Schneider Rd as identified on the site plan is supported.
- 7. Access consolidation along Schneider is encouraged.
- 8. Providing access through the 105 Schneider site is possible. However from a transportation perspective, consideration should be given to the impacts to the neighboring site. If vehicles turn left towards Schneider, then the driving aisle on 105 Schneider separates the parking and building, and therefore sending heavy vehicles through the site raises concern for pedestrian safety. If heavy vehicles travel northbound directly to Legget, then it's less a concern. Signage/geometric changes could be provided to address this concern.



10. Ensure that all movements can be accommodated so that a heavy vehicle may both enter and exit from the main site access off Schneider.

- 11. Parking lots are preferred over parking along the drive aisles. This encourage separation of pedestrians/personal vehicles from heavy vehicles.
- 12. A clear throat length of 15m is encouraged off Schneider.
- 13. Clarify that the "One Way Exit" east of the 101 (A) building is northbound within the site.
- 14. On site plan:
  - a. The site plan should show the entire property.
  - b. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
  - c. Ensure pedestrian pathways are provided.
  - d. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
  - e. Turning movement diagrams required for internal movements (loading areas, garbage).
  - f. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible.
  - g. Show lane/aisle widths.
  - h. Grey out any area that will not be impacted by this application.
- 15. The City recommends development on private property be in accordance with the City's Accessibility Design Standards (see attached Site Plan Checklist, which summarizes AODA requirements). As the proposed site is industrial and for general public use, AODA legislation applies.

### Parks Comments:

 Cash-in-lieu of parkland will be calculated as 2% of the gross land area of the vacant parcel at 103 Schneider Road. Thomas Quinn in Real Estate prepares land valuations, and the applicant will be required to pay the \$565 (including HST) assessment fee.

### Corporate Real Estate (CREO) Comments:

 The proposed development at 101-103 Schneider Road is located within 300 m from the Renfrew Subdivision operating rail corridor. The adopted Guidelines for New Development in Proximity to Rail Operations were created by the Railway Association of Canada and the Federation of Canadian Municipalities, see: <u>https://www.proximityissues.ca/wp-</u> <u>content/uploads/2017/09/2013\_05\_29\_Guidelines\_NewDevelopment\_E.pdf</u>. CREO's main objective in its adoption of these guidelines is to mitigate railway-oriented impacts such as noise, vibration, and safety hazards, to ensure that the quality of life of a building's occupants and users are not

negatively affected and to the maintain the long-term integrity and viability of the rail corridor.

2. It is also recommended that a noise and vibration study should be conducted according to page 28 of the guidelines.

### **Urban Design Comments:**

- 1. Please provide a landscape plan that illustrates the anticipated pedestrian circulation around the site, between the various parking zones and the buildings and with the public right of way.
- 2. In one location the drive aisle runs through parking while in other locations to the north there is a separate drive aisle running parallel to a parking drive aisle. Can these be consolidated and the extra land be dedicated to additional landscaping and trees?
- 3. We would like to better understand the restaurant building, how it is sited, its connectivity for pedestrians and vehicles and with the public right of way.

4. A Design Brief is a required submittal for all Site Plan/Re-zoning applications. Please see the Design Brief Terms of Reference (attached).

### **Conservation Authority:**

- The Mississippi Valley Conservation Authority (MVCA) confirms that a portion of the subject property is regulated under Ontario Regulation 153/06, *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Under Ontario Regulation 153/06, written permission is required from the MVCA prior to the initiation of development (which includes construction, site grading and the placement or removal of fill) within an area regulated by the Conservation Authority (regulation limit delineated in yellow on the attached regulation mapping) as well as straightening, changing, diverting or interfering in any way with the existing channel or the shoreline of a watercourse.
- Portions of the property are located within the 1:100 year flood plain (delineated in orange on the enclosed mapping) of the Kizell Drain, which was approved by the MVCA Board of Directors in 2017. We note this updated mapping has not yet been carried forward in the City of Ottawa Zoning Bylaw.
- 3. The preliminary plan includes a stormwater management facility within the flood plain, which MVCA does not support. New development should be directed outside the flood plain.
- 4. The stormwater water quality requirement for the Kizell Drain is an enhanced level of protection, which requires 80% total suspended solids removal.
- 5. Low Impact Development techniques are recommended for stormwater management and water temperature controls should also be taken into consideration.
- The Kizell Drain has been assessed as a part of the City Stream Watch Program. A copy of the Kizell Drain Summary Report from 2016 is available on our website <u>https://mvc.on.ca/wpcontent/uploads/2020/08/Kizell-2016.pdf</u>
- 7. Digital copies of the flood plain mapping are available upon request.

Please refer to the links to <u>"Guide to preparing studies and plans"</u> and fees for general information. Additional information is available related to <u>building permits</u>, <u>development charges</u>, and the <u>Accessibility Design Standards</u>. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at Lisa.Stern@ottawa.ca or at 613-580-2424 extension 21108 if you have any questions.

Sincerely,

Lisa Stern, RPP MCIP Planner



Planning, Infrastructure and Economic Development Department Services de la planification, de l'infrastructure et du développement économique

# MEMO

Date: December 15, 2020

To / Destinataire	Lisa Stern, Planner	
From / Expéditeur	Justin Armstrong, Project Manager, Infrastructure Approvals	
Subject / Objet	Pre-Application Consultation 101-105 Schneider Road, Ward 4 Site Plan Control Application,	File No. PC2020-0342

Please note the following information regarding the engineering design submission for the above noted site:

- 1. The Servicing Study Guidelines for Development Applications are available at the following address: <u>http://ottawa.ca/en/development-application-review-process-</u> O/servicing-study-guidelines-development-applications
- 2. Servicing and site works shall be in accordance with the following documents:
  - ⇒ Ottawa Sewer Design Guidelines (October 2012)
  - ⇒ Ottawa Design Guidelines Water Distribution (2010)
  - ⇒ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - ⇒ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
  - ⇒ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
  - ⇒ City of Ottawa Park and Pathway Development Manual (2012)
  - ⇒ City of Ottawa Accessibility Design Standards (2012)
  - ⇒ Ottawa Standard Tender Documents (latest version)
  - ⇒ Ontario Provincial Standards for Roads & Public Works (2013)



Planning, Infrastructure and Economic Development Department Services de la planification, de l'infrastructure et du développement économique

- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at <u>InformationCentre@ottawa.ca</u> or by phone at (613) 580-2424 x.44455).
- 4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
  - i. Post-development peak flows for the site will need to be controlled to predevelopment peak flows. The existing drainage patterns for the site should be maintained.
  - ii. Quality control to be provided as specified by the MVCA.
  - iii. Note that any stormwater runoff for the site that currently drains to Kizzel Municipal Drain must cross a portion of 302 Legget Drive before reaching the Kizzel Municipal Drain. Drainage rights across this land are not maintained if the portion of the site draining to this location is modified. If this is the case, an agreement will need to be in place with the owner of 302 Leggett in order to maintain this drainage outlet.
- 5. There is a 250mm diameter concrete sanitary sewer in Schneider Road. The City's Asset Management Branch will be circulated as it relates to a connection to this sewer once a detailed civil design is complete and a formal application has been made.
- 6. There is a 305mm diameter DI watermain in Schneider Road. A water boundary condition request should be made as it relates to a connection to this main. Water boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide Justin Armstrong the following information:
  - i. Location of service
  - ii. Type of development and the amount of fire flow required (as per FUS, 1999).
  - iii. Average daily demand: \_\_\_\_ l/s.
  - iv. Maximum daily demand: \_\_\_\_l/s.



Planning, Infrastructure and Economic Development Department Services de la planification, de l'infrastructure et du développement économique

- v. Maximum hourly daily demand: \_\_\_\_ l/s.
- 7. Although most infrastructure related comments will largely be dependent on the proposed design, the following are some general comments to consider:
  - *i.* Services should ideally be grouped in a common trench to minimize the number of road cuts.
  - *ii.* A DMA chamber is needed for private developments serviced by a water connection 150mm in diameter or larger.
  - iii. A monitoring maintenance hole should be provided for the sanitary connection it should be located in an accessible location on private property near the property line (ie. Not in a parking area).
  - *iv.* Sewer connections to rigid mains are to be made above the springline of the sewermain as per:
    - a. Std Dwg S11 (For rigid main sewers) lateral must be less than 50% the diameter of the sewermain,
    - b. Std Dwg S11.2 (for rigid main sewers using bell end insert method) for larger diameter laterals where manufactured inserts are not available; lateral must be less than 50% the diameter of the sewermain,
    - c. Laterals greater than 50% the diameter of the sewermain require a maintenance hole.
  - *v.* There should be no stormwater ponding in parking areas or drive aisles during the 2-year storm.
- 8. MOECC ECA Requirements

It is anticipated that an MOECC Environmental Compliance Approval (ECA) for stormwater works (Private Sewage Works &/or Industrial Sewage Works) will be required, however, this will be confirmed once a detailed civil design is complete and a formal application is made.

9. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.



Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x21746 or by email at Justin.Armstrong@ottawa.ca.

# **Conservation Partners Partenaires de conservation**

Mississippi Valley Office de protection Conservation Authority Ode la nature de la vallée Mississippi





SOUTH NATION CONSERVATION DE LA NATION SUD

File: PMRSP-26

May 19, 2021

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

Dear Ms. Stern:

### Re: Application for Site Plan Control – D07-12-21-0044 103, 105 & 105A Schneider Road, City of Ottawa (March)

The staff of Mississippi Valley Conservation Authority (MVCA) has reviewed the above noted application for concerns related to natural heritage and natural hazards for the subject property and surrounding lands. The scope of the natural heritage review includes wetlands, watercourses and significant valleylands, while the focus of the natural hazards review includes flood plain, unstable slopes and unstable soils.

The following comments are offered for your consideration:

### Summary of Proposal

The applicant has proposed three new industrial buildings to be constructed at 105A Schneider Road. Building A is proposed to be a one-storey 49,275 square foot building for light industrial uses. Building B is proposed to be a one storey 25,599 square foot building for light industrial uses. Building C is proposed to be a two storey building with light industrial uses on the main floor and office uses on the second floor. Each building will have a transport truck delivery zone.

### **Property Overview**

The property 105A Schneider Road is approximately 2.32 ha in size and is currently vacant. The site will be developed in conjunction with the surrounding industrial buildings at 103 & 105 Schneider Road. Portions of the proposed development area are located within the 1:100 year flood plain of the Kizell Drain. Kizell Drain is located north east of the subject properties. The subject properties are located outside of the meander belt erosion hazard and approximately 30 metres from the top of bank of the channel.

### Natural Heritage

The proposed development is sufficiently setback from the Kizell Drain from a natural heritage perspective. Water quality impacts are reviewed in the stormwater management section below. Low Impact Development techniques are recommended for stormwater management and water temperature controls should be incorporated into the design as the Kizell Drain is a classified as a cool stream, as per the MVCA City Stream Watch Kizell Drain 2016 Summary Report.

### Natural Hazards

As previously mentioned, the subject property is located within the 1:100 year flood plain of the Kizell Drain. New development is generally not permitted within the 1:100 year flood plain. All proposed buildings have been directed beyond the limits of the 1:100 year flood plain, however the proposed loading area and driveway north and east of Building B are located within the flood plain.

As discussed during pre-consultation, if the proposed loading area and driveway were to extend into the flood hazard, an analysis of the flood plain would be required to determine if there was an opportunity for a balanced cut and fill approach in this area to compensate for any proposed loss of flood plain storage. The application should demonstrate:

- a maximum depth of flooding of 0.3 metres over the loading area and driveway during a 1:100 year flood event,
- no loss of flood plain storage, and;
- any fill placement required within the flood plain is completed through a balanced cut and fill.

The *Grading Plan Drawing No. C03*, prepared by WSP, dated April 6, 2021 proposes to raise the existing grades for the loading area and driveway within the flood plain by over 1 metre in some locations, which would exceed the elevation of the 1:100 year flood plain.

*Section 3.4 - Floodplain Considerations* of the *Stormwater Management Report* prepared by WSP, dated April 06, 2021 states: "Due to development in the northeast corner of the site, 80 m<sup>3</sup> of floodplain volume is lost. This volume will be compensated elsewhere on the site. This will be coordinated with the developer and MVCA during detailed design."

MVCA does not recommend the application proceed without the detailed design of the balanced cut and fill. MVCA cannot support approval of an application with a loss of flood plain storage. MVCA requests that the detailed analysis of the proposed balanced cut and fill be provided at this stage. The application must demonstrate that:

- 1. The site alteration is confined to lands with existing ground elevations that are no more than 0.3 metres lower than the estimated 1:100 year water surface elevation of the Kizell Drain. (74.89 m G.S.C.)
- 2. The area of the proposed cut or fill zones will be roughly equal to one another.
- 3. Safe access is available. The depth of flooding does not exceed 0.3 metres.
- 4. The loss of flood plain storage volume within the 1:100 year flood plain which will result from the placement of fill shall be fully compensated for by an incrementally balanced cut (or excavation) to be carried out in close proximity to and concurrently with the placement of the fill. The cut and fill operation must occur on the same property.
- 5. Building B is appropriately flood proofed. The minimum elevation of the underside of the floor shall be 74.89 m G.S.C. No exterior openings, electrical or mechanical services (i.e. hot water tanks, furnaces, power boxes, outlets and duct work) are located below the flood proofing elevation. No basement below the flood proofing elevation.

The flood plain of the Kizell Drain is regulated by MVCA under Ontario Regulation 153/06, *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Under Ontario Regulation 153/06,

written permission is required from the MVCA prior to under taking the proposed development and site grading works (cut and fill balance) within the regulated area and the proposed stormwater outlet to the Kizell Drain. Permission from MVCA would follow Site Plan Control approval.

### Stormwater Management

MVCA engineering staff have reviewed the following reports for impacts to water quantity and quality on the receiving watercourse:

- Renfroe Land Management 103 Schneider Road, Light Industrial Development, Ottawa, ON Servicing Report by WSP Canada Group Ltd., April 6, 2021.
- Renfroe Land Management 103 Schneider Road, Stormwater Management Report by WSP Canada Group Ltd., April 6, 2021.

Water quantity is proposed to be addressed through roof top storage and surface storage with inlet control devices. The enhanced level (80% total suspended solids removal) of water quality treatment required is proposed to be provided with an oil and grit separator.

Please see the enclosed Technical Review Memorandum for comments regarding stormwater management.

### **Conclusion**

MVCA recommends the enclosed stormwater management comments be addressed and detailed design for the proposed balanced cut and fill, to accommodate the loading area and driveway within the flood plain of the Kizell Drain, be provided prior to proceeding with Site Plan Control approval.

Thank you for the opportunity to review and comment. Please advise us of the decision in this matter.

Please contact the undersigned with any questions that may arise.

Regards,

drica C Ogden

Erica C. Ogden, MCIP, RPP Environmental Planner

Encl. Technical Review Memorandum – Stormwater Management

Mississippi Valley Sonservation Authority

### Technical Review Memorandum

May 18, 2021

File Number: PMRSP-26 To: Erica Ogden, MCIP, RPP, Environmental Planner Prepared by: Christopher McGuire, Water Resources Engineer Re: Site Plan Control – D07-12-21-0044 – 103, 105, 105A Schneider Road, City of Ottawa

The Mississippi Valley Conservation Authority's (MVCA) engineering team has reviewed the above noted application for concerns related to natural hazards, water quality and quantity for the subject property and surrounding lands. The following documents were reviewed in preparation of this memorandum:

- Renfroe Land Management 103 Schneider Road, Light Industrial Development, Ottawa, ON Servicing Report by WSP Canada Group Ltd., April 6, 2021.
- Renfroe Land Management 103 Schneider Road, Stormwater Management Report by WSP Canada Group Ltd., April 6, 2021.

### Summary

This Site Plan Control application is to construct three new industrial buildings (total of gross floor area of 94,332 square feet) with 134 parking spaces. Access will be obtained from Schneider Road and Legget Drive. Building A is proposed to be a one-storey, 49,275 square foot building for light industrial uses. Building B is proposed to be a one storey 25,599 square foot building for light industrial uses. Building C is proposed to be a two-storey building with light industrial uses on the main floor and office uses on the second floor.

The 2.32 ha site is currently vacant and will be developed in conjunction with the surrounding industrial buildings at 103 & 105 Schneider Road. Portions of the proposed development area are located within the 1:100 year flood plain of the Kizell Drain. The Kizell Drain is located north east of the subject parcel. The subject properties are located outside of the meander belt erosion hazard and approximately 30 metres from the top of bank of the channel.

The allowable release rate was calculated to be 246 L/s. Runoff from the roof decks will be restricted with a maximum storage depth of 150 mm, although no design was provided at this time. An enhanced level of quality control (80% TSS removal) will be provided using a Stormcepter unit. No treatment is proposed for the uncontrolled drainage areas.

Sedimentation and erosion control will be provided through a combination of straw bales, bulkhead barriers, silt fencing, catch basin inserts and a temporary mud mat at the site exit. Furthermore, dewatering operations will use filter socks and dewatering traps before discharging.

### Recommendations

At this time, we recommend that following comments be addressed in the next submission, prior to proceeding with Site Plan Control approval:

- i) Please submit an existing drainage area plan and confirm that post development drainage patters will not have an adverse effect on external areas.
- ii) The Design Criteria (1.4) note Low Impact Development will be incorporated but this has not been included in the proposal. Low Impact Development techniques are recommended for stormwater management.
- iii) Water temperature controls should also be taken into consideration as design criteria.
- iv) The City's Pre-Application Consultation Memo 7.v. (December 15, 2020) notes that there should be no stormwater ponding in parking areas or drive aisles during the 2-year storm. Please confirm this is achieved and show that all ponding depths are less than 0.30 m to provide safe access during the 100-year storm.

- v) The Oil-Grit Separator (OGS) is located within the 100-year floodplain. Please confirm that it will work as designed up to and including the 100-year event or relocate it.
- vi) Water Quality (3.3) notes that rooftop runoff is considered clean but it appears that this flow will also pass through the OGS. Please show how this flow will bypass the OGS, and outlet directly to Kizzel Drain or confirm that the OGS can handle the additional flow.
- vii) Water Quality (3.3) also notes that runoff from walkways and pervious areas are considered clean. All runoff from walkways must be given an enhanced level of protection. Furthermore, runoff from asphalt areas and walkways that passes over impervious areas still require treatment.
- viii) Several of the uncontrolled subcatchments are in parking and sidewalk areas that appear to bypass the OGS for quality control. Please ensure that all runoff from parking and sidewalk areas received enhanced treatment (80% TSS removal).
- ix) Section 3.1 notes that surface storage with inlet control devices will be used. Please provide more details on how flows will be controlled in drainage areas S-101 to S-106.
- x) Designs for the roof top storage and flow attenuation have not been completed. Please provide a detailed design with the next submission.
- xi) Floodplain Considerations (3.4) notes that 80 m<sup>3</sup> of floodplain volume will be lost but does not explain if this is feasible at the site. Please include a detailed design that meets the MVCA's design requirements, as noted in the cover letter.
- xii) The emergency overflow spillway is in the 100-year floodplain and passes over an adjacent property before reaching its outlet at the Kizzel Drain. Please provide a detailed design and confirm that this can be legally built on the adjacent property.

Thank you for providing the opportunity to review the development proposal. Should any questions arise, please contact the undersigned.

Christopher McGuire, P.Eng Water Resources Engineer



# B CALCULATIONS & HYDROCAD OUTPUT

			Project:	Schneider Road	No.:		
			By:	<sup>By:</sup> JW	Date:	6/22/2021	Page:
			Checked	<sup>E</sup> MH	Checked:	6/22/2021	1
ubject:	SWM CALCULATIONS -	Pre-Develop	ment Peak Flow				•
	Calculation of existing runoff ra	ate is undertaken	using the Rational	Method:	Q = 2.78CiA		
	W	C = runoff i = rainfall i	low rate (litres/seco coefficient intensity (mm/hour) nent area (hectares	,			
	Site Area, A	22,700	m <sup>2</sup>				
	Site Area, A	2.27	hectares				
	Runoff Coefficient, C	0.26					
	Rainfall intensity calculated in	accordance with	City of Ottawa Sew	er Design Guidelines (s	section 5.4.2):		
	-	Γ 4 ]			-		

$$i = \left[\frac{A}{(Td+C)^B}\right]$$

Where:A, B, C = regression constants for each return period (defined in section 5.4.2)i = rainfall intensity (mm/hour)Td = storm duration (minutes)10 minutes

Return Period (Years)	2	5	10	25	50	100*
Α	733.0	998.1	1,174.2	1,402.9	1,569.6	1,735.7
В	0.810	0.814	0.816	0.819	0.820	0.820
С	6.199	6.053	6.014	6.018	6.014	6.014
T (mins)	10	10	10	10	10	10
l (mm/hr)	76.8	104.2	122.1	144.7	161.5	178.6
Runoff Coefficient C	0.26	0.26	0.26	0.26	0.26	0.26
C Multiplier (OSDG Table 5.7)	1.00	1.00	1.00	1.10	1.20	1.25
Revised Runoff Coefficient C	0.26	0.26	0.26	0.29	0.31	0.33
Q (litres/sec)	126	171	200	261	318	366
Q (m3/sec)	0.13	0.17	0.20	0.26	0.32	0.37

By:       KK       Date: $6/22/2021$ Page         Subject:       SWM CALCULATIONS - Pre-Development Peak Flow - External Area       Checked: $MH$ Checked: $6/22/2021$ Subject:       SWM CALCULATIONS - Pre-Development Peak Flow - External Area       Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CiA$ Where: $Q = peak$ flow rate (litres/second) $C = runoff coefficient$ $i = rainfall$ intensity (mm/hour) $A = catchment area (hectares)$ Site Area, A       10,180       m <sup>2</sup> Site Area, A       1.02       hectares         Runoff Coefficient, C       0.85       0.85       0.85       0.278       0.278				Project:	Schneider Road	No.:		
MH       6/22/2021         Swm CALCULATIONS - Pre-Development Peak Flow - External Area         Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CiA$ Where:       Q = peak flow rate (litres/second) $C = runoff coefficient$ i = rainfall intensity (mm/hour)       A = catchment area (hectares)         Site Area, A       10,180 $m^2$ Site Area, A       1.02       hectares				By:	KK	Date:	6/22/2021	Page:
Swm CALCULATIONS - Pre-Development Peak Flow - External Area         Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CiA$ Where:       Q = peak flow rate (litres/second)         C = runoff coefficient       i = rainfall intensity (mm/hour)         A = catchment area (hectares)         Site Area, A       10,180 m <sup>2</sup> Site Area, A       1.02 hectares				Checked:	MH	Checked:	6/22/2021	1
Where: Q = peak flow rate (litres/second)         C = runoff coefficient         i = rainfall intensity (mm/hour)         A = catchment area (hectares)         Site Area, A       10,180 m <sup>2</sup> Site Area, A       1.02 hectares	ubject:	SWM CALCULATIONS	- Pre-Develop	ment Peak Flow	- External Area			•
Where: Q = peak flow rate (litres/second)         C = runoff coefficient         i = rainfall intensity (mm/hour)         A = catchment area (hectares)         Site Area, A       10,180 m <sup>2</sup> Site Area, A       1.02 hectares								
C = runoff coefficient i = rainfall intensity (mm/hour) A = catchment area (hectares) Site Area, A 10,180 m <sup>2</sup> Site Area, A 1.02 hectares		Calculation of existing runoff	rate is undertaken	using the Rational M	lethod:	Q = 2.78CiA		
C = runoff coefficient         i = rainfall intensity (mm/hour)         A = catchment area (hectares)         Site Area, A       10,180 m <sup>2</sup> Site Area, A       1.02 hectares		14	(horo) O = nook fl	ou roto (litrooloooon	d)			
i = rainfall intensity (mm/hour)         A = catchment area (hectares)         Site Area, A       10,180 m <sup>2</sup> Site Area, A       1.02 hectares		vv	•	•	u)			
A = catchment area (hectares)       Site Area, A     10,180 m <sup>2</sup> Site Area, A     1.02 hectares			• • • • • • • • • • • • • • • • • • • •					
Site Area, A 1.02 hectares				,				
		Site Area, A	10,180	m <sup>2</sup>				
Runoff Coefficient, C 0.85		Site Area, A	1.02	hectares				
		Runoff Coefficient, C	0.85					
		Rainfall intensity calculated in	accordance with	City of Ottawa Sewe	r Design Guidelines (s	ection 5.4.2):		

$$i = \left[\frac{A}{(Td+C)^B}\right]$$

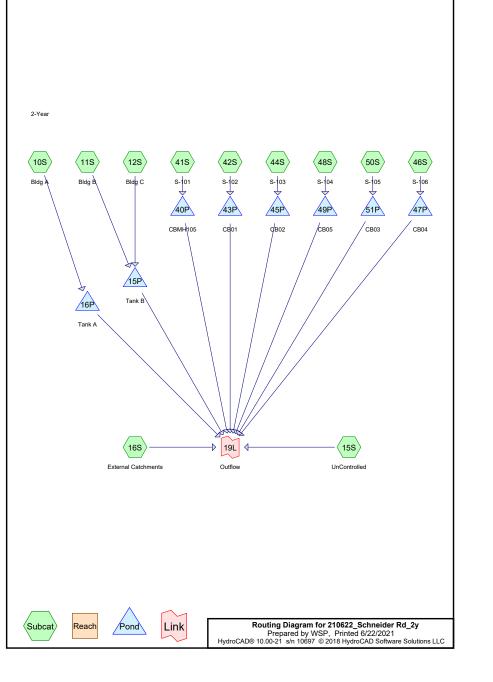
Where:A, B, C = regression constants for each return period (defined in section 5.4.2)i = rainfall intensity (mm/hour)Td = storm duration (minutes)10 minutes

Return Period (Years)	2	5	10	25	50	100*
А	733.0	998.1	1,174.2	1,402.9	1,569.6	1,735.7
В	0.810	0.814	0.816	0.819	0.820	0.820
С	6.199	6.053	6.014	6.018	6.014	6.014
T (mins)	10	10	10	10	10	10
l (mm/hr)	76.8	104.2	122.1	144.7	161.5	178.6
Runoff Coefficient C	0.85	0.85	0.85	0.85	0.85	0.85
C Multiplier (OSDG Table 5.7)	1.00	1.00	1.00	1.10	1.20	1.25
Revised Runoff Coefficient C	0.85	0.85	0.85	0.94	1.00	1.00
Q (litres/sec)	185	251	294	383	457	505
Q (m3/sec)	0.18	0.25	0.29	0.38	0.46	0.51

