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FUNCTIONAL SERVICING REPORT

Millbrook South East Subdivision

East Side of County Road 10, South of Fallis Line
Community of Millbrook
Township of Cavan Monaghan
County of Peterborough

April 2021

Prepared For: **Vargas Properties Inc.**

File: **19121**



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1.0 INTRODUCTION

Valdor Engineering Inc. has been retained by Vargas Properties Inc. to provide consulting engineering services for the proposed Millbrook South East Subdivision located on 29.5 hectare parcel on the east side of County Road 10, south of Fallis Line, in the Community of Millbrook, Township of Cavan Monaghan, County of Peterborough as illustrated in **Figure 1**.

1.1 Existing Conditions

The subject site is bounded to the west by County Road 10 and external lands fronting County Road 10, to the north by agricultural lands and the future Fallis Line extension, to the east by forested lands, and to the south by residential development along Nina Court. The southern portion of the site is traversed by a tributary of Baxter Creek which flows in an easterly direction. The geotechnical and topographical conditions of the site are summarized as follows:

1.1.1 Geotechnical

A Geotechnical Investigation Report prepared by GHD Ltd. (March 8, 2021) for the subject site included thirteen boreholes and six test pits, ranging in depth from 3.0 m to 8.2 m. Based on the investigation it was determined that the site is covered by a topsoil layer having a depth of approximately 150-300mm underlain by silty sand and then glacial till and/or silty clay. The boreholes are included in **Appendix "H"**.

1.1.2 Topography

The surface condition of the subject site can be generally described having a rolling topography. Based on a recent topographic survey of the site, the property generally slopes down from the intersection of County Road 10 and Fallis Line in a southeasterly direction towards the tributary of Baxter Creek. Based on an existing elevation of approximately 255.6 m at the County Road 10 and Fallis Line intersection, and an existing elevation of 209.6 at the south-east limit of the development, the differential of 46.0 m equates to an overall average slope of approximately 6.4% which is considered to be relatively steep.

1.2 Proposed Development

The proposed development consists of a mix of lots for detached dwellings and street townhomes as well a block for medium density housing and a commercial block. The lot frontages for the detached dwellings will range from 10.7m to 15.9m while the townhomes will consist of 7.6m frontages. Access for the subdivision will consist of a road network with two road connections off Fallis Line and one road connection to Nina Court at the south limit of the subdivision. A block of land has been established for a stormwater management facility to control and treat stormwater runoff. The remainder of the site, associated with the tributary of Baxter Creek and the forested lands in the eastern portion of the site, will be retained in environmental protection blocks.

A copy of the Draft Plan of Subdivision as well as the Conceptual Master Plan is contained in **Appendix "A"** together with the calculation of the equivalent population which is

summarized in **Table 1A** and **Table 1B**. The Draft Plan indicates the proposed development within the limits of the current urban boundary for the community of Millbrook. The Conceptual Master Plan indicates the proposed ultimate development of the lands in anticipation of an expansion of the urban boundary.

Table 1A. Development Statistics – Proposed Draft Plan

Land Use	Area (Ha)	Residential Units (No.)	Equivalent Population (persons)
Detached Dwellings	3.18	70	245
Street Townhomes	0.27	10	35
Commercial	3.10		11
Stormwater Management Pond	1.62		
Natural Heritage Systems	14.31		
Parkland & Trails	0.02		
Roads & Road Widening	2.18		
Future Development	4.79		
TOTAL	29.47	80	291

Table 1B. Development Statistics – Ultimate Development

Land Use	Area (Ha)	Residential Units (No.)	Equivalent Population (persons)
Detached Dwellings	5.77	116	406
Street Townhomes	1.57	58	203
Medium Density	0.23	70	140
Commercial	3.10		11
Stormwater Management Pond	1.62		
Natural Heritage Systems	14.31		
Parkland & Trails	0.02		
Roads & Widening	2.85		
TOTAL	29.47	244	760

1.3 Purpose of Report

This report has been prepared in support of the application for draft plan approval for the subject property. The primary intent of the report is to demonstrate the viability of water and wastewater servicing, storm drainage and stormwater management, grading as well as vehicular and pedestrian access for the proposed development with respect to applicable guidelines, policies and design criteria.

This report has been prepared based on a review of the topographic survey and background studies, discussions with municipal staff and a visit to the site. This document provides guidance for detailed engineering design of the subdivision. A **Preliminary Servicing & Grading Plan** is included in a pouch at the rear of the report.

1.4 Approving Authorities

This report will be circulated for review, comment and approval to:

1. The Township of Cavan Monaghan;
2. The County of Peterborough; and
3. The Otonabee Region Conservation Authority (ORCA).

2.0 WATER SERVICING

The existing Millbrook water servicing system consists of a water treatment facility, with water taken from three local wells, a water storage tank and a network of watermains that service most of the existing urban area of the community.

The existing Millbrook Water Treatment Plant (WTP) consists of 3 wells, each with 25 L/s capacity, chlorine disinfection and a chlorine contact tank. The existing water storage tank was built in 1976 and is located on the east end of Millbrook on a local high point of land. The existing 10.4m diameter tank has a useable storage capacity of 1,410m³ with a top water level at an elevation of 278.0m.

The Township of Cavan Monaghan completed a Class Environmental Assessment (Class EA) in June 2014 to investigate on the alternatives to address concerns associated with the water storage and water servicing needs. In this regard, the expansion of the existing urban boundary of Millbrook required additional water storage and expansion of the existing water servicing network to the new development area.

As a result, a new, larger water storage tank was constructed on the Township Office site, a new watermain was constructed to connect to the tank to the existing water supply main and the original water storage tank in Millbrook as decommissioned. A booster station was also constructed within the Township Office site to ensure proper minimum fire pressures are maintained during maximum day demand throughout the higher elevations within the development.

The Township has recently initiated a Water and Wastewater Master Servicing Study as part of a Municipal Class Environmental Assessment to examine water and wastewater servicing alternatives within the current urban boundary and beyond. This study should consider the proposed draft plan as well as the ultimate development for the subject lands.

The following is a summary of the water servicing requirements for the subject site.

2.1 Domestic Demand

The domestic water demand is to be calculated using the Township and Ministry of the Environment design standards which includes the following parameters:

Residential Average Day Demand:	450 L/person/day
Maximum Day Factor:	2.00
Peak Hour Factor	3.00

A detailed tabulation of the domestic water demand calculation is detailed in **Table B1** of **Appendix "B"**. The domestic demands for the proposed draft plan and the ultimate development are summarized in **Table 2A** and **Table 2B**, respectively.

Table 2A. Domestic Water & Fire Flow Demand – Proposed Draft Plan

Land Use	Equivalent Population (Persons)	Domestic Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)	Fire Flow (L/min)	Maximum Day Plus Fire Flow (L/min)
Detached Dwellings	245	76.6	153.1	229.7	8,000	
Street Townhomes	35	10.9	21.9	32.8	7,000	
Commercial Block	11	3.4	6.9	10.3		
TOTAL	291	90.9	181.9	272.8	8,000	8,182

Table 2B. Domestic Water & Fire Flow Demand – Ultimate Development

Land Use	Equivalent Population (Persons)	Domestic Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)	Fire Flow (L/min)	Maximum Day Plus Fire Flow (L/min)
Detached Dwellings	406	126.9	253.8	380.6	8,000	
Street Townhomes	203	63.4	126.9	190.3	7,000	
Medium Density	140	43.8	87.5	131.3		
Commercial Block	11	3.4	6.9	10.3		
TOTAL	760	237.5	475.0	712.5	8,000	8,475

2.2 External Watermains

The location of the existing Water Treatment Plant, existing water storage tank and the existing water booster station are indicated in **Figure 2**. The subject site will be serviced by an 250mm diameter watermain on Fallis Line which has been stubbed immediately east of County Road 10. To complete a loop, the proposed watermain system will also connect to the existing 150mm diameter watermain on Nina Court at the south limit of the site,

2.3 Local Watermains & Service Connections

The local water distribution system within the subdivision will consist of watermains ranging in diameter from 150mm to 250mm. This water system will connect to the trunk watermain.

In accordance with Township standards the individual detached dwellings are each to have separate water connections. Based on Ontario Building Code (OBC 2012) regulations (7.6.3.4.(1) and (5) and Table 7.6.3.4), the dwellings will be serviced with 25mm diameter water connections given that it is anticipated that the dwellings will each have more than 16 fixture units.

Water meters are to be purchased from the Township and will be installed in the basement of each dwelling with a remote readout device located on the exterior ground floor wall of the house. Generally, residential water meters are selected to be one size smaller than the water service and therefore 20mm x 25mm water meters will be installed.

The configuration of the site watermain is illustrated on the **Preliminary Site Servicing & Grading Plan**. A copy of the Township standard water service connection and water meter details is included in **Appendix "B"**.

2.4 Fire Protection

The fire flow required for the proposed dwelling units was calculated using the criteria indicated in the *Water Supply for Public Fire Protection Manual*, 1999, by the Fire Underwriters Survey (FUS). The calculation incorporates various parameters such as coefficient for fire-resistant construction, an area reduction accounting for a fire-resistant (one hour rating) protection, a reduction for low-hazard occupancies, and a factor for neighbouring building proximity.

The calculation was completed to reflect the governing conditions which are the largest detached dwelling and the largest interior townhouse unit. Based on the calculations, the minimum fire suppression flow required for the detached dwellings and the townhouse units is 8,000 L/min and 7,000 L/min respectively. The detailed fire flow calculation is shown in **Table B2-1** to **Table B2-2** of **Appendix "B"**. In accordance with the Township standards, this flow must be available at the nearest hydrant with a minimum pressure of 140 KPa.

Fire hydrants will be provided along the municipal roads such that a fire hydrant will be available within 90m of the principle entrance of each unit as set out in the Ontario Building Code (OBC 2012). A copy of the standard fire hydrant detail is included in **Appendix “B”**.

3.0 WASTEWATER SERVICING

The community of Millbrook is currently serviced by the existing Millbrook Wastewater Treatment Plant (WWTP) located at the east limit of Centennial Lane. This WWTP was built in 1975 and the plant was upgraded in 2004 to improve the treatment quality.

In May 2013 the Township of Cavan Monaghan completed a Class Environmental Assessment (Class EA) which investigated the alternatives to address concerns associated with the existing WWTP, in particular, the fact that it did not have sufficient capacity to sustain the projected growth. In addition, the existing plant is at the end of its useful life and requires substantial upgrade and rehabilitation. Based on the recommendations of the EA, the expansion and upgrade of the existing Millbrook WWTP was completed in 2015 to include a high-level tertiary treatment facility that is able to provide improved effluent quality to meet the current effluent discharge criteria, as well as the increased capacity to accommodate future flows.

The Township has recently initiated a Water and Wastewater Master Servicing Study as part of a Municipal Class Environmental Assessment to examine water and wastewater servicing alternatives within the current urban boundary and beyond. This study should consider the proposed draft plan as well as the ultimate development for the subject lands.

The location of the existing sanitary sewers and the WWTP is indicated in **Figure 3**. The following is a summary of the wastewater servicing analysis for the subject site.

3.1 Wastewater Loading

The wastewater loading is to be calculated using the Township engineering design standards which include the following parameters:

Residential Average Daily Flow: 450 L/person/day

Residential Peaking Factor: $K_H = 1 + \frac{14}{4 + \sqrt{P}}$

Where: K_H = Harmon Peaking Factor
(Max. 4.0, Min. 2.75)
 p = Population in thousands

Extraneous Flow, I : 0.28 L/s/Ha (Infiltration)

Design Flow, Q = $Q \times K_H + I$

Based on the above criteria the sewage flow calculations are provided in **Table C1** contained in **Appendix “C”** and the wastewater flow for the proposed draft plan and the ultimate development are summarized in **Table 3A** and **Table 3B**, respectively.

Table 3A. Wastewater Loading Summary – Proposed Draft Plan

Land Use	Area (Ha)	Equivalent Population (Persons)	Average Daily Flow (L/s)	Peaking Factor	Peak Daily Flow (L/s)	Infiltration Rate (L/s)	Total Flow (L/s)
Detached Dwellings	3.18	245	1.28	4.11	5.25	0.89	6.14
Street Townhomes	0.27	35	0.18	4.34	0.79	0.08	0.87
Commercial	3.10	11	3.57	2.50	8.91	0.87	9.78
Roads	2.18					0.61	0.61
TOTAL	8.73	291	5.02		14.95	2.44	17.40

Table 3B. Wastewater Loading Summary – Ultimate Development

Land Use	Area (Ha)	Equivalent Population (Persons)	Average Daily Flow (L/s)	Peaking Factor	Peak Daily Flow (L/s)	Infiltration Rate (L/s)	Total Flow (L/s)
Detached Dwellings	5.77	406	2.11	4.02	8.50	1.62	10.11
Street Townhomes	1.57	203	1.06	4.15	4.38	0.44	4.82
Medium Density	0.23	140	0.73	4.20	3.06	0.06	3.13
Commercial	3.10	11	3.57	2.50	8.91	0.87	9.78
Roads	2.85					0.80	0.80
TOTAL	13.52	760	7.47		24.86	3.79	28.64

3.2 External Sanitary Sewers

A 525mm diameter trunk sanitary sewer has been constructed to the south limit of the subject lands. This trunk sewer will be extended northerly along Street “A” to the proposed Fallis Line extension and will service the subject lands as well as future development lands north of the proposed Fallis Line extension, east of County Road 10. The alignment of the trunk sanitary sewer is indicated in **Figure 3**.

An analysis of the downstream sanitary sewer was conducted to confirm that there is sufficient capacity. In this regard, a sanitary sewer design sheet has been prepared which indicates that there is sufficient capacity in the downstream sanitary sewer from the subject site to the WWTP to accommodate the subject lands. The design sheet is included in **Appendix “C”** together with the sanitary sewer drainage plan as delineated in **Figure C-1**.

3.3 Local Sanitary Sewers & Service Connections

The subject site will be serviced by a local sanitary system consisting of 200mm diameter sewers. The local sewer will be designed such that the upstream end of each length will have a minimum 1% slope to assist with self-cleansing. In accordance with standard

practice, manholes will be provided for maintenance access at a maximum spacing of 120m.

Each dwelling unit will be provided with a 100mm diameter single connection in accordance with Township standards.

4.0 STORM CONVEYANCE SYSTEM

The subject site is located in the Baxter Creek watershed which is one of the twelve watersheds under the jurisdiction of the Otonabee Region Conservation Authority (ORCA). Baxter Creek originates from the Oak Ridges Moraine and flows in an easterly direction and outlets into the Otonabee River. Baxter Creek meets the Otonabee River approximately 20 km upstream of Rice Lake. A map illustrating the Baxter Creek watershed is contained in **Appendix "D"**.

In accordance with Township standards, a major / minor system storm conveyance concept has been incorporated into the functional servicing design for the subject development. The following sections provide a brief summary of the storm drainage components:

4.1 Minor System Design

As per the Township engineering design criteria, the proposed development is to be serviced with a minor storm sewer system that is designed to convey runoff from the 5-year storm event. The rainfall intensity values, I , are calculated in accordance with the 2014 rainfall intensity duration frequency (IDF) data for the Peterborough Airport weather station, obtained from Environment Canada. Based on this data the rainfall intensity for the 5- and 100-year rainfall events is calculated as follows:

$$I_5 = \frac{844}{(t+7.5)^{0.78}} \quad I_{100} = \frac{1697}{(t+10.5)^{0.81}}$$

The peak flows are calculated using the following formula:

$$Q = R \times A \times I \times 2.778$$

where: Q = peak flow (L/s)

A = area in hectares (ha)

I = rainfall intensity (mm/hr)

R = composite runoff coefficient

t = time of concentration (min)

The proposed storm sewer will discharge to the proposed stormwater management facility (SWM pond) located in the north-west corner of the site.

The IDF curve data is included in **Appendix "D"**. A schematic design of the minor system is illustrated in on the **Preliminary Site Servicing & Grading Plan**.

4.2 Major System Design

The major system will generally be comprised of an overland flow route along the municipal road network directing drainage to a safe outlet. This major system will convey

flows which are in excess of the capacity of the minor storm sewer system. The major system flow route is illustrated in on the **Preliminary Servicing & Grading Plan**. Major flows will be captured at the low point on Street 'A' and conveyed to the SWM pond via an overland flow route.

4.3 Foundation Drainage

It is anticipated that the dwellings will have basements and therefore a foundation weeping tile system will be required. In accordance with Township standards, storm service connections are to be provided to each dwelling unit. A hydraulic grade line analysis of the storm sewer system will be completed at the detailed design stage to ensure that basements are protected during the 100-year storm event.

4.4 Roof Drainage

It is anticipated that the proposed dwellings will have conventional peaked roof with eaves troughs and downspouts. As per standard practice the downspouts are to discharge to grade over splash pads, preferably towards sodded areas. Roof downspouts are not to be connected to the storm sewer.

4.5 Floodplain Analysis

The south part of the subject site is traversed by a tributary of Baxter Creek which flows in an easterly direction under Street "A". The total upstream drainage area of this tributary is approximately 68.29 ha (*Catchments 401-403*), as shown on **Figure 4**.

In order to determine the extent of the Regulatory floodplain at this location, a HEC-RAS model was prepared and the Regulatory floodplain has been delineated for both the pre-development (**Figure 5**) and post-development (**Figure 6**) conditions. As indicated in **Figure 6**, the Regulatory flood plain will be entirely contained within open space blocks and therefore the proposed lots are protected from flooding. Supporting documentation, VO5 and HEC-RAS modelling output, and hydraulic calculations are provided in **Appendix "E"**.

A 2.4 m wide by 1.2 m high open-bottom concrete box culvert is proposed at Street "A" to accommodate the watercourse. This culvert has been sized to convey the regional flow.

5.0 STORMWATER MANAGEMENT

5.1 Storm Drainage Areas

Based on the topographic survey and the proposed draft plan of subdivision, the following is a summary of the pre and post-development drainage areas.

5.1.1 Pre-Development

Under pre-development conditions, the subject site north of the Baxter Creek tributary (*Catchment 101*, 11.77 ha) drains in a south-easterly direction to the tributary, along with an external area fronting County Road 10 (*Catchment 103*, 4.27 ha). The portion of the site located to the south of the tributary (*Catchment 102*, 3.68 ha) generally drains in a north-easterly direction to the tributary.

For the purpose of the pre-development modelling, drainage boundaries were determined based on the post-development limits, except along the northern boundary where a drainage divide was identified.