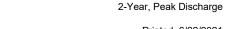
\_\_\_\_

210622\_Schneider Rd\_2y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021

#### Area Listing (selected nodes)



Area	С	Description
(sq-meters)		(subcatchment-numbers)
8,471.0	0.90	(10S, 11S, 12S)
1,290.0	0.80	S-101 (41S)
1,960.0	0.88	S-102 (42S)
880.0	0.79	S-103 (44S)
1,330.0	0.90	S-104 (48S)
1,790.0	0.88	S-105 (50S)
1,020.0	0.82	S-106 (46S)
5,900.0	0.81	S-EXT1 (16S)
1,850.0	0.90	S-EXT2 (16S)
1,530.0	0.90	S-EXT3 (16S)
900.0	0.90	S-EXT4 (16S)
250.0	0.90	S-U1 (15S)
940.0	0.86	S-U2 (15S)
800.0	0.28	S-U3 (15S)
850.0	0.88	S-U4 (15S)
3,070.0	0.20	S-U5 (15S)
32,831.0	0.79	TOTAL AREA



Page 2

2-Year, Peak Discharge	eak Discharge	2-Year, P
------------------------	---------------	-----------

210622_Schneider Rd_2y		Ŭ
Prepared by WSP	Printed	6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC		Page 3

#### Soil Listing (selected nodes)

Area (sq-meters)	Soil Group	Subcatchment Numbers
0.0	HSG A	
0.0	HSG B	
0.0	HSG C	
0.0	HSG D	
32,831.0	Other	10S, 11S, 12S, 15S, 16S, 41S, 42S, 44S, 46S, 48S, 50S
32,831.0		TOTAL AREA

210622	Schneider	Rd 2v

Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021

#### Ground Covers (selected nodes)

HSG-A	HSG-B	HSG-C	HSG-D	Other	Total	Ground	S
(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	Cover	N
0.0	0.0	0.0	0.0	8,471.0	8,471.0		
0.0	0.0	0.0	0.0	1,290.0	1,290.0	S-101	
0.0	0.0	0.0	0.0	1,960.0	1,960.0	S-102	
0.0	0.0	0.0	0.0	880.0	880.0	S-103	
0.0	0.0	0.0	0.0	1,330.0	1,330.0	S-104	
0.0	0.0	0.0	0.0	1,790.0	1,790.0	S-105	
0.0	0.0	0.0	0.0	1,020.0	1,020.0	S-106	
0.0	0.0	0.0	0.0	5,900.0	5,900.0	S-EXT1	
0.0	0.0	0.0	0.0	1,850.0	1,850.0	S-EXT2	
0.0	0.0	0.0	0.0	1,530.0	1,530.0	S-EXT3	
0.0	0.0	0.0	0.0	900.0	900.0	S-EXT4	
0.0	0.0	0.0	0.0	250.0	250.0	S-U1	
0.0	0.0	0.0	0.0	940.0	940.0	S-U2	
0.0	0.0	0.0	0.0	800.0	800.0	S-U3	
0.0	0.0	0.0	0.0	850.0	850.0	S-U4	
0.0	0.0	0.0	0.0	3,070.0	3,070.0	S-U5	
0.0	0.0	0.0	0.0	32,831.0	32,831.0	TOTAL	
						AREA	

#### 2-Year, Peak Discharge

Page 4

Subca Numbe

<b>210622_Schneider Rd_2y</b> Prepared by WSP HydroCAD® 10.00-21_s/n 10697 © 201	2-Year, Peak Discharge Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr Printed 6/22/2021 8 HydroCAD Software Solutions LLC Page 5
Runoff by	n=0.00-3.00 hrs, dt=0.01 hrs, 301 points Rational method, Rise/Fall=1.0/1.0 xTc nd+Trans method - Pond routing by Stor-Ind method
Subcatchment10S: Bldg A	Runoff Area=0.4481 ha 0.00% Impervious Runoff Depth=12 mm Tc=10.0 min C=0.90 Runoff=0.0845 m³/s 51.6 m³
Subcatchment11S: Bldg B	Runoff Area=0.2380 ha 0.00% Impervious Runoff Depth=12 mm Tc=10.0 min C=0.90 Runoff=0.0449 m³/s 27.4 m³
Subcatchment12S: Bldg C	Runoff Area=0.1610 ha 0.00% Impervious Runoff Depth=12 mm Tc=10.0 min C=0.90 Runoff=0.0304 m³/s 18.5 m³
Subcatchment15S: UnControlled	Runoff Area=0.5910 ha   0.00% Impervious   Runoff Depth=6 mm Tc=10.0 min   C=0.44   Runoff=0.0545 m³/s   33.3 m³
Subcatchment16S: External	Runoff Area=1.0180 ha 0.00% Impervious Runoff Depth=11 mm Tc=10.0 min C=0.85 Runoff=0.1814 m³/s 110.7 m³
Subcatchment41S: S-101	Runoff Area=0.1290 ha 0.00% Impervious Runoff Depth=10 mm Tc=10.0 min C=0.80 Runoff=0.0216 m³/s 13.2 m³
Subcatchment42S: S-102	Runoff Area=0.1960 ha 0.00% Impervious Runoff Depth=11 mm Tc=10.0 min C=0.88 Runoff=0.0362 m³/s 22.1 m³
Subcatchment44S: S-103	Runoff Area=0.0880 ha 0.00% Impervious Runoff Depth=10 mm Tc=10.0 min C=0.79 Runoff=0.0146 m³/s 8.9 m³
Subcatchment46S: S-106	Runoff Area=0.1020 ha 0.00% Impervious Runoff Depth=10 mm Tc=10.0 min C=0.82 Runoff=0.0175 m³/s 10.7 m³
Subcatchment48S: S-104	Runoff Area=0.1330 ha 0.00% Impervious Runoff Depth=12 mm Tc=10.0 min C=0.90 Runoff=0.0251 m³/s 15.3 m³
Subcatchment50S: S-105	Runoff Area=0.1790 ha 0.00% Impervious Runoff Depth=11 mm Tc=10.0 min C=0.88 Runoff=0.0330 m³/s 20.2 m³
Pond 15P: Tank B	Peak Elev=74.304 m Storage=41.0 m³ Inflow=0.0753 m³/s 45.9 m³ Outflow=0.0072 m³/s 42.1 m³
Pond 16P: Tank A	Peak Elev=74.519 m Storage=46.3 m³ Inflow=0.0845 m³/s 51.6 m³ Outflow=0.0077 m³/s 47.0 m³
Pond 40P: CBMH105	Peak Elev=76.005 m Storage=2.8 m³ Inflow=0.0216 m³/s 13.2 m³ Outflow=0.0128 m³/s 13.1 m³
Pond 43P: CB01	Peak Elev=76.023 m Storage=9.3 m³ Inflow=0.0362 m³/s 22.1 m³ Outflow=0.0136 m³/s 21.9 m³
Pond 45P: CB02	Peak Elev=75.777 m Storage=0.7 m³ Inflow=0.0146 m³/s 8.9 m³ Outflow=0.0136 m³/s 8.8 m³

Pond 47P: CB04 Peak Elev=75.316 m Storage=0.4 m<sup>3</sup> Inflow=0.0175 m<sup>3</sup>/s 10.7 m<sup>3</sup> Outflow=0.0171 m<sup>3</sup>/s 10.6 m<sup>3</sup>

210622_Schneider Rd_2y Prepared by WSP	Ottawa 2-Year Duration=10 min, Inte	Peak Discharge en=76.8 mm/hr hted 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 20	18 HydroCAD Software Solutions LLC	Page 6
Pond 49P: CB05	Peak Elev=75.578 m Storage=4.2 m³ Inflow=0.025 Outflow=0.013	1 m³/s 15.3 m³ 31 m³/s 15.2 m³
Pond 51P: CB03	Peak Elev=75.560 m Storage=8.1 m³ Inflow=0.033 Outflow=0.013	0 m³/s 20.2 m³ 86 m³/s 19.7 m³
Link 19L: Outflow		l m³/s 322.4 m³ l m³/s 322.4 m³

 Total Runoff Area = 32,831.0 m²
 Runoff Volume = 331.9 m³
 Average Runoff Depth = 10 mm

 100.00%
 Pervious = 32,831.0 m²
 0.00%
 Impervious = 0.0 m²

	2-Ye	ar, Peak Discharge
210622 Schneider Rd 2y	Ottawa 2-Year Duration=10 min,	Inten=76.8 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCA	AD Software Solutions LLC	Page 7

## Summary for Subcatchment 10S: Bldg A

Runoff = 0.0845 m<sup>3</sup>/s @ 0.17 hrs, Volume= 51.6 m<sup>3</sup>, Depth= 12 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

	. ()		cription						
	4481 0.9	-							
0.	0.4481 100.00% Pervious Area								
Тс	Length	Slope	Velocity	Capacity	Description				
<u>(min)</u>	(meters)	(m/m)	(m/sec)	(m³/s)					
10.0					Direct Entry,				
			Su	bcatchm	ent 10S: Bldg A				
				Hydrogra	bh				
0.09	<u> </u>				Runoff				
0.085	0.0845 m <sup>3</sup> /s				Ottawa 2-Year				
0.08 0.075					Duration=10 min,				
0.07									
0.065	₹1 <mark>//</mark>				Inten=76.8 mm/hr				
0.06					Runoff-Area=0.4481 ha				
(s) 0.055 (u) 0.05					Runoff Volume=51.6 m <sup>3</sup>				
0.045 0.04					Runoff Depth=12 mm				
0.035					Tc=10.0 min				
0.03					C=0.90				
0.025									
0.015									
0.01	<b>H</b> V								
0.005		him							
0	0	<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>	1		2 3				
				Time (I	nours)				

	d by WSF			roCAD Softwar	e Solutions	LLC	Printed 6/22/20 Page
		Sum	nmary for	Subcatch	nent 11S	8: Bldg B	
Runoff	= 0.	.0449 m³/s @	0.17 hrs	, Volume=	2	7.4 m³, Depth=	12 mm
		method, Rise ration=10 mir			Span= 0.0	0-3.00 hrs, dt=	0.01 hrs
Area	ı (ha)	C Descrip	tion				
-		90					
0.	2380	100.00%	% Pervious	Area			
Tc (min)	Length (meters)	•		pacity Descr m³/s)	iption		
10.0					t Entry,		
0.05 0.048 0.046 0.044					+	Ottawa 2-	
	0.0449 m³/s				+		Runoff
0.044 0.042 0.04							
0.038						ration=10	
0.036	₹HV-					en=76.8 mr	
0.032					ī	Area=0.238	
<b>S</b>				R	1	olume=27.	
ເຊິຍ ຍິງ 0.028 ຍິງ 0.026					Runoff	Depth=12	mm
% 0.028 € 0.026 0.024 0.022	₹ <u>/</u>   r ]				+ +	Tc=10.0	min
ی 0.028 0.026 0.024 0.022 0.02 0.018	11				+	C=	0.90
Sr 0.028     0.026     0.024     0.022     0.022     0.02     0.02     0.02     0.018     0.016     0.014	₹ <b>1</b> {				+		
<pre>% 0.028 0.026 0.024 0.022 0.02 0.018 0.016 0.014 0.012 0.01</pre>			1				
<pre>% 0.028 0.026 0.026 0.024 0.022 0.018 0.016 0.014 0.012 0.011 0.008 0.008</pre>							
% 0.028 0.026 0.026 0.022 0.022 0.022 0.022 0.022 0.02 0.014 0.014 0.014 0.014 0.016 0.014 0.016 0.014 0.016 0.014 0.016 0.014 0.016 0.014 0.016 0.014 0.010 0.010 0.008 0.008 0.0004 0.002			·		+ /////////////////////////////		
\$ 0.028 0.026 0.024 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.024 0.024 0.024 0.024 0.024 0.024 0.026 0.026 0.026 0.026 0.026 0.022 0.018 0.018 0.014 0.014 0.014 0.014 0.014 0.014 0.012 0.012 0.018 0.014 0.014 0.012 0.018 0.014 0.014 0.012 0.018 0.014 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.018 0.002 0.002 0.018 0.002 0.002 0.002 0.018 0.004 0.002			 	Time (hours)	2		3

210622_Schneider Rd_2y       Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr         Prepared by WSP       Printed 6/22/2021         HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC       Page 9	2-Year, Peak Discharge <b>210622_Schneider Rd_2y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Cttawa 2-Year Duration=10 min, Inten=76.8 mm/hr Printed 6/22/2021 Printed 6/22/2021
Summary for Subcatchment 12S: Bldg C	Summary for Subcatchment 15S: UnControlled
Runoff = 0.0304 m³/s @ 0.17 hrs, Volume= 18.5 m³, Depth= 12 mm	Runoff = 0.0545 m <sup>3</sup> /s @ 0.17 hrs, Volume= 33.3 m <sup>3</sup> , Depth= 6 mm
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr	Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr
Area (ha) C Description	Area (ha) C Description
0.1610 0.90	0.0800 0.28 S-U3
0.1610 100.00% Pervious Area	0.3070 0.20 S-U5 0.0250 0.90 S-U1
Tc Length Slope Velocity Capacity Description	0.0940 0.86 S-U2
(min) (meters) (m/m) (m/sec) (m³/s)	0.0850 0.88 S-U4
10.0 Direct Entry,	0.5910 0.44 Weighted Average 0.5910 100.00% Pervious Area
Subcatchment 12S: Bldg C	
Hydrograph	Tc Length Slope Velocity Capacity Description (min) (meters) (m/m) (m/sec) (m³/s)
0.034	10.0 Direct Entry,
0.032	
0.03 0.028 Ottawa 2-Year	Subcatchment 15S: UnControlled
0.026 Duration=10 min,	Hydrograph
0.024 Inten=76.8 mm/hr	0.06
0.022 0.022 Runoff Area=0.1610 ha	
€ 0.02 € 0.018 Runoff Volume=18.5 m <sup>3</sup>	0.05 Duration=10 min,
<sup>3</sup> 0.016 <b>1</b> − − − − − − − − − − − − − − − − − − −	0.045
" 0.014 0.012 Tc=10.0 min	0.04 Runoff Area=0,5910 ha
0.01	
0.008	
0.006	الم
0.002	0.02 Tc=10.0 min
	0.015 C=0.44
Time (hours)	0.01
	0.005

1

Time (hours)

2

ġ.

	2-Ye	ear, Peak Discharge
210622_Schneider Rd_2y	Ottawa 2-Year Duration=10 min,	Inten=76.8 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hydro(	CAD Software Solutions LLC	Page 11

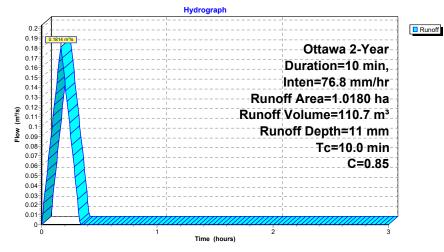
## Summary for Subcatchment 16S: External Catchments

Runoff	=	0.1814 m³/s @	0.17 hrs, Volume=	110.7 m <sup>3</sup> . Depth=	11 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

_	Area	(ha)	С	Des	cription		
	0.	5900	0.81	S-EX	KT1		
	0.	1850	0.90	S-EX	KT2		
	0.	1530	0.90	S-EX	KT3		
_	0.0	0900	0.90	S-EX	KT4		
	1.0	0180	0.85	Weig	ghted Ave	rage	
	1.0	0180		100.	00% Perv	ious Area	
	Tc	Leng	<i>,</i>	Slope	Velocity	Capacity	Description
_	(min)	(mete	rs)	(m/m)	(m/sec)	(m³/s)	
	10.0						Direct Entry,

## Subcatchment 16S: External Catchments



Runoff =	-			icalcinnent (	41S: S-101	
Runoff =			-			
	0.0216 m³/s	@ 0.1	7 hrs, Volu	ime=	13.2 m <sup>3</sup> , Depth= 10 m	m
Runoff by Ration Ottawa 2-Year [					0.00-3.00 hrs, dt= 0.01 hrs	
		,	n=70.0 mm	1/111		
Area (ha)		cription				
0.1290	0.80 S-10 100 (		ious Area			
Tc Lengt (min) (meters	•	Velocity (m/sec)	Capacity (m³/s)	Description		
10.0	<i>, (,)</i>	(11,000)	(,0)	Direct Entry,	,	
		е,	ibeatebr	nent 41S: S-	101	
		31	Hydrogra		101	
0.004					+	
0.024 0.023 0.0216 m <sup>3</sup> /s					T	Runoff
0.022					Ottawa 2-Year	
0.02					Duration=10 min,	
0.018 0.017 0.016					nten=76.8 mm/hr	
0.015				Runof	f Area=0.1290 ha	
<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>				Runoff	Volume=13.2 m <sup>3</sup>	
0.012 0.011 0.011				Runo	off Depth=10 mm	
0.009					Tc=10.0 min	
0.007-					C=0.80	
0.005					· 	
0.003						
0.001						
Ő		1	Time (I	hours)	3	

Prepared by	chneider Rd_2 / WSP 0.00-21 s/n 1069	-			Duration=10 min,	Printed 6/22/2021 Page 13
				catchment		<u> </u>
Runoff =	0.0362 m³/s	@ 0.17 h	nrs, Volu	me=	22.1 m <sup>3</sup> , Depth=	11 mm
	itional method, R ar Duration=10 ו				0.00-3.00 hrs, dt= 0.	01 hrs
Area (ha	) C Desc	ription				
0.196						
0.196	J 100.0	00% Perviou	is Area			
	ength Slope eters) (m/m)	Velocity C (m/sec)	Capacity (m³/s)	Description		
10.0				Direct Entry	,	
		Sub	catchm	nent 42S: S-	102	
			Hydrograp	oh		
0.04					+   +	
		1			1	- rtanon
0.038	362 m <sup>3</sup> /s					
0.000	362 m <sup>3</sup> /s	· · · · · · · · · · · · · · · · · · ·			Ottawa 2-Y	
0.038	362 m <sup>*</sup> /s	·			Ottawa 2-Y Duration=10 m	
0.038 0.036 0.034	362 m/s					nin,
0.038 0.036 0.034 0.032 0.03 0.032 0.03 0.028	862 mYs 				Duration=10 m	nin, /br
0.038 0.036 0.034 0.032 0.03 0.028 0.026				l Runof	Duration=10 m nten=76.8 mm f Area=0.1960	hin, //hr ha
0.038 0.036 0.034 0.032 0.03 0.028 0.026				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1	hin,- /br ha m <sup>3</sup> -
0.038 0.036 0.034 0.032 0.03 0.028 0.026 0.024 0.022 0.022 0.022 0.022 0.022 0.022				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1 off Depth=11 r	hin,- /br ha m <sup>3</sup> - nm
Length Constraints (1997) Length Constraints (1				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1	hin,- /br ha m <sup>3</sup> - nm
0.033 0.036 0.036 0.032 0.024 0.025 0.0240				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1 off Depth=11 r	nin,- /br ha m <sup>3</sup> nm
Length Constraints (Constraints) (Constraint				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1 off Depth=11 r Tc=10.0 r	nin,- /br ha m <sup>3</sup> nm
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■				l Runof Runoff	Duration=10 m nten=76.8 mm f Area=0.1960 Volume=22.1 off Depth=11 r Tc=10.0 r	nin,- /br ha m <sup>3</sup> nm

ż

ż.

0.002 0

ò

1

Time (hours)

210622_Schneider Rd_2y Otta Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD So	2-Year, Peak Discharge wa 2-Year Duration=10 min, Inten=76.8 mm/hr Printed 6/22/2021 ftware Solutions LLC Page 14
Summary for Subca	tchment 44S: S-103
Runoff = 0.0146 m <sup>3</sup> /s @ 0.17 hrs, Volume	e= 8.9 m³, Depth= 10 mm
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, T Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr	
Area (ha) C Description	
0.0880 0.79 S-103	
0.0880 100.00% Pervious Area	
Tc Length Slope Velocity Capacity D (min) (meters) (m/m) (m/sec) (m³/s)	escription
10.0 D	irect Entry,
Subcatchmer	at 446: 6 103
Hydrograph	11 445. 5-105
	·
0.016 0.0146 m <sup>3</sup> /s	Runoff
0.014	Ottawa 2-Year
0.013	Duration=10 min,
0.012	Inten=76.8 mm/hr
0.011	
0.01	Runoff Area=0.0880 ha
Сорона в 0.0000 0.000	Runoff Volume=8.9 m <sup>3</sup>
ê 0.007	Runoff Depth=10 mm
0.006	Tc=10.0 min
0.005	
0.003	C=0.79
0.002	
0.001	
	2 3
Time (hour	s)

	2-Year, Peak Disch	narge
210622_Schneider Rd_2y	Ottawa 2-Year Duration=10 min, Inten=76.8 r	nm/hr
Prepared by WSP	Printed 6/22/	2021
HydroCAD® 10.00-21 s/n 10697 © 2018 HydroC	AD Software Solutions LLC Page	ge 15

## Summary for Subcatchment 46S: S-106

Runoff = 0.0175 m<sup>3</sup>/s @ 0.17 hrs, Volume= 10.7 m<sup>3</sup>, Depth= 10 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

	1020 0.8				
0.	1020	100	.00% Perv	ious Area	
Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,
			Sı	ubcatchm	nent 46S: S-106
				Hydrogra	ph
0.019- 0.018 0.017- 0.016 0.015- 0.014 0.013 0.012- 0.001 0.009- 0.009- 0.009- 0.009- 0.009- 0.009- 0.009- 0.0005- 0.007- 0.006- 0.005- 0.004- 0.003- 0.004- 0.005- 0.004- 0.005- 0.005- 0.005- 0.017- 0.016- 0.017- 0.016- 0.017- 0.016- 0.017- 0.016- 0.017- 0.016- 0.017- 0.016- 0.017- 0.016- 0.017- 0.017- 0.016- 0.017- 0.009- 0.009- 0.007-					Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr Runoff Area=0.1020 ha Runoff Volume=10.7 m³ Runoff Depth=10 mm Tc=10.0 min C=0.82
0.001 0		///////////////////////////////////////	///////////////////////////////////////	///////////////////////////////////////	

<b>210622_Schneider Rd_2y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 20			Duration=10 min,	Printed 6/22/20 Page
Summ	ary for Sub	ocatchment	48S: S-104	
Runoff = 0.0251 m³/s @ 0	).17 hrs, Volu	ime=	15.3 m <sup>3</sup> , Depth=	12 mm
Runoff by Rational method, Rise/Fa Ottawa 2-Year  Duration=10 min.  Ir			0.00-3.00 hrs, dt= 0.	01 hrs
,		1/111		
Area (ha) C Description				
0.1330 0.90 S-104 0.1330 100.00% Pe	ervious Area			
Tc Length Slope Veloci		Description		
(min) (meters) (m/m) (m/se	c) (m³/s)			
10.0		Direct Entry		
10.0		Direct Entry		
	Subcatchm	Direct Entry nent 48S: S-		
	Subcatchm Hydrograf	nent 48S: S-		
		nent 48S: S-		
		nent 48S: S-	104	Runoff
0.028		nent 48S: S- <sup>ph</sup>	104 Ottawa 2-Y	ear
0.028 0.026 0.026 0.024 0.022		nent 48S: S- ph	104 Ottawa 2-Yo Duration=10 m	ear nin,
0.028 0.026 0.026 0.024 0.022 0.02		nent 48S: S- ph	104 Ottawa 2-Y	ear nin,
0.028 0.026 0.026 0.024 0.022 0.02 0.02 0.018		nent 48S: S- ph	104 Ottawa 2-Yo Duration=10 m	ear hin, h/hr
0.028 0.026 0.026 0.024 0.022 0.02 0.02 0.018		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm	ear lin, l/hr ha
0.028 0.026 0.026 0.024 0.022 0.022 0.022 0.02 0.018 0.016		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm f Area=0.1330 Volume=15.3	ear lin, l/hr ha m <sup>3</sup>
0.028 0.026 0.026 0.024 0.022 0.022 0.022 0.022 0.022 0.016 0.016 0.014 0.014 0.014		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm f Area=0.1330	ear hin, //hr ha m <sup>3</sup> nm
0.028 0.026 0.026 0.024 0.022 0.022 0.022 0.02 0.018 0.016		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm f Area=0.1330 Volume=15.3 off Depth=12 n Tc=10.0 r	ear lin, l/hr ha m <sup>3</sup> - nm
0.028 0.026 0.026 0.025 0.024 0.022 0.022 0.022 0.02 0.018 0.014 0.0		nent 48S: S- ph I Runof	104 Ottawa 2-Yi Duration=10 m nten=76.8 mm f Area=0.1330 Volume=15.3 off Depth=12 n	ear lin, l/hr ha m <sup>3</sup> - nm
0.028 0.026 0.026 0.025 0.024 0.022 0.022 0.02 0.016 0.014 0.0		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm f Area=0.1330 Volume=15.3 off Depth=12 n Tc=10.0 r	ear lin, l/hr ha m <sup>3</sup> - nm
0.028 0.026 0.026 0.025 0.024 0.022 0.02 0.02 0.016 0.016 0.014 0.01		nent 48S: S- ph I Runof	104 Ottawa 2-Yo Duration=10 m nten=76.8 mm f Area=0.1330 Volume=15.3 off Depth=12 n Tc=10.0 r	ear lin, l/hr ha m <sup>3</sup> - nm