The existing land uses comprise of forests and meadows (all catchments), as well as row crops (*Catchment 101*) and some open space and impervious areas (*Catchment 103*). **Figure 7** illustrates the drainage patterns for the pre-development condition.

5.1.2 Post-Development

The proposed development consists of a mix of residential (single detached, townhomes and medium density) and commercial land uses, in addition to the SWM block and the open space blocks to remain undeveloped.

The majority of the subject site (*Catchment 201*, 14.95 ha), including the external institutional development on the north side of the future Fallis Line extension, will drain to the SWM pond. An external future development area (residential) along County Road 10 (*Catchment 202*, 4.27 ha) has also been identified and assumed to be conveyed to the SWM pond. Drainage will be conveyed to the SWM pond (*Catchment 203*, 1.39 ha) via the storm sewer system, or overland via the road network to the low point on Street "A" adjacent to the SWM pond maintenance access road.

Discharge from the SWM pond will be released to the Baxter Creek tributary downstream of the Street "A" crossing via an outlet pipe under Street "A". **Figure 8** illustrates the drainage patterns for the post-development condition.

Due to grading constraints, the rear of lots along the eastern and southern portion of the site (*Catchment 204*, 2.93 ha) will drain uncontrolled. Adequate overcontrol will be provided by the SWM pond to account for this uncontrolled drainage.

5.2 Stormwater Management Design Criteria

The proposed SWM facility shall be designed to provide the following levels of control as per the requirements of the Ministry of the Environment (MOE), Otonabee Region Conservation Authority (ORCA) and Township of Cavan Monaghan:

- **Quality control:** The permanent pool shall be sized to provide Enhanced (Level 1) treatment of stormwater runoff for the proposed development.
- **Erosion control:** Stormwater runoff from the 25 mm storm event shall be stored and released over a minimum 24-hour period (48 hours preferred).

- **Flood control:** Flood storage and control shall be provided to maintain peak outflows from the pond at or below pre-development levels for the critical of the 6, 12 & 24-hour SCS, the 6, 12 & 24-hour AES, and the 4-hour Chicago storm distributions, for the 2-yr through 100-yr design storm events.

5.3 Stormwater Management Pond Design

A wet detention pond SWM facility is proposed to serve the subject site. The total service area for the SWM pond is approximately 20.61 ha (including the future development area). The proposed SWM pond is located at the south-west corner of the proposed development, as illustrated in **Figure 9**.

Per the Township standards, MOE SWM pond criteria and recommendations in the geotechnical report, the SWM pond design includes 5H:1V side slopes for 3.0 to either side of the normal water level with 4H:1V slopes above, and 3H:1V slopes below, the permanent pool. A 4.0 m wide maintenance access road is provided along the top of the pond with a maximum 10% slope.

5.3.1 Quality Control

Various source controls, conveyance and end-of-pipe SWM facilities were considered to provide the appropriate level of stormwater quality control. Reduced lot grades, rear and side yard swales, and discharge of roof leaders to pervious surfaces will augment the control provided by the SWM facility and promote infiltration where possible. Based on a preliminary review of available controls, it appears that the primary and most effective option to provide water quality control for runoff from the contributing drainage areas is a SWM facility. The options reviewed are as follows:

- **Roof Leader to Ponding Areas or Soakaway Pits (Lot Level):** The Township design criteria do not address the use of ponding areas or soakaway pits in the rear yards. Roof leaders will discharge directly to pervious surfaces to encourage infiltration and filtration on the lots. Soakaway pits can be an effective means of improving infiltration of stormwater, but require a large area in comparison to typical residential rear yard dimensions. As a result, soakaway pits and ponding areas are not recommended.
- **Grassed Swales (Conveyance):** Rear and side yard swales will be incorporated into the grading plan. The swales will convey runoff to rear lot catch basins. The number of rear lot catch basins will be minimized in order to encourage infiltration via swales.
- **Stormwater Management Facilities (End-of-Pipe):** Based on discussions with the ORCA, SWM facilities are required to provide water quality, extended detention and flood control of stormwater runoff. Stormwater management facilities will be constructed within the subject property.
- **Oil/Grit Separation Technologies (End-of-Pipe):** These SWMF's can be effective for smaller, high impervious sites where spill protection is desired and when area for a stormwater pond is unavailable. The construction of the stormwater pond will eliminate the need for any oil/grit separation units.

- Infiltration Trenches/Basins (End-of-Pipe): These SWMF's are most effective in areas with highly pervious soils and large areas.

In accordance with the ORCA requirements for development within the Baxter Creek watershed, Enhanced (Level 1) water quality protection shall be provided by the proposed SWM facility. Based on a total average imperviousness of 75.0%, the required permanent pool volume is provided below.

SWM Pond Permanent Pool Volume Calculation

Volume required for catchment with 75.0% imperviousness:	233.3 m ³ /ha
Less 40 m ³ /ha of extended detention storage zone:	- 40.0 m ³ /ha
Permanent Pool Volume Required:	193.3 m ³ /ha

The permanent pool storage volume required for the Pond is 193.3 m³/ha × 20.61 ha = 3,985 m³.

In order to maintain a permanent pool of water in the pond and to prevent the mixing of surface water with ground water, the base of the SWM pond will be protected with an appropriate liner. A review of the Geotechnical Investigation Report for the site indicates that the native, undisturbed silty clay, or till with finer-grained gradation (silts and clays) would have a sufficiently low permeability and could substitute for a liner.

The normal water level of the permanent pool for the pond is set at an elevation of 212.50 m. The bottom of the pond is set at an elevation of 210.50 m in the forebay and 211.00 in the main cell, providing a permanent pool depth of 2.00 m and 1.50 m, respectively. The actual permanent pool storage volume provided is approximately 5,097 m³ which is greater than the minimum required volume (3,985 m³). The required and provided quality control volume together with the elevation of the normal water level are summarized in **Table 5**.

The forebay has been sized based on MOE design criteria and supporting calculations are provided below. These calculations have been completed based on the more conservative development scenario, which includes the potential future development to the west.

Forebay Sizing Calculations

The proposed forebay is approximately 58 m in length and 25 m in width, on average. The resultant length-to-width ratio is therefore 2.3:1. Using the methodology provided in the *Stormwater Management Planning and Design Manual*, the recommended forebay length based on particulate settling is calculated using the following expression:

$$Dist = \sqrt{\frac{r \cdot Q_p}{V_s}} \quad [1]$$

where: *Dist* is the forebay length (m)
r is the length-to-width ratio of the forebay (2.3:1 or *r* = 2.3)

- Q_p is the pond's peak discharge (0.030 m³/s, VO modelling of 25 mm storm)
 V_s is the settling velocity (0.0003 m/s for 150 µm particles)

Solving [1] gives:

$$Dist = \sqrt{\frac{2.3 \times 0.030}{0.0003}} = 15.2 \text{ m}$$

The recommended forebay length based on flow dispersion calculations is calculated using the following expression:

$$Dist = \frac{8 \cdot Q}{d \cdot V_f}, \quad [2]$$

- where: $Dist$ is the forebay length (m)
 Q is the peak inlet flow (1.958 m³/s, VO modeling of 5-year storm)
 d is the depth of the permanent pool in the forebay (2.00 m)
 V_f is the desired velocity in the forebay (0.50 m/s)

Solving [2] gives:

$$Dist = \frac{8 \times 1.958}{2.00 \times 0.50} = 15.7 \text{ m}$$

The distance from the headwall to the forebay berm is 58 m. The proposed design therefore satisfies the minimum forebay length recommendations.

The minimum recommended forebay bottom width is calculated as follows, based on the maximum distance from the calculations above:

$$Width = \frac{Dist}{8} = \frac{15.7}{8} = 2.0 \text{ m}$$

The design proposes an average forebay bottom width of approximately 12 m, which satisfies this criterion.

5.3.2 Erosion Control

In accordance with the ORCA guidelines, erosion control shall be provided using an extended detention active storage zone sized to capture the runoff resulting from a 25 mm rainfall event and to release the runoff over a period of at least 24 hours. Based on the VO5 modelling of this storm condition (i.e. the 25 mm 4-hour Chicago storm distribution), the estimated runoff volume is 15.85 mm distributed over the 20.61 ha catchment area draining to the SWM pond, for a required erosion control volume of 3,267 m³.

Based on the design for the SWM pond, the extended detention volume provided is 3,573 m³ at an elevation of 213.20 m. This exceeds the required erosion control

volume of 3,267 m³. The proposed extended detention depth is 0.70 m, which is less than the maximum recommended extended detention depth of 1.00 m.

The extended detention function of the pond will be controlled with a 140 mm diameter orifice plate (*Orifice #1*) located in the box manhole control structure to achieve the minimum required drawdown time of 24 hours (48 hours is considered preferable).

The drawdown time can be calculated using the following expressions, from the *Stormwater Management Planning and Design Manual*:

$$t_d = \frac{0.66 \cdot C_2 \cdot h_1^{1.5} + 2 \cdot C_3 \cdot h_1^{0.5}}{2.75 \cdot A_o} \quad [3]$$

where: t_d is the drawdown time (s)
 h is the maximum water elevation above the orifice (0.63 m)
 A_o is the cross-sectional area of the orifice (0.0155394 m²)
 C_2 is the slope coefficient from area-depth linear regression (1984.3)
 C_3 is the intercept from area-depth linear regression (4403.0)

The variable h is the maximum water elevation above the centroid of the orifice and is calculated as follows (invert of orifice set at normal water level):

$$h_1 = HWL_{25mm} - \left[NWL + \frac{D}{2} \right] = 213.20 - \left[212.50 + \frac{0.140}{2} \right] = 0.63 \text{ m}$$

where: HWL_{25mm} is the high water level for the 25 mm rainfall (213.20 m)
 NWL is the normal water level (212.50 m)
 D is the diameter of the orifice (0.140 m)

Solving [3] yields:

$$t_d = \frac{0.66 \times (1984.3) \times (0.63)^{1.5} + 2 \times (4403.0) \times (0.63)^{0.5}}{2.75 \times (0.015394)} = 180,576s = 50.2 \text{ hrs}$$

The orifice size, erosion control release rate, draw down time, extended detention volume and water level are summarized in **Table 5**.

5.3.3 Quantity Control

As per the ORCA and the Township's standards, the SWM facility shall be designed to control the post-development peak flow to pre-development levels for the 2-year through 100-year design storms and to safely convey the greater of the uncontrolled 100-year or Regional flow.

A critical storm analysis was completed to determine which storm distribution (based on the latest Peterborough Airport IDF data for 1971-2006 obtained from Environment Canada) requires the largest storage volume to achieve pre-

development target flow rates. Based on the results provided in **Table F.9** (provided in **Appendix “F”**), the 6-hour AES storm was identified as the critical storm requiring the largest storage volume to achieve the 100-year flow control.

The preliminary rating curve is provided in **Table F.5** (provided in **Appendix “F”**), and consists of a box manhole control structure with a 1.20 m wide weir (*Weir #1*) cut into the wall of the box manhole.

Table 4 shows the VO5 modelling results based on the 6-hour AES storm distribution, and **Table 5** shows the SWM pond performance characteristics for each return period event.

The SWM pond has been designed with a total active storage volume of 8,763 m³ at an elevation of 214.00 m. The expected maximum storage required during 100-year storm conditions is approximately 8,317 m³. The provided active storage is therefore sufficient.

As shown in **Table 4**, the peak discharge rates are equal to or less than the target release rates. Adequate overcontrol has been provided to account for the uncontrolled drainage areas. Supporting documentation (**Tables F.1-9**) and output from the VO5 modelling is provided in **Appendix “F”**.

Table 4. Summary of Storm Drainage Peak Flows

Return Period	Existing Peak Flows (m ³ /s)	Proposed Peak Flow (m ³ /s)
25mm Chicago	-	0.117
2-year	0.308	0.166
5-year	0.599	0.439
10-year	0.834	0.674
25-year	1.163	0.978
50-year	1.431	1.255
100-year	1.714	1.543
Regional	-	2.103

5.3.4 Thermal Mitigation Measures

Mitigation measures shall be incorporated into the SWM pond design to minimize thermal impacts to the receiving watercourse. These measures include a bottom draw pipe and a planting strategy to promote shading along the pond perimeter.

Bottom Draw Pipe

Instead of the common perforated riser configuration, a bottom draw pipe will be implemented for the extended detention component to discharge water from the deepest section of the pond where the water temperature is lowest. This outlet consists of a submerged intake headwall and a bottom draw pipe which discharges via an orifice plate in the quality control structure. Given that this pipe is sized for frequent rainfall events (25 mm storm), it will provide the greatest benefit to the thermal regime of the receiving watercourse.

Planting Strategy

In accordance with the Township and ORCA requirements the SWM facility will be planted to provide a natural appearance and to provide environmental benefits. The landscape plan will specify shade producing species to minimize solar heating of the permanent pool during summer months. The forebay design provides additional pond perimeter where shade producing vegetation can be planted.

5.3.5 SWM Pond Inspection & Maintenance

The stormwater management facility should be inspected periodically to determine the frequency of maintenance activities. As such, maintenance activities will be performed on an as-required basis. During the first two years of operation, it is recommended that the stormwater management facility be inspected following significant storm events to determine if and when maintenance activities are required. Subsequently, inspections should be carried out twice per year. The following items should be considered when inspecting the pond:

- Sediment accumulation to determine cleanout requirements;
- Erosion of side slopes and outfall channel;
- Safety hazards;
- Hydraulic operation of the pond;
- Drawdown time following a rainfall event (extended drawdown time greater than 50 hours may indicate a blocked orifice or intake);
- Condition of terrestrial and aquatic vegetation;
- Trash accumulation near hydraulic structures; and
- Surface sheen indicating possible oil contamination.

Table 5: SWM Facility Performance Summary

Quality Control		
	Protection Level	Level 1 (Enhanced)
	Permanent Pool Required (m ³)	3,985
	Permanent Pool Provided (m ³)	5,097
	Normal Water Level, NWL (m)	212.50
Erosion Control		
25mm Chicago	Orifice Size (mm)	140
	Draw Down Time (hrs)	50.2
	Flow In (m ³ /s)	1.420
	Flow Out (m ³ /s)	0.030
	Storage Used (m ³)	2,969
	Pond W.S. Elevation (m)	213.09
Quantity Control (6-hour SCS)		
2-year	Flow in (m ³ /s)	1.384
	Flow Out (m ³ /s)	0.148
	Storage Used (m ³)	4,415
	Pond W.S. Elevation (m)	213.34
5-year	Flow in (m ³ /s)	1.958
	Flow Out (m ³ /s)	0.386
	Storage Used (m ³)	5,456
	Pond W.S. Elevation (m)	213.51
10-year	Flow in (m ³ /s)	2.379
	Flow Out (m ³ /s)	0.589
	Storage Used (m ³)	6,171
	Pond W.S. Elevation (m)	213.62
25-year	Flow in (m ³ /s)	2.900
	Flow Out (m ³ /s)	0.861
	Storage Used (m ³)	7,035
	Pond W.S. Elevation (m)	213.75
50-year	Flow in (m ³ /s)	3.364
	Flow Out (m ³ /s)	1.081
	Storage Used (m ³)	7,664
	Pond W.S. Elevation (m)	213.84
100-year	Flow in (m ³ /s)	3.773
	Flow Out (m ³ /s)	1.316
	Storage Used (m ³)	8,317
	Pond W.S. Elevation (m)	213.93
Regional Storm (Timmins)	Flow in (m ³ /s)	2.192
	Flow Out (m ³ /s)	1.839
	Storage Used (m ³)	9,232
	Pond W.S. Elevation (m)	214.06

5.4 Site Water Balance

In accordance with the requirements of the ORCA, a site water balance assessment for the subject development area was completed by GHD Ltd. and included in the Geotechnical Investigation Report (March 8, 2021). The goal of the water balance assessment is to determine the overall infiltration deficit under proposed conditions and to design infiltration mitigation measures as part of an overall mitigation strategy to maintain pre-development infiltration volumes. The water balance assessment was completed based on the preliminary draft plan with a development area of 29.5 ha. Excerpts from the GHD letter report regarding the water balance analysis are included in **Appendix H**. The findings of the GHD water balance analysis are summarized below.

For the pre-development condition a total estimated infiltration of 41,098 m³/year for the site was determined.

For the post-development condition, without infiltration enhancements, a total estimated infiltration of 27,375 m³/year for the site was determined. This corresponds to a total infiltration deficit of 13,723 m³/year, a 33% decrease in annual infiltration compared to the pre-development condition.

The decrease in annual infiltration indicates the need for Low Impact Development (LID) strategies be implemented in order to maintain pre-development infiltration rates. Primary enhancement LID measures identified by GHD include reducing lot grades, increasing topsoil depth, and directing residential roof leaders to grassed areas. Additional enhancement LID measures identified by GHD include, but are not limited to, rainwater harvesting, infiltration trenches, vegetated filter strips, bioretention, permeable pavement, enhanced grass swales, dry swales and perforated pipe systems.

The water budget calculations were repeated for the post-development condition, with the inclusion of roof downspout disconnection infiltration enhancement LIDs, which direct clean water from rooftops to lawn areas to be infiltrated. Based on this calculation, it was determined that the pre-development infiltration volume (41,098 m³/year) can be maintained, resulting in no infiltration deficit.

Further refinement to the water balance calculations and the design of LID measures will be completed at detailed design.

6.0 VEHICULAR & PEDESTRIAN ACCESS

The layout of the proposed subdivision has been developed with consideration for efficient and safe access and circulation of both vehicular and pedestrian traffic.

6.1 Municipal Roads

The subject site has a frontage on both Fallis Line and on County Road 10. Fallis Line, east of County Road 10 is a 20.0m wide Township road allowance which is currently unopened and untravelled. County Road 10 is an arterial road which is under the

jurisdiction of the County of Peterborough. This road consists of a rural cross section having two lanes with partially paved shoulders and road side ditches.

The vehicular access to the subdivision will be facilitated by two connections, being the intersections of Street "A" and Street "C" with the proposed Fallis Line extension. Road access will also be provided to Nina Court at the south limit of the subdivision

The streets in the subdivision will be in the form of 20.0m road allowances with Street "A" having 10.0m wide pavement and the rest of the streets will have 8.5m pavement width. The proposed roads will have urban sections having pavement crowned with a 2.0% cross fall and edged with concrete curb and gutter. The longitudinal slope of the road will generally be 0.50% with some length of road ranging up to 6.5% slope. The standard road cross sections are included in **Appendix "G"**.

Based on the recommendations contained in the Geotechnical Investigation Report for the site, the recommended minimum pavement structure for the proposed roads is as follows:

Municipal Roads

<u>Material</u>	<u>Compacted Depth</u>
HL3 Surface Course Asphalt	40mm
HL8 Base Course Asphalt	50mm
Granular "A"	150mm
Granular "B"	450mm

6.2 Driveways

Each dwelling will have an attached garage and driveway. The recommended pavement structure for the residential driveways is as follows:

Driveways

<u>Material</u>	<u>Compacted Depth</u>
HL3 Surface Course Asphalt	40mm
Granular "A"	150mm

The residential driveways will be either single or double car width. The slope of driveways is to be within the range of 1.0% to 7.0% in accordance with Township criteria.

6.3 Sidewalks, Walkways & Trails

Internal pedestrian access will be provided by standard 1.5m wide concrete sidewalks to safely guide residents through the subdivision for access to the proposed commercial block and the existing community centre. Sidewalks will be generally constructed on one side of each road. The sidewalks will have tactile warning plates at all curb ramps in accordance with Provincial accessibility standards.

Details of the standard sidewalk, curb ramp and tactile warning plate are included in **Appendix "G"**.

7.0 GRADING

As is typical will all subdivision, earthmoving is required, to varying degrees, in order to achieve the municipal design criteria and accommodate the development form.

7.1 Grading Criteria

The subject site is to be graded in accordance with the Township grading criterion which dictates that road grades are to range from 0.5% to 8.0% and that sodded yard areas are to range from 2.0% to 5.0%. For large grade differentials, a maximum slope 3H : 1V can be used for sodded embankments. In areas where space is limited, retaining walls can be utilized to accommodate grade differentials, however, their use should be minimized. Given the relatively steep site, a road grade of 6.5% will be utilized for a length of Street "A".

7.2 Preliminary Design

Based on the topographic survey, the proposed subdivision configuration and the Township's criteria, a preliminary grading design has been prepared. The preliminary grading design, considered the following factors:

- Achieve the Township's lot grading criteria.
- Meet the Township's vertical road design parameters.
- Minimize the requirement for retaining walls.
- Match existing grades along the adjacent properties and road allowances.
- Grading along existing road allowances is to have consideration for their future urbanization and grades are to be established to accommodate future boulevard slopes in the range of 2 to 4%.
- Provide an overland flow route to direct drainage to a safe outlet.
- Provide sufficient cover over the sanitary sewer.

An analysis of the earthworks will be conducted using digital terrain modelling software at the detailed design stage to optimize the cut and fill volumes. Based on the **Preliminary Servicing & Grading Plan**, given that the site is relatively steep, many basement walk-out type lots will be utilized and some areas will require 3:1 slopes and retaining walls to accommodate the grade differential. With these measures we anticipate that it will be feasible to achieve the municipal grading design standards.

7.3 Permitting

A review of the Regulation Mapping indicates that the subject site is located within an area that is regulated by the ORCA. A grading permit is therefore required from their office under Ontario Regulation 166/06 prior to commencing topsoil stripping and earthworks. The permit application should be submitted in conjunction with the detailed design at the subdivision engineering stage.

8.0 EROSION & SEDIMENT CONTROL DURING CONSTRUCTION

Construction activity, especially operations involving the handling of earthen material, dramatically increases the availability of particulate matter for erosion and transport by surface drainage. In order to mitigate the adverse environmental impacts caused by the release of silt-laden stormwater runoff into receiving watercourses, measures for erosion and sediment control are required for construction sites. This is an extremely important component of land development that plays a large role in the protection of downstream watercourses and aquatic habitat.

The impact of construction on the environment is recognized by the Greater Golden Horseshoe Area Conservation Authorities. In December 2006 they released their document titled Erosion & Sediment Control Guidelines for Urban Construction (ESC Guideline). This document provides guidance for the preparation of effective erosion and sediment control plans.

Control measures must be selected that are appropriate for the erosion potential of the site and it is important that they be implemented and modified on a staged basis to reflect the site activities. Furthermore, their effectiveness decreases with sediment loading and therefore inspection and maintenance is required. The selection, implementation, inspection and maintenance of the control features are summarized as follows:

8.1 Control Measures

On relatively large sites, measures for erosion and sediment control typically include the use of sediment control basins, silt fencing, a mud mat and sediment traps. The following is a description of the sediment controls to be implemented on the subject site:

- **Temporary Sediment Control Basins** are commonly used to clarify silt-laden stormwater runoff by promoting sedimentation of the suspended particles in the runoff through long detention times. The proposed SWM pond will be utilized as temporary sediment control basins during construction. The basin is to be sized in accordance with the ESC Guideline based on a required storage volume of 250 m³ per hectare of disturbed area (125 m³/ha of permanent pool and 125 m³/ha of active storage). The basin's outlet is to have a Hickenbottom riser and a minimum 75mm diameter orifice plate sized to provide a drawdown time in the order of 48 hours.
- **Silt Fences** are to be installed adjacent to all property limits subject to drainage from the development area prior to topsoil stripping and in other locations, such as at the bases of topsoil stockpiles. It is recommended that earthworks not extend immediately adjacent to the silt fence and instead 1m to 2m vegetated buffer be maintained for additional protection. The silt fences are to be constructed with 150 x 150mm wire farm fence fabric to properly support the geotextile. Heavy duty silt fence is recommended to be installed adjacent the South Wetland consisting of two rows of fence with a row of staked straw bales between.
- **Mud Mat** is to be installed at the construction entrance prior to commencing earthworks to minimize the tracking of mud onto municipal roads.

- **Sediment Traps** are to be installed at all catchbasin locations once the storm sewer system has been constructed to prevent silt laden runoff from entering.
- **Rock Check Dams** are to be constructed in swales and ditches to reduce velocities and trap sediment.

A set of Erosion and Sediment Control Plans are to be prepared at the detailed engineering design stage to reflect the various construction stages. Details of typical erosion and sediment control measures are included in **Appendix "I"**.

8.2 Construction Sequencing

The following is a summary of the scheduling of construction activities and the related implementation of sediment controls:

Stage 1 – Subdivision Earthworks

1. Construct mud mat for temporary construction access.
2. Install primary silt fencing around the limits of grading and secondary silt fencing along the south limit of the work area adjacent the existing wetland.
3. Install temporary swales and rock check dams.
4. Excavate and construct the temporary sediment basins including installation of hickenbottom drain and spillway and connect to temporary swales.
5. Strip any remaining topsoil, stockpile where indicated and install silt fence around the perimeter.
6. Rough grade the site by placing cut material in fill areas and spreading and compacting of imported fill. Maintain the mud mat to minimize the tracking of silt onto the municipal road and provide street sweeping as necessary.

Stage 2 – Subdivision Servicing & Road Construction

1. Install underground servicing, covering the end of the pipe at the end of each work day to ensure that silt does not enter the storm sewer.
2. Construct roads, install sediment controls on catchbasins and install temporary hickenbottom drains at low point of lot blocks.

Stage 3 – House Construction

1. Construct houses and maintain all sediment controls including regular street sweeping and catchbasin cleaning.
2. Stabilize all lot surfaces as soon as possible after completion of the houses.
3. Remove silt fencing on a phased basis as areas are stabilized.

8.3 ESC Inspection & Maintenance

In order to ensure that the erosion and sediment control measures operate effectively, they are to be regularly monitored and they will require periodic cleaning (e.g., removal of accumulated silt), maintenance and/or re-construction.

Inspections of all of the erosion and sediment controls on the construction site should be undertaken with the following frequency:

- On a weekly basis
- After every rainfall event
- After significant snow melt events
- Prior to forecasted rainfall events

If damaged control measures are found they should be repaired and/or replaced within 48 hours. Site inspection staff and construction managers should refer to the Erosion and Sediment Control Inspection Guide (2008) prepared by the Greater Golden Horseshoe Area Conservation Authorities. This Inspection Guide provides information related to the inspection reporting, problem response and proper installation techniques.

9.0 UTILITIES

While some external upgrades may be necessary by the utility providers, it is anticipated that utilities such as electrical (Hydro One Networks Inc.), natural gas (Enbridge Gas Distribution Inc.) and telecommunications (Nexicom Inc.) will be available to service the subject development. As per standard practice in subdivisions, utilities will be installed underground. Co-ordination with the Hydro One and the various utility companies will be undertaken at the detailed engineering design stage to determine appropriate locations for pedestals, transformers and street lights.

It is recommended that the utility installation be in the form of a joint trench. The process of joint trenching allows all of the utility companies to co-ordinate the placement of their lines in a common trench excavated by a single utility contractor. Joint trenching maximizes the efficiency of the available area in the utility corridor and provides for a safe installation.

In accordance with the Township requirements, street lights will be LED. The street lights will have black octagonal poles with black post top luminaires similar to those installed in the Phase 1 subdivision.

A copy of a typical joint trench detail is included in **Appendix "J"** together with a detail of the street light.

10.0 SUMMARY

Based on the analysis contained herein, the proposed residential subdivision can be adequately serviced with full municipal services (watermain, wastewater and storm) in accordance with the standards of the Township of Cavan Monaghan, the County of Peterborough and the Otonabee Region Conservation Authority design criteria and consists of the following:

Water

- The community of Millbrook is currently serviced by a well based water system with a treatment plant and water storage tank. A 300mm diameter trunk watermain was constructed northerly along County Road 10 with a water tower and booster station located on the site of the municipal offices. A 250mm diameter watermain was constructed on Fallis Line to the east side of County Road 10 which will service the subject development. A connection will also be made to the 150mm diameter watermain on Nina Court, to the south of the subject development, to complete a loop.
- A local water distribution system will be constructed along the roads to provide domestic supply and fire protection for the proposed dwellings. This local system will have pipe diameters ranging in size from 150mm to 250mm. Based on the Ontario Building Code (OBC 2012) requirements, the water service connections for the individual townhouse units are to be 25mm diameter.

Waste Water

- A 525mm diameter trunk sanitary sewer has been constructed on Nina Court to the south limit of the subject site. This trunk sewer will be extended northerly through the subject lands to service future development north of Fallis Line and on the east side of County Road 10. An analysis of the downstream sanitary sewer was conducted which confirmed that there is sufficient capacity in the sewer from the subject site to the WWTP.
- A local sanitary sewer system will be constructed along the proposed roads to provide service to the dwellings. In accordance with Township standards, the dwellings will be serviced with individual sanitary connections.

Storm Drainage

- The subject site is located in the Baxter Creek subwatershed. The Baxter Creek drains to the Otonabee River which discharges to Rice Lake.
- In accordance with Township criteria, the subject site will be serviced by minor system comprised of a municipal storm sewer sized for the 5-year storm event. This storm sewer will outlet to the proposed SWM facility.
- The major system will be comprised of an overland flow route which will convey runoff from rainfall events in excess of the capacity of the municipal storm sewer to the SWM facility.
- The Regulatory floodplain of the Baxter Creek tributary is contained entirely within the valley lands and therefore the proposed residential lots and the stormwater management pond are outside the Regulatory floodplain.

Stormwater Management

- A stormwater management facility will be constructed to service the subject property, as well as the potential future development to the west. This facility has been designed as a wet pond to provide Enhanced (Level 1) water quality treatment, extended detention for erosion control and flood control using the calculated pre-development flow targets up to and including the 100-year storm event. The wet pond consists of a sediment forebay and a main cell separated by a forebay berm.
- Thermal mitigation measures are to be incorporated in the design of the pond including bottom draw pipe and a planting strategy to provide shading around the pond perimeter.
- A site water balance assessment has been undertaken to ensure that pre-development infiltration volumes are maintained. Based on the analysis it was determined that mitigation measures are required in the form of roof downspout disconnections to lawn areas.

Vehicular & Pedestrian Access

- Vehicular access to the subject site will be provided by two road connections to the proposed Fallis Line extension and one road connection to Nina Court at the south limit of the site.
- The proposed local roads will be constructed to urban standards having 20m wide road allowances. Street "A" will have a 10.0m pavement width and the rest of the streets will have 8.5m pavement width.
- Pedestrian access will be provided by 1.5m wide concrete sidewalks which are to be generally located on one side of each road.

Grading

- As is typical with large subdivision projects, earthmoving will be required to achieve the proposed subdivision grading necessary to meet the criteria of the Township. A detailed analysis of the earthworks will be conducted at the detailed design stage to optimize the cut and fill volumes.
- Given that the site is relatively steep, many basement walk-out type lots will be utilized and some areas will require 3:1 slopes and retaining walls to accommodate the grade differential. With these measures we anticipate that it will be feasible to achieve the municipal grading design standards.
- Since the subject site is located in an area which regulated by the ORCA, a permit will be required from their office prior to commencing earthworks.

Erosion & Sediment Control During Construction

- Erosion and sediment control (ESC) measures are to be implemented during construction to prevent silt laden runoff downstream in accordance with the Erosion & Sediment Control Guidelines for Urban Construction (December 2006). The ESC plans are to be prepared at the detailed engineering design stage and are to reflect the various construction stages.

Utilities

- Similar to the Phase 1 subdivision, utility servicing will include an underground joint utility trench for electrical, natural gas and telecommunications. Street lighting will be LED and will be comprised of black octagonal poles with black post top luminaires.

Subdivision Engineering Design

- Detailed design for the proposed development is to be prepared at the subdivision engineering stage. This detailed design is to include servicing and grading plans as well as a stormwater management report based on the criteria established in this Functional Servicing Report.

11.0 REFERENCES & BIBLIOGRAPHY

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- GHD Inc., **Geotechnical Investigation Report**, March 8, 2021.

Respectfully Submitted,

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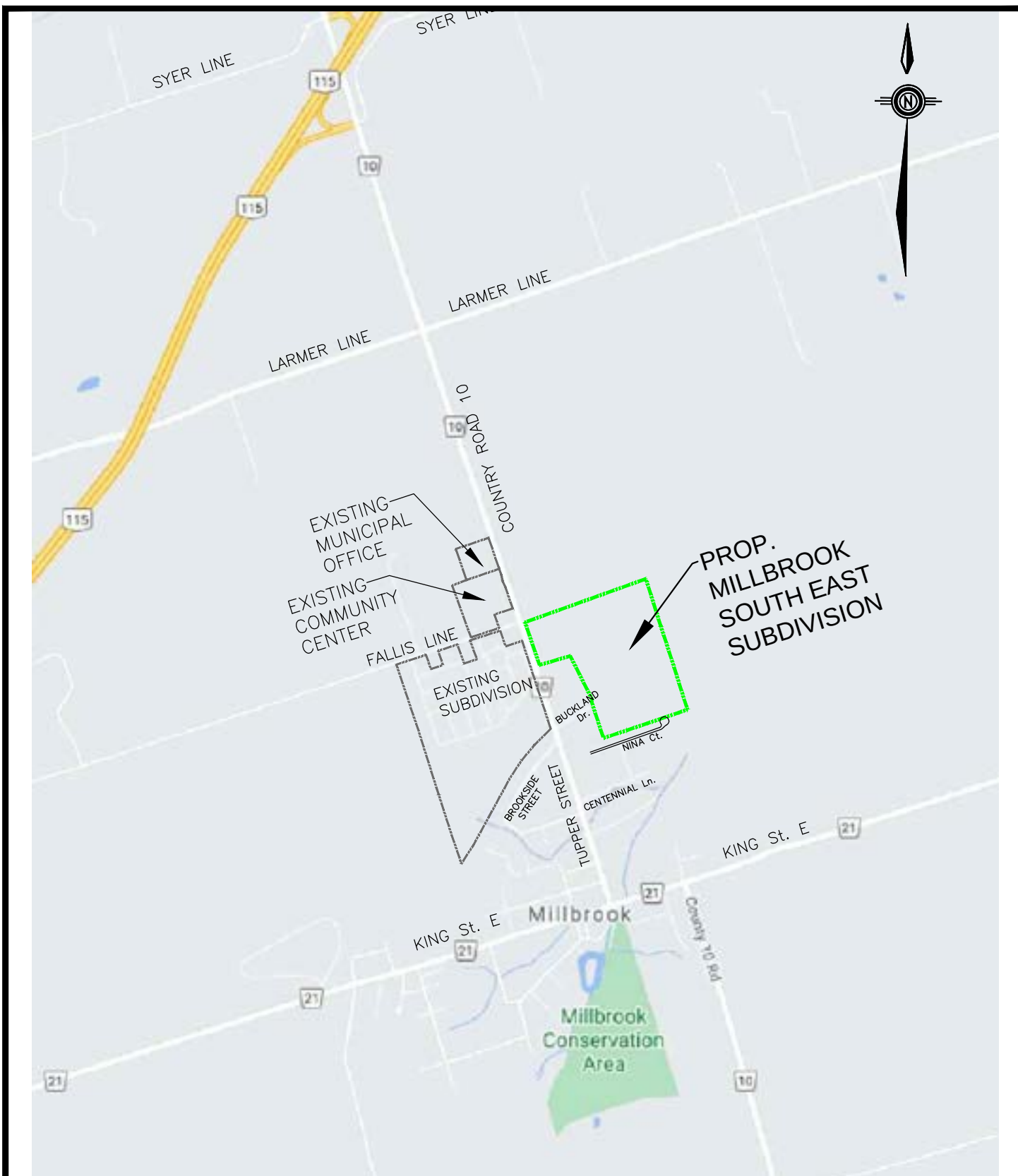
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MILLBROOK SOUTH EAST SUBDIVISION

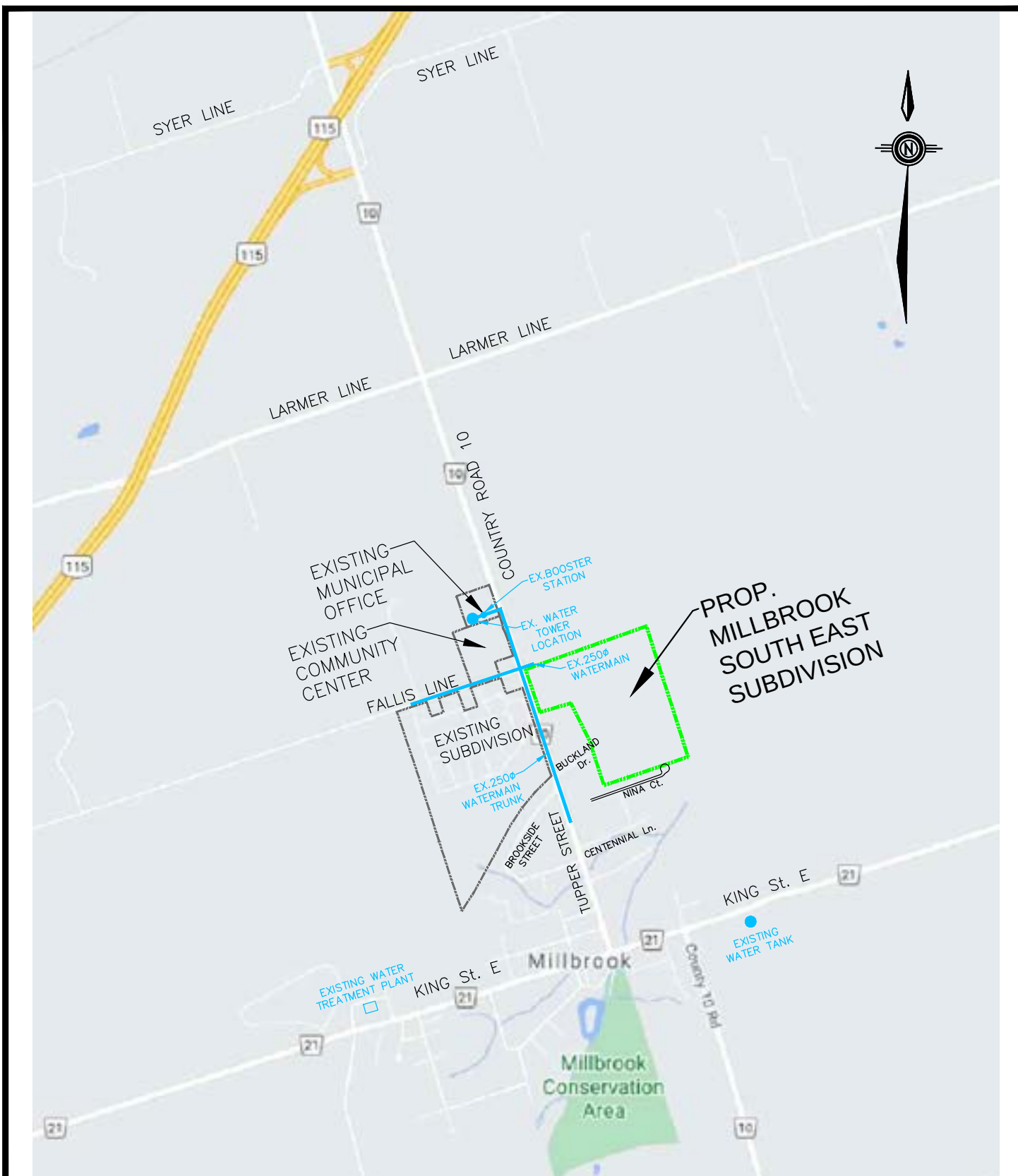
LOCATION MAP



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SCALE	N.T.S.	PROJECT	19121
DATE	April, 2021	DRAWN BY	V.L.