2-Year, Peak Di 210622_Schneider Rd_2y Ottawa 2-Year Duration=10 min, Inten=76. Prepared by WSP Printed 6/. HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC	mm/hr 210622_Schneider Rd_2y Ottawa 2-Year Duration=10 min, Inten=76.8 mm/l
Summary for Subcatchment 50S: S-105	Summary for Pond 15P: Tank B
Runoff = 0.0330 m³/s @ 0.17 hrs, Volume= 20.2 m³, Depth= 11 mm Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr	Inflow Area = $3,990.0 \text{ m}^2$ $0.00\%$ Impervious, Inflow Depth = $12 \text{ mm}$ for 2-Year eventInflow = $0.0753 \text{ m}^3/\text{s}$ $0.17 \text{ hrs}$ , Volume= $45.9 \text{ m}^3$ Outflow = $0.0072 \text{ m}^3/\text{s}$ $0.32 \text{ hrs}$ , Volume= $42.1 \text{ m}^3$ , Atten= 90%, Lag= 9.0 minPrimary = $0.0072 \text{ m}^3/\text{s}$ $0.32 \text{ hrs}$ , Volume= $42.1 \text{ m}^3$
Area (ha) C Description 0.1790 0.88 S-105	Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs           Peak Elev= 74.304 m @ 0.32 hrs         Surf.Area= 100.0 m²         Storage= 41.0 m³
0.1790 100.00% Pervious Area Tc Length Slope Velocity Capacity Description (min) (meters) (m/m) (m/sec) (m <sup>3</sup> /s)	Plug-Flow detention time= 60.3 min calculated for 42.1 m <sup>3</sup> (92% of inflow) Center-of-Mass det. time= 59.7 min ( 69.7 - 10.0 )
10.0 Direct Entry,	Volume         Invert         Avail.Storage         Storage         Description           #1         73.894 m         400.0 m³ <b>10.00 mW x 10.00 mL x 4.00 mH Prismatoid</b>
Subcatchment 50S: S-105	Device Routing Invert Outlet Devices
Hydrograph	#1 Primary 73.894 m 75 mm Vert. Orifice/Grate C= 0.600
0.036 0.034 0.032 0.033 0.0280 0.028 0.028 0.0280 0.028 0.028 0.028 0.028 0.028 0.028 0.028 0.00	unoff       Primary OutFlow Max=0.0072 m³/s @ 0.32 hrs HW=74.304 m (Free Discharge)         └─1=Orifice/Grate (Orifice Controls 0.0072 m³/s @ 1.62 m/s)         Pond 15P: Tank B
0.026 Inten=76.8 mm/hr	Hydrograph
0.024 0.022	
0.002 0.002 0.002 0.002 Runoff Volume=20.2 m <sup>3</sup>	0.08 Primary
흝 0.016 Runoff Depth=11 mm	0.075 0.07
0.014 0.012 0.01 0.01 0.008	0.065 0.066 0.055 0.055
	(0.05) (0.045) (0.045) (0.03) (0.03) (0.03) (0.03) (0.03) (0.03) (0.03) (0.03) (0.03) (0.04) (0.0
Time (hours)	0.025

0.015 0.01 0.005

3

2

1

Time (hours)

<b>210622_Schneider Rd_2y</b> Prepared by WSP HvdroCAD® 10.00-21 s/n 10697 @	2-Year, Peak Discharge Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr Printed 6/22/2021 2018 HydroCAD Software Solutions LLC Page 19
	Summary for Pond 16P: Tank A
$\begin{array}{llllllllllllllllllllllllllllllllllll$	0.00% Impervious, Inflow Depth =         12 mm         for 2-Year event           0.17 hrs, Volume=         51.6 m³           0.32 hrs, Volume=         47.0 m³, Atten= 91%, Lag= 9.1 min           0.32 hrs, Volume=         47.0 m³
	e Span= 0.00-3.00 hrs, dt= 0.01 hrs 5   Surf.Area= 100.0 m²   Storage= 46.3 m³
Center-of-Mass det. time= 61.9 n Volume Invert Avail.St	nin calculated for 46.9 m <sup>3</sup> (91% of inflow) nin ( 71.9 - 10.0 ) orage Storage Description 0.0 m <sup>3</sup> 10.00 mW x 10.00 mL x 4.00 mH Prismatoid
Device Routing Invert	Outlet Devices
#1 Primary 74.056 m	75 mm Vert. Orifice/Grate C= 0.600
Primary OutFlow Max=0.0077 r 1=Orifice/Grate (Orifice Cont	n³/s @ 0.32 hrs HW=74.519 m (Free Discharge) rols 0.0077 m³/s @ 1.73 m/s)
	Pond 16P: Tank A
4	Hydrograph
0.0845 m <sup>3</sup> /s	Inflow
0.09	Inflow Area=4,481.0 m <sup>2</sup>
0.08	Peak Elev=74.519 m
0.075	Storage=46.3 m <sup>3</sup>
0.065	

2

Time (hours)

(%) 0.055 € 0.05

0.045 0.04

0.035

0.03

0.025

0.02 0.015

0.01

0.005

0

0

2-Year, Peak Discharge Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr 210622\_Schneider Rd\_2y Prepared by WSP Printed 6/22/2021 HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Page 20 Summary for Pond 40P: CBMH105 Inflow Area = 1,290.0 m<sup>2</sup>, 0.00% Impervious, Inflow Depth = 10 mm for 2-Year event Inflow 0.0216 m<sup>3</sup>/s @ 0.17 hrs, Volume= . 13.2 m³ = Outflow = 0.0128 m³/s @ 0.24 hrs, Volume= 13.1 m<sup>3</sup>, Atten= 41%, Lag= 4.1 min Primarv = 0.0128 m³/s @ 0.24 hrs, Volume= 13.1 m<sup>3</sup> Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 76.005 m @ 0.24 hrs Surf.Area=  $80.4 \text{ m}^2$  Storage=  $2.8 \text{ m}^3$ Plug-Flow detention time=2.2 min calculated for 13.0 m<sup>3</sup> (99% of inflow) Center-of-Mass det. time= 2.1 min (12.1 - 10.0) Volume Invert Avail.Storage Storage Description #1 74.450 m 65.9 m<sup>3</sup> Custom Stage Data (Prismatic)Listed below (Recalc) Surf.Area Inc.Store Cum.Store Elevation (meters) (sq-meters) (cubic-meters) (cubic-meters) 74.450 0.4 0.0 0.0 75.950 0.4 0.6 0.6 435.0 65.9 76.250 65.3 Invert Outlet Devices Device Routing 74.776 m 75 mm Vert. Orifice/Grate C= 0.600 #1 Primary Primary OutFlow Max=0.0128 m³/s @ 0.24 hrs HW=76.005 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0128 m³/s @ 2.90 m/s) Pond 40P: CBMH105 Hydrograph Inflow
Primary 0.024 0.023 Inflow Area=1,290.0 m<sup>2</sup> 0.022 0.021 Peak Elev=76.005 m 0.02 0.019 Storage=2.8 m<sup>3</sup> 0.018 0.017 0.016 0.015 (s) 0.014 **u** 0.013 0.012 Flow 0.011 0.01 0.009

2

1

Time (hours)

0.008

0.007 0.006 0.005 0.004 0.003 0.002 0.001

210622_Schr Prepared by W	/SP				ited 6/22/202
HydroCAD® 10.0		2018 HydroCAD S			Page 2
		Summary for	Pond 43P: 0	CB01	
Inflow Area = Inflow = Outflow = Primary =	1,960.0 m², 0.0362 m³/s @ 0.0136 m³/s @ 0.0136 m³/s @	0.00% Impervi 0.17 hrs, Volun 0.27 hrs, Volun 0.27 hrs, Volun	ne= ne=	epth = 11 mm for 2 22.1 m <sup>3</sup> 21.9 m <sup>3</sup> , Atten= 62%, 21.9 m <sup>3</sup>	
		e Span= 0.00-3.0 Surf.Area= 235			
	tion time= 6.2 mi det. time= 6.1 mi	n calculated for 2 n(16.1-10.0)	1.9 m³ (99% of	inflow)	
Volume In		orage Storage [			
#1 74.25	i9 m 144	4.7 m <sup>3</sup> Custom	Stage Data (P	rismatic)Listed below (I	Recalc)
Elevation (meters) 74,259	Surf.Area (sq-meters) ( 0.4	Inc.Store cubic-meters) 0.0	Cum.Store (cubic-meters) 0.0	)	
75.950 76.250	0.4 960.0	0.7 144.1	0.7 144.7	7	
	0	Outlet Devices			
#1 Primar	y 74.651 m w Max=0.0136 n	75 mm Vert. O	IW=76.023 m	C= 0.600 (Free Discharge)	
#1 Primar	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s (	IW=76.023 m		
#1 Primar	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s (	IW=76.023 m @ 3.07 m/s) <b>3P: CB01</b>		
#1 Primar Primary OutFlo 1=Orifice/Gr	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow		- Inflow - Primary
#1 Primar Primary OutFlo 1=Orifice/Gr	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	
#1 Primar Primary OutFlo 1=Orifice/Gr	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup>	
#1 Primar Primary OutFlo 1=Orifice/Gr	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	
#1 Primar Primary OutFlo 1=Orifice/Gr	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	
#1 Primar Primary OutFlo 1=Orifice/Gr 0.04 0.038 0.034 0.032 0.034 0.032 0.034 0.032 0.034 0.032 0.034 0.034 0.032 0.034 0.02	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	
#1 Primar Primary OutFlo 1=Orifice/Gr 0.04 0.038 0.038 0.038 0.034 0.032 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.022 0.016 0.016 0.016 0.022 0.016 0.016 0.016 0.016 0.016 0.016 0.017 0.022 0.016 0.016 0.016 0.016 0.017 0.017 0.022 0.016 0.017 0.017 0.017 0.017 0.017 0.017 0.017 0.017 0.017 0.022 0.016 0.017 0.01	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	
#1 Primar Primary OutFlo 1=Orifice/Gr 0.034 0.038 0.038 0.034 0.034 0.032 0.034 0.022 0.024 0.018 0.018 0.014 0.018 0.014	y 74.651 m w Max=0.0136 n	75 mm Vert. O n³/s @ 0.27 hrs H rols 0.0136 m³/s ( Pond 4	IW=76.023 m @ 3.07 m/s) 3P: CB01 Inflow	(Free Discharge) Area=1,960.0 m <sup>2</sup> Celev=76.023 m	

0

ŏ

1

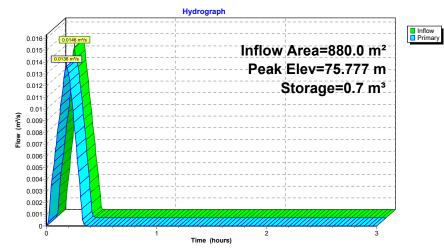
3

2

Time (hours)

			Summary	for Pon	d 45P: (	CB02			
Inflow Are	ea =	880.0 m	<sup>12</sup> , 0.00% Im	pervious,	Inflow De	epth =	10 mm	for 2-Ye	ar event
Inflow	= 0.0	)146 m³/s @	0.17 hrs, 1	Volume=		8.9 m³			
Outflow	= 0.0	)136 m³/s @	0.18 hrs,	Volume=		8.8 m³,	Atten= 7	7%, Lag=	0.8 min
Primary	= 0.0	)136 m³/s @	0.18 hrs, 1	Volume=		8.8 m³			
- <i></i> .	<u>.</u>								
			ne Span= 0.0						
Peak Elev	I = 75 777	m @ 0.18 hi	rs Surf Area=	$= 0.4 \text{ m}^2$ 9	Storage=	$0.7 m^{3}$			
		0	0 001111 1100	0.4111	otorago	0.7 111			
		0			Ū				
Plug-Flow	/ detention	time=0.7 n	nin calculated	for 8.8 m <sup>3</sup>	Ū				
Plug-Flow	/ detention	time=0.7 n		for 8.8 m <sup>3</sup>	Ū				
Plug-Flow Center-of-	/ detention -Mass det	i time= 0.7 n . time= 0.6 n	nin calculated nin ( 10.6 - 10	for 8.8 m³ .0 )	(98% of i				
Plug-Flow Center-of- <u>Volume</u>	/ detention	time=0.7 m time=0.6 n t Avail.5	nin calculated nin ( 10.6 - 10 Storage Stor	for 8.8 m³ .0) rage Desci	(98% of i ription	inflow)	_isted be	low (Reca	alc)
Plug-Flow Center-of-	/ detention -Mass det. Invert	time=0.7 m time=0.6 n t Avail.5	nin calculated nin ( 10.6 - 10 Storage Stor	for 8.8 m³ .0 )	(98% of i ription	inflow)	_isted be	low (Reca	alc)
Plug-Flow Center-of- <u>Volume</u>	v detention -Mass det Inver 74.121 m	time=0.7 m time=0.6 n t Avail.5	nin calculated nin ( 10.6 - 10 Storage Stor	for 8.8 m <sup>3</sup> .0) rage Desci stom Stag	(98% of i ription	inflow) Prismatic)	_isted be	low (Reca	alc)
Plug-Flow Center-of- <u>Volume</u> #1	/ detention -Mass det <u>Invert</u> 74.121 m	time= 0.7 n time= 0.6 n t Avail.5	nin calculated nin ( 10.6 - 10 <u>Storage Stor</u> 18.8 m³ <b>Cus</b>	for 8.8 m <sup>3</sup> .0 ) rage Desci stom Stag re (	ription e Data (P	inflow) Prismatic) e	_isted be	low (Reca	alc)
Plug-Flow Center-of- <u>Volume</u> #1 Elevation	/ detention -Mass det 	time= 0.7 n time= 0.6 n t <u>Avail.5</u> Surf.Area	nin calculated nin ( 10.6 - 10 Storage Stor 18.8 m <sup>3</sup> Cus Inc.Stor (cubic-meters	for 8.8 m <sup>3</sup> .0 ) rage Desci stom Stag re (	ription e Data (P Cum.Store	inflow) Prismatic) e	_isted be	elow (Reca	alc)
Plug-Flow Center-of- <u>Volume</u> #1 Elevation (meters)	v detention -Mass det Inver 74.121 m 5 ) (so	time= 0.7 n time= 0.6 n t <u>Avail.5</u> Gurf.Area I-meters)	nin calculated nin ( 10.6 - 10 <u>Storage Stor</u> 18.8 m <sup>3</sup> Cus Inc.Stor (cubic-meters 0	for 8.8 m <sup>3</sup> .0) <del>rage Descr</del> stom Stag re  ( s)  (cub	ription e Data (P Cum.Store	inflow) Prismatic) e : <u>)</u> 0	isted be	elow (Reca	alc)
Plug-Flow Center-of- <u>Volume</u> #1 Elevation (meters) 74.121	v detention -Mass det Invert 74.121 m 5 ) (so	u time= 0.7 n . time= 0.6 n t Avail.5 Gurf.Area (-meters) 0.4	nin calculated nin ( 10.6 - 10 <u>Storage Stor</u> 18.8 m <sup>3</sup> Cus Inc.Stor (cubic-meters 0	for 8.8 m <sup>3</sup> .0) rage Descr tom Stag re ( s) (cub .0 .7	ription e Data (P Cum.Store ic-meters 0.0	inflow) Prismatic) e :) 0 7	_isted be	elow (Reca	alc)
Plug-Flow Center-of- #1 Elevation (meters) 74.121 75.950	v detention -Mass det Invert 74.121 m 5 ) (so	u time= 0.7 n time= 0.6 n t Avail. <u>s</u> Surf.Area <u>meters)</u> 0.4 0.4	nin calculated nin ( 10.6 - 10 Storage Stor 18.8 m <sup>3</sup> Cus Inc.Stor (cubic-meter 0 0	for 8.8 m <sup>3</sup> .0) rage Descr tom Stag re ( s) (cub .0 .7	ription e Data (P Cum.Store ic-meters 0.0	inflow) Prismatic) e :) 0 7	_isted be	elow (Reca	alc)
Plug-Flow Center-of- #1 Elevation (meters) 74.121 75.950 76.150	v detention -Mass det Invert 74.121 m 5 ) (so	time= 0.7 n time= 0.6 n t Avail.s Gurf.Area 	nin calculated nin ( 10.6 - 10 Storage Stor 18.8 m <sup>3</sup> Cus Inc.Stor (cubic-meter 0 0	for 8.8 m <sup>3</sup> .0) age Descr stom Stag re ( s) (cub .0 .7 .0	ription e Data (P Cum.Store ic-meters 0.0	inflow) Prismatic) e :) 0 7	_isted be	elow (Reca	alc)

## Pond 45P: CB02



Prepared by V	nneider Rd_2y WSP .00-21 s/n 10697 @				in, Inten=76.8 mm/h Printed 6/22/2021 Page 23
		Summary fo	r Pond 47P:	CB04	
Inflow Area = Inflow = Outflow = Primary =	1,020.0 m² 0.0175 m³/s @ 0.0171 m³/s @ 0.0171 m³/s @	, 0.00% Impen 0.17 hrs, Volu 0.17 hrs, Volu 0.17 hrs, Volu	ume= ume=	10.7 m³	for 2-Year event = 2%, Lag= 0.4 min
Peak Elev= 75	or-Ind method, Tim 0.316 m @ 0.17 hrs ention time= 0.5 mi	Surf.Area= 0.4	4 m <sup>2</sup> Storage=	0.4 m <sup>3</sup>	
Volume		orage Storage		Prismatic)Listed	below (Recalc)
Elevation	Surf.Area	I			
		Inc.Store	Cum.Stor	-	
(meters) 74.221 76.690 76.840		( <u>cubic-meters)</u> 0.0 1.0 11.3	Cum.Stor (cubic-meters 0. 1. 1. 12.	<u>s)</u> 0 0	
(meters) 74.221 76.690 76.840	(sq-meters) 0.4 0.4 150.0	(cubic-meters) 0.0 1.0	(cubic-meters 0. 1. 12.	<u>s)</u> 0 0	
(meters) 74.221 76.690 76.840 <u>Device Routi</u> #1 Prima <b>Primary OutF</b>	(sq-meters) 0.4 0.4 150.0 ng Invert	(cubic-meters) 0.0 1.0 11.3 Outlet Device 100 mm Vert. n <sup>3</sup> /s @ 0.17 hrs	(cubic-meters 0. 1. 12. s . Orifice/Grate HW=75.309 m	<u>s)</u> 0 0 3 C= 0.600	e)
(meters) 74.221 76.690 76.840 <u>Device Routi</u> #1 Prima <b>Primary OutF</b>	(sq-meters) 0.4 0.4 150.0 ing Invert ary 74.594 m low Max=0.0170 r	(cubic-meters) 0.0 1.0 11.3 Outlet Device 100 mm Vert n <sup>3</sup> /s @ 0.17 hrs rols 0.0170 m <sup>3</sup> /s	(cubic-meters 0. 1. 12. s . Orifice/Grate HW=75.309 m	<u>s)</u> 0 0 3 C= 0.600	e)
(meters) 74.221 76.690 76.840 <u>Device Routi</u> #1 Prima <b>Primary OutF</b>	(sq-meters) 0.4 0.4 150.0 ing Invert ary 74.594 m low Max=0.0170 r	(cubic-meters) 0.0 1.0 11.3 Outlet Device 100 mm Vert n <sup>3</sup> /s @ 0.17 hrs rols 0.0170 m <sup>3</sup> /s	(cubic-meters 0. 1. 22. 5 6 Orifice/Grate HW=75.309 m 5 @ 2.17 m/s) 47P: CB04	<u>s)</u> 0 0 3 C= 0.600	e)

Peak Elev=75.316 m

2

Time (hours)

Storage=0.4-m<sup>3</sup>

3

0.017

0.016 0.015

0.013 0.014 0.013 0.012 0.012 0.011 0.011 0.019 0.009 0.008

0.008 0.007 0.006 0.005 0.004 0.003 0.002 0.001

0

1

			Sumr	nary f	or Po	nd 49P	: CB05	
Inflow Area = Inflow = Outflow = Primary =	0.0251 0.0131	,330.0 m 1 m³/s @ 1 m³/s @ 1 m³/s @	0.17 0.25	9% Impe hrs, Vo hrs, Vo hrs, Vo	olume= olume=		Depth = 12 mm for 2- 15.3 m <sup>3</sup> 15.2 m <sup>3</sup> , Atten= 48%, I 15.2 m <sup>3</sup>	
Routing by Sto Peak Elev= 75	5.578 m @	0.25 hr	s Surf.	Area= 9	91.6 m <sup>2</sup>	<sup>2</sup> Storag	e= 4.2 m <sup>3</sup>	
Plug-Flow dete Center-of-Mas	s det. tim	1e= 3.0 m 1e= 2.9 m	nin calcu nin ( 12.9	ated fo 9 - 10.0	or 15.2	m³ (99%	of inflow)	
Volume	Invert		Storage					
#1 74.0	028 m	5	53.1 m³	Custo	om Sta	ge Data	(Prismatic)Listed below (R	lecalc)
Elevation	Surf	Area	In	c.Store		Cum.Sto	ore	
(meters)	(sq-me	eters)	(cubic-r	neters)	(cu	ibic-mete	ers)	
74.028		0.4		0.0			0.0	
75.500 75.800		0.4 350.0		0.6 52.6			0.6 3.1	
10.000	,	500.0		02.0		0.	0.1	
Device Rout	ing	Inver	t Outle	et Devid	ces			
#1 Primary OutF	low Max		m³/s @	0.25 hr	s HW=	=75.578 r	C= 0.600 n (Free Discharge)	
Primary OutF	low Max	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup>	s HW= ³/s @ 2	=75.578 r		
Primary OutF	low Max	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup>	s HW= ³/s @ 2 d <b>49P</b>	=75.578 r 96 m/s)		7
Primary OutF 1=Orifice/(	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b>	=75.578 r 96 m/s)		] I Inflow
Primary OutF -1=Orifice/(	low Max	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	-75.578 r .96 m/s) <b>: CB05</b>	n (Free Discharge)	Inflow Primary
Primary OutF -1=Orifice/( 0.028 0.026	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m <sup>2</sup>	Inflow Primary
Primary OutF -1=Orifice/(	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF -1=Orifice/( 0.028 0.026 0.024	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m <sup>2</sup>	Primary
Primary OutF -1=Orifice/( 0.028 0.026 0.024 0.022	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Inflow Primary
Primary OutF -1=Orifice/0 0.028 0.026 0.024 0.022 0.022 0.022 0.022 0.022	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF -1=Orifice/0 0.028 0.026 0.024 0.022 0.022 0.022 0.022 0.022	Flow Max Grate (Or	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF -1=Orifice/0 0.028 0.026 0.024 0.022 0.028 0.018 0.	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF -1=Orifice/0 0.028 0.026 0.024 0.022 0.022 0.022 0.022 0.022	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF 1=Orifice/0 0.028 0.026 0.024 0.022 0.02 0.022 0.02 0.022 0.012 0.014	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	inflow Primary
Primary OutF 1=Orifice/0 0.028 0.026 0.024 0.022 0.02 0.022 0.02 0.022 0.011 0.01	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF 1=Orifice/0 0.028 0.026 0.024 0.022 0.02 0.022 0.02 0.024 0.022 0.011 0.001 0.011 0.011 0.001	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary
Primary OutF 1=Orifice/0 0.028 0.026 0.024 0.022 0.02 0.022 0.02 0.022 0.018 0.016 0.014 0.016 0.016 0.012 0.002 0.012	225 mm	=0.0131	m³/s @	0.25 hr )131 m <sup>3</sup> <b>Pon</b>	s HW= ³/s @ 2 d <b>49P</b> raph	=75.578 r .96 m/s) : CB05 Inflow	n (Free Discharge) / Area=1,330.0 m² ak Elev=75.578 m	Primary

Time (hours)

 210622\_Schneider Rd\_2y
 Ottawa 2-Year Duratio

 Prepared by WSP
 HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC

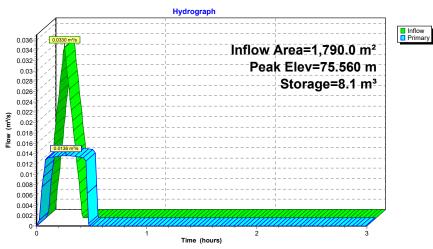
2-Year, Peak Discharge Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

Printed 6/22/2021 Page 24

<b>210622_Schneider Rd_2y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 @	Ottawa 2-Year Duration=10	2-Year, Peak Discharge min, Inten=76.8 mm/hr Printed 6/22/2021 Page 25					
	Summary for Pond 51P: CB03						
Inflow = $0.0330 \text{ m}^3/\text{s}$ @		ım for 2-Year event en= 59%, Lag= 5.9 min					
	e Span= 0.00-3.00 hrs, dt= 0.01 hrs s   Surf.Area= 129.0 m²   Storage= 8.1 m³						
Plug-Flow detention time= 5.5 m Center-of-Mass det. time= 5.3 m	in calculated for 19.7 m³ (98% of inflow) in(15.3 - 10.0)						

Volume	Inv	ert Avail	Storage	Storage	Description	
#1	73.097	m	53.5 m³	Custom	Stage Data (P	rismatic)Listed below (Recalc)
Elevatio (meters		Surf.Area sq-meters)	Ind (cubic-n	c.Store neters)	Cum.Store (cubic-meters)	
73.09	7	0.4		0.0	0.0	- I
75.45	0	0.4		0.9	0.9	
75.75	0	350.0		52.6	53.5	i
Device	Routing	Inve	ert Outle	et Devices		
#1	Primary	74.183	m 75 m	m Vert. C	Drifice/Grate	C= 0.600

Primary OutFlow Max=0.0136 m³/s @ 0.27 hrs HW=75.560 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0136 m³/s @ 3.08 m/s)

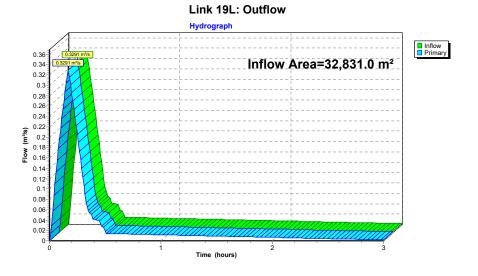


	2-Year, Peak Discharge	1
210622_Schneider Rd_2y	Ottawa 2-Year Duration=10 min, Inten=76.8 mm/h	r
Prepared by WSP	Printed 6/22/2021	
HydroCAD® 10.00-21 s/n 10697 © 2	018 HydroCAD Software Solutions LLC Page 26	

## Summary for Link 19L: Outflow

Inflow Are	ea =	32,831.0 m²,	0.00% Impervious,	Inflow Depth >	10 mm	for 2-Year event
Inflow	=	0.3291 m³/s @	0.17 hrs, Volume=	322.4 m	3	
Primary	=	0.3291 m³/s @	0.17 hrs, Volume=	322.4 m	³, Atten=	0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