FIGURE 1



MILLBROOK SOUTH EAST SUBDIVISION

WATER SERVICING EXTERNAL

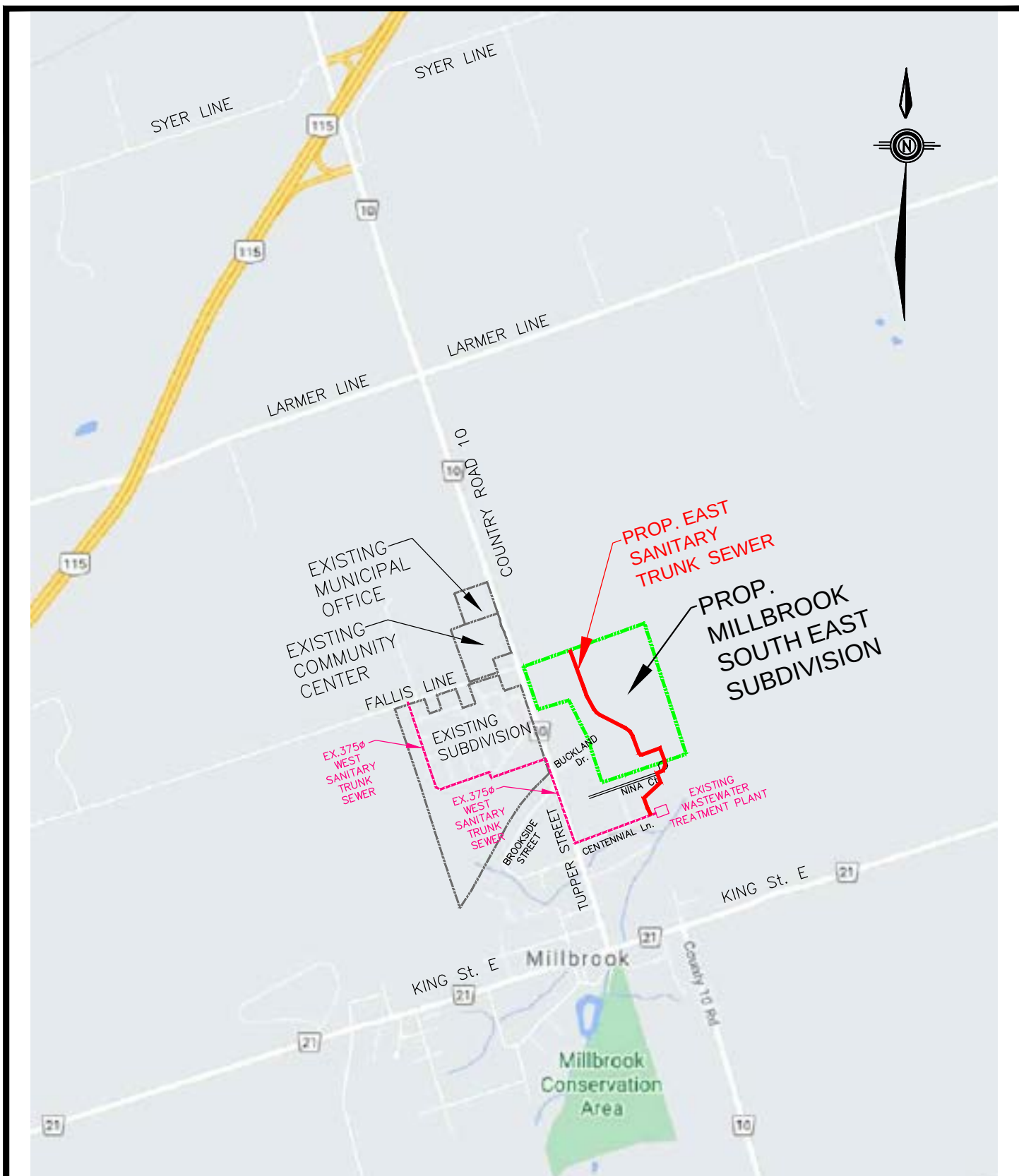


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SCALE N.T.S.
DATE April, 2021

PROJECT 19121
DRAWN BY V.L.

FIGURE 2



MILLBROOK SOUTH EAST SUBDIVISION

WASTEWATER SERVICING EXTERNAL



VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers

741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9
TEL (905)264-0054, FAX (905)264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

SCALE N.T.S.

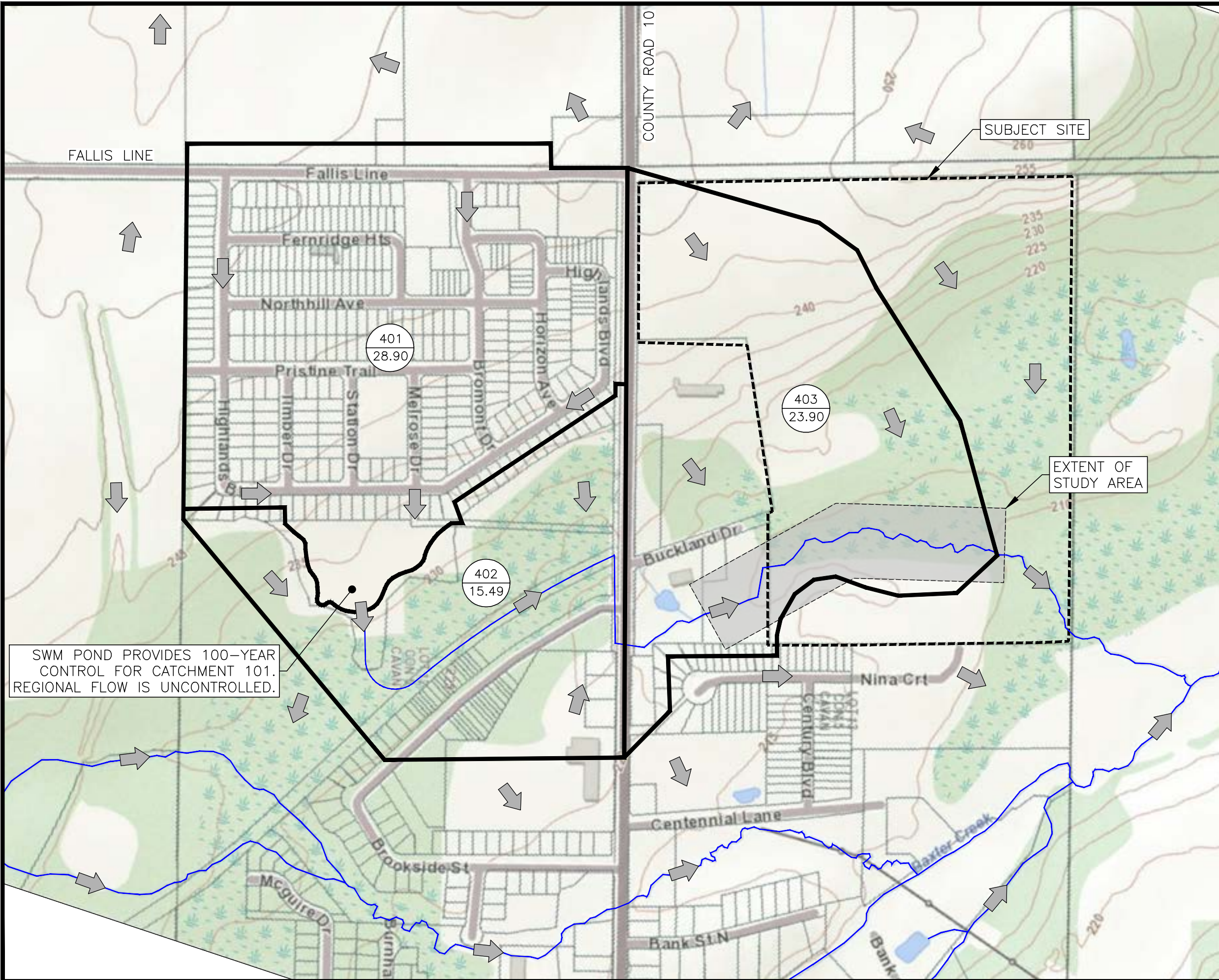
DATE April, 2021

PROJECT 19121

DRAWN BY V.L.

FIGURE 3

ACAD File: S:\Projects\2019\19121\Hydrotechnical\0-Working\Figures\19121_Drainage Plan_Floodplain.dwg Layout: Proposed Printed: Apr. 19, 2021

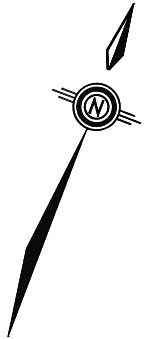
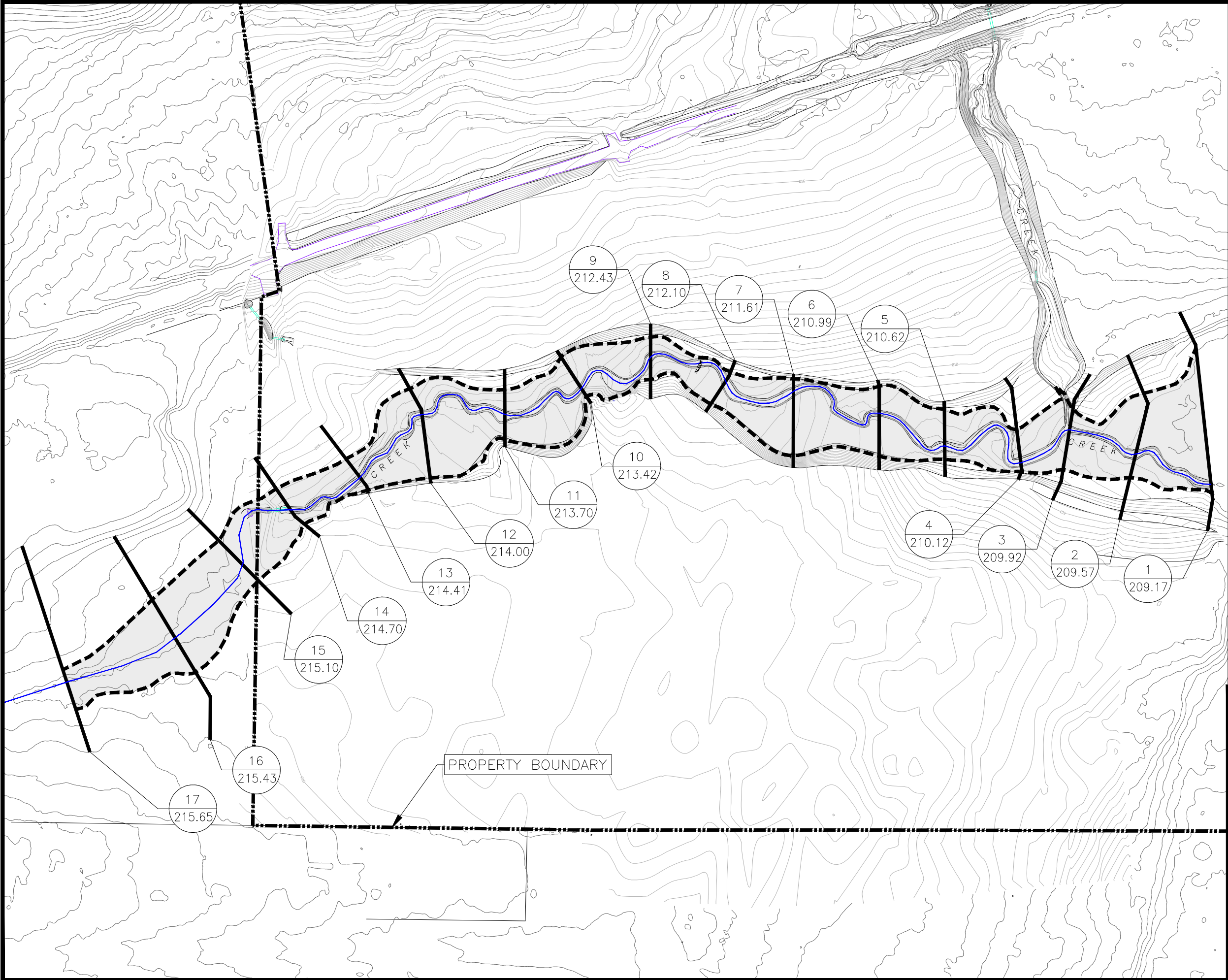


LEGEND

-  CATCHMENT ID
AREA (HA)
-  DRAINAGE BOUNDARY
-  WATERCOURSE
-  OVERLAND FLOW

PROJECT		MILLBROOK SOUTH EAST SUBDIVISION	
TITLE		FLOODPLAIN MAPPING DRAINAGE PLAN	
		 VALDOR ENGINEERING INC. Consulting Engineers - Project Managers 741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9 TEL (905)264-0054, FAX (905)264-0069 E-MAIL: info@valdor-engineering.com www.valdor-engineering.com	
PREPARED BY	O.B.	CKD. BY	O.B.
SCALE	1:5000	DATE	APR. 2021
PROJECT	19121	FIGURE 4	

ACAD File: S:\Projects\2019\19121\Hydrotechnical\0-Working\Figures\19121_Floodplain Mapping.dwg Layout: FPM Pre-Dev Printed: Apr. 19, 2021

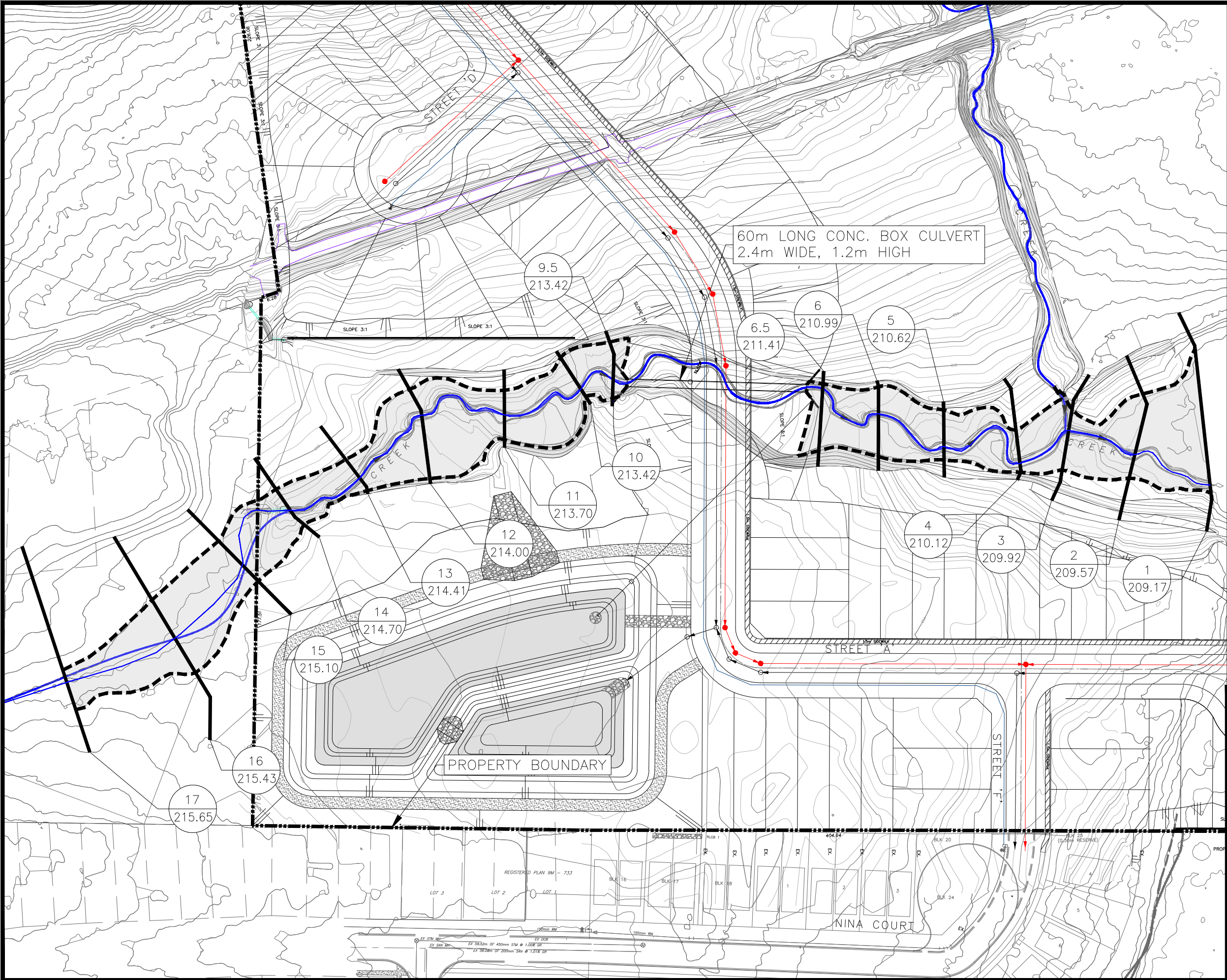


LEGEND

- EXISTING REGIONAL FLOODLINE
- PROPERTY BOUNDARY
- HEC-RAS CROSS-SECTION
- HEC-RAS CROSS-SECTION ID
- REGIONAL WATER SURFACE ELEVATION (m)