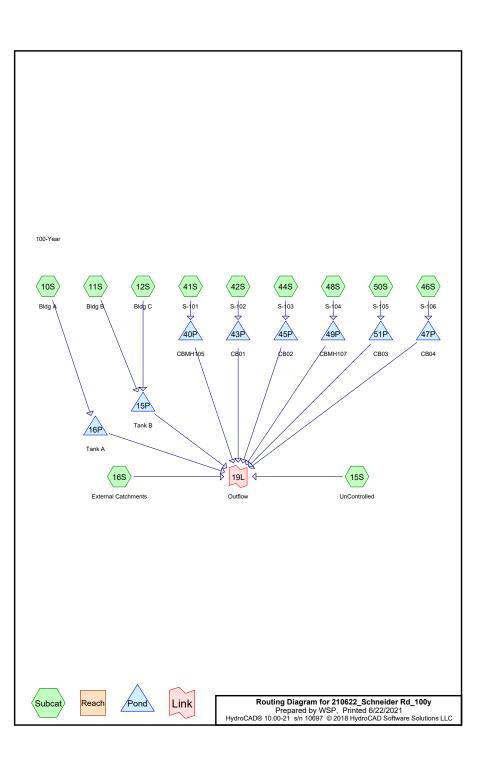


Pond 51P: CB03

210622\_Schneider Rd\_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021 Page 2

#### Area Listing (selected nodes)

Area	С	Description
(sq-meters)		(subcatchment-numbers)
8,471.0	1.00	(10S, 11S, 12S)
1,290.0	1.00	S-101 (41S)
1,960.0	1.00	S-102 (42S)
880.0	1.00	S-103 (44S)
1,330.0	1.00	S-104 (48S)
1,790.0	1.00	S-105 (50S)
1,020.0	1.00	S-106 (46S)
5,900.0	1.00	S-EXT1 (16S)
1,850.0	1.00	S-EXT2 (16S)
1,530.0	1.00	S-EXT3 (16S)
900.0	1.00	S-EXT4 (16S)
250.0	1.00	S-U1 (15S)
940.0	0.83	S-U2 (15S)
800.0	0.35	S-U3 (15S)
850.0	1.00	S-U4 (15S)
3,070.0	0.25	S-U5 (15S)
32,831.0	0.91	TOTAL AREA



100-Year, Peak Discharge

210622_Schneider Rd_100y	,	5
Prepared by WSP	Printed	6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC		Page 3

## Soil Listing (selected nodes)

 Area (sq-meters)	Soil Group	Subcatchment Numbers
0.0	HSG A	
0.0	HSG B	
0.0	HSG C	
0.0	HSG D	
32,831.0	Other	10S, 11S, 12S, 15S, 16S, 41S, 42S, 44S, 46S, 48S, 50S
32,831.0		TOTAL AREA

210622\_Schneider Rd\_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021 Page 4

#### Ground Covers (selected nodes)

HSG-A	HSG-B	HSG-C	HSG-D	Other	Total	Ground	S
(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	(sq-meters)	Cover	N
0.0	0.0	0.0	0.0	8,471.0	8,471.0		
0.0	0.0	0.0	0.0	1,290.0	1,290.0	S-101	
0.0	0.0	0.0	0.0	1,960.0	1,960.0	S-102	
0.0	0.0	0.0	0.0	880.0	880.0	S-103	
0.0	0.0	0.0	0.0	1,330.0	1,330.0	S-104	
0.0	0.0	0.0	0.0	1,790.0	1,790.0	S-105	
0.0	0.0	0.0	0.0	1,020.0	1,020.0	S-106	
0.0	0.0	0.0	0.0	5,900.0	5,900.0	S-EXT1	
0.0	0.0	0.0	0.0	1,850.0	1,850.0	S-EXT2	
0.0	0.0	0.0	0.0	1,530.0	1,530.0	S-EXT3	
0.0	0.0	0.0	0.0	900.0	900.0	S-EXT4	
0.0	0.0	0.0	0.0	250.0	250.0	S-U1	
0.0	0.0	0.0	0.0	940.0	940.0	S-U2	
0.0	0.0	0.0	0.0	800.0	800.0	S-U3	
0.0	0.0	0.0	0.0	850.0	850.0	S-U4	
0.0	0.0	0.0	0.0	3,070.0	3,070.0	S-U5	
0.0	0.0	0.0	0.0	32,831.0	32,831.0	TOTAL	
						AREA	

#### 100-Year, Peak Discharge

Subca Numbe

<b>210622_Schneider Rd_100y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 20	100-Year, Peak Discharge Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr Printed 6/22/2021 018 HydroCAD Software Solutions LLC Page 5	<b>210622_Schneider Rd_100y</b> Prepared by WSP <u>HydroCAD® 10.00-21_s/n 10697</u> © 2	100-Year, Peak Discharge Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr Printed 6/22/2021 2018 HydroCAD Software Solutions LLC Page 6
Runoff by	nn=0.00-3.00 hrs, dt=0.01 hrs, 301 points y Rational method, Rise/Fall=1.0/1.0 xTc Ind+Trans method - Pond routing by Stor-Ind method	Pond 49P: CBMH107	Peak Elev=75.713 m Storage=25.5 m³ Inflow=0.0648 m³/s 39.6 m³ Outflow=0.0138 m³/s 39.6 m³
Subcatchment10S: Bldg A	Runoff Area=0.4481 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.2184 m³/s 133.3 m³	Pond 51P: CB03	Peak Elev=75.616 m Storage=38.5 m³ Inflow=0.0872 m³/s 53.2 m³ Outflow=0.0139 m³/s 53.2 m³
Subcatchment11S: Bldg B	Runoff Area=0.2380 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.1160 m³/s 70.8 m³	Link 19L: Outflow	Inflow=0.7574 m³/s 831.5 m³ Primary=0.7574 m³/s 831.5 m³
Subcatchment12S: Bldg C	Runoff Area=0.1610 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0785 m³/s 47.9 m³	Total Runoff Area = 32,83	1.0 m <sup>2</sup> Runoff Volume = 888.7 m <sup>3</sup> Average Runoff Depth = 27 m 14.65% Pervious = 4,810.0 m <sup>2</sup> 85.35% Impervious = 28,021.0 m
Subcatchment15S: UnControlled	Runoff Area=0.5910 ha 18.61% Impervious Runoff Depth=15 mm Tc=10.0 min C=0.50 Runoff=0.1440 m³/s 87.9 m³		
Subcatchment16S: External	Runoff Area=1.0180 ha  100.00% Impervious  Runoff Depth=30 mm Tc=10.0 min  C=1.00  Runoff=0.4961 m³/s  302.8 m³		
Subcatchment41S: S-101	Runoff Area=0.1290 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0629 m³/s 38.4 m³		
Subcatchment42S: S-102	Runoff Area=0.1960 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0955 m³/s 58.3 m³		
Subcatchment44S: S-103	Runoff Area=0.0880 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0429 m³/s 26.2 m³		
Subcatchment46S: S-106	Runoff Area=0.1020 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0497 m³/s 30.3 m³		
Subcatchment48S: S-104	Runoff Area=0.1330 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0648 m³/s 39.6 m³		
Subcatchment50S: S-105	Runoff Area=0.1790 ha 100.00% Impervious Runoff Depth=30 mm Tc=10.0 min C=1.00 Runoff=0.0872 m³/s 53.2 m³		
Pond 15P: Tank B	Peak Elev=1.100 m Storage=110.0 m <sup>3</sup> Inflow=0.1944 m <sup>3</sup> /s 118.7 m <sup>3</sup> Outflow=0.0121 m <sup>3</sup> /s 93.3 m <sup>3</sup>		
Pond 16P: Tank A	Peak Elev=1.240 m Storage=124.0 m³ Inflow=0.2184 m³/s 133.3 m³ Outflow=0.0129 m³/s 101.3 m³		
Pond 40P: CBMH105	Peak Elev=76.134 m Storage=24.5 m³ Inflow=0.0629 m³/s 38.4 m³ Outflow=0.0135 m³/s 38.4 m³		
Pond 43P: CB01	Peak Elev=76.114 m Storage=43.2 m³ Inflow=0.0955 m³/s 58.3 m³ Outflow=0.0140 m³/s 58.3 m³		
Pond 45P: CB02	Peak Elev=76.110 m Storage=11.8 m³ Inflow=0.0429 m³/s 26.2 m³ Outflow=0.0152 m³/s 26.2 m³		
Pond 47P: CB04	Peak Elev=76.790 m Storage=5.6 m³ Inflow=0.0497 m³/s 30.3 m³ Outflow=0.0306 m³/s 30.4 m³		

	100-ነ	/ear, Peak Discharge
210622_Schneider Rd_100y	Ottawa 100-Year Duration=10 min,	Inten=178.6 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 H	lydroCAD Software Solutions LLC	Page 7

## Summary for Subcatchment 10S: Bldg A

Runoff = 0.2184 m<sup>3</sup>/s @ 0.17 hrs, Volume= 133.3 m<sup>3</sup>, Depth= 30 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr

	4481 1.0	-					
0.	4481	100.	.00% Impe	ervious Area	а		
Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description		
10.0					Direct Entry	',	
			Su	bcatchm	ent 10S: Bl	dg A	
				Hydrogra	oh	-	
0.24	0.2184 m <sup>3</sup> /s						Runoff
0.22 0.21 0.19 0.18 0.17 0.16 0.15 (\$) 0.14 0.13					Runc	Ottawa 100-Year Duration=10 min, nten=178.6 mm/hr off Area=0.4481 ha Volume=133.3 m <sup>3</sup>	
(s, 0.14 0.13 0.12 0.11 0.11 0.09 0.08 0.07					Rur	noff Depth=30 mm Tc=10.0 min C=1.00	
0.07 0.06 0.05 0.04 0.03 0.02							
0.02		mm	mmh				

210622_Schneider Rd_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 201	100-Year, Peak Discharg Ottawa 100-Year Duration=10 min, Inten=178.6 mm/ Printed 6/22/202 18 HydroCAD Software Solutions LLC Page a
Summa	ry for Subcatchment 11S: Bldg B
Runoff = 0.1160 m <sup>3</sup> /s @ 0.	.17 hrs, Volume= 70.8 m <sup>3</sup> , Depth= 30 mm
Runoff by Rational method, Rise/Fall Ottawa 100-Year Duration=10 min,	I=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Inten=178.6 mm/hr
Area (ha) C Description	
0.2380 1.00	· · ·
0.2380 100.00% Imp	pervious Area
Tc Length Slope Velocity (min) (meters) (m/m) (m/sec	
10.0	Direct Entry,
0.125 0.12 0.115 0.115	Hydrograph
0.11	Duration=10 min,
0.095	Inten=178.6 mm/hr
0.085	Runoff Area=0.2380 ha
(φ 0.075 0.07 0.065	Runoff Volume=70.8 m <sup>3</sup>
<b>8</b> 0.06 <b>0</b> 0.055	Runoff Depth=30 mm
0.045	Tc=10.0 min
0.04	C=1.00
0.025	
0.015	
0.015	

<b>210622_Schneider Rd_100</b> Prepared by WSP <u>HydroCAD® 10.00-21 s/n 10697</u> @	Printed 6/22	mm/hr 210622_Schneider Rd_100y Ottawa 100-Year Duration=10 min, Inten=17	
Sum	mary for Subcatchment 12S: Bldg C	Summary for Subcatchment 15S: UnControlled	
Runoff = 0.0785 m <sup>3</sup> /s @	0.17 hrs, Volume= 47.9 m³, Depth= 30 mm	Runoff = 0.1440 m³/s @ 0.17 hrs, Volume= 87.9 m³, Depth= 15 mm	ı
Runoff by Rational method, Rise, Ottawa 100-Year Duration=10 m	/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs nin, Inten=178.6 mm/hr	Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr	
Area (ha) C Descripti	ion	Area (ha) C Description	
0.1610 1.00		0.0250 1.00 S-U1	
0.1610 100.00%	Impervious Area	0.0940 0.83 S-U2	
Tc Length Slope Vel	ocity Capacity Description	0.0800 0.35 S-U3 0.0850 1.00 S-U4	
	/sec) (m <sup>3</sup> /s)	0.3070 0.25 S-U5	
10.0	Direct Entry,	0.5910 0.50 Weighted Average	
		0.4810 81.39% Pervious Area	
	Subcatchment 12S: Bldg C	0.1100 18.61% Impervious Area	
	Hydrograph	Tc Length Slope Velocity Capacity Description	
0.085		(min) (meters) (m/m) (m/sec) (m <sup>3</sup> /s)	
0.08 0.0785 m <sup>3</sup> /s	· · · · · · · · · · · · · · · · · · ·	10.0 Direct Entry,	
0.075	Ottawa 100-Year	Subcatchment 15S: UnControlled	
0.07	Duration=10-min,		
0.065	Inten=178.6 mm/hr	Hydrograph	
0.055	Runoff Area=0.1610 ha	0.16 0.15 1.140 m/s	Runoff
	Runoff Volume=47.9 m³	0.13 Ottawa 100-Year	
0.045 0.044	Runoff Depth=30 mm	<sup>0.13</sup> Duration=10 min,	
0.035	Tc=10.0 min		
0.03	C=1.00		
0.02			
0.015		E 0.08 Runoff Volume=87.9 m <sup>3</sup>	
0.01		🖞 ۵.07 🚽 منابع من Runoff Depth=15 mm	
0.005		$^{0.06}$	
0	1 2 3 Time (hours)		
	· ······	0.04 0.03	
		0.03	

0.02 0.01

2

Time (hours)

	100-Y	ear, Peak Discharge
210622_Schneider Rd_100y	Ottawa 100-Year Duration=10 min,	Inten=178.6 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hy	droCAD Software Solutions LLC	Page 11

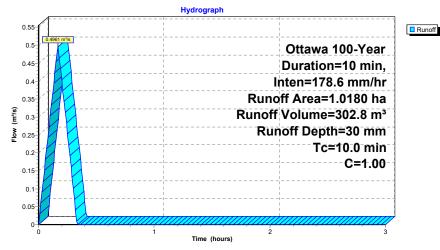
## Summary for Subcatchment 16S: External Catchments

	Runoff	=	0.4961 m³/s @	0.17 hrs, Volume=	302.8 m <sup>3</sup> , Depth=	30 mm
--	--------	---	---------------	-------------------	-------------------------------	-------

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr

	Area (ha)	С	Desc	cription			
	0.5900	1.00	S-E>	<b>(</b> T1			
	0.1850	1.00	S-E>	<t2< td=""><td></td><td></td><td></td></t2<>			
	0.1530	1.00	S-E>	<t3< td=""><td></td><td></td><td></td></t3<>			
	0.0900	1.00	S-E>	KT4			
	1.0180 1.0180	1.00		ghted Ave 00% Impe	rage rvious Area	1	
_	Tc Len (min) (mete	0	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description	
	10.0					Direct Entry,	

#### Subcatchment 16S: External Catchments



	S	Summar	y for Sub	catchment	41S: S-101		
Runoff = 0	.0629 m³/s	@ 0.17	7 hrs, Volu	me=	38.4 m <sup>3</sup> , Depth=	30 mn	n
					0.00-3.00 hrs, dt= (	0.01 hrs	
Ottawa 100-Year		,	ten=178.6	mm/nr			
Area (ha)		cription					
0.1290 1.	.00 S-10 100 (		rvious Area	а			
Tc Length (min) (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description			
10.0	(11/11)	(III/Sec)	(1175)	Direct Entry			
0.07-			Hydrogra	ph 	+		Bunoff
0.065 0.065 0.055 0.055 0.055			Hydrogra	In Runof	Ottawa 100-) Duration=10 i ten=178.6 mr f Area=0.129 Volume=38.4	min, n/hr 0 ha 4 m <sup>3</sup>	Runoff
0.065 0.05 0.05 0.045			Hydrogra	In Runof	Duration=10 n ten=178.6 mr ff Area=0.129 Volume=38.4 off Depth=30	min, n/hr 0 ha 4 m <sup>3</sup> mm	Runoff
0.065 0.055 0.055 0.045 0.045 0.045 0.045 0.045 0.045 0.045 0.035 0.035			Hydrogra	In Runof	Duration=10 i ten=178.6 mr ff Area=0.129 Volume=38.4 off Depth=30 Tc=10.0	min, n/hr 0 ha 4 m <sup>3</sup> mm min	Runoff
0.065 0.055 0.055 0.045 0.045 0.045 0.045 0.045 0.045 0.035 0.035 0.035 0.035			Hydrogra	In Runof	Duration=10 i ten=178.6 mr ff Area=0.129 Volume=38.4 off Depth=30 Tc=10.0	min, n/hr 0 ha 4 m <sup>3</sup> mm	Runoff
0.065 0.065 0.055 0.045 0.045 0.045 0.045 0.045 0.035 0.025 0.02 0.025 0.02 0.02			Hydrogra	In Runof	Duration=10 i ten=178.6 mr ff Area=0.129 Volume=38.4 off Depth=30 Tc=10.0	min, n/hr 0 ha 4 m <sup>3</sup> mm min	Runoff
0.065 0.055 0.055 0.045 0.045 0.045 0.045 0.045 0.045 0.035 0.035 0.035 0.035			Hydrogra	In Runof	Duration=10 i ten=178.6 mr ff Area=0.129 Volume=38.4 off Depth=30 Tc=10.0	min, n/hr 0 ha 4 m <sup>3</sup> mm min	Runoff

repared by WSP ydroCAD® 10.00-21	s/n 10697 © 2018	HydroCAD	Software Soluti	ons LLC		Printed 6/22/2021 Page 13
	Summar	y for Sub	catchment	42S: S-10	02	
tunoff = 0.09	955 m³/s @ 0.17	7 hrs, Volu	me=	58.3 m³,	Depth=	30 mm
tunoff by Rational m Ottawa 100-Year Du				0.00-3.00 h	nrs, dt= 0.0	01 hrs
Area (ha) C	Description					
0.1960 1.00						
0.1960	100.00% Impe	ervious Area	a			
Tc Length	Slope Velocity (m/m) (m/sec)	Capacity (m³/s)	Description			
(IIIIII) (IIIeleis)						
<u>(min) (meters)</u> 10.0		(11.70)	Direct Entry	,		
~ / ~ /			-			
~ / ~ /		ıbcatchm	nent 42S: S-			
10.0			nent 42S: S-			]
0.105		ıbcatchm	nent 42S: S-			
0.105 0.105 0.15 0.095 0.095 0.095		ıbcatchm	nent 42S: S-		100-Ye	
0.105 0.11 0.095 0.095 0.095		ıbcatchm	nent 42S: S-	102 Ottawa		ear
0.105 0.105 0.095 0.095		ıbcatchm	nent 42S: S-	102 Ottawa Duration	i=10 m	ear iin,
10.0 0.105 0.095 0.095 0.085 0.085 0.085 0.085 0.075		ıbcatchm	nent 42S: S-	102 Ottawa Duration en=178	10 m .6 mm	ear iin, /hr-
10.0 0.105 0.11 0.095 0.09 0.085 0.09 0.085 0.07 0.07 0.07		ıbcatchm	hent 42S: S-	102 Ottawa Juration en=178 Area=(	10 m .6 mm .1960	ear lin, /hr ha
10.0 0.105 0.95 0.095 0.085 0.085 0.085 0.065 0.075 0.08		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Duration en=178 Area=0 Volume	1=10 m .6 mm .1960 =58.3	ear lin, /hr ha m <sup>3</sup>
10.0 0.105 0.15 0.095 0.099 0.085 0.075 0.075 0.075 0.075 0.065 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.075 0.06		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Juration en=178 Area=(	1=10 m .6 mm .1960 =58.3	ear lin, /hr ha m <sup>3</sup>
10.0 0.105 0.95 0.095 0.085 0.085 0.085 0.065 0.075 0.08		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Duration en=178 Area=0 Volume ff Deptl	1=10 m .6 mm .1960 =58.3 h=30 n	ear lin, /hr ha m <sup>3</sup>
10.0 0.105 0.15 0.095 0.095 0.099 0.085 0.006 0.075 0.06		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Duration en=178 Area=0 Volume ff Deptl	e=10 m .6 mm 0.1960 =58.3 h=30 n =10.0 n	ear lin, /hr ha m <sup>3</sup> nm
10.0 0.105 0.95 0.095 0.095 0.095 0.095 0.085 0.085 0.075 0.065 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.05		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Duration en=178 Area=0 Volume ff Deptl	1=10 m .6 mm .1960 =58.3 h=30 n	ear lin, /hr ha m <sup>3</sup> nm
10.0 0.105 0.105 0.095 0.095 0.085 0.085 0.075 0.0		ıbcatchm	nent 42S: S- ph E Int Runoff	102 Ottawa Duration en=178 Area=0 Volume ff Deptl	e=10 m .6 mm 0.1960 =58.3 h=30 n =10.0 n	ear lin, /hr ha m <sup>3</sup> nm

10622_Schneider Rd_100y Prepared by WSP IydroCAD® 10.00-21 s/n 10697 © 2018 F		Duration=10 min,	ear, Peak Discharge Inten=178.6 mm/h Printed 6/22/2021 Page 14
Summary	for Subcatchmen	t 44S: S-103	
Runoff = 0.0429 m <sup>3</sup> /s @ 0.17	hrs, Volume=	26.2 m <sup>3</sup> , Depth=	30 mm
Runoff by Rational method, Rise/Fall=1 Ottawa 100-Year Duration=10 min, Inte		= 0.00-3.00 hrs, dt= 0	0.01 hrs
Area (ha) C Description			
0.0880 1.00 S-103			
0.0880 100.00% Imper	vious Area		
Tc Length Slope Velocity (min) (meters) (m/m) (m/sec)	Capacity Description (m³/s)		
10.0	Direct Entr	у,	
Sul	bcatchment 44S: S	6-103	
	Hydrograph		
0.048			
0.046			
0.042		Ottawa 100-	
0.038		Duration=10	
0.034	<b> </b>	nten=178.6 mi	n/hr
0.03	Runc	off Area=0.088	0 ha
(m) 0.028 (m) 0.026 (m) 0.026	Runo	ff Volume=26.	2 m³
<b>8</b> 0.022	Rur	noff Depth=30	mm
0.018		Tc=10.0	
0.016			1.00
0.012			1.00
0.008			
0.004			
0.002			
0 1			'

210622_Schneider Rd_100y Prepared by WSP	Ottawa 100-Year	100-Ye Duration=10 min, 1	ar, Peak Discharge Inten=178.6 mm/hr Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hydro	droCAD Software Solu	tions LLC	Page 15
Summary fo	or Subcatchmen	t 46S: S-106	
Runoff = 0.0497 m <sup>3</sup> /s @ 0.17 hr	s, Volume=	30.3 m <sup>3</sup> , Depth=	30 mm
Runoff by Rational method, Rise/Fall=1.0/ Ottawa 100-Year Duration=10 min, Inten		= 0.00-3.00 hrs, dt= 0.	01 hrs
Area (ha) C Description 0.1020 1.00 S-106			
0.1020 1.00 0-100 0.1020 100.00% Impervio	ous Area		
Tc Length Slope Velocity Ca (min) (meters) (m/m) (m/sec)	apacity Description (m³/s)		
10.0	Direct Entr	у,	
Subc	atchment 46S: S	6-106	
F	lydrograph		
0.055-			Runoff
0.05		Ottawa 100-Y	ear

Duration=10 min, Inten=178.6 mm/hr

> . Tc=10.0 min

C=1.00

ż.

Runoff Area=0.1020 ha

Runoff Volume=30.3 m<sup>3</sup> Runoff Depth=30 mm

2

1

Time (hours)

0.045

0.04

0.035 (ع) الس 0.03 الس 0.025

0.02

0.015 0.01 0.005

<b>210622_Schneider Rd_100y</b> Prepared by WSP <u>HydroCAD® 10.00-21 s/n 10697 © 2018 H</u>	100-Year, Peak Discharge Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr Printed 6/22/2021 ydroCAD Software Solutions LLC Page 16
Summary	for Subcatchment 48S: S-104
Runoff = 0.0648 m <sup>3</sup> /s @ 0.17 h	ars, Volume= 39.6 m <sup>3</sup> , Depth= 30 mm
Runoff by Rational method, Rise/Fall=1.0 Ottawa 100-Year Duration=10 min, Inte	0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs n=178.6 mm/hr
Area (ha) C Description	
0.1330 1.00 S-104	ious Area
0.1330 100.00% Imperv	ious Area
Tc Length Slope Velocity C (min) (meters) (m/m) (m/sec)	Capacity Description (m³/s)
10.0	Direct Entry,
Sub	catchment 48S: S-104
Cul	Hydrograph
	Runoff
0.065+	
0.06	Ottawa 100-Year
0.055	Duration=10 min,
0.05	Inten=178.6 mm/hr
0.045	Runoff Area=0.1330 ha
(% 0.04 0.035	Runoff Volume=39.6 m <sup>3</sup>
§ 0.035 	Runoff Depth=30 mm
0.025	Tc=10.0 min
0.02	C=1.00
0.015	
0.01	
0.005	
	Z 3 Time (hours)

210622_Schneider Rd_100y       Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr         Prepared by WSP       Printed 6/22/2021         HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC       Page 17	100-Year, Peak Discharge         210622_Schneider Rd_100y       Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hi         Prepared by WSP       Printed 6/22/2021         HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC       Page 18
Summary for Subcatchment 50S: S-105	Summary for Pond 15P: Tank B
Runoff=0.0872 m³/s @0.17 hrs, Volume=53.2 m³, Depth=30 mmRunoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs0.01 hrsOttawa 100-YearDuration=10 min, Inten=178.6 mm/hr	$ \begin{array}{rcl} \mbox{Inflow Area} = & 3,990.0 \ m^2,100.00\% \ \mbox{Impervious, Inflow Depth} = & 30 \ mm & for \ 100-Year \ event \\ \mbox{Inflow} = & 0.1944 \ m^3/s \ @ & 0.17 \ hrs, \ Volume = & 118.7 \ m^3 \\ \mbox{Outflow} = & 0.0121 \ m^3/s \ @ & 0.32 \ hrs, \ Volume = & 93.3 \ m^3, \ Atten = 94\%, \ Lag = 9.3 \ min \\ \mbox{Primary} = & 0.0121 \ m^3/s \ @ & 0.32 \ hrs, \ Volume = & 93.3 \ m^3 \\ \end{array} $
Area (ha)         C         Description           0.1790         1.00         S-105           0.1790         100.00% Impervious Area	Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 1.100 m @ 0.32 hrs Surf.Area= 100.0 m² Storage= 110.0 m³
0.1790 100.00% Impervious Area Tc Length Slope Velocity Capacity Description (min) (meters) (m/m) (m/sec) (m³/s)	Plug-Flow detention time=74.2 min calculated for 93.3 m³ (79% of inflow) Center-of-Mass det. time=72.7 min(82.7 - 10.0)
10.0 Direct Entry,	Volume         Invert         Avail.Storage         Storage         Description           #1         0.000 m         400.0 m³         10.00 mW x 10.00 mL x 4.00 mH Prismatoid
Subcatchment 50S: S-105 Hydrograph	Device     Routing     Invert     Outlet Devices       #1     Primary     0.000 m <b>75 mm Vert. Orifice/Grate</b> C= 0.600       Primary     OutFlow     Max=0.0121 m³/s @ 0.32 hrs     HW=1.099 m     (Free Discharge) <b>1=Orifice/Grate</b> (Orifice Controls 0.0121 m³/s @ 2.74 m/s)
0.08 0.075 0.077 0.065 Duration=10 min, 0.077 Inten=178.6 mm/hr	Pond 15P: Tank B
0.06 <sup> </sup>	0.21 0.22 0.19 0
0.033 0.03 0.025 0.0	0.17 0.16 0.15 0.14 (* 0.13) (* 0.12) 0.11
0.005 0 0 0 1 Time (hours)	

0.04 0.03 0.02 0.0

ź

Time (hours)

1

210622_Sch Prepared by \	nneider Rd_100	<b>y</b> Otta	awa 100-Year	Duration=10 min,	ear, Peak Discharge Inten=178.6 mm/l Printed 6/22/202
	.00-21 s/n 10697 ©	2018 HydroCA	D Software Solu	tions LLC	Page 19
			n Dand (CD)	Tank A	
		summary to	r Pond 16P:		
Inflow Area =	, , ,		rvious, Inflow		for 100-Year even
Inflow = Outflow =	0.2184 m³/s @ 0.0129 m³/s @	0.17 hrs, Vo 0.32 hrs, Vo		133.3 m <sup>3</sup> 101.3 m <sup>3</sup> Δtten=	94%, Lag= 9.4 min
Primary =	0.0129 m³/s @	0.32 hrs, Vo		101.3 m <sup>3</sup>	0470, Eug- 0.4 min
Routing by Sto	or-Ind method, Time	Span= 0 00-3	3 00 hrs_dt= 0	01 hrs	
	240 m @ 0.32 hrs				
Plug-Flow dete	ention time= 75.3 m	in calculated f	or 101 3 m <sup>3</sup> (76	% of inflow)	
	s det. time= 73.6 m				
Volume	Invert Avail.Sto	orage Storag	e Description		
				L x 4.00 mH Prisma	atoid
#1 0.0	400	.om 10.00	10.00 m		
Device Routi	ing Invert	Outlet Devic	es		
#1 Prima	ary 0.000 m	75 mm Vert	. Orifice/Grate	C= 0.600	
	,				
Primary OutF	low Max=0.0129 m	n³/s @ 0.32 hrs	s HW=1.239 m		
Primary OutF	,	n³/s @ 0.32 hrs rols 0.0129 m³/	s HW=1.239 m /s @ 2.91 m/s)	(Free Discharge)	
Primary OutF	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) <b>16P: Tank A</b>	(Free Discharge)	
Primary OutF	low Max=0.0129 m	n³/s @ 0.32 hrs rols 0.0129 m³/	s HW=1.239 m /s @ 2.91 m/s) <b>16P: Tank A</b>	(Free Discharge)	
Primary OutF 1=Orifice/0	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) <b>16P: Tank A</b>	(Free Discharge)	Inflow
Primary OutF 1=Orifice/C	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph	(Free Discharge)	Primary
Primary OutF 1=Orifice/C	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge)	Primary
Primary OutF -1=Orifice/0 0.24 0.23 0.23 0.21 0.2 0.19	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
Primary OutF 1=Orifice/C 0.24 0.23 0.22 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge)	0 m -
0.24 0.23 0.23 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
Primary OutF 1=Orifice/C 0.24 0.23 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.22 0.21 0.19 0.1	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
224 0.23 0.22 0.23 0.22 0.21 0.2 0.21 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.1	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
Primary OutF 1=Orifice/C 0.24 0.23 0.22 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.21 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
0.24 0.23 0.22 0.22 0.22 0.22 0.22 0.22 0.22	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
Primary OutF 1=Orifice/O 024 023 022 021 0.22 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.11 0.11 0.11	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
Primary OutF 1=Orifice/C 0.24 0.23 0.22 0.21 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.11 0.12 0.11 0.12 0.00 0.0	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -
0.24 0.23 0.22 0.22 0.22 0.22 0.22 0.22 0.22	low Max=0.0129 m	n³/s @ 0.32 hrs ols 0.0129 m³/ <b>Pond</b>	s HW=1.239 m /s @ 2.91 m/s) 16P: Tank A aph Inflow	(Free Discharge) A Area=4,481.0 eak Elev=1.24	0 m -

2

1

Time (hours)

0.01

0

<b>210622_Schneid</b> Prepared by WSP <sub>HydroCAD®</sub> 10.00-21		Ottawa 100-Ye 8 HydroCAD Software S	ar Duration=10 min	Year, Peak Discharge , <i>Inten=178.6 mm/hr</i> Printed 6/22/2021 <u>Page 20</u>
	Sumn	nary for Pond 40F	2: CBMH105	
Dutflow = 0.0 Primary = 0.0 Routing by Stor-Ind	629 m³/s @ 0.1 135 m³/s @ 0.3 135 m³/s @ 0.3 method, Time Spa	.00% Impervious, Info 17 hrs, Volume= 30 hrs, Volume= 30 hrs, Volume= an= 0.00-3.00 hrs, dt= ırf.Area= 261.7 m² St	38.4 m³ 38.4 m³, Atten= 38.4 m³	for 100-Year event 79%, Lag= 7.8 min
Plug-Flow detention Center-of-Mass det.		alculated for 38.3 m³ ( 25.7 - 10.0 )	100% of inflow)	
/olume Invert	Avail.Storag	e Storage Description	on	
#1 74.776 m	64.6 m	<sup>13</sup> Custom Stage Da	ata (Prismatic)Listed b	elow (Recalc)
		Inc.Store Cum c-meters) (cubic-m	.Store eters)	
74.776	0.4	0.0	0.0	
75.950 76.250	0.4 427.0	0.5 64.1	0.5 64.6	
Device Routing	Invert Ou	utlet Devices		
#1 Primary	74.776 m 75	mm Vert. Orifice/Gr	ate C= 0.600	
		@ 0.30 hrs HW=76.13 0.0135 m³/s @ 3.05 m	34 m (Free Discharge /s)	)
		Pond 40P: CBMI	1105	
		Hydrograph		
0.07				Inflow
0.065		Infl	ow Area=1,290.	
0.06			Peak Elev=76.13	
0.055				
0.05			Storage=24.	5-111 <sup></sup>
0.045			·	
(% 0.04 0.035 0.035	·			
0.035				
Ĕ 0.03			1	

ź

Time (hours)

3

0.025

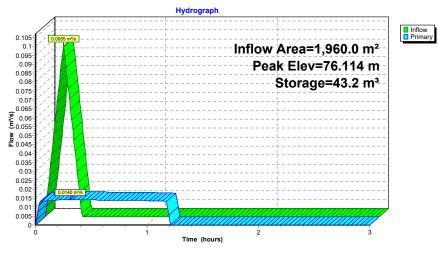
0.02 0.015 0.01 0.005

0

1

Prepare									Printed	6/22/202
HydroCA	D® 10	00-21	<u>s/n 10697</u>	© 2018	HydroCA	D Software	Solution	s LLC		Page 2
				Sum	mary fo	or Pond 4	3P: C	B01		
nflow Ai nflow Outflow <sup>P</sup> rimary	=	0.01	1,960.0 ı 55 m³/s (( 40 m³/s (( 40 m³/s ((	0.17 0.31	0% Impe hrs, Vo hrs, Vo hrs, Vo	lume=	į	58.3 m³		Year even g= 8.5 min
							0 0 4 1			
						3.00 hrs, dt= 21.7 m² S				
Peak ĔĬe Plug-Flo Center-c	ev= 76 ow dete of-Mas	.114 m ention ti	@ 0.31 l ime= 26.3 ime= 26.4	nrs Surf min cal min ( 36	Area= 5 culated f 6.4 - 10.0	521.7 m²́S or 58.1 m³ (	torage= (100% c	• 43.2 m³		
Peak ĔĬe Plug-Flo Center-c	ev= 76 ow dete of-Mas	.114 m ention ti s det. ti	@ 0.31 l ime= 26.3 ime= 26.4 Avail.	nrs Surf min cal min ( 36	Area= 5 culated f 6.4 - 10.0 Storag	21.7 m²́S or 58.1 m³ ( ) )	torage= (100% c on	• 43.2 m <sup>3</sup> of inflow)	elow (Rec	alc)
Peak ĔĬe Plug-Flo Center-c <u>/olume</u>	ev= 76 ow dete of-Mas 74.6 on	.114 m ention ti s det. ti Invert 551 m Su	@ 0.31 l ime= 26.3 ime= 26.4 Avail.	nrs Surf min cale min (36 <u>Storage</u> 44.0 m <sup>3</sup> Ir	Area= 5 culated f 6.4 - 10.0 Storag	21.7 m <sup>2</sup> S or 58.1 m <sup>3</sup> ( ) <u>le Description <b>m Stage D</b>a</u>	torage= (100% c on <b>ata (Pri</b> n.Store	• 43.2 m <sup>3</sup> of inflow)	elow (Rec	alc)
Peak Ĕle Plug-Flo Center-c <u>/olume</u> #1 Elevatic (meters 74.65	ev = 76 bw dete of-Mas 74.6 on s) 51	.114 m ention ti s det. ti Invert 551 m Su	@ 0.31 H ime= 26.3 ime= 26.4 Avail. rf.Area <u>neters)</u> 0.4	nrs Surf min cale min (36 <u>Storage</u> 44.0 m <sup>3</sup> Ir	Area= 5 culated f 6.4 - 10.0 <u>Storag</u> Custo nc.Store <u>meters)</u> 0.0	21.7 m <sup>2</sup> S or 58.1 m <sup>3</sup> ( ) <u>e Descriptions</u> <b>m Stage D</b> Curr	torage= (100% c on <b>ata (Pri</b> n.Store <u>neters)</u> 0.0	• 43.2 m <sup>3</sup> of inflow)	elow (Rec	alc)
Peak Ĕie Plug-Flo Center-c <u>/olume</u> #1 Elevatic <u>(meters</u>	ev = 76 bw dete of-Mas 74.6 51 51 50	.114 m ention ti s det. ti Invert 551 m Su	@ 0.31 H ime= 26.3 ime= 26.4 Avail. 1 rf.Area neters)	nrs Surf min cale min (36 <u>Storage</u> 44.0 m <sup>3</sup> Ir	Area= 5 culated f 6.4 - 10.0 <u>Storag</u> Custo nc.Store meters)	21.7 m <sup>2</sup> S or 58.1 m <sup>3</sup> ( ) <u>e Descriptions</u> <b>m Stage D</b> Curr	torage= (100% c on <b>ata (Pri</b> n.Store neters)	• 43.2 m <sup>3</sup> of inflow)	elow (Rec	alc)
Peak Ele Plug-Flo Center-c <u>/olume</u> #1 Elevatic <u>(meters</u> 74.65 75.95	ev = 76 bw dete of-Mas 74.6 51 51 50	.114 m ention ti s det. ti Invert 551 m Su (sq-r	@ 0.31 l ime=26.3 ime=26.4 Avail. rf.Area neters) 0.4 0.4 956.0	nrs Surf a min cala a min ( 30 <u>Storage</u> 44.0 m³ Ir (cubic-	Area= 5 culated f 6.4 - 10.0 Storag Custo custo custo custo custo 0.0 0.0	21.7 m <sup>2</sup> S or 58.1 m <sup>3</sup> ( ) ) <u>e Descriptii</u> <b>m Stage D</b> Curr (cubic-n	torage= (100% c on <b>ata (Pri</b> n.Store <u>neters)</u> 0.0 0.5	• 43.2 m <sup>3</sup> of inflow)	elow (Rec	alc)





210622_Schneider Rd_100y       Ottawa 100-Year Duration=10 min, Inten=178.6 mm/l         Prepared by WSP       Printed 6/22/202         HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC       Page 22	hr 1
Summary for Pond 45P: CB02	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	-
Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 76.110 m @ 0.28 hrs Surf.Area= 139.2 m² Storage= 11.8 m³	
Plug-Flow detention time=6.8 min calculated for 26.1 m³ (100% of inflow) Center-of-Mass det. time=6.8 min ( 16.8 - 10.0 )	
Volume Invert Avail.Storage Storage Description	
#1 74.396 m 18.1 m <sup>3</sup> Custom Stage Data (Prismatic)Listed below (Recalc)	-
Elevation Surf.Area Inc.Store Cum.Store	
_(meters) (sq-meters) (cubic-meters) (cubic-meters)	
74.396 0.4 0.0 0.0	
75.950 0.4 0.6 0.6	
76.150 174.0 17.4 18.1	
Device Routing Invert Outlet Devices	
Dente Plant Plant Plant	_
#1 Primary 74.396 m <b>75 mm Vert. Orifice/Grate</b> C= 0.600	-
#1 Primary 74.396 m <b>75 mm Vert. Orifice/Grate</b> C= 0.600	-
	-
#1 Primary 74.396 m <b>75 mm Vert. Orifice/Grate</b> C= 0.600 <b>Primary OutFlow</b> Max=0.0152 m <sup>3</sup> /s @ 0.28 hrs HW=76.110 m (Free Discharge)	_
#1 Primary 74.396 m <b>75 mm Vert. Orifice/Grate</b> C= 0.600 <b>Primary OutFlow</b> Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge) <b>1=Orifice/Grate</b> (Orifice Controls 0.0152 m³/s @ 3.44 m/s)	_
#1 Primary 74.396 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0152 m <sup>3</sup> /s @ 0.28 hrs HW=76.110 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0152 m <sup>3</sup> /s @ 3.44 m/s) Pond 45P: CB02 Hydrograph	_
#1 Primary 74.396 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0152 m <sup>3</sup> /s @ 0.28 hrs HW=76.110 m (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.0152 m <sup>3</sup> /s @ 3.44 m/s) Pond 45P: CB02 Hydrograph	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs       HW=76.110 m       (Free Discharge)         L=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow         Odd8         0048         Inflow         Area=880.0 m²	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge)       (Free Discharge)         1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s)       Pond 45P: CB02         Hydrograph         0.048         0.048       0.044         0.048       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         Ordet Elev=76.110 m	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         Ordet Elev=76.110 m	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         Odda	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         0.048       0.048         0.048       0.044         0.048       0.044         0.048       0.044         0.048       0.044         0.048       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         0.048       Orage=11.8 m³         0.048       Orage=11.8 m³         0.034       Orage=11.8 m³	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge)       1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         0.048       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       Peak Elev=76.110 m         0.034       Storage=11.8 m³         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034	_
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate       C= 0.600         Primary       OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge)       (Free Discharge)         1=Orifice/Grate       (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         0.048       Peak Elev=76.110 m         0.048       Storage=11.8 m³         0.038       0.024         0.038       0.024         0.039       0.024         0.034       Storage=11.8 m³         0.024       0.024         0.024       0.024	_
#1 Primary 74.396 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s) Pond 45P: CB02 Hydrograph 0.048 0.046 0.044 0.0	_
#1 Primary 74.396 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s) Pond 45P: CB02 Hydrograph 0.048 0.044 0.0	_
#1 Primary 74.396 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s) Pond 45P: CB02 Hydrograph 0.048 0.048 0.044 0.0	
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge)       1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         0.048       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.038       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.034	
#1       Primary       74.396 m       75 mm Vert. Orifice/Grate C= 0.600         Primary OutFlow Max=0.0152 m³/s @ 0.28 hrs HW=76.110 m (Free Discharge)       1=Orifice/Grate (Orifice Controls 0.0152 m³/s @ 3.44 m/s)         Pond 45P: CB02         Hydrograph         Inflow Area=880.0 m²         0.048       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.044       0.044         0.034       0.034         0.034       0.034         0.034       0.034         0.034       0.044         0.034       0.044         0.034       0.044         0.034       0.044         0.034       0.044         0.034       0.044         0.034       0.044	

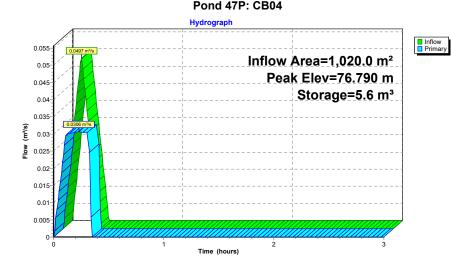
ź

1

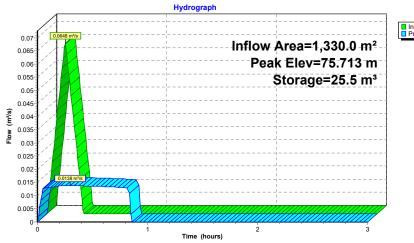
Time (hours)

0

Prepared HydroCAD®	0 10.00	0-21 s/	/n 1069 <i>i</i>	7 © 2018	HydroC	AD Softw	are Soluti	ons LLC				Page
				Sun	mary	for Por	d 47P:	CB04				
Inflow Area Inflow Outflow Primary	- = =	0.049 0.030 0.030	7 m³/s ( 6 m³/s ( 6 m³/s (	@ 0.1 @ 0.2 @ 0.2	7 hrs, 3 hrs,  V	olume= olume= olume=		30.4 m	³, Att			)-Year ev ag= 3.9 r
Routing by Peak Elev=					f.Area=							
	= 76.7 deten Mass (	90 m ( tion tin	@ 0.23 ne= 1.6 ne= 1.7	hrs Sui min calo min ( 11	culated f .7 - 10.0	94.0 m² or 30.3 n	໌Storage າ <sup>3</sup> (100%	e= 5.6 m³				
Peak Elev= Plug-Flow Center-of-N Volume	= 76.7 deten Mass (	90 m ( tion tin det. tin <u>vert</u>	@ 0.23 ne= 1.6 ne= 1.7	hrs Sui min calo min ( 11	culated for .7 - 10.0 e Stora	94.0 m² or 30.3 n ) ) <u>ge Desc</u>	์ Storage า <sup>3</sup> (100% <u>ription</u>	e= 5.6 m³	')	ed bel	ow (Re	calc)
Peak Ĕlev <sup>=</sup> Plug-Flow Center-of-N <u>Volume</u> #1 Elevation	= 76.7 deten Mass ( In <u>'</u>	90 m ( tion tin det. tin <u>vert</u> 4 m Surf	@ 0.23 ne= 1.6 ne= 1.7 <u>Avail</u> f.Area	hrs Sur min calo min (11 I.Storage 11.4 m	culated f .7 - 10.0 <u>e Stora</u> <sup>3</sup> Cust	94.0 m <sup>2</sup> or 30.3 n ) ) g <u>e Desc</u> om Stag	Storage n³ (100% ription le Data ( Cum.Sto	e= 5.6 m³ of inflow Prismation re	')	ed bel	ow (Re	calc)
Peak Elev= Plug-Flow Center-of-N <u>Volume</u> #1	= 76.7 deten Mass ( In <u>'</u>	90 m ( tion tin det. tin <u>vert</u> 4 m Surf	@ 0.23 ne= 1.6 ne= 1.7 <u>Avail</u>	hrs Sur min calo min (11 I.Storage 11.4 m	culated for .7 - 10.0 Stora <b>Cust</b>	94.0 m <sup>2</sup> or 30.3 n ) ) ge Desc om Stag	Storage n³ (100% ription e Data ( Cum.Sto <u>sic-meter</u>	e= 5.6 m³ of inflow Prismation re	')	ed bel	ow (Re	calc)
Peak Elev <sup>=</sup> Plug-Flow Center-of-N <u>Volume</u> #1 Elevation (meters) 74.594 76.690	= 76.7 deten Mass ( In <u>'</u>	90 m ( tion tin det. tin <u>vert</u> 4 m Surf (sq-m	@ 0.23 ne= 1.6 ne= 1.7 <u>Avail</u> f.Area <u>eters)</u> 0.4 0.4	hrs Sur min calo min (11 I.Storage 11.4 m	culated for .7 - 10.0 <u>Stora</u> <b>Cust</b> nc.Store -meters 0.0 0.8	94.0 m <sup>2</sup> or 30.3 n ) ) <u>ge Desc</u> om Stag	Storage n³ (100% e Data ( Cum.Sto <u>bic-meter</u> 0 0	≈ 5.6 m <sup>3</sup> of inflow Prismation re s) .0 .8	')	ed bel	ow (Re	calc)
Peak Elev <sup>=</sup> Plug-Flow Center-of-N <u>Volume</u> #1 Elevation <u>(meters)</u> 74.594	= 76.7 deten Mass ( In <u>'</u>	90 m ( tion tin det. tin <u>vert</u> 4 m Surf (sq-m	@ 0.23 me= 1.6 me= 1.7 Avail f.Area eters) 0.4	hrs Sur min calo min (11 I.Storage 11.4 m	culated for .7 - 10.0 <u>Stora</u> <b>Cust</b> nc.Store <u>-meters</u> 0.0	94.0 m <sup>2</sup> or 30.3 n ) ) <u>ge Desc</u> om Stag	Storage n³ (100% ription e Data ( Cum.Sto <u>ic-meter</u> 0	≈ 5.6 m <sup>3</sup> of inflow Prismation re s) .0 .8	')	ed bel	ow (Re	calc)
Peak Elev= Plug-Flow Center-of-N <u>Volume</u> #1 Elevation (meters) 74.594 76.690 76.840	= 76.7 deten Mass ( In <u>'</u>	90 m ( tion tin det. tin <u>vert</u> 4 m Surf (sq-m	@ 0.23 ne= 1.6 ne= 1.7 <u>Avail</u> f.Area <u>eters)</u> 0.4 0.4 140.7	hrs Sur min calo min (11 I.Storage 11.4 m	culated fr .7 - 10.0 <u>Stora</u> <b>Cust</b> nc.Store -meters 0.0 0.8 10.6	94.0 m <sup>2</sup> or 30.3 n ) ) ge Desc om Stag ) (cub	Storage n³ (100% e Data ( Cum.Sto <u>bic-meter</u> 0 0	≈ 5.6 m <sup>3</sup> of inflow Prismation re s) .0 .8	')	ed bel	ow (Re	calc)



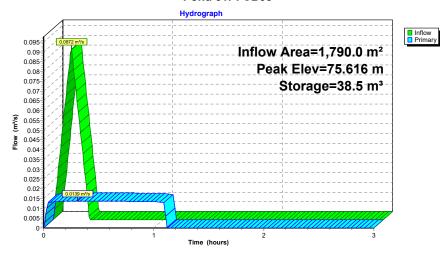
Prepared by	nneider Rd_100y WSP .00-21 s/n 10697 © 2018		ear Duration=10 min,	/ear, Peak Discharg Inten=178.6 mm/l Printed 6/22/202 Page 24
	Summ	ary for Pond 49F	CBMH107	-
Inflow Area = Inflow = Outflow = Primary =	0.0648 m <sup>3</sup> /s @ 0.1 0.0138 m <sup>3</sup> /s @ 0.3	00% Impervious, Inflo 7 hrs, Volume= 0 hrs, Volume= 0 hrs, Volume=	39.6 m³	for 100-Year even 79%, Lag= 7.9 min
	or-Ind method, Time Spa 5.713 m @ 0.30 hrs Sur			
Volume	s det. time= 16.0 min ( 2 Invert Avail.Storage 297 m 50.0 m <sup>3</sup>	Storage Description	on ata (Prismatic)Listed b	elow (Recalc)
Elevation (meters)		nc.Store Cum -meters) (cubic-m	.Store	
74.297 75.500 75.800	0.4 0.4 330.0	0.0 0.5 49.6	0.0 0.5 50.0	
Device Rout	ing Invert Out	tlet Devices		
#1 Prim	ary 74.297 m <b>75</b>	mm Vert. Orifice/Gr	ate C= 0.600	
	low Max=0.0138 m³/s @ Grate (Orifice Controls 0			)
		Pond 49P: CBMI	1107	
,		Hydrograph	I	
0.07	)648 m³/s	, 		
0.065		Infl	ow Area=1,330.0	$m^{2}$