PROJECT	MILLBROOK SOUTH EAST SUBDIVISION	
TITLE	FLOODPLAIN MAPPING PRE-DEVELOPMENT	
	VALDOR ENGINEERING INC. Consulting Engineers - Project Managers 741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9 TEL (905)264-0054, FAX (905)264-0069 E-MAIL: info@valdor-engineering.com www.valdor-engineering.com	
PREPARED BY	O.B.	CKD. BY O.B.
SCALE	1:1250	DATE APR. 2021
PROJECT	19121	FIGURE 5

ACAD File: S:\Projects\2019\19121\Hydrotechnical\0-Working\Figures\19121_Floodplain Mapping.dwg Layout: FPM Post-Dev Printed: Apr. 19, 2021

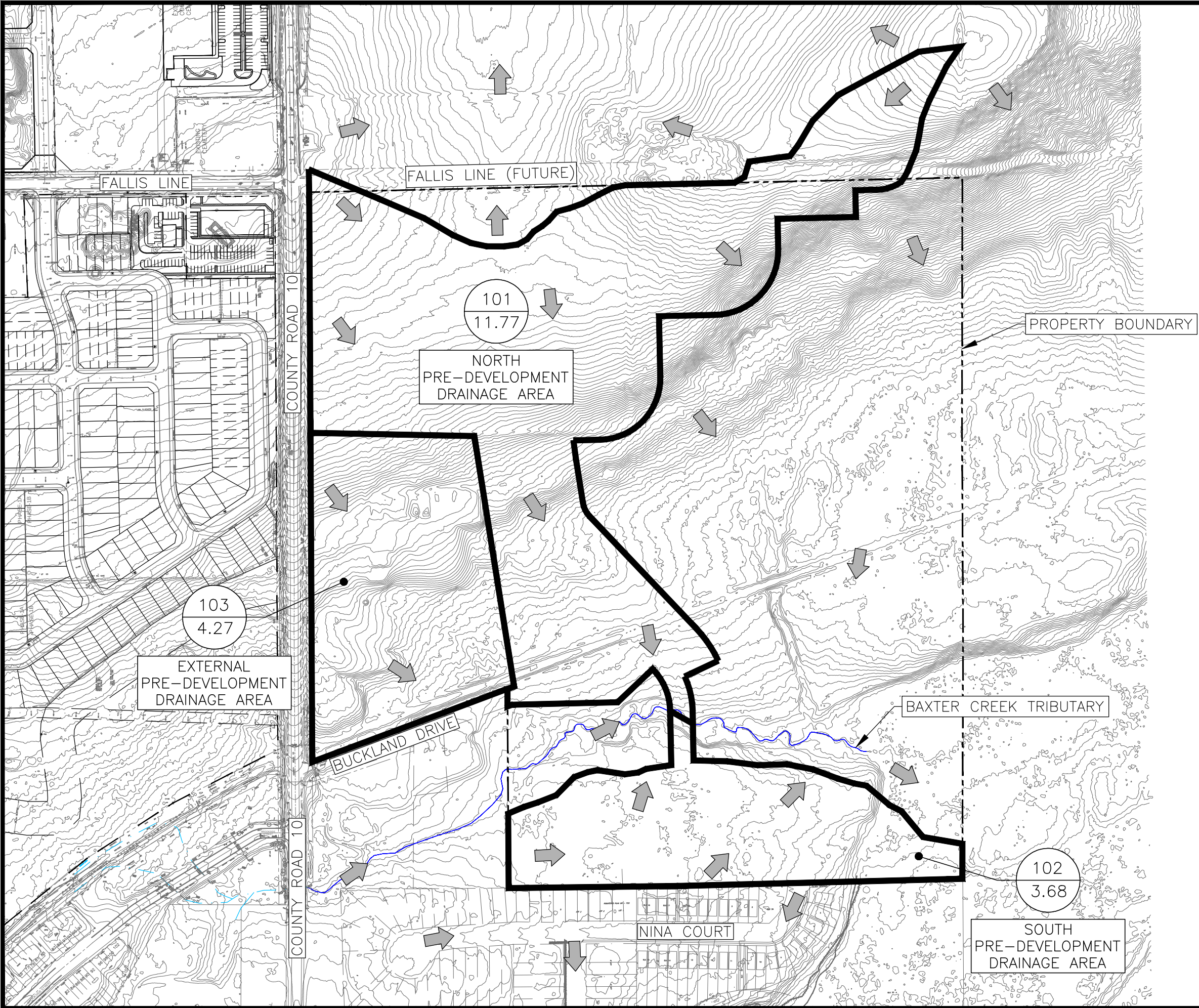


LEGEND

- PROPOSED REGIONAL FLOODLINE
- PROPERTY BOUNDARY
- HEC-RAS CROSS-SECTION
- HEC-RAS CROSS-SECTION ID
- REGIONAL WATER SURFACE ELEVATION (m)

PROJECT	MILLBROOK SOUTH EAST SUBDIVISION	
TITLE	FLOODPLAIN MAPPING POST-DEVELOPMENT	
	VALDOR ENGINEERING INC. Consulting Engineers - Project Managers 741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9 TEL (905)264-0054, FAX (905)264-0069 E-MAIL: info@valdor-engineering.com www.valdor-engineering.com	
PREPARED BY	O.B.	CKD. BY O.B.
SCALE	1:1250	DATE APR. 2021
PROJECT	19121	FIGURE 6

ACAD File: S:\Projects\2019\19121\Hydrotechnical\0-Working\Figures\19121_Drainage Plan_SWM.dwg Printed: Apr. 19, 2021 Layout: Existing



LEGEND

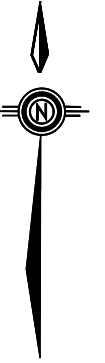
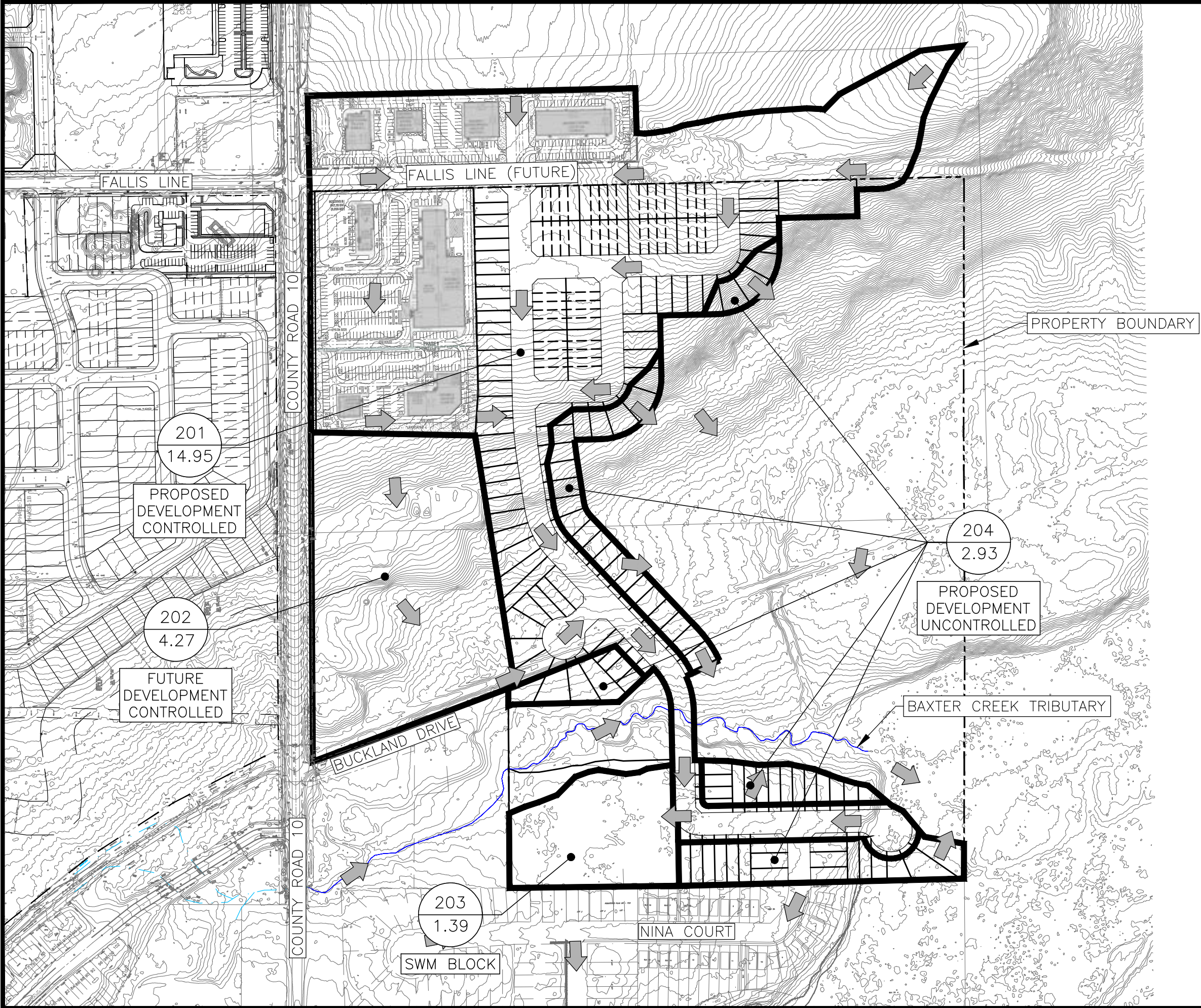
- 101

11.77

 CATCHMENT ID
AREA (HA)
- DRAINAGE BOUNDARY
- OVERLAND FLOW

PROJECT		MILLBROOK SOUTH EAST SUBDIVISION	
TITLE		SWM DRAINAGE PLAN PRE-DEVELOPMENT	
		VALDOR ENGINEERING INC. Consulting Engineers - Project Managers 741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9 TEL (905)264-0054, FAX (905)264-0069 E-MAIL: info@valdor-engineering.com www.valdor-engineering.com	
PREPARED BY	O.B.	CKD. BY	O.B.
SCALE	NTS	DATE	APR. 2021
PROJECT	19121	FIGURE 7	

ACAD File: S:\Projects\2019\19121\Hydrotechnical\0-Working\Figures\19121_Drainage Plan_SWM.dwg Layout: Proposed Printed: Apr. 19, 2021

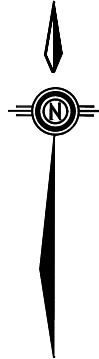
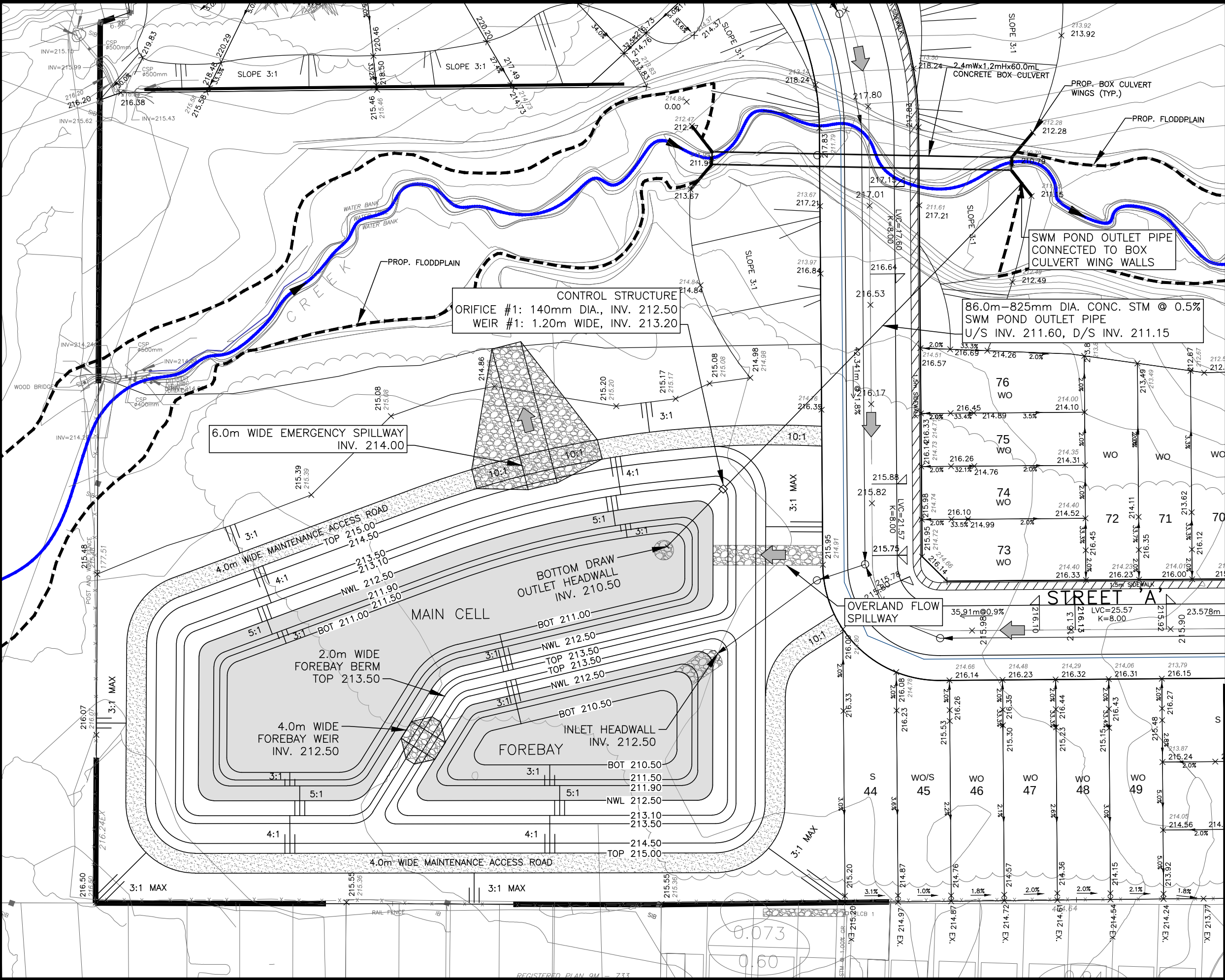


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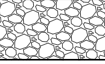
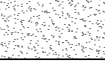
- 201 — CATCHMENT ID
- 9.37 — AREA (HA)
- DRAINAGE BOUNDARY
- ➔ OVERLAND FLOW

PROJECT		MILLBROOK SOUTH EAST SUBDIVISION	
TITLE		SWM DRAINAGE PLAN POST-DEVELOPMENT	
		VALDOR ENGINEERING INC. Consulting Engineers - Project Managers 741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9 TEL (905)264-0054, FAX (905)264-0069 E-MAIL: info@valdor-engineering.com www.valdor-engineering.com	
PREPARED BY	O.B.	CKD. BY	O.B.
SCALE	NTS	DATE	APR. 2021
PROJECT	19121	FIGURE 8	

ACAD File: S:\Projects\2019\19121\Drawings\19121-Working-March19-2021\SWM\19121_SWM_Pond_Figures.dwg Layout: SWM_Pond Printed: Apr. 19, 2021



LEGEND

-  OVERLAND FLOW
-  PERMANENT POOL
-  RIP-RAP EROSION PROTECTION
-  MAINTENANCE ACCESS ROAD

RETURN PERIOD	POND WSEL (m)
25 mm	213.09
2-YEAR	213.34
5-YEAR	213.51
10-YEAR	213.62
25-YEAR	213.75
50-YEAR	213.84
100-YEAR	213.93
REGIONAL	214.06

PROJECT

**MILLBROOK SOUTH
EAST SUBDIVISION**

TITLE

**PRELIMINARY
SWM POND**

**VALDOR ENGINEERING INC.**
Consulting Engineers - Project Managers
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TEL (905)264-0054, FAX (905)264-0069
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PREPARED BY

O.B.

CKD. BY

O.B.

SCALE

1:750

DATE

APR. 2021

PROJECT

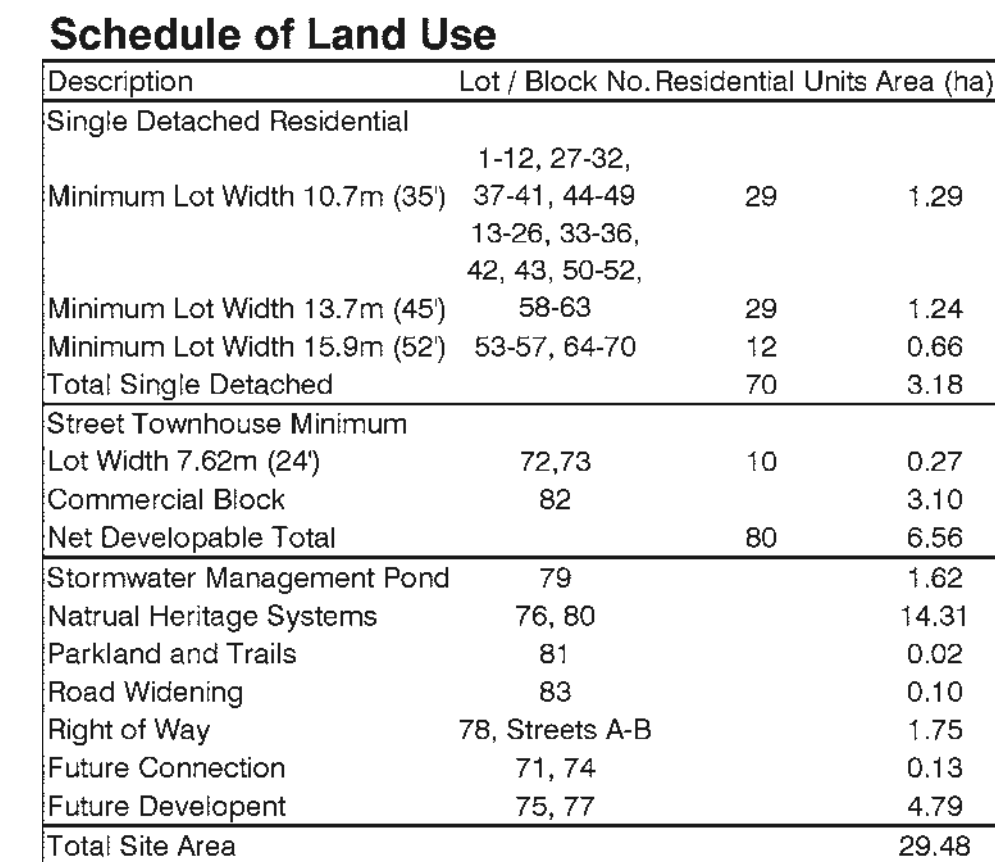
19121

FIGURE 9

APPENDIX “A”

Draft Plan, Conceptual Master Plan & Equivalent Population Calculation

**CONCEPT
FOR DISCUSSION PURPOSES ONLY
- CONFIDENTIAL -**



THE BIGLIERI GROUP LTD.

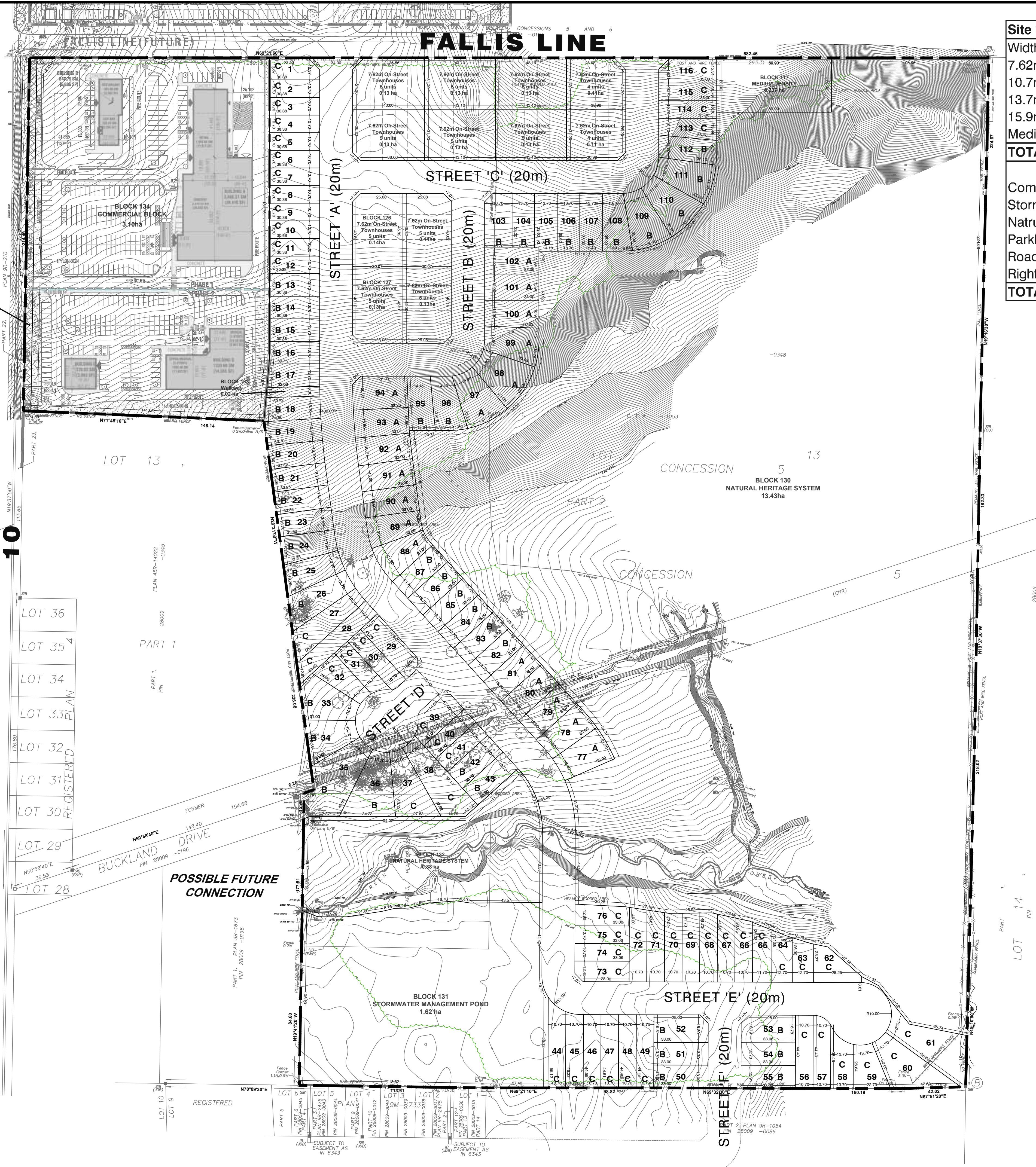
Planning | Development | Project Management | Urban Design

20 Louis Street, Suite 201, Toronto
106 Catherine Street North, Hamilton

(416) 833-4141
thebiglierigroup.com

DRAFT

CONCEPT
FOR DISCUSSION PURPOSES ONLY
- CONFIDENTIAL -



Site Statistics			
Width Minimums		Units	Area (ha)
7.62m (24') Street Townhouse	D	58	1.57
10.7m (35') Single Detached	C	54	2.45
13.7m (45') Single Deatched	B	44	2.30
15.9m (52') Single Detached	A	18	1.02
Medium Density (5-Storey Building)		70	0.23
TOTAL		244	7.57
Commerical Block			3.10
Stormwater Management Pond			1.62
Natrual Heritage Systems			14.31
Parkland and Trails			0.02
Road Widening			0.10
Right of Way			2.76
TOTAL SUBJECT SITE			29.47

TITLE:

CONCEPTUAL MASTER PLAN

LEGAL DESCRIPTION:

DRAFT PLAN OF SUBDIVISION
PART OF LOT 13
CONCESSION 5
TOWNSHIP OF CAVAN
COUNTY OF PETERBOURGH

KEY PLAN:

REQUIRED INFORMATION:

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990.

(a) SEE PLAN

(b) SEE PLAN

(c) SEE KEY MAP

(d) SEE SCHEDULE OF LAND USE

(e) SEE PLAN

(f) SEE PLAN

(g) SEE PLAN

(h) PIPED WATER TO BE PROVIDED

(i) CLAY LOAM SOIL

(j) SEE PLAN

(k) SANITARY & STORM SEWERS TO BE PROVIDED

(l) SEE PLAN

NOTE: CONTOURS RELATE TO CANADIAN GEODETIC DATUM

SURVEYOR'S CERTIFICATE:

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATE AND CORRECTLY SHOWN IN ACCORDANCE WITH A PLAN OF SURVEY PREPARED BY

DATE

OWNER'S CERTIFICATE:

I HEREBY AUTHORIZE THE BIGLIERI GROUP LTD. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE

DATE

**FALLIS LINE
PETERBOURGH
COUNTY**

APPROVAL STAMP:

REVISIONS

No.	Description	Date	Int.
3			
2			
1			

PROJECT No.: 20699

DATE: March 10, 2021

SCALE: 1:2500

DRAFTED BY: JS CHECKED BY:

DRAWING No.: **CMP-01**

THE BIGLIERI GROUP LTD.
Planning | Development | Project Management | Urban Design
20 Leslie Street, Suite 121, Toronto
(416) 869-8165
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VALDOR ENGINEERING INC.

741 Rowntree Dairy Road, Suite 2, Woodbridge, ON L4L 5T9
 Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
 www.valdor-engineering.com

TABLE: A1

EQUIVALENT POPULATION

Project Name: **Millbrook South East Subdivision**
 File: **19121**
 Date: **April 2021**

PROPOSED DRAFT PLAN

Land Use	Area (Hectares)	Criteria	No. of Units	Equivalent Population
Detached Dwellings	3.18	3.50 persons per unit	70	245
Street Townhomes	0.27	3.50 persons per unit	10	35
Commercial	3.10	3.68 persons per hectare *		11
Stormwater Management Pond	1.62			
Natural Heritage Systems	14.31			
Parkland & Trails	0.02			
Roads & Road Widening	2.18			
Future Development	4.79			
Total:	29.47		80	291

ULTIMATE DEVELOPMENT

Land Use	Area (Hectares)	Criteria	No. of Units	Equivalent Population
Detached Dwellings	5.77	3.50 persons per unit	116	406
Street Townhomes	1.57	3.50 persons per unit	58	203
Medium Density	0.23	2.00 persons per unit	70	140
Commercial	3.10	3.68 persons per hectare *		11
Stormwater Management Pond	1.62			
Natural Heritage Systems	14.31			
Parkland & Trails	0.02			
Roads & Road Widening	2.85			
Total:	29.47		244	760

* Equates to sewage flow of 1.15 L/s/Ha and 450 L/person/day

APPENDIX “B”

Water Demand Calculations & Details

**VALDOR ENGINEERING INC.**

741 Rowntree Dairy Road, Suite 2, Woodbridge, ON L4L 5T9
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

TABLE: B1**DOMESTIC WATER DEMAND CALCULATION**

Project Name: **Millbrook South East Subdivision, Township of Cavan Monaghan**

File: 19121

Date: April 2021

Conditions:

Residential Average Day Demand	450 L/person/day
Maximum Day Factor	2.0
Peak Hour Factor	3.0

PROPOSED DRAFT PLAN

Land Use	Equivalent Population (persons)	Domestic Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)
Detached Dwellings	245	76.6	153.1	229.7
Street Townhomes	35	10.9	21.9	32.8
Commercial Block	11	3.4	6.9	10.3
Total	291	90.9	181.9	272.8

ULTIMATE DEVELOPMENT

Land Use	Equivalent Population (persons)	Domestic Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)
Detached Dwellings	406	126.9	253.8	380.6
Street Townhomes	203	63.4	126.9	190.3
Medium Density	140	43.8	87.5	131.3
Commercial Block	11	3.4	6.9	10.3
Total	760	237.5	475.0	712.5

**VALDOR ENGINEERING INC.**

741 Rowntree Dairy Road, Suite 2, Woodbridge, ON L4L 5T9
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

TABLE: B2-1**CALCULATION OF REQUIRED FIRE FLOW**

In accordance to Water Supply for Public Fire Protection, Fire Underwriters Survey 1999

Project Name: Millbrook South East Subdivision

File: 19121

Date: April 2021

Notes: DETACHED DWELLING

Assume:

- 3,500 sq.ft total floor area

- interior unit for max exposure

Type of Construction -

Wood Frame

C = 1.5

Total Floor Area: 325 sq.m

A = 325 sq.m

(Total Floor Area includes all storeys, but excludes basements at least 50 percent below grade)

$$F = 220 C \sqrt{A}$$

F = 5,949 L/min

F = 6,000 (to nearest 1,000 L/min)

Occupancy Factor

Type: Non-Combustible Charge
 $f_1 = -25\%$

$$F' = F \times (1 + f_1)$$

F' = 4,500 L/min

Sprinkler Credit

		Charge
NFPA 13 Sprinkler Standard:	NO	0%
Standard Water Supply:	NO	0%
Fully Supervised System:	NO	0%
Total Charge to Fire Flow:	$f_2 =$	0%

Exposure Factor

		Charge
Side 1 - Distance to Building (m):	0 to 3m	25%
Side 2 - Distance to Building (m):	0 to 3m	25%
Side 3 - Distance to Building (m):	3.1 to 10m	20%
Side 4 - Distance to Building (m):	3.1 to 10m	20%
	$f_3 =$	75% (maximum of 75%)

$$F'' = F' + F' \times f_2 + F' \times f_3$$

F'' = 7,875 L/min

REQUIRED FIRE FLOW

F'' = 8,000 L/min (to nearest 1,000 L/min)

**VALDOR ENGINEERING INC.**

741 Rowntree Dairy Road, Suite 2, Woodbridge, ON L4L 5T9
 Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
 www.valdor-engineering.com

TABLE: B2-2**CALCULATION OF REQUIRED FIRE FLOW**

In accordance to Water Supply for Public Fire Protection, Fire Underwriters Survey 1999

Project Name: Millbrook South East Subdivision

File: 19121

Date: April 2021

Notes: STREET TOWNHOMES DWELLING

Assume:

- 2,500 sq.ft total floor area

- interior unit for max exposure

Type of Construction -

Wood Frame

C = 1.5

Total Floor Area: 233 sq.m

A = 233 sq.m

(Total Floor Area includes all storeys, but excludes basements at least 50 percent below grade)

$$F = 220 C \sqrt{A}$$

F = 5,037 L/min

F = 5,000 (to nearest 1,000 L/min)

Occupancy Factor

Type: Non-Combustible Charge -25%
 $f_1 = -25\%$

$$F' = F \times (1 + f_1)$$

F' = 3,750 L/min

Sprinkler Credit

		Charge
NFPA 13 Sprinkler Standard:	NO	0%
Standard Water Supply:	NO	0%
Fully Supervised System:	NO	0%
Total Charge to Fire Flow:	$f_2 =$	0%

Exposure Factor

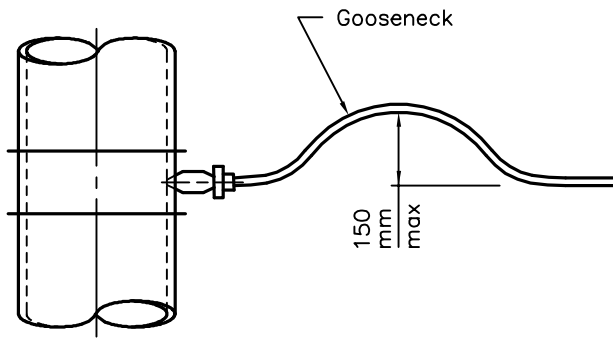
		Charge
Side 1 - Distance to Building (m):	0 to 3m	25%
Side 2 - Distance to Building (m):	0 to 3m	25%
Side 3 - Distance to Building (m):	3.1 to 10m	20%
Side 4 - Distance to Building (m):	3.1 to 10m	20%
	$f_3 =$	75% (maximum of 75%)

$$F'' = F' + F' \times f_2 + F' \times f_3$$

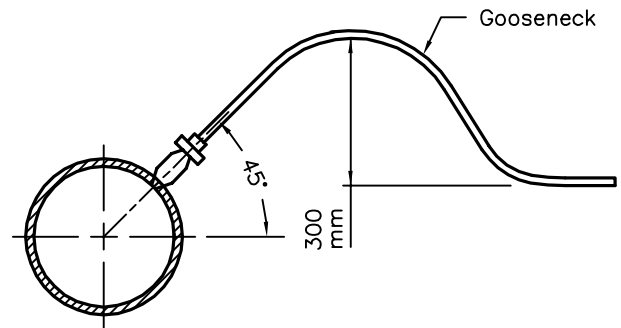
F'' = 6,563 L/min

REQUIRED FIRE FLOW

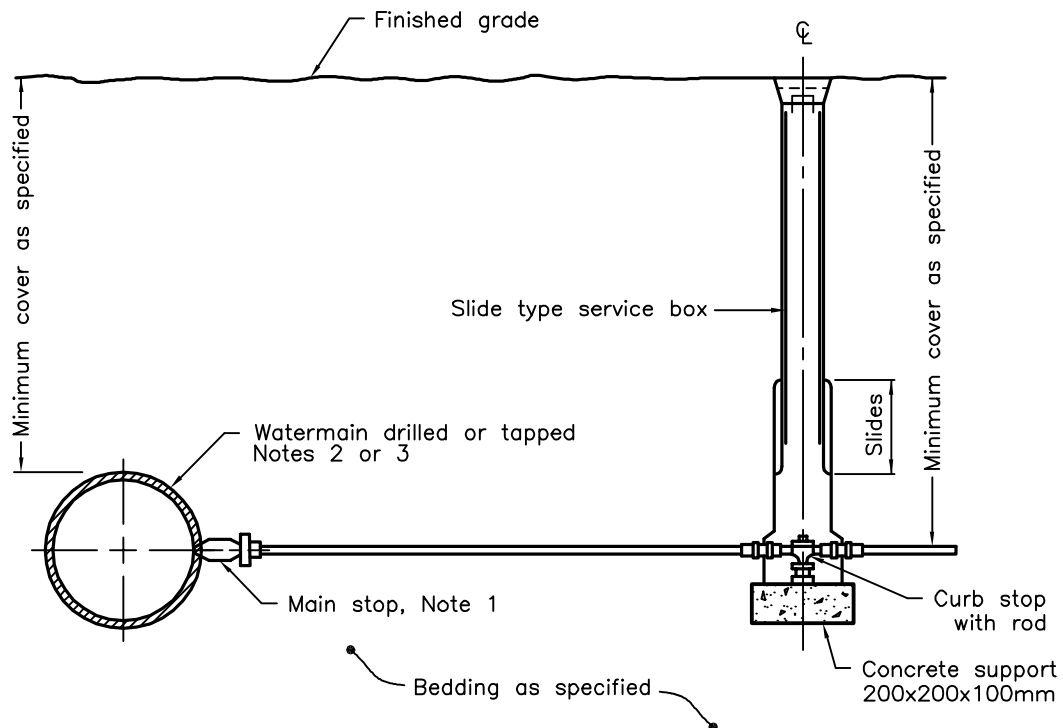
F'' = 7,000 L/min (to nearest 1,000 L/min)



HORIZONTAL GOOSENECK



VERTICAL GOOSENECK OPTION



VERTICAL SECTION

NOTES:

- 1 For plastic service pipes, install main stop at 15° above horizontal with a minimum 1.2m long gooseneck.
- 2 Direct tap ductile iron pipe with approved tool with standard AWWA inlet thread.
- 3 Service connections to plastic watermains shall be made using service saddles or factory made tees.
- A When specified, the vertical gooseneck option shall be used.
- B Couplings shall not be permitted unless the service length exceeds 20m between the main stop and curb stop.
- C All water services shall be installed 90° to the longitudinal axis of the watermain.
- D Backfill material within 500mm of service box shall be native or imported, as specified.
- E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013