<b>210622_Sc</b> Prepared by	<b>hneider Rd_1</b> WSP	00y	Ottawa 10	0-Year I	Juration=10	mın,	Inten=178.6 mm/h Printed 6/22/2021
HydroCAD® 1	0.00-21 s/n 1069	7 © 2018 Hyd	roCAD Softw	/are Soluti	ons LLC		Page 25
		Summa	ry for Por	nd 51P:	СВ03		
Inflow Area = Inflow = Outflow =	0.0872 m³/s ( 0.0139 m³/s (	<ul> <li>0.17 hrs</li> <li>0.31 hrs</li> </ul>	, Volume= , Volume=		53.2 m <sup>3</sup> 53.2 m <sup>3</sup> , At		for 100-Year event 84%, Lag= 8.4 min
Primary =	0.0139 m³/s (	@ 0.31 nrs	, Volume=		53.2 m³		
Routing by Si	0.0139 m³/s ( tor-Ind method, 1 5.616 m @ 0.31	ິ ⊺ime Span= 0	.00-3.00 hrs	s, dt= 0.0	1 hrs		
Routing by Si Peak Elev= 7 Plug-Flow de	tor-Ind method, T	└ime Span= 0 hrs Surf.Are 7 min calcula	.00-3.00 hrs a= 455.7 m ted for 53.1	s, dt= 0.0 <sup>2</sup> Storag	1 hrs e= 38.5 m³		
Routing by Si Peak Elev= 7 Plug-Flow de	tor-Ind method, T '5.616 m @ 0.31 tention time= 23. iss det. time= 23.	└ime Span= 0 hrs Surf.Are 7 min calcula	.00-3.00 hrs a= 455.7 m ted for 53.1 10.0 )	s, dt= 0.0 <sup>2</sup> Storag m³ (100%	1 hrs e= 38.5 m³		
Routing by Si Peak Elev= 7 Plug-Flow de Center-of-Ma Volume	tor-Ind method, T 5.616 m @ 0.31 tention time= 23. ss det. time= 23. Invert Avai	Fime Span= 0 hrs Surf.Are 7 min calcula 7 min ( 33.7 - I.Storage St	.00-3.00 hrs a= 455.7 m ted for 53.1 · 10.0 ) <u>orage Desc</u>	s, dt= 0.0 <sup>°</sup> <sup>2</sup> Storag m³ (100% cription	1 hrs e= 38.5 m³	ted be	elow (Recalc)
Routing by Si Peak Elev= 7 Plug-Flow de Center-of-Ma Volume	tor-Ind method, T 5.616 m @ 0.31 tention time= 23. ss det. time= 23. Invert Avai	Fime Span= 0 hrs Surf.Are 7 min calcula 7 min ( 33.7 - I.Storage St	.00-3.00 hrs a= 455.7 m ted for 53.1 10.0 ) torage Desc ustom Stag	s, dt= 0.0 <sup>2</sup> Storag m³ (100% cription	1 hrs e= 38.5 m <sup>3</sup> 6 of inflow) Prismatic)List	ted be	elow (Recalc)
Routing by Si Peak Elev= 7 Plug-Flow de Center-of-Ma <u>Volume</u> #1 74	tor-Ind method, T 5.616 m @ 0.31 tention time= 23. iss det. time= 23. Invert Avai .183 m	Fime Span= 0 hrs Surf.Are 7 min calcula 7 min ( 33.7 - <u>I.Storage Si</u> 123.7 m <sup>3</sup> <b>C</b>	.00-3.00 hrs a= 455.7 m ted for 53.1 10.0 ) <u>orage Desc</u> ustom Stag	s, dt= 0.0 <sup>;</sup> <sup>2</sup> Storag m <sup>3</sup> (100% cription ge Data (I	1 hrs e= 38.5 m <sup>3</sup> 6 of inflow) Prismatic)List	ted be	elow (Recalc)
Routing by Si Peak Elev= 7 Plug-Flow de Center-of-Ma <u>Volume</u> #1 74 Elevation	tor-Ind method, T '5.616 m @ 0.31 tention time= 23. iss det. time= 23. <u>Invert Avai</u> .183 m Surf.Area	Fime Span= 0 hrs Surf.Are 7 min calcula 7 min ( 33.7 - I.Storage Si 123.7 m <sup>3</sup> C Inc.S	.00-3.00 hrs a= 455.7 m ted for 53.1 10.0 ) <u>orage Desc</u> ustom Stag	s, dt= 0.0 <sup>°</sup> Storag m <sup>3</sup> (100% cription ge Data (I Cum.Stor	1 hrs e= 38.5 m <sup>3</sup> 6 of inflow) Prismatic)List re s)	ted be	elow (Recalc)
Routing by Si Peak Elev= 7 Plug-Flow de Center-of-Ma <u>Volume</u> #1 74 Elevation (meters)	tor-Ind method, T '5.616 m @ 0.31 tention time= 23. iss det. time= 23. <u>Invert Avai</u> .183 m Surf.Area (sq-meters)	Fime Span= 0 hrs Surf.Are 7 min calcula 7 min ( 33.7 - I.Storage Si 123.7 m <sup>3</sup> C Inc.S	.00-3.00 hrs a= 455.7 m ted for 53.1 10.0 ) rorage Desc ustom Stag tore ers) (cut	s, dt= 0.0 <sup>°</sup> Storag m <sup>3</sup> (1009 cription ge Data (I Cum.Stor pic-meters	1 hrs e= 38.5 m <sup>3</sup> 6 of inflow) Prismatic)List re s) 0	ted be	elow (Recalc)

#1 Primary 74.183 m 75 mm Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.0139 m³/s @ 0.31 hrs HW=75.616 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0139 m³/s @ 3.14 m/s)

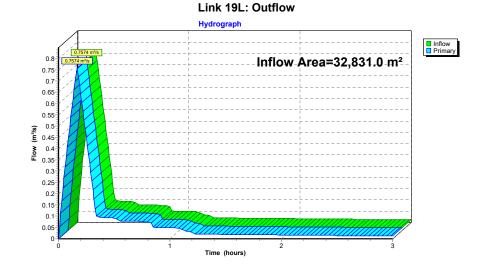


	100-Y	'ear, Peak Discharge
210622_Schneider Rd_100y	Ottawa 100-Year Duration=10 min,	Inten=178.6 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hy	droCAD Software Solutions LLC	Page 26

## Summary for Link 19L: Outflow

Inflow Are	a =	32,831.0 m²,	85.35% Impervious,	Inflow Depth >	25 mm	for 100-Year event
Inflow	=	0.7574 m³/s @	0.17 hrs, Volume=	831.5 m <sup>3</sup>		
Primary	=	0.7574 m³/s @	0.17 hrs, Volume=	831.5 m³	, Atten=	0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs



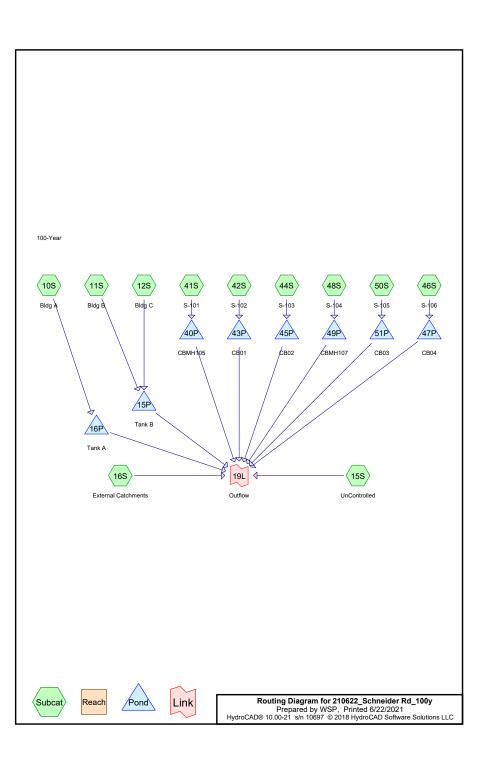
Pond 51P: CB03

210622\_Schneider Rd\_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021 Page 2

100-Year, Peak Storage (Tank)

#### Area Listing (selected nodes)

Area	С	Description
(sq-meters)		(subcatchment-numbers)
8,471.0	1.00	(10S, 11S, 12S)
1,290.0	1.00	S-101 (41S)
1,960.0	1.00	S-102 (42S)
880.0	1.00	S-103 (44S)
1,330.0	1.00	S-104 (48S)
1,790.0	1.00	S-105 (50S)
1,020.0	1.00	S-106 (46S)
5,900.0	1.00	S-EXT1 (16S)
1,850.0	1.00	S-EXT2 (16S)
1,530.0	1.00	S-EXT3 (16S)
900.0	1.00	S-EXT4 (16S)
250.0	1.00	S-U1 (15S)
940.0	0.83	S-U2 (15S)
800.0	0.35	S-U3 (15S)
850.0	1.00	S-U4 (15S)
3,070.0	0.25	S-U5 (15S)
32,831.0	0.91	TOTAL AREA



100-Year.	Peak Storage	(Tank)
	. oun onengo	(

210622_Schneider Rd_100y	,	0 ( )
Prepared by WSP	Pri	nted 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC		Page 3

## Soil Listing (selected nodes)

 Area (sq-meters)	Soil Group	Subcatchment Numbers
0.0	HSG A	
0.0	HSG B	
0.0	HSG C	
0.0	HSG D	
32,831.0	Other	10S, 11S, 12S, 15S, 16S, 41S, 42S, 44S, 46S, 48S, 50S
32,831.0		TOTAL AREA

210622\_Schneider Rd\_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Printed 6/22/2021 Page 4

#### Ground Covers (selected nodes)

HSG-A (sq-meters)	HSG-B (sq-meters)	HSG-C (sq-meters)	HSG-D (sq-meters)	Other (sq-meters)	Total (sq-meters)	Ground Cover	Subca Numbe
0.0	0.0	0.0	0.0	8,471.0	8,471.0		
0.0	0.0	0.0	0.0	1,290.0	1,290.0	S-101	
0.0	0.0	0.0	0.0	1,960.0	1,960.0	S-102	
0.0	0.0	0.0	0.0	880.0	880.0	S-103	
0.0	0.0	0.0	0.0	1,330.0	1,330.0	S-104	
0.0	0.0	0.0	0.0	1,790.0	1,790.0	S-105	
0.0	0.0	0.0	0.0	1,020.0	1,020.0	S-106	
0.0	0.0	0.0	0.0	5,900.0	5,900.0	S-EXT1	
0.0	0.0	0.0	0.0	1,850.0	1,850.0	S-EXT2	
0.0	0.0	0.0	0.0	1,530.0	1,530.0	S-EXT3	
0.0	0.0	0.0	0.0	900.0	900.0	S-EXT4	
0.0	0.0	0.0	0.0	250.0	250.0	S-U1	
0.0	0.0	0.0	0.0	940.0	940.0	S-U2	
0.0	0.0	0.0	0.0	800.0	800.0	S-U3	
0.0	0.0	0.0	0.0	850.0	850.0	S-U4	
0.0	0.0	0.0	0.0	3,070.0	3,070.0	S-U5	
0.0	0.0	0.0	0.0	32,831.0	32,831.0	TOTAL	
						AREA	

100-Year, Peak Storage (Tank)

<b>210622_Schneider Rd_100y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 20	100-Year, Peak Storage (Tank) Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Printed 6/22/2021 18 HydroCAD Software Solutions LLC Page 5	210622_Schneider Rd_1 Prepared by WSP HydroCAD® 10.00-21 s/n 1069	100-Year, Peak Storage (Tank)           100y         Ottawa 100-Year         Duration=90 min,         Inten=41.1 mm/hr           17 © 2018 HydroCAD Software Solutions LLC         Page 6
Runoff by	n=0.00-3.00 hrs, dt=0.01 hrs, 301 points y Rational method, Rise/Fall=1.0/1.0 xTc Ind+Trans method - Pond routing by Stor-Ind method	Pond 49P: CBMH107	Peak Elev=75.634 m Storage=10.3 m³ Inflow=0.0152 m³/s 82.0 m³ Outflow=0.0134 m³/s 82.0 m³
Subcatchment10S: Bldg A	Runoff Area=0.4481 ha 100.00% Impervious Runoff Depth=62 mm	Pond 51P: CB03	Peak Elev=75.608 m Storage=34.8 m³ Inflow=0.0204 m³/s 110.4 m³ Outflow=0.0138 m³/s 110.4 m³
Subcatchment11S: Bldg B	Tc=10.0 min C=1.00 Runoff=0.0512 m³/s 276.3 m³ Runoff Area=0.2380 ha 100.00% Impervious Runoff Depth=62 mm	Link 19L: Outflow	Inflow=0.2581 m³/s 1,591.6 m³ Primary=0.2581 m³/s 1,591.6 m³
Subcatchment12S: Bldg C	Tc=10.0 min C=1.00 Runoff=0.0272 m³/s 146.8 m³ Runoff Area=0.1610 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0184 m³/s 99.3 m³	Total Runoff Area = 32	,831.0 m² Runoff Volume = 1,842.3 m³ Average Runoff Depth = 56 m 14.65% Pervious = 4,810.0 m² 85.35% Impervious = 28,021.0 m
Subcatchment15S: UnControlled	Runoff Area=0.5910 ha 18.61% Impervious Runoff Depth=31 mm Tc=10.0 min C=0.50 Runoff=0.0337 m³/s 182.2 m³		
Subcatchment16S: External	Runoff Area=1.0180 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.1163 m³/s 627.8 m³		
Subcatchment41S: S-101	Runoff Area=0.1290 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0147 m³/s 79.5 m³		
Subcatchment42S: S-102	Runoff Area=0.1960 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0224 m³/s 120.9 m³		
Subcatchment44S: S-103	Runoff Area=0.0880 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0100 m³/s 54.3 m³		
Subcatchment46S: S-106	Runoff Area=0.1020 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0116 m³/s 62.9 m³		
Subcatchment48S: S-104	Runoff Area=0.1330 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0152 m³/s 82.0 m³		
Subcatchment50S: S-105	Runoff Area=0.1790 ha 100.00% Impervious Runoff Depth=62 mm Tc=10.0 min C=1.00 Runoff=0.0204 m³/s 110.4 m³		
Pond 15P: Tank B	Peak Elev=1.844 m Storage=184.4 m³ Inflow=0.0456 m³/s 246.0 m³ Outflow=0.0158 m³/s 131.0 m³		
Pond 16P: Tank A	Peak Elev=2.103 m Storage=210.3 m³ Inflow=0.0512 m³/s 276.3 m³ Outflow=0.0169 m³/s 140.7 m³		
Pond 40P: CBMH105	Peak Elev=76.061 m Storage=9.2 m³ Inflow=0.0147 m³/s 79.5 m³ Outflow=0.0131 m³/s 79.6 m³		
Pond 43P: CB01	Peak Elev=76.115 m Storage=43.8 m³ Inflow=0.0224 m³/s 120.9 m³ Outflow=0.0140 m³/s 120.9 m³		
Pond 45P: CB02	Peak Elev=75.166 m Storage=0.3 m <sup>3</sup> Inflow=0.0100 m <sup>3</sup> /s 54.3 m <sup>3</sup> Outflow=0.0100 m <sup>3</sup> /s 54.3 m <sup>3</sup>		
Pond 47P: CB04	Peak Elev=74.955 m Storage=0.1 m³ Inflow=0.0116 m³/s 62.9 m³ Outflow=0.0116 m³/s 62.9 m³		

roCAD® 10.00-21 s/n 10697 © 201			Page 7
Summar	y for Subo	catchment 10S: Bldg A	
$noff = 0.0512 \text{ m}^3/\text{s} @ 0.7$	17 hrs, Volu	me= 276.3 m <sup>3</sup> , Depth= 62 n	nm
noff by Rational method, Rise/Fall: awa 100-Year Duration=90 min, I		, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs nm/hr	;
Area (ha) C Description			
0.4481 1.00			
0.4481 100.00% Imp	ervious Area	3	
Tc Length Slope Velocity nin) (meters) (m/m) (m/sec)		Description	
min) (meters) (m/m) (m/sec) 10.0	(11-78)	Direct Entry,	
S		ent 10S: Bldg A	
1	Hydrograp	bh	1
0.055	J   		Runoff
		Ottawa 100-Year	
0.0512 m <sup>3</sup> /s		Ottawa 100-Year	
		Duration=90 min,	
0.05			
0.05		Duration=90 min,	
0.05		Duration=90 min, Inten=41.1 mm/hr	
0.05		Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.4481 ha	
0.05 0.045 0.045 0.035 0.035 0.035		Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.4481 ha Runoff Volume=276.3 m <sup>3</sup>	
0.05 0.045 0.04 0.035 0.03 0.025 0.02		Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.4481 ha Runoff Volume=276.3 m <sup>3</sup> Runoff Depth=62 mm	
0.05 0.045 0.035 0.035 0.035 0.025 0.025		Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.4481 ha Runoff Volume=276.3 m <sup>3</sup> Runoff Depth=62 mm Tc=10.0 min	
0.05 0.045 0.04 0.035 0.03 0.025 0.02		Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.4481 ha Runoff Volume=276.3 m <sup>3</sup> Runoff Depth=62 mm Tc=10.0 min	

100-Year, Peak Storage (Tank)         210622_Schneider Rd_100y       Ottawa 100-Year       Duration=90 min, Inten=41.1 mm/hr         Prepared by WSP       Printed 6/22/2021         HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC       Page 8
Summary for Subcatchment 11S: Bldg B
Runoff = 0.0272 m <sup>3</sup> /s @ 0.17 hrs, Volume= 146.8 m <sup>3</sup> , Depth= 62 mm
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr
Area (ha) C Description
0.2380 1.00
0.2380 100.00% Impervious Area
Tc Length Slope Velocity Capacity Description (min) (meters) (m/m) (m/sec) (m³/s)
10.0 Direct Entry,
Subcatchment 11S: Bldg B
Hydrograph
0.03
0.022 Inten=41.1 mm/hr
0.02 Runoff Area=0.2380 ha
Runoff Volume=146.8 m <sup>3</sup>
المعالم من Runoff Depth=62 mm
0.012 Tc=10.0 min
<sup>0.01</sup>
0.006
0.004
0.002
Time (hours)

210622_Schneider Rd_100 Prepared by WSP HydroCAD® 10.00-21 s/n 10697 @	100-Year, Peak Storage (Tank) Dy Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Printed 6/22/2021 2018 HydroCAD Software Solutions LLC Page 9	100-Year, Peak Stor <b>210622_Schneider Rd_100y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC	
Sum	mary for Subcatchment 12S: Bldg C	Summary for Subcatchment 15S: UnControlled	
Runoff = 0.0184 m <sup>3</sup> /s @	0.17 hrs, Volume= 99.3 m <sup>3</sup> , Depth= 62 mm	Runoff = 0.0337 m³/s @ 0.17 hrs, Volume= 182.2 m³, Depth= 31 mm	ก
Runoff by Rational method, Rise Ottawa 100-Year Duration=90 n	/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs nin, Inten=41.1 mm/hr	Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr	
Area (ha) C Descript	ion	Area (ha) C Description	
0.1610 1.00		0.0250 1.00 S-U1	
0.1610 100.00%	b Impervious Area	0.0940 0.83 S-U2	
		0.0800 0.35 S-U3 0.0850 1.00 S-U4	
	locity Capacity Description /sec) (m³/s)	0.0850 1.00 S-U4 0.3070 0.25 S-U5	
<u>(min) (meters) (m/m) (m</u> 10.0	/sec) (m³/s) Direct Entry.	0.5910 0.50 Weighted Average	
10.0	Direct Litty,	0.4810 81.39% Pervious Area	
	Subcatchment 12S: Bldg C	0.1100 18.61% Impervious Area	
	Hydrograph	Tc Length Slope Velocity Capacity Description	
4		(min) (meters) (m/m) (m/sec) (m <sup>3</sup> /s)	
0.02 0.019 0.0184 m <sup>3</sup> /s	Runoff	10.0 Direct Entry,	
0.019	Ottawa 100-Year		
0.017	Duration=90 min.	Subcatchment 15S: UnControlled	
0.016		Hydrograph	
0.014	Inten=41.1 mm/hr		Duraff
0.013 <b>6</b> 0.012	Runoff Area=0.1610 ha	0.036	Runoff
ε 0.011	Runoff Volume=99.3 m <sup>3</sup>	0.034 0.032 Ottawa 100-Year	
0.01	Runoff Depth=62 mm	0.032 Duration=90 min,	
0.008	Tc=10.0 min	0.028	
0.007		0.026 0.024 Runoff Area=0.5910 ha	
0.006	C=1.00		
0.004		E 0.02	
0.003		§ 0.018 ↓ Runoff Depth=31 mm	
0.001		<sup> </sup>	
o- <b>I</b>		0.012 C=0.50	
~	Time (hours)	0.01	
		0.008	

0.004 0.002 0

Ó

1

Time (hours)

2

	100-Year, P	eak Storage (Tank)
210622_Schneider Rd_100y	Ottawa 100-Year Duration=90 min,	Inten=41.1 mm/hr
Prepared by WSP		Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hydr	oCAD Software Solutions LLC	Page 11

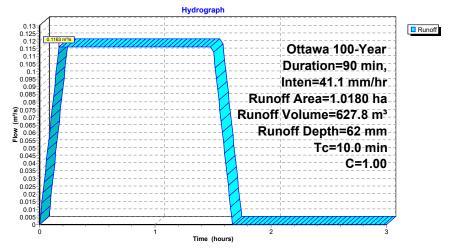
## Summary for Subcatchment 16S: External Catchments

Runoff	=	0.1163 m³/s @	0.17 hrs.	Volume=	627.8 m³.	Depth=	62 mm
--------	---	---------------	-----------	---------	-----------	--------	-------

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr

_	Area	(ha)	С	Des	cription			
	0.	5900	1.00	S-EX	(T1			
	0.	1850	1.00	S-EX	<t2< td=""><td></td><td></td><td></td></t2<>			
	0.	1530	1.00	S-EX	<b>(</b> T3			
_	0.	0900	1.00	S-EX	KT4			
	1.	0180	1.00	Wei	ghted Aver	rage		
	1.	0180		100.	00% Impe	rvious Area	a	
	_							
	Tc	Leng	,	Slope	Velocity	Capacity	Description	
_	(min)	(mete	rs) (	<u>m/m)</u>	(m/sec)	(m³/s)		
	10.0						Direct Entry,	

#### Subcatchment 16S: External Catchments



		S	Summar	y for Sub	catchment	41S: S-101	
Runoff	= 0.0	147 m³/s	@ 0.1	7 hrs, Volu	ime=	79.5 m <sup>3</sup> , Depth= 62 m	ım
Runoff by	Rational n	nethod. [	Rise/Fall=	1.0/1.0 xTc	. Time Span=	0.00-3.00 hrs, dt= 0.01 hrs	
				nten=41.1 r		,	
Area	(ha) C	Dese	cription				
	290 1.00						
0.1	290	100.	00% Impe	ervious Are	а		
Тс	Length	Slope	Velocity		Description		
(min) 10.0	(meters)	(m/m)	(m/sec)	(m³/s)	Direct Entry		
10.0					Direct Entry	3	
			Su	ubcatchn	nent 41S: S-	101	
	1			Hydrogra	ph	1	,
0.016	1					÷	Runoff
0.015	0.0147 m³/s	///////	///////////////////////////////////////			Ottawa 100-Year	
0.014- 0.013-	í,					Duration=90 min,	
0.013			   			nten=41.1 mm/hr	
0.011	Ĵ <mark>/</mark>					f Area=0.1290 ha	
0.01 (s) (u) (0.009	///·					Volume=79.5 m <sup>3</sup>	
U.008 0.008 0.007			   			I	
	( <mark> </mark>				Run	off Depth=62 mm	
0.006	<b>/</b>					Tc=10.0 min	
0.004						C=1.00	
0.003	[						
0.002-						+	
0	, ,	· · ·		, ,			,
0			1	Time (		3	

	d by WSP         Printed         6/22/2021           D® 10.00-21         s/n         10697         © 2018         HydroCAD         Software Solutions         LLC         Page 13	
	Summary for Subcatchment 42S: S-102	
Runoff	= 0.0224 m <sup>3</sup> /s @ 0.17 hrs, Volume= 120.9 m <sup>3</sup> , Depth= 62 mm	
	y Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs I00-Year Duration=90 min, Inten=41.1 mm/hr	
	a (ha) C Description	
	1960         1.00         S-102           1960         100.00% Impervious Area	
Тс	Length Slope Velocity Capacity Description	
<u>(min)</u> 10.0	(meters) (m/m) (m/sec) (m³/s) Direct Entry,	
0.024 0.023 0.022 0.021 0.019 0.018 0.017 0.016 (%) 0.014 0.013 0.013 0.011 0.011 0.011 0.011 0.011 0.011 0.011	Ottawa 100-Year Duration=90 min, inten=41.1 mm/hr Runoff Area=0.1960 ha Runoff Volume=120.9 m <sup>3</sup> Runoff Depth=62 mm Tc=10.0 min C=1.00	
0.005 0.004 0.003 0.002 0.001 0		

210622_Schneider Rd_100y Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 Hydr	100-Year, Peak Storage (Tank) Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Printed 6/22/2021 oCAD Software Solutions LLC Page 14
Summary for	Subcatchment 44S: S-103
Runoff = 0.0100 m <sup>3</sup> /s @ 0.17 hrs,	Volume= 54.3 m <sup>3</sup> , Depth= 62 mm
Runoff by Rational method, Rise/Fall=1.0/1 Ottawa 100-Year Duration=90 min, Inten=	.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs 41.1 mm/hr
Area (ha) C Description	
0.0880 1.00 S-103	
0.0880 100.00% Imperviou	s Area
<b>o</b> 1 <b>j</b> 1	pacity Description m³/s)
10.0	Direct Entry,
	Time (hours)

roCAD® 10.00-21 s/n 10697 © 2018 F	· · · · · ·
Summary	/ for Subcatchment 46S: S-106
off = 0.0116 m <sup>3</sup> /s @ 0.17	hrs, Volume= 62.9 m <sup>3</sup> , Depth= 62 mm
off by Rational method, Rise/Fall=1. wa 100-Year Duration=90 min, Inte	.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs ten=41.1 mm/hr
Area (ha) C Description	
0.1020 1.00 S-106	
0.1020 100.00% Imperv	rvious Area
Tc Length Slope Velocity nin) (meters) (m/m) (m/sec)	Capacity Description (m³/s)
10.0	Direct Entry,
Suk	bcatchment 46S: S-106
50	Hydrograph
	nyarograph
0.013	
0.013 0.013 0.012 0.0116 m/s	
0.013	Ottawa 100-Year
0.013 0.012 0.012 0.0114	······
0.013 0.012 0.0116 m/s 0.0111 0.0111 0.0111	Ottawa 100-Year
0.013 0.012 0.0112 0.011 0.009 0.009 0.008 0	Ottawa 100-Year Duration=90 min,
0.013 0.012 0.011 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr
0.013 0.012 0.011 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.0000000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.1020 ha Runoff Volume=62.9 m <sup>3</sup>
0.013 0.012 0.0116 0.011 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.1020 ha Runoff Volume=62.9 m <sup>3</sup> Runoff Depth=62 mm
0.013 0.012 0.0112 0.011 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.1020 ha Runoff Volume=62.9 m <sup>3</sup> Runoff Depth=62 mm Tc=10.0 min
0.013 0.012 0.0112 0.011 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.1020 ha Runoff Volume=62.9 m <sup>3</sup> Runoff Depth=62 mm
0.013 0.012 0.011 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000000	Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Runoff Area=0.1020 ha Runoff Volume=62.9 m <sup>3</sup> Runoff Depth=62 mm Tc=10.0 min

Time (hours)

210622\_Schneider Rd\_100y Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Prepared by WSP Printed 6/22/2021 HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Page 16 Summary for Subcatchment 48S: S-104 82.0 m<sup>3</sup>, Depth= 62 mm Runoff = 0.0152 m<sup>3</sup>/s @ 0.17 hrs, Volume= Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr C Description Area (ha) 1.00 S-104 0.1330 100.00% Impervious Area 0.1330 Slope Velocity Capacity Description (m/m) (m/sec) (m<sup>3</sup>/s) Tc Length (min) (meters) (m/m) (m/sec) 10.0 Direct Entry, Subcatchment 48S: S-104 Hydrograph 0.017 Runoff 0.016 Ottawa 100-Year 0.015 0.014 Duration=90 min. 0.013 Inten=41.1 mm/hr 0.012 0.011 Runoff Area=0.1330 ha 0.01 (s) **(s) (b) (c) (c)** Runoff Volume=82.0 m<sup>3</sup> 800.0 E Runoff Depth=62 mm 0.007 Tc=10.0 min 0.006 0.005 C=1.00 0.004 0.003

Time (hours)

ź

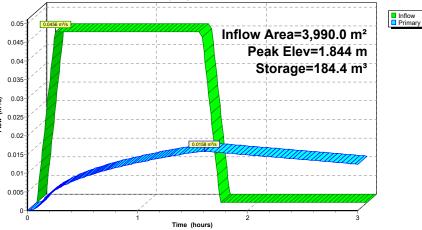
÷.

100-Year, Peak Storage (Tank)

0.002 0.001 03

ò

100-Year, Peak Storage (Tank)210622_Schneider Rd_100yOttawa 100-Year Duration=90 min, Inten=41.1 mm/hrPrepared by WSPPrinted 6/22/2021HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLCPage 17	100-Year, Peak Storage (Tank) <b>210622_Schneider Rd_100y</b> Prepared by WSP HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC 100-Year, Peak Storage (Tank) Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr Printed 6/22/2021 Page 18
Summary for Subcatchment 50S: S-105	Summary for Pond 15P: Tank B
Runoff = 0.0204 m³/s @ 0.17 hrs, Volume= 110.4 m³, Depth= 62 mm Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr	$ \begin{array}{llllllllllllllllllllllllllllllllllll$
Area (ha)       C       Description         0.1790       1.00       S-105         0.1790       100.00% Impervious Area         Tc       Length       Slope         Velocity       Capacity       Description	Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 1.844 m @ 1.61 hrs Surf.Area= 100.0 m <sup>2</sup> Storage= 184.4 m <sup>3</sup> Plug-Flow detention time= 72.3 min calculated for 130.6 m <sup>3</sup> (53% of inflow) Center-of-Mass det. time= 51.4 min ( 101.4 - 50.0 )
(min) (meters) (m/m) (m/sec) (m <sup>3</sup> /s) 10.0 <b>Direct Entry</b> ,	Volume         Invert         Avail.Storage         Storage         Description           #1         0.000 m         400.0 m³         10.00 mW x 10.00 mL x 4.00 mH Prismatoid
Subcatchment 50S: S-105 Hydrograph OU22 0.021 0.022 0.022 0	Device       Routing       Invert       Outlet Devices         #1       Primary       0.000 m       75 mm Vert. Orifice/Grate C= 0.600         Primary OutFlow Max=0.0158 m³/s @ 1.61 hrs HW=1.843 m (Free Discharge)       Primary         1=Orifice/Grate (Orifice Controls 0.0158 m³/s @ 3.57 m/s)       Pond 15P: Tank B         Hydrograph       Inflow Area=3,990.0 m²       Peak Elev=1.844 m         0.044       Storage=184.4 m³       Storage=184.4 m³
0.00 0 1 2 3 Time (hours)	



Prepare HvdroCA			10697 ©	2018 Hvd	roCAD Soft	ware Solut	ions LLC		Prin	ted 6/22/202 Page 19
		<u> </u>			y for Po					
Inflow Ar Inflow Outflow	=	0.0512	m³/s @ ́	0.17 hrs	Impervious s, Volume= s, Volume=		276.3 m	1 <sup>3</sup>		00-Year even Lag= 86.5 mi
Primary					s, Volume=		140.7 m		01 /0,	Lug 00.0 m
					ated for 140	).7 m³ (51	% of inflo	w)		
Center-o	f-Mass o	det. time vert	≔ 51.6 m Avail.Sto	in(101.6 orage S		cription			atoid	
Center-o <u>Volume</u> #1	f-Mass o	det. time <u>vert</u> 0 m	= 51.6 m <u>Avail.Sto</u> 400	in(101.6 orage S	6 - 50.0) <u>torage Des</u> <b>0.00 mW x</b>	cription			atoid	
Center-o <u>Volume</u> #1	f-Mass o Inv 0.000	det. time <u>vert</u> 0 m	= 51.6 m <u>Avail.Sto</u> 400 <u>Invert</u>	in(101.6 o <u>rage S</u> .0 m³ <b>1</b> Outlet [	6 - 50.0) <u>torage Des</u> <b>0.00 mW x</b>	cription 10.00 ml	- x 4.00 r	nH Prism	atoid	
Center-o <u>Volume</u> #1 <u>Device</u> #1 <b>Primary</b>	f-Mass of Inv 0.000 Routing Primary <b>OutFlo</b> v	det. time vert 0 m 9 v w Max=0	= 51.6 m <u>Avail.Sto</u> 400 <u>Invert</u> 0.000 m 0.0169 m	in ( 101.6 o <u>rage S</u> .0 m <sup>3</sup> <b>1</b> <u>Outlet [</u> <b>75 mm</b> <sup>3</sup> /s @ 1.6	5 - 50.0) <u>torage Des</u> <b>0.00 mW x</b> Devices	ceription 10.00 ml ce/Grate =2.103 m	<b>- x 4.00 r</b> C= 0.60	nH Prism		
Center-o <u>Volume</u> #1 <u>Device</u> #1 <b>Primary</b>	f-Mass of Inv 0.000 Routing Primary <b>OutFlo</b> v	det. time vert 0 m 9 v w Max=0	= 51.6 m <u>Avail.Sto</u> 400 <u>Invert</u> 0.000 m 0.0169 m	in ( 101.6 o <u>rage S</u> .0 m <sup>3</sup> <b>1</b> Outlet [ <b>75 mm</b> <sup>3</sup> /s @ 1.6 ols 0.016	5 - 50.0) torage Des 0.00 mW x Devices Vert. Orifi 61 hrs HW	<b>ce/Grate</b> =2.103 m 3.82 m/s)	<b>- x 4.00 r</b> C= 0.60 (Free D	nH Prism		
Center-o <u>Volume</u> #1 <u>Device</u> #1 <b>Primary</b>	f-Mass of Inv 0.000 Routing Primary <b>OutFlo</b> v	det. time vert 0 m 9 v w Max=0	= 51.6 m <u>Avail.Sto</u> 400 <u>Invert</u> 0.000 m 0.0169 m	in ( 101.6 o <u>rage S</u> .0 m <sup>3</sup> <b>1</b> <u>Outlet I</u> <b>75 mm</b> <sup>3</sup> /s @ 1.6 ols 0.016 <b>P</b>	3 - 50.0 ) <u>torage Des</u> <b>0.00 mW x</b> <u>Devices</u> <b>Vert. Orifi</b> 31 hrs HW: 9 m³/s @ 3	<b>ce/Grate</b> =2.103 m 3.82 m/s)	<b>- x 4.00 r</b> C= 0.60 (Free D	nH Prism		

Storage=210.3 m<sup>3</sup>

2

Time (hours)

0.045

0.04

0.035

0.03

0.02

0.015

0.01

0.005

0-

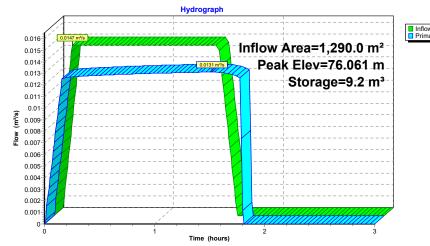
0

**8** 0.025

(m³/s)

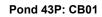
Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr 210622\_Schneider Rd\_100y Prepared by WSP Printed 6/22/2021 HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Page 20 Summary for Pond 40P: CBMH105 Inflow Area = 1.290.0 m<sup>2</sup>.100.00% Impervious. Inflow Depth = 62 mm for 100-Year event Inflow 0.0147 m<sup>3</sup>/s @ 0.17 hrs, Volume= . 79.5 m³ = Outflow = 0.0131 m<sup>3</sup>/s @ 1.52 hrs, Volume= 79.6 m<sup>3</sup>, Atten= 11%, Lag= 80.9 min Primarv = 0.0131 m<sup>3</sup>/s @ 1.52 hrs, Volume= 79.6 m<sup>3</sup> Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 76.061 m @ 1.52 hrs Surf.Area= 157.7 m<sup>2</sup> Storage= 9.2 m<sup>3</sup> Plug-Flow detention time= 6.4 min calculated for 79.3 m<sup>3</sup> (100% of inflow) Center-of-Mass det. time= 6.4 min ( 56.4 - 50.0 ) Volume Invert Avail.Storage Storage Description 64.6 m<sup>3</sup> Custom Stage Data (Prismatic)Listed below (Recalc) #1 74.776 m Surf.Area Inc.Store Cum.Store Elevation (meters) (sq-meters) (cubic-meters) (cubic-meters) 0.0 74.776 0.4 0.0 75.950 0.4 0.5 0.5 76.250 427.0 64.1 64.6 Invert Outlet Devices Device Routing 74.776 m 75 mm Vert. Orifice/Grate C= 0.600 #1 Primary Primary OutFlow Max=0.0131 m³/s @ 1.52 hrs HW=76.061 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0131 m³/s @ 2.97 m/s) Pond 40P: CBMH105 Hydrograph Inflow
Primary 0.016

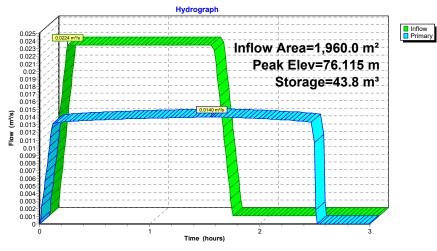
100-Year, Peak Storage (Tank)



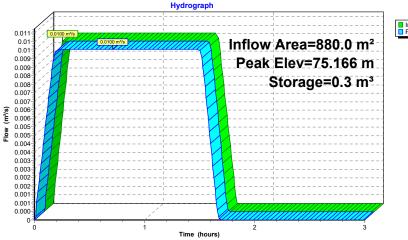
Summ		
24 m³/s @ 0.17 h		
		120.9 m³, Atten= 37%, Lag= 83.5 mi
40 m³/s @ 1.56 h	rs, volume=	120.9 m <sup>3</sup>
	10a- 525.1111 Otorag	JC- +0.0 m
		0% of inflow)
inie-27.0 min (77.0	J - 50.0 )	
Avail.Storage	Storage Description	
144.0 m³	Custom Stage Data (	(Prismatic)Listed below (Recalc)
ırf.Area Inc	.Store Cum.Sto	pre
motora) (oubia m	eters) (cubic-meter	rs)
meters) (cubic-m		<u> </u>
0.4		0.0
	0.0 0	<u> </u>
0.4 0.4	0.0 0	).0 ).5
	nethod, Time Span= @ 1.56 hrs Surf.A ime= 26.9 min calcu ime= 27.0 min ( 77.0 <u>Avail.Storage</u> 144.0 m <sup>3</sup>	hethod, Time Span= 0.00-3.00 hrs, dt= 0.0 @ 1.56 hrs Surf.Area= 525.1 m <sup>2</sup> Storag ime= 26.9 min calculated for 120.5 m <sup>3</sup> (100 ime= 27.0 min ( 77.0 - 50.0 ) <u>Avail.Storage Storage Description</u> 144.0 m <sup>3</sup> <b>Custom Stage Data (</b>

Primary OutFlow Max=0.0140 m³/s @ 1.56 hrs HW=76.115 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0140 m³/s @ 3.17 m/s)



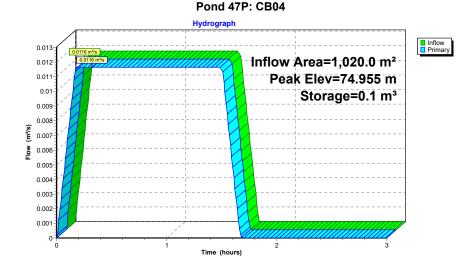


Prepared by	<b>hneider Rd_100</b> WSP <u>).00-21_s/n 10697_©</u>	,		Duration=90 min, Int Pri	Storage (Tank) en=41.1 mm/hr nted 6/22/2021 Page 22
		Summary for I	Pond 45P:	CB02	
Inflow Area = Inflow = Outflow = Primary =	880.0 m², 0.0100 m³/s @ 0.0100 m³/s @ 0.0100 m³/s @		ne= ne=	epth = 62 mm for 54.3 m <sup>3</sup> 54.3 m <sup>3</sup> , Atten= 0%, 54.3 m <sup>3</sup>	100-Year event Lag= 32.4 min
Peak Elev= 75 Plug-Flow det	or-Ind method, Time 5.166 m @ 0.64 hrs ention time=0.5 min ss det. time= 0.5 min	Surf.Area= 0.4 r n calculated for 54	m² Storage=	0.3 m³	
Volume	Invert Avail.St	orage Storage D		Prismatic)Listed below (	Recalc)
(meters) 74.396			(cubic-meters	<u>s)</u>	
75.950 76.150	0.4 0.4 174.0	0.0 0.6 17.4	0. 18.	6	
Device Rout	0			0 0 000	
	ary 74.396 m Flow Max=0.0100 n Grate (Orifice Conti		W=75.166 m		
		Pond 4	5P: CB02		
0.011	0100 m <sup>3</sup> /s	Hydrograph		۸roa=880 0 m <sup>2</sup>	  Primary

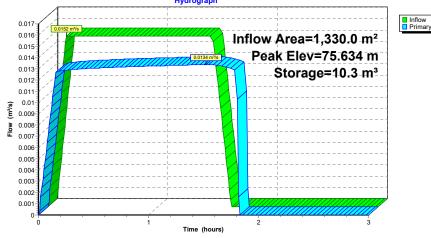


Prepared by ۱				Duration=90 min, Inten=41.1 mm/h Printed 6/22/2021
HydroCAD® 10.	.00-21 s/n 10697	© 2018 HydroCAE	) Software Solutic	ons LLC Page 23
		Summary fo	r Pond 47P:	CB04
Inflow Area =				epth = 62 mm for 100-Year event
Inflow =		0.17 hrs, Vol		$62.9 \text{ m}^3$
Outflow = Primary =		<ul> <li>0.32 hrs, Vol</li> <li>0.32 hrs, Vol</li> </ul>		62.9 m <sup>3</sup> , Atten= 0%, Lag= 9.0 min 62.9 m <sup>3</sup>
Peak Elev= 74	.955 m @ 0.29 h	me Span= 0.00-3 rs Surf.Area= 0. nin calculated for	4 m² Storage=	0.1 m³
Peak Ĕlev= 74 Plug-Flow dete Center-of-Mas	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 )	4 m² Storage= 62.7 m³ (100%)	0.1 m³
Peak Ĕlev= 74 Plug-Flow dete Center-of-Mas Volume	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail.	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) Storage Storage	4 m² Storage= 62.7 m³ (100%) e Description	0.1 m³
Peak Ĕlev= 74 Plug-Flow dete Center-of-Mas Volume	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail.	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) Storage Storage	4 m² Storage= 62.7 m³ (100%) e Description	0.1 m³ of inflow) Prismatic)Listed below (Recalc)
Peak Elev= 74 Plug-Flow dete Center-of-Mass <u>Volume</u> #1 74.5	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail. 994 m	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) <u>Storage Storage</u> 11.4 m <sup>3</sup> <b>Custor</b>	4 m² Storage= 62.7 m³ (100%) • <u>Description</u> n Stage Data (P	0.1 m <sup>3</sup> of inflow) P <b>rismatic)</b> Listed below (Recalc) e
Peak Ĕlev= 74 Plug-Flow dete Center-of-Mas: <u>Volume  </u> #1 74.5 Elevation	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail. 94 m Surf.Area	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) <u>Storage Storage</u> 11.4 m <sup>3</sup> <b>Custor</b> Inc.Store	4 m <sup>2</sup> Storage= 62.7 m <sup>3</sup> (100%) <u>e Description</u> n Stage Data (P Cum.Store	0.1 m <sup>3</sup> of inflow) P <b>rismatic)</b> Listed below (Recalc) e <u>)</u>
Peak Elev= 74 Plug-Flow dete Center-of-Mass <u>Volume</u> #1 74.5 Elevation (meters)	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail. 994 m Surf.Area (sq-meters)	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) <u>Storage Storage</u> 11.4 m <sup>3</sup> <b>Custor</b> Inc.Store (cubic-meters)	4 m <sup>2</sup> Storage= 62.7 m <sup>3</sup> (100%) <u>e Description</u> n Stage Data (P Cum.Store (cubic-meters	0.1 m <sup>3</sup> of inflow) Prismatic)Listed below (Recalc) e ) 0
Peak Elev= 74 Plug-Flow dete Center-of-Mass Volume #1 74.5 Elevation (meters) 74.594	.955 m @ 0.29 h ention time= 0.2 r s det. time= 0.2 r Invert Avail. 994 m Surf.Area (sq-meters) 0.4	rs Surf.Area= 0. nin calculated for nin ( 50.2 - 50.0 ) Storage Storage 11.4 m <sup>3</sup> Custor Inc.Store (cubic-meters) 0.0	4 m <sup>2</sup> Storage= 62.7 m <sup>3</sup> (100% <u>e Description</u> <b>n Stage Data (P</b> Cum.Stor (cubic-meters 0.1	0.1 m <sup>3</sup> of inflow) <b>'rismatic)</b> Listed below (Recalc) e <u>)</u> 0 3

Primary OutFlow Max=0.0116 m³/s @ 0.32 hrs HW=74.955 m (Free Discharge) ▲1=Orifice/Grate (Orifice Controls 0.0116 m³/s @ 1.48 m/s)



100-Year, Peak Storage (Tank) Ottawa 100-Year Duration=90 min, Inten=41.1 mm/hr 210622\_Schneider Rd\_100y Prepared by WSP Printed 6/22/2021 HydroCAD® 10.00-21 s/n 10697 © 2018 HydroCAD Software Solutions LLC Page 24 Summary for Pond 49P: CBMH107 Inflow Area = 1,330.0 m<sup>2</sup>,100.00% Impervious, Inflow Depth = 62 mm for 100-Year event Inflow 0.0152 m<sup>3</sup>/s @ 0.17 hrs, Volume= . 82.0 m³ = Outflow = 0.0134 m³/s @ 1.52 hrs, Volume= 82.0 m<sup>3</sup>, Atten= 12%, Lag= 81.0 min Primarv = 0.0134 m³/s @ 1.52 hrs, Volume= 82.0 m<sup>3</sup> Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 75.634 m @ 1.52 hrs Surf.Area= 147.1 m<sup>2</sup> Storage= 10.3 m<sup>3</sup> Plug-Flow detention time=7.0 min calculated for 81.8 m<sup>3</sup> (100% of inflow) Center-of-Mass det. time= 7.0 min ( 57.0 - 50.0 ) Volume Invert Avail.Storage Storage Description #1 74.297 m 50.0 m<sup>3</sup> Custom Stage Data (Prismatic)Listed below (Recalc) Surf.Area Inc.Store Cum.Store Elevation (sa-meters) (cubic-meters) (cubic-meters) (meters) 0.0 74.297 0.4 0.0 75.500 0.4 0.5 0.5 330.0 50.0 75.800 49.6 Invert Outlet Devices Device Routing #1 Primary 74.297 m 75 mm Vert. Orifice/Grate C= 0.600 Primary OutFlow Max=0.0134 m³/s @ 1.52 hrs HW=75.634 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0134 m³/s @ 3.03 m/s) Pond 49P: CBMH107 Hydrograph



210622_Schneider Rd_100y Prepared by WSP	100-Year, P Ottawa 100-Year Duration=90 min,	eak Storage (Tank) Inten=41.1 mm/hr Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hyd	roCAD Software Solutions LLC	Page 25
Summa	ry for Pond 51P: CB03	

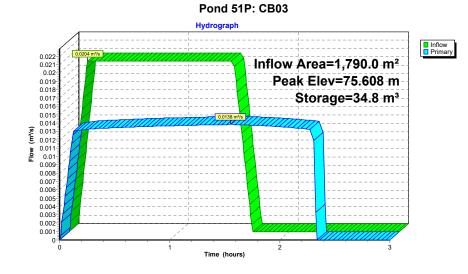
Inflow Are	ea =	1,790.0 m²,	100.00% Impervious,	Inflow Depth =	62 mm	for 100-Year event
Inflow	=	0.0204 m³/s @	0.17 hrs, Volume=	110.4 m	3	
Outflow	=	0.0138 m³/s @	1.55 hrs, Volume=	110.4 m	<sup>13</sup> , Atten=	32%, Lag= 83.0 min
Primary	=	0.0138 m³/s @	1.55 hrs, Volume=	110.4 m	3	-

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs Peak Elev= 75.608 m @ 1.55 hrs Surf.Area= 433.3 m<sup>2</sup> Storage= 34.8 m<sup>3</sup>

Plug-Flow detention time= 21.8 min calculated for 110.0 m³ (100% of inflow) Center-of-Mass det. time= 21.8 min ( 71.8 - 50.0 )

Volume	Inve	rt Avail.	Storage	Storage	Description	
#1	74.183 ı	n 1	23.7 m³	Custon	n Stage Data (P	rismatic)Listed below (Recalc)
Elevatio (meters		Surf.Area q-meters)	Inc (cubic-n	c.Store neters)	Cum.Store (cubic-meters)	-
74.18	3	0.4		0.0	0.0	)
75.45	50	0.4		0.5	0.5	5
75.75	50	821.0		123.2	123.7	,
Device	Routing	Inve	ert Outle	t Device	S	
#1	Primary	74.183	m 75 m	m Vert.	Orifice/Grate	C= 0.600

Primary OutFlow Max=0.0138 m³/s @ 1.55 hrs HW=75.608 m (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.0138 m³/s @ 3.13 m/s)

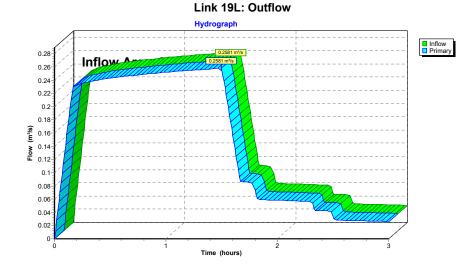


		100-Year, P	eak Storage (Tank)
210622_Schneider Rd_100y	Ottawa 100-Year	Duration=90 min,	Inten=41.1 mm/hr
Prepared by WSP			Printed 6/22/2021
HydroCAD® 10.00-21 s/n 10697 © 2018 Hydro	oCAD Software Soluti	ons LLC	Page 26

#### Summary for Link 19L: Outflow

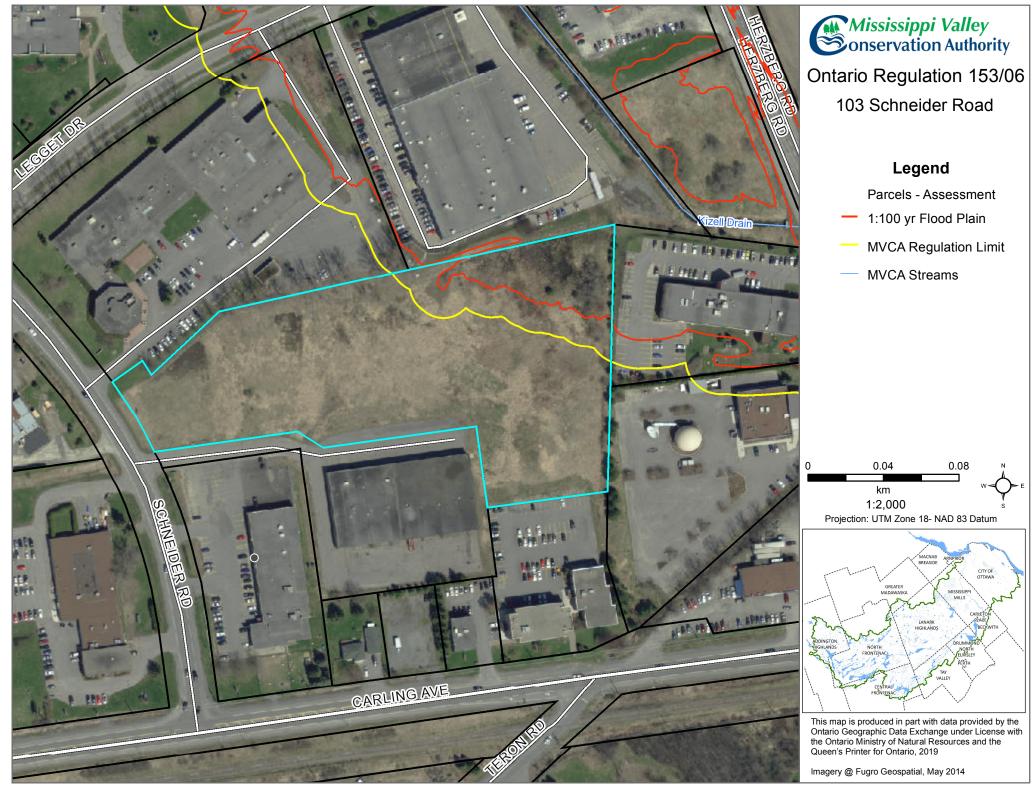
Inflow Are	a =	32,831.0 m²,	85.35% Impervious,	Inflow Depth >	48 mm	for	100-Year event
Inflow	=	0.2581 m³/s @	1.50 hrs, Volume=	1,591.6 m <sup>3</sup>			
Primary	=	0.2581 m³/s @	1.50 hrs, Volume=	1,591.6 m³	, Atten= (	0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs