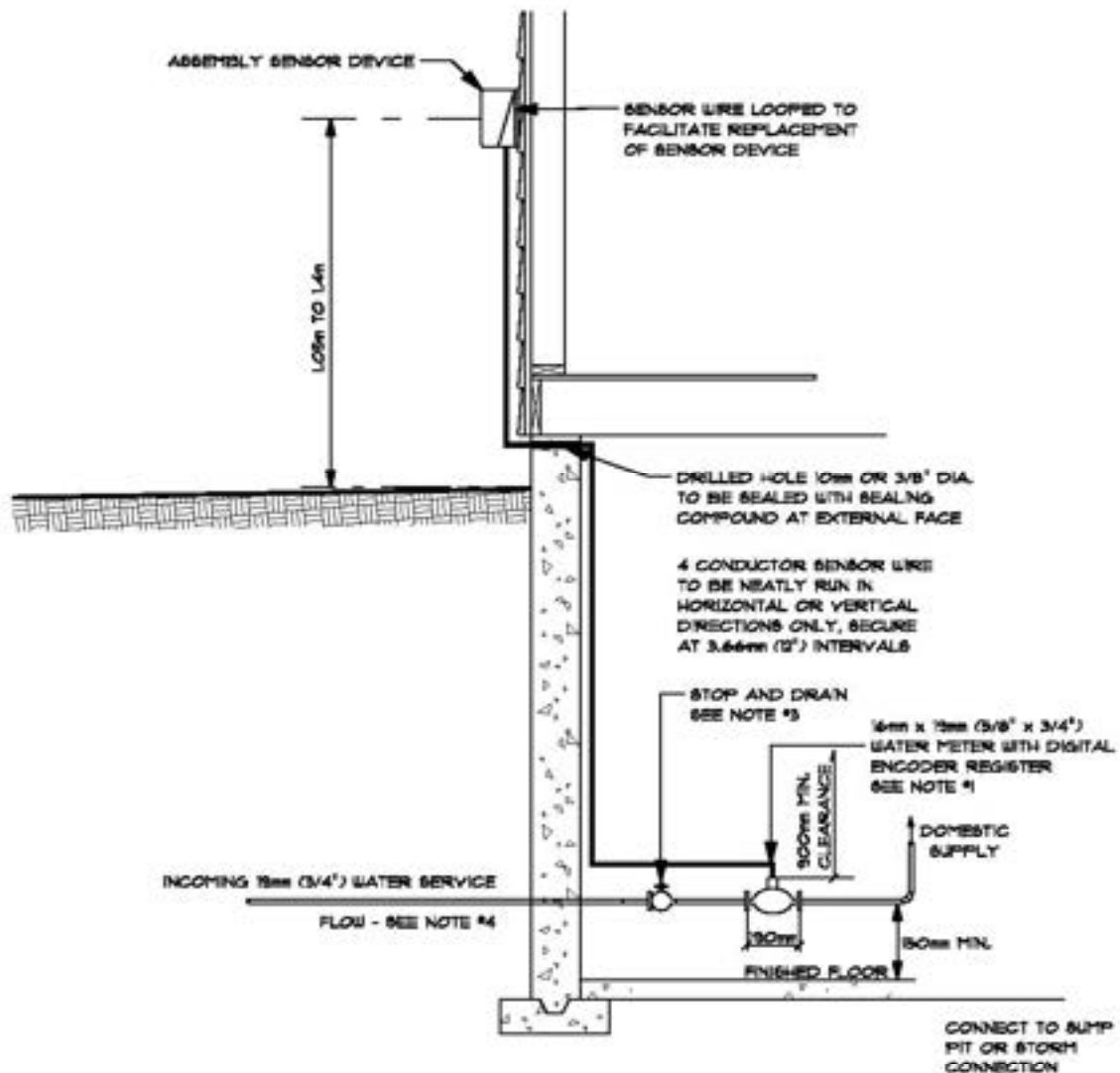
Rev 3

**WATER SERVICE
CONNECTION**

19 and 25mm DIAMETER SIZES

OPSD 1104.010





NOTES:

- 1 - METER SHALL BE 16mm (5/8") METER. REGISTRATION IN CUBIC METERS. 19mm (3/4") THREADED CONNECTIONS
- 2 - SUPPLY AND INSTALL REMOTE READOUT DEVICE ON OUTSIDE WALL WITHIN 2.0m OF THE FROST WALL AND IN THE SAME SIDE AS THE HYDRO METER. REMOTE READOUT DEVICE SHALL BE SUITABLE FOR TOUCH READ AUTOMATED READING AND BILLING SYSTEM.
- 3 - STOP AND DRAIN VALVE TO BE THE SAME SIZE AS INCOMING PIPE
- 4 - IF HOT WATER TANK IS WITHIN 3.0m OF THE METER, A CHECK VALVE IS REQUIRED BETWEEN THE METER AND THE HOT WATER TANK.
- 5 - METER SHALL BE INSTALLED USING THREADED CONNECTIONS ONLY

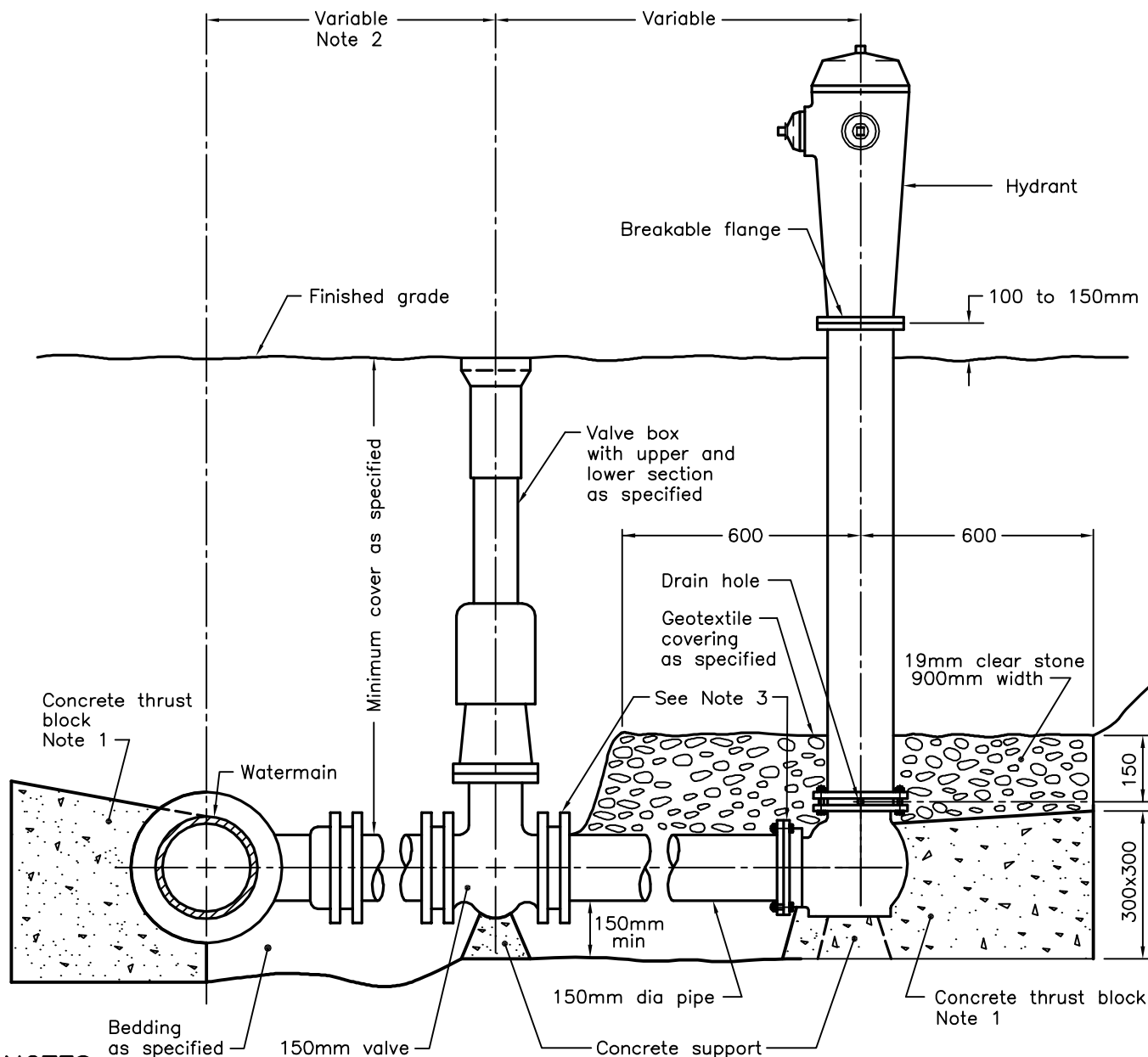
TOWNSHIP OF
CAVAN MONAGHAN

**TYPICAL WATER
METER INSTALLATION**

SCALE: NOT TO SCALE

DATE: AUGUST 2013

**STD.
S7**



NOTES:

- 1 All concrete thrust blocks shall be poured against undisturbed ground.
- 2 When specified, for watermain 400mm and less, locate valve within 1.0m of centreline of watermain. Retaining and restraining devices shall be utilized. For watermain 600mm and over, bolt valve with flanged end directly to flanged tee.
- 3 When specified, retaining and restraining devices shall be utilized, in addition to thrust blocks.
- A Bond breaker shall be used between the concrete and the fittings and appurtenances.
- B Bolts and nuts for buried flange to flange connections shall be stainless steel.
- C When required, flange of standpipe extensions shall not be in frost zone.
- D This OPSD shall be read in conjunction with OPSD 1103.010 and 1103.020.
- E Backfill material within 500mm of service box shall be native or imported, as specified.
- F All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013

Rev 2



HYDRANT INSTALLATION

OPSD 1105.010

APPENDIX “C”

Wastewater Servicing Details & Calculations



VALDOR ENGINEERING INC.

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 www.valdor-engineering.com

TABLE: C1

WASTEWATER FLOW CALCULATIONS

Project Name: **Millbrook South East Subdivision, Township of Cavan Monaghan**

File: 19121

Date: April 2021

Conditions:

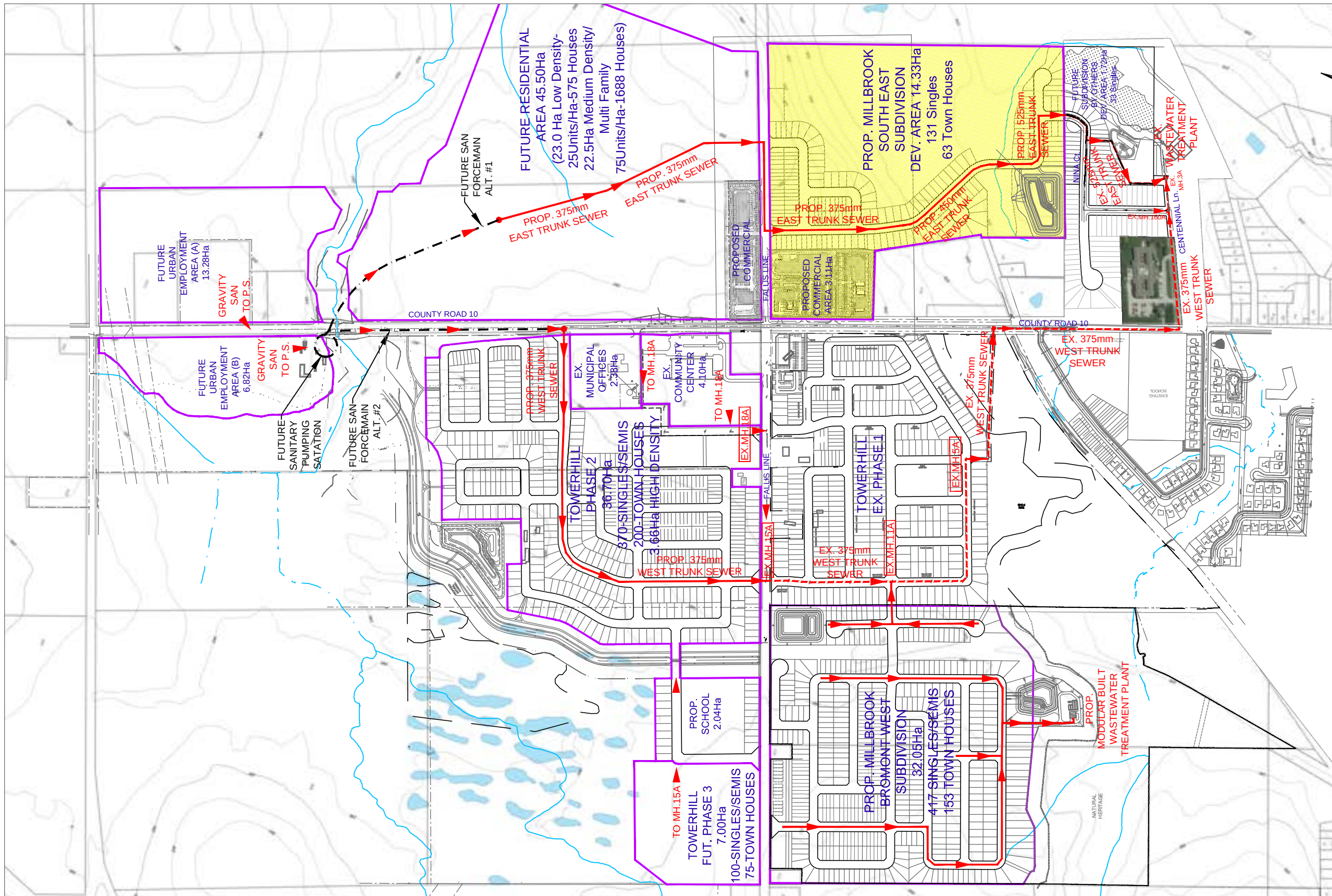
Residential Average Daily Flow: 450 L/person/day
 Residential Peaking Factor: $K_H = 1 + \frac{14}{4 + \sqrt{P}}$ where K_H = Harmon Peaking Factor
 (max. 4.5, min. 2.0)
 p = population in thousands
 Extraneous Flow (I): 0.28 L/s/ha. (infiltration)
 Design Flow (Q_D): $Q \times K_H + I$
 Commercial/institutional Average Daily Flow: 1.15 L/s/ha
 Commercial/Institutional Peaking Factor: 2.5

PROPOSED DRAFT PLAN

Land Use	Area (ha.)	Equivalent Population (persons)	Average Daily Flow (L/s)	Harmon Peaking Factor	Peak Daily Flow (L/s)	Extraneous Flow (L/s)	Total Flow (L/s)
Detached Dwellings	3.18	245	1.28	4.11	5.25	0.89	6.14
Street Townhomes	0.27	35	0.18	4.34	0.79	0.08	0.87
Commercial Block	3.10	11	3.57	2.50	8.91	0.87	9.78
Roads	2.18					0.61	0.61
Total	8.73	291	5.02		14.95	2.44	17.40

ULTIMATE DEVELOPMENT

Land Use	Area (ha.)	Equivalent Population (persons)	Average Daily Flow (L/s)	Harmon Peaking Factor	Peak Daily Flow (L/s)	Extraneous Flow (L/s)	Total Flow (L/s)
Detached Dwellings	5.77	406	2.11	4.02	8.50	1.62	10.11
Street Townhomes	1.57	203	1.06	4.15	4.38	0.44	4.82
Medium Density	0.23	140	0.73	4.20	3.06	0.06	3.13
Commercial Block	3.10	11	3.57	2.50	8.91	0.87	9.78
Roads	2.85					0.80	0.80
Total	13.52	760	7.47		24.86	3.79	28.64



MILLBROOK SOUTH EAST SUBDIVISION

SANITARY DRAINAGE PLAN

DRAWN BY

V.L.

CKD. BY

D.G.

DATE

April, 2021



VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers

741 ROWNTREE DAIRY ROAD, SUITE 2, WOODBRIDGE, ONTARIO, L4L 5T9
TEL (905)264-0054, FAX (905)264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

SCALE

N.T.S.

PROJECT

19121

FIGURE C

Residential			Commercial		
Average Daily Flow	450	l/person/d	Average Daily f	1.15	l/s/ha
Peaking factor, M	2.00	min.	Peaking factor,	2.5	
	4.50	max.			

Infiltration rate, 0.28 l/s/ha

Pipe Velocities 0.75 m/s min

3.00 m/s max

Township of Cavan Monaghan

SANITARY SEWER DESIGN SHEET

Project Name: Millbrook North Sanitary Trunk Sewer

Project No: 17125

SANITARY FLOW

$$M = 1 + \frac{14}{4 + \sqrt{P}}$$
 where P in 1000's

$$Q(p) = \frac{P \times q \times M}{86.4}$$
 in (l / s)

$$Q(i) = i \times A$$
 in (l / s)

$$Q(d) = Q(p) + Q(i)$$
 in (l / s)

Consultant:



Valdor Engineering Inc.