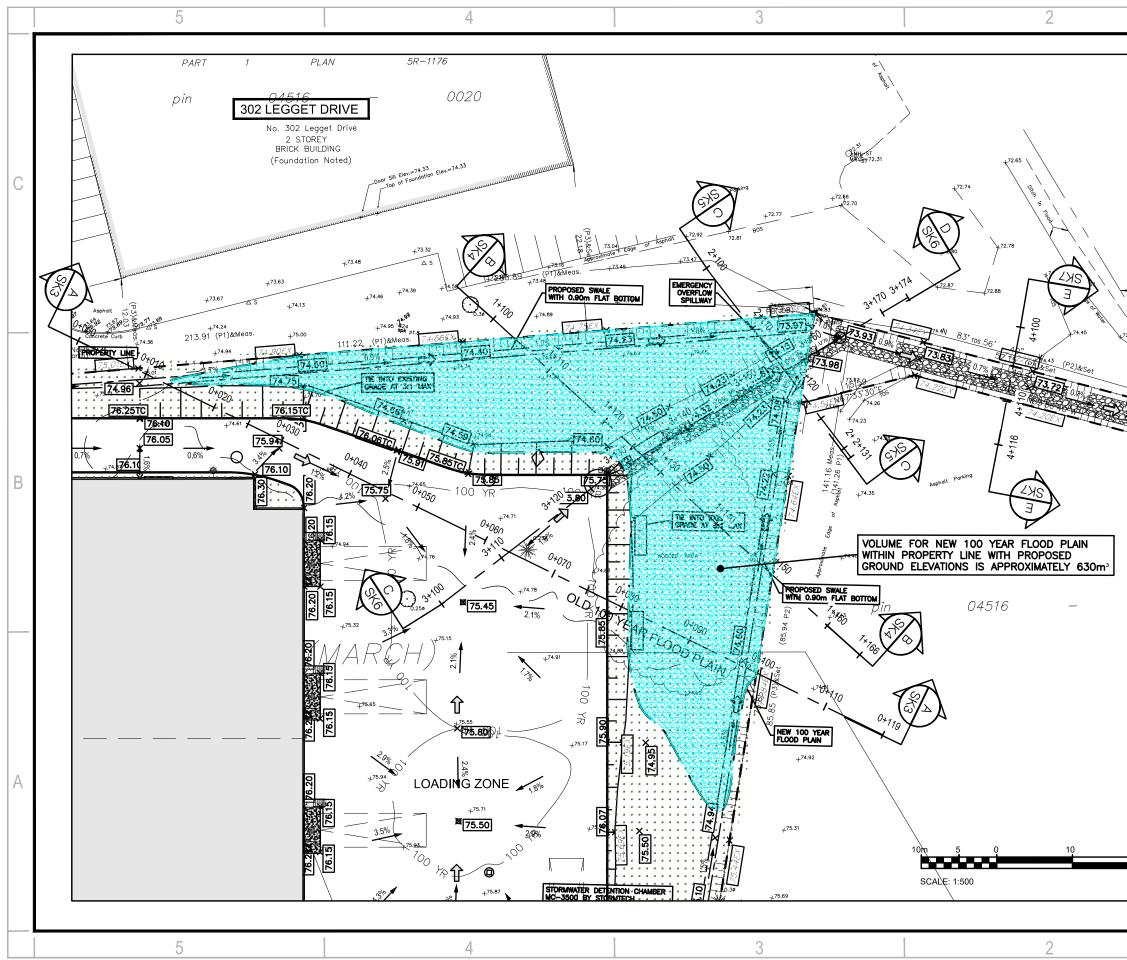
## C MVCA FLOODPLAIN MAP



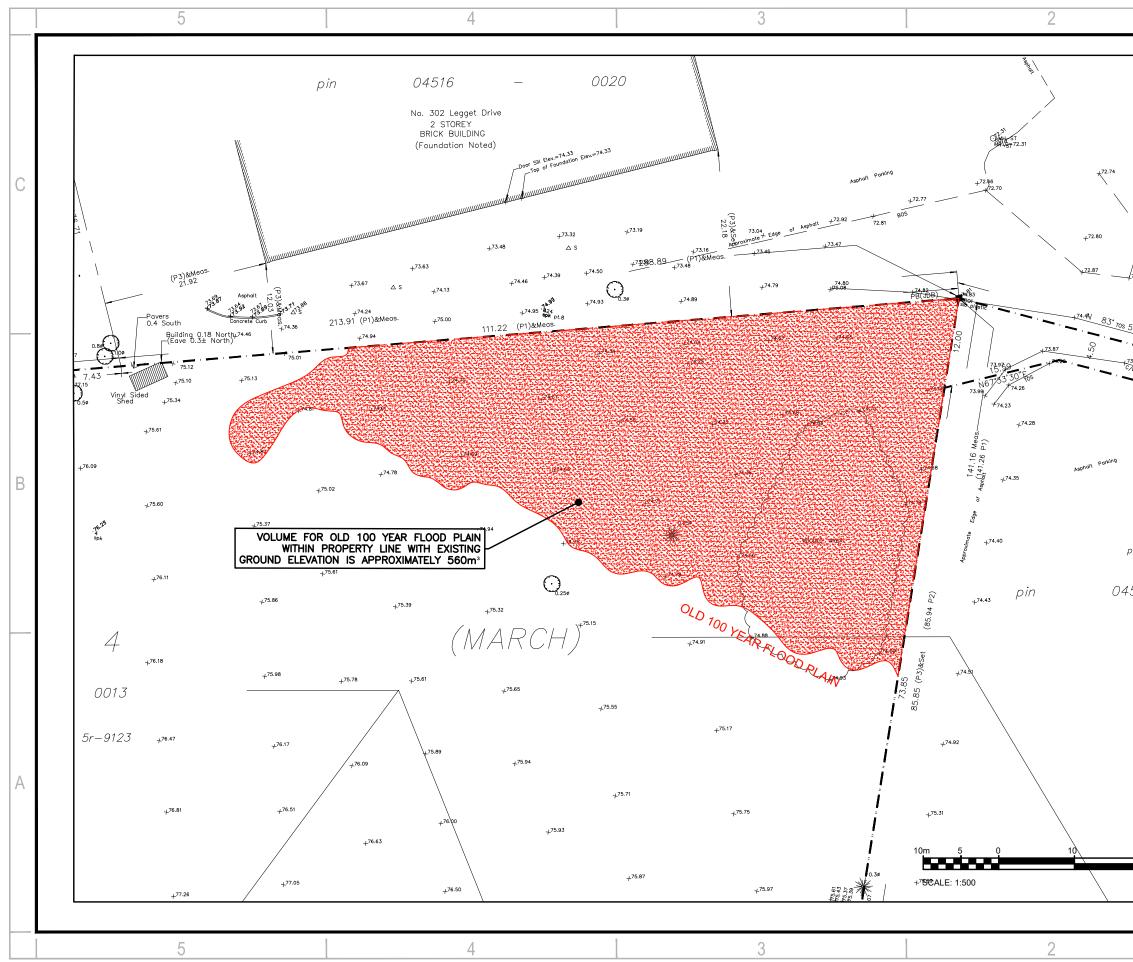
Date: 12/11/2020



# D CUT AND FILL ANALYSIS



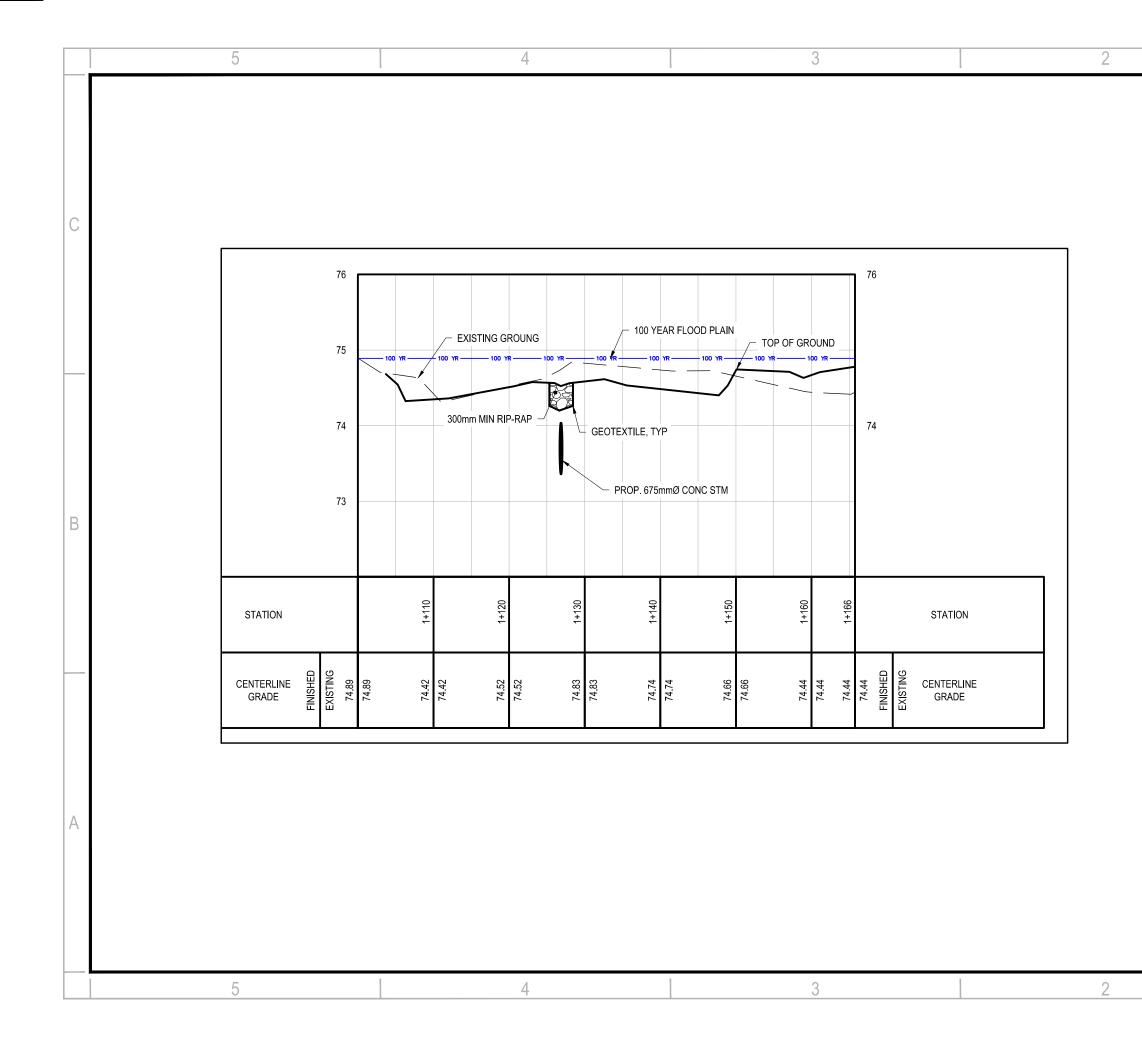
				1			
	CLIENT	Γ:	201 0 0	1 QUEENSVIEW TTAWA, ONTAR SANADA K2B 8K T: 613-829-8299 WWW.WSP.COM	IO 2		
	CLIENT	Г REF. #: :СТ:	Renfroe La		MENT		
- p  			103 SCH	NEIDEF	ROAD		
		D FOR - R					
	1 	RE	2021/06/23 DATE	ISSUE FO	DESCRIPTION		B
004	PROJE 211-0 ORIGIN 1:500	CT NO: 1794-0 NAL SCAL	0	I	DATE: JUNE 2021 IF THIS BAR IS LONG, ADJUS PLOTTING	ST YOUR	
	DRAWN	(ED BY: .J.			25mn	n	
	TITLE:		NEW 100				А
n	SHEET	NUMBEF	R:	N VOLU	1 1		
	ISSUE:		OR SPA	. 01		REV #	
				1			



72.65			0	QUEENSVIEW ITAWA, ONTAR ANADA K28 8K T: 613-829-2800 F: 613-829-8299 WWW.WSP.COM	IO 2		
.78	CLIENT	Γ: Γ REF.#:			MENT		С
40"/15 <b>1</b> 59	PROJE	CT:	103 SCH	NEIDEF	ROAD		
	ISSUE	D FOR - F	EVISION:				
	4		2024/06/22				D
	1	PE	2021/06/23	ISSUE FO			В
part	IS	RE CT NO:	2021/06/23 DATE	ISSUE FC	DESCRIPTION DATE:		В
part 5r-1	IS PROJE 211-0	CT NO:	date 0	ISSUE FC	DESCRIPTION		В
	IS PROJE 211-0 ORIGIN 1:500 DESIGI	CT NO: 1 <b>1794-0</b> NAL SCAL	date 0	ISSUE FC	DESCRIPTION DATE:	ST YOUR	В
5r-1	IS PROJE 211-0 ORIGIN 1:500	LIT94-0 NAL SCAL	date 0	ISSUE FC	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS	ST YOUR	B
5r-1	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWI J.T.	I IT794-0 MAL SCAL NED BY:	date 0	ISSUE FC	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS	ST YOUR	B
5r-1	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWN J.T. CHECK	ITT94-0 NAL SCAL NED BY: N BY:	date 0	ISSUE FC	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS	ST YOUR SCALE.	B
5r-1	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWI J.T. CHECK D.Y./I DISCIP	IT794-0 NAL SCAL NED BY: N BY: KED BY:	date 0	ISSUE FC	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS PLOTTING S	ST YOUR SCALE.	B
5r-1	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWI J.T. CHECK D.Y./I	IT794-0 NAL SCAL NED BY: N BY: KED BY:	DATE 0 E: OLD 100	CIVIL	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS PLOTTING S 25mm	ST YOUR SCALE.	В 
5r-1	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWN J.T. CHECK D.Y./I DISCIP	IT794-0 NAL SCAL NED BY: N BY: KED BY:	DATE 0 E: OLD 100 PLAI	CIVIL	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS PLOTTING S 25mm	ST YOUR SCALE.	
5r-:	IS PROJE 211-0 ORIGIN 1:500 DESIGI D.Y. DRAWN J.T. CHECK D.Y./I DISCIP	CT NO: 11794-0 11794-0 NAL SCAL NED BY: CED BY: .J. .UINE: *	DATE 0 E: OLD 100 PLAI	CIVIL	DESCRIPTION DATE: JUNE 2021 IF THIS BAR IS I LONG, ADJUS PLOTTING S 25mm	ST YOUR SCALE.	

		5		4		3		2
	78							78
С	77 76					DF GROUND	BARRIER CURB	76
	75	100 YB			- PROP. 675mmØ CONC STM		00 YEAR FLOOD PLAIN	R 100 YR 74
В	STATION	0+010	0+020	0+030	0+060	04040	0+090	0+110
	CENTERLINE DHSIN GRADE HSINIE GRADE HSINIE	74.16 75.00 75.00	74.72 74.72	74.66 74.66 74.68 74.68	74.68 74.68 74.73 74.73	74.71 74.71 74.71 74.71	74.69 74.69 74.64 74.64	74.66 74.66 75.02 75.02 FINISHED EXISTING
A								
		5		4		3		2

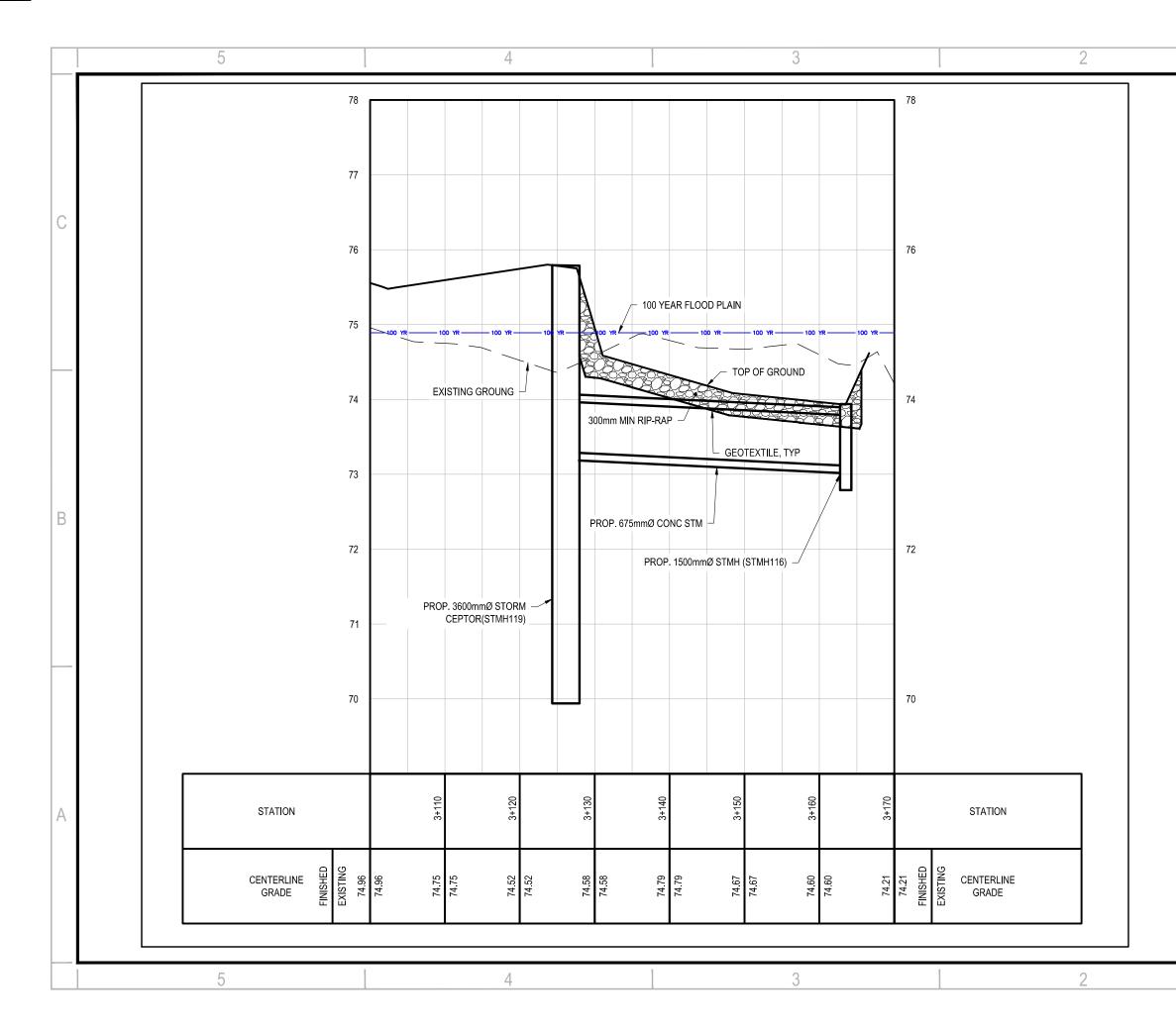
			1		
CLIEN	T:	201 O (	1 QUEENSVIEW TTAWA, ONTAR ZANADA K2B 8K T: 613-829-2800 WWW.WSP.COM	DR. 10 2	
CLIEN PROJE	T REF. #:	RENFROE LA		IENT	
		103 SCH	NEIDEF	ROAD	
ISSUE	) FOR - F				
1		2021/06/23	ISSUE FO	R SPA	В
IS PRO II	RE CT NO:	DATE		DESCRIPTION DATE:	
	)1794-0	00		JUNE 2021	
1:500	NAL SCAI ) NED BY:	.E:		IF THIS BAR IS NOT 25m LONG, ADJUST YOUR	m
D.Y.				PLOTTING SCALE.	
J.T. CHEC	KED BY: I.J.			PLOTTING SCALE.	•
DRAW J.T. CHECI D.Y./ DISCIF	KED BY: I.J. PLINE:		CIVIL		•
DRAW J.T. CHECI DISCIF	KED BY: I.J. PLINE:	CROSS		25mm	- -
J.T. CHECI D.Y./ DISCIF TITLE: SHEE'	KED BY: I.J. PLINE: T NUMBE	R:		25mm DN A-A	- A
DRAW J.T. CHECI DISCIF TITLE: SHEET SSUE	KED BY: J.J. LINE:	R:	SECTIO SK3	25mm	■ A



			1			
		0	1 QUEENSVIEW TTAWA, ONTARI 20NADA K28 8K0 F: 613-829-8209 WWW.WSP.COM	O 2		
CLIEN	T: T REF. #:			IENT		С
PROJE		103 SCH	NEIDEF	ROAD		
ISSUE	D FOR - R	REVISION:				
1		2021/06/23	ISSUE FO	R SPA		В
IS	RE	DATE		DESCRIPTION		
	ECT NO:			DATE:		
	01794-0 NAL SCAL			JUNE 2021		
1:500	)			IF THIS BAR IS LONG, ADJUS	ST YOUR	
DESIG	NED BY:				1/2 ALE	
				PLOTTING \$	SCALE.	
D.Y. DRAW	N BY:			PLOTTING S	SCALE.	
D.Y. draw J.T.				PLOTTING \$	SCALE.	
D.Y. DRAW J.T. CHECP	KED BY:			PLOTTING \$		
D.Y. DRAW J.T.	KED BY: I.J.					
D.Y. DRAW J.T. CHECH D.Y./I DISCIF	KED BY: I.J. PLINE:		CIVIL			
D.Y. DRAW J.T. CHECH D.Y./	KED BY: I.J. PLINE:		CIVIL			A
D.Y. DRAW J.T. CHECH D.Y./I DISCIF	KED BY: I.J. PLINE:	CROSS		25mn		A
D.Y. DRAW J.T. CHECH D.Y./I DISCIF	KED BY: I.J. PLINE:		SECTIO	25mn		A
D.Y. DRAW J.T. CHECP D.Y.// DISCIF	KED BY: I.J. PLINE: T NUMBEF	<del>?</del> :		25mn	)	A
D.Y. DRAW J.T. CHECK D.Y.// DISCIF TITLE: SHEET SHEET ISSUE		<del>?</del> :	SECTIO SK4	25mn		A

	5		4			3			
	Γ								
С			76			PLAIN 100 YR ING GROUNG	76		
			74 300	mm MIN RIP-RAP	GEOTEXTILE, T	OP OF GROUND	74		
В		STATION		2+110	2+130	2+140		STATION	
		CENTERLINE GRADE	FINISHED EXISTING 73.99 73.99	74.78 74.78 74.61	74.61 74.31	74.31	FINISHED EXISTING	CENTERLINE GRADE	
A									
	5		4			3			

2011 QUEENSVIEW DR. OTTAWA, ONTARIO CANADA K2B 8K2 T: 613-829-2800 F: 613-829-8299 WWW.WSP.COM CLIENT: CLIENT: CLIENT REF. #: PROJECT:	С
103 SCHNEIDER ROAD	
ISSUED FOR - REVISION:	
1 2021/06/23 ISSUE FOR SPA	В
IS         RE         DATE         DESCRIPTION           PROJECT NO:         DATE:         DATE:         DATE:	
211-01794-00 JUNE 2021	
2 11-0 17 94-00     JONE 202 1       ORIGINAL SCALE:     IF THIS BAR IS NOT 26       1:500     LONG, ADJUST YOU       DESIGNED BY:     PLOTTING SCALE.       D.Y.     D.Y.	imm R
D.T. DRAWN BY:	
J.T.           CHECKED BY:           D.Y./I.J.	
TITLE: CROSS SECTION C-C	B mm R A V# D
SHEET NUMBER: SHEET #: 1 OF 5	V #
	)



-							
		0	1 QUEENSVIEW TTAWA, ONTAR TTAWA, ONTAR TTAWA, ONTAR TTAWA, ONTAR TTAWA T	O 2			
CLIEN	CLIENT: RENFROE LAND MANAGEMENT CLIENT REF. #:						
PROJE	ECT:	103 SCH	NEIDEF	ROAD			
ISSUE	D FOR - R	YEVISION:					
1		2021/06/23	ISSUE FO	R SPA		В	
IS	RE	DATE		DESCRIPTION			
	ECT NO:			DATE:			
044 0	01794-0			JUNE 2021			
211-0 ORIGI	WAL SUAL						
ORIGI				IF THIS BAR IS LONG, ADJUS			
ORIGI 1:500				if This Bar is Long, adjus Plotting s	ST YOUR		
ORIGI 1:500	) INED BY:			LONG, ADJUS	ST YOUR		
ORIGII 1:500 DESIG D.Y. DRAW	) INED BY:			LONG, ADJUS	ST YOUR		
ORIGII 1:500 DESIG D.Y. DRAW J.T.	) INED BY:	-		LONG, ADJUS PLOTTING S	ST YOUR SCALE.		
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI D.Y./	) INED BY: IN BY: KED BY: I.J.			LONG, ADJUS	ST YOUR SCALE.		
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI	) INED BY: IN BY: KED BY: I.J.		CIVIL	LONG, ADJUS PLOTTING S	ST YOUR SCALE.		
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI	) IN BY: KED BY: I.J. PLINE:		CIVIL	LONG, ADJUS PLOTTING S	ST YOUR SCALE.		
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI DISCIF	) IN BY: KED BY: I.J. PLINE:	CROSS		LONG, ADJUS PLOTTING S 25mn	ST YOUR SCALE.	A	
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI DISCIF	) IN BY: KED BY: I.J. PLINE:			LONG, ADJUS PLOTTING S 25mn	ST YOUR SCALE.	A	
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECH D.Y./ DISCIF	) IN BY: KED BY: I.J. PLINE:	CROSS	SECTIO	LONG, ADJUS PLOTTING S 25mn	ST YOUR SCALE.	A	
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECI D.Y./ DISCIF TITLE: SHEET SHEET	) NED BY: KED BY: I.J. PLINE: T NUMBEF	CROSS		LONG, ADJUS PLOTTING S 25mn	ST YOUR SCALE.	A	
ORIGII 1:500 DESIG D.Y. DRAW J.T. CHECH DISCIF TITLE: SHEET SHEET ISSUE	) N BY: KED BY: I.J. PLINE: T NUMBEF	CROSS	SECTIO SK6	LONG, ADJUS PLOTTING S 25mn	ST YOUR SCALE.	А	

5		4			3	}	
C		76	/ 100 YE	AR FLOOD PLAIN	76		
		74	100 YR 100 YR TOP OF G EXIST	ROUND FING GROUNG RIP-RAP	74		
В	STATION	73	PROP. 675	5mmØ CONC STM		STATION	
	CENTERLINE GRADE			++	FINISHED		
A							
5		4				}	

		0	1 QUEENSVIEW VTTAWA, ONTAR CANADA K2B 8K T: 613-829-8299 WWW.WSP.COM	IO 2		
	CLIENT: RENFROE LAND MANAGEMENT CLIENT REF. #:					
PROJE		103 SCH	INEIDEF	ROAD		
	D FOR - F	REVISION:				
1		2021/06/23	ISSUE FC	R SPA		В
IS	RE	DATE		DESCRIPTION DATE:		
		10		JUNE 2021		
211-01794-00 ORIGINAL SCALE: 1:500 DESIGNED BY: D.Y.				IF THIS BAR IS LONG, ADJUS PLOTTING S		
DRAW	N BY:					
J.T. CHECKED BY:						
D.Y./I				25mm		
TITLE:						
CROSS SECTION E-E						А
		CROSS	SECTIO	ON E-E		
SHEET	NUMBEI			ON E-E		
SHEET	·#:		SECTIO	7	REV #	
SHEET	JED F		SK7		REV #	