741 Rowntree Dairy Road, Suite 2, Woodbridge, Ontario, L4L 5T9

Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com

Design: V. Lider Date: April, 2021

Checked: D. Giugovaz, P.Eng

Approved: P. Zourntos, P.Eng

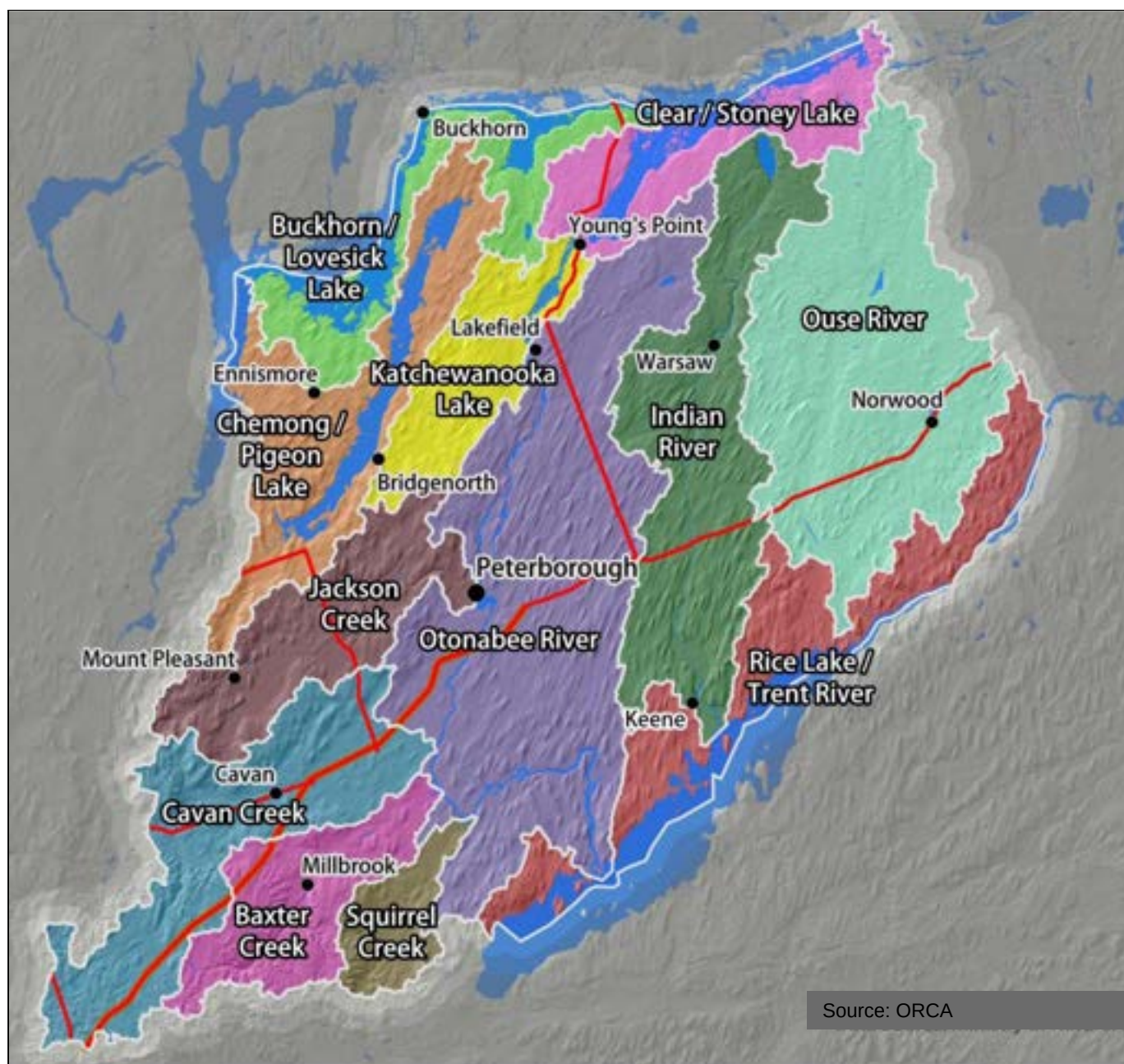
Sheet:

Street	from M.H.	to M.H.	Developable Area	No. of Detached Dwellings	No. of Street Townhomes	No. of Medium Density	No. of High Density	Industrial Commercial Institutional	Population	Accum. Population P	Peaking Factor M	Industrial Institutional Commercial	Peak Flow Q(p) (l/s)	Accum. Area (ha)	Extraneous Flow Q(i) (l/s)	Design Flow Q(d) (l/s)	Pipe Length L (m)	Pipe Diameter d (mm)	Pipe Slope S (%)	Nominal Pipe Full Flow Cap. Q(f), (l/s)	Pipe Full Flow Vel. V(f) (m/s)	Actual Velocity V(a) (m/s)	Q(d) / Q(f)	COMMENTS
			(ha)	(Units)	(Units)	(ha.)	(ha.)	(ha.)	(person)	(person)		Flow (l/s)												
FUT. DEV. NORTH COMMERCIAL	PLUG	MH.15AA	20.10	0	0		0	20.100	0	0	2.50	23.12	50.25	20.100	5.63	55.88	50.0	375	0.3%	96.0	0.87	0.90	0.58	
FUT. TOWERHILL PHASE 2 (Residential)	PLUG	MH.15AA	34.66	370	200		3.660	0.000	2873.0	2873.0	3.46	0.00	51.75	34.66	9.70	61.45	50.0	375	0.3%	96.0	0.87	0.92	0.64	
FUT. TOWERHILL PHASE 2 (School)	PLUG	MH.15AA	2.04	0	0		0.000	2.040	0.0	0.0	1.50	2.80	4.20	2.04	0.57	4.77	50.0	375	0.3%	96.0	0.87	0.45	0.05	
FUT. TOWERHILL PHASE 3	PLUG	MH.15AA	7.00	100	75		0.000	0.000	530.0	530.0	3.96	0.00	10.93	7.00	1.96	12.89	50.0	375	0.3%	96.0	0.87	0.61	0.13	
TOTAL FUT. FLOW to EX.MH.15A (N. Developments)	MH.15AA	EX.MH.15A	63.80	470	275		3.660	22.140	3403.0	3403.0	3.40	25.92	114.63	63.80	17.86	132.49	50.0	375	0.3%	96.0	0.87	0.88	1.38	
EX. Municipality&Community (To MH.18A-OLD Criteria)	EX.MH.24A	EX.MH.18A	6.480	0	0		0	6.480	0	0	2.00	0.75	1.50	6.480	1.81	3.31	80.0	200	1.3%	38.0	1.21	0.74	0.09	
EX. FALLIS LINE (To MH 15A-OLD Criteria)	EX.MH.18A	EX.MH.15A	3.150	30	0		0	0.000	78.0	78.0	4.00	0.00	1.63	3.150	0.88	2.51	60.0	200	1.0%	32.8	1.04	0.62	0.08	
EX. TOWERHILL PHASE 1 (To MH.11A-OLD Criteria)	EX.MH.15A	EX.MH.11A	4.970	87	0		0	0.000	226.2	226.20	4.00	0.00	4.71	14.600	4.09	8.80	60.0	375	0.3%	96.0	0.87	0.54	0.09	
TOTAL FLOW TO EX. MH.11A	EX.MH.15A	EX.MH.11A	78.4	587	275		3.660	28.620	3707.2	3707.2	3.36	26.67	120.88	78.4	21.95	142.83	60.0	375	0.3%	96.0	0.87	0.88	1.49	
FUT. SOUTH WEST SUBDIVISION	PLUG	MH.11A	32.050	417	153		0	0	1826.7	1826.7	3.62	0.00	34.40	32.050	8.97	43.38	60.0	250	1.0%	59.5	1.21	1.32	0.73	
TOTAL FUT. FLOW TO EX. MH.10A (Highlands Blvd.)	EX.MH.11A	EX.MH.10A	110.5	1004	428		3.660	28.620	5533.9	5533.9	3.20	26.67	148.29	110.5	30.93	179.22	60.0	375	0.3%	96.0	0.87	0.88	1.87	
EX. TOWERHILL PHASE 1 (To MH 5A-OLD Criteria)	EX.MH.11A	EX.MH.5A	17.400	245	0		0	0.000	637.0	637.00	4.00	0.00	13.27	17.400	4.87	18.14	60.0	375	0.3%	96.0	0.87	0.67	0.19	
TOTAL FUTURE FLOW TO EX. MH.1A	EX.MH.5A	EX.MH.1A	127.9	1249	428		3.660	28.620	6170.9	6170.9	3.16	26.67	157.48	127.9	35.80	193.28	60.0	375	2.7%	288.1	2.61	2.80	0.67	
EX.Tupper St./County Road 10 (Old Criteria)	EX.MH.1A	EX.MH.22A	5.260	51	0		0	0	132.6	132.6	4.00	0.00	2.76	5.260	1.47	4.24	50.0	375	0.9%	166.3	1.51	0.64	0.03	
TOTAL FUTURE FLOW TO EX. MH.22A	EX.MH.1A	EX.MH.22A	133.1	1300	428		3.660	28.620	6303.5	6303.5	3.15	26.67	159.38	133.1	37.27	196.65	60.0	375	0.9%	166.3	1.51	1.53	1.18	
EX.Centennial Lane (Old Criteria)	EX.MH.22A	EX.MH.3A	8.130	241	0		0	0	483.6	483.6	4.00	0.00	10.08	8.130	2.28	12.35	50.0	375	0.61%	136.9	1.24	0.77	0.09	
TOTAL FUTURE FLOW TO EX. MH.3A (WEST DEV.)	EX.MH.22A	EX.MH.3A	141.2	1541	428		3.660	28.620	6787.1	6787.1	3.12	26.67	166.22	141.2	39.55	205.77	60.0	375	0.61%	136.9	1.24	1.26	1.50	
FUTURE NORTH EAST SUBDIVISION (NORTH FALLIS LINE)	MH200A	MH.300A	47.700	575	1688		0	0	6063.7	6063.7	3.17	0.00	100.00	47.700	13.36	113.36	60.0	375	1.0%	175.3	1.59	1.69	0.65	
EASTCOMMERCIAL (SOUTH FALLIS LINE)	MH.350A	MH.300A	3.11	0	0		0	3.110	0	0	2.50	3.58	7.78	3.110	0.87	8.65	50.0	200	1.0%	32.8	1.04	0.88	0.26	
SOUTH EAST SUBDIVISION (SOUTH FALLIS LINE)	MH.300A	MH.SA-6A	9.520	108	62		0.000	0.000	526.8	6590.5	3.13	0.00	107.50	60.330	16.89	133.04	60.0	375	1.0%	175.3	1.59	1.75	0.76	
FUTURE SUBDIVISION (BY OTHERS)	MH.SA-6A	EX.MH.3A	1.720	33	0		0.000	0.000	115.5	6706.0	3.12	0.00	109.13	62.050	17.37	135.15	60.0	375	1.0%	175.3	1.59	1.75	0.77	

</

APPENDIX “D”

Storm Drainage Details

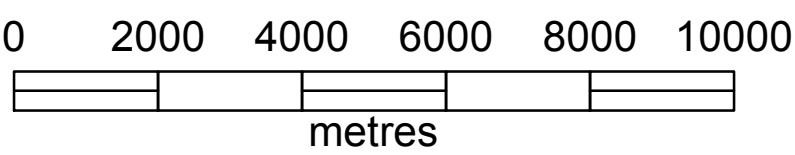
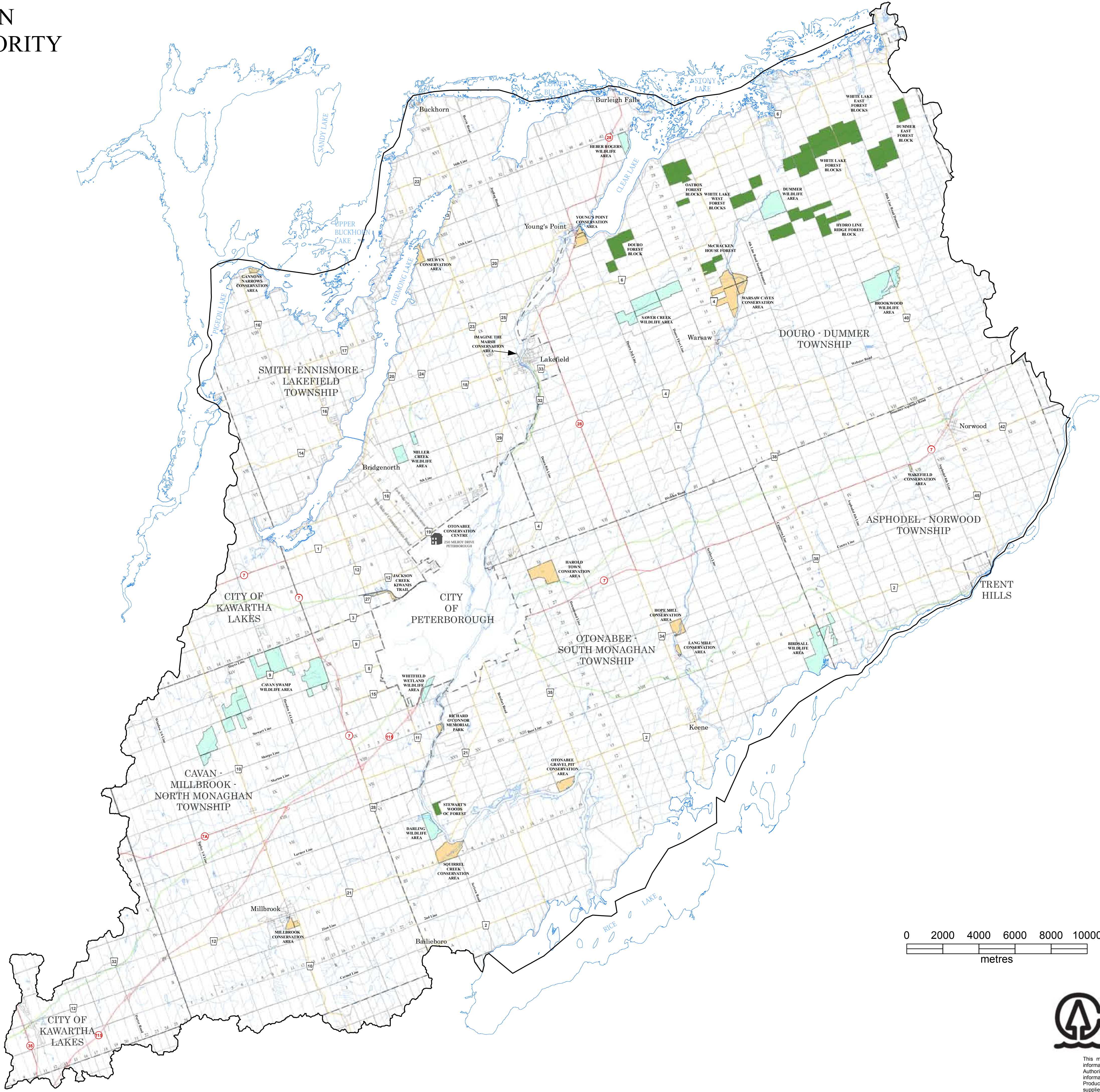


OTONABEE REGION
CONSERVATION AUTHORITY
LANDS



Legend

- Conservation Area
- Forest Land
- Wildlife Area
- Right-of-Way
- Township Road
- County Road
- King's Highway
- Lot Parcel Line
- Township Boundary
- Watershed Boundary

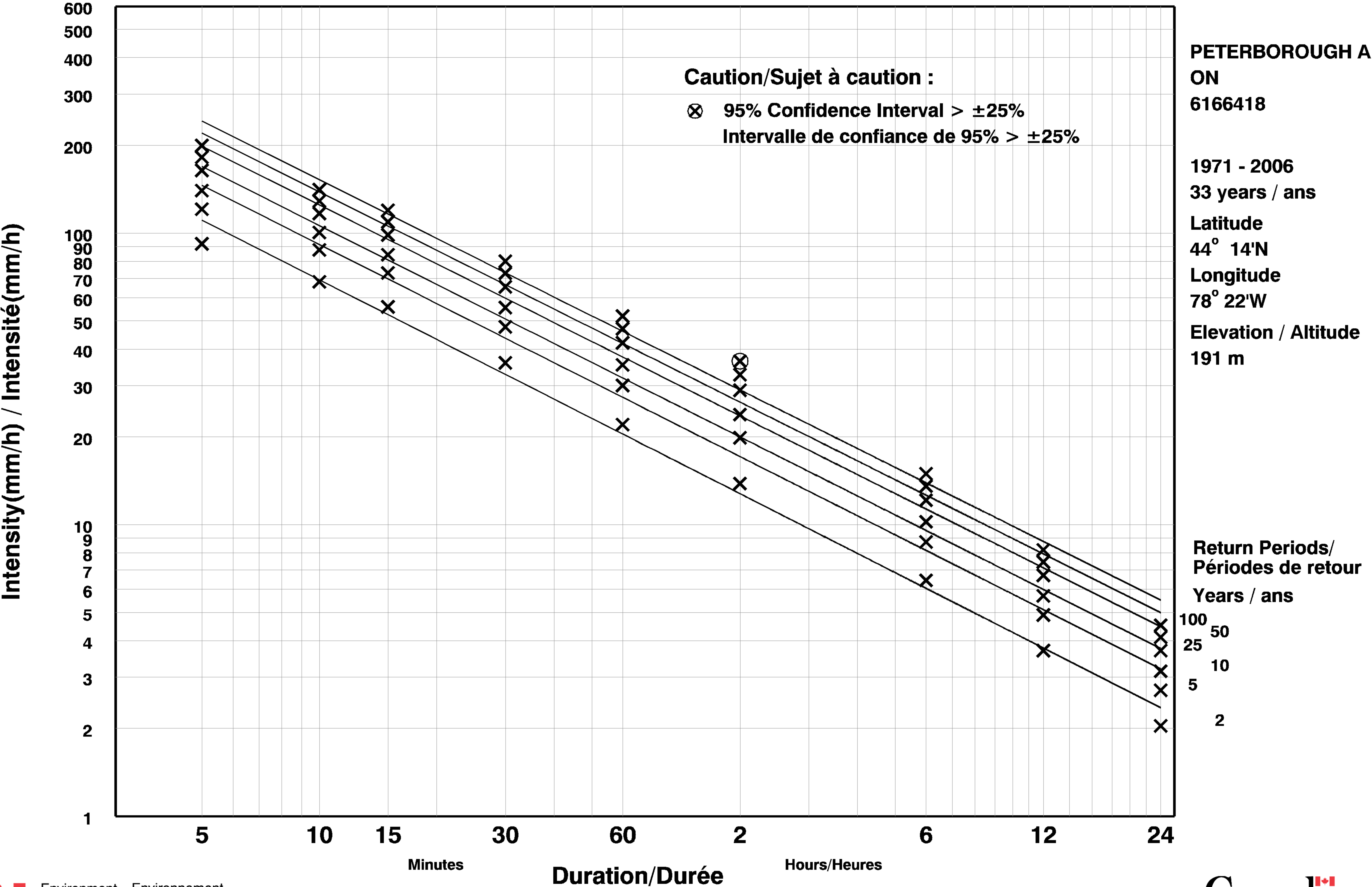


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Short Duration Rainfall Intensity-Duration-Frequency Data

2014/12/21

Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



Intensity Duration Frequency Statistics for Peterborough

Location - Peterborough Airport

2014 Data

$$\text{Rainfall Intensity} = a / (T_c + b)^c$$

T_c = Time of Concentration

2 Year Return Period		
a	b	c
583.351	6.010	0.773
Duration	Intensity	
5	92.0	
10	68.2	
15	56.0	
30	35.9	
60	22.1	
120	13.9	
360	6.4	
720	3.7	
1440	2.0	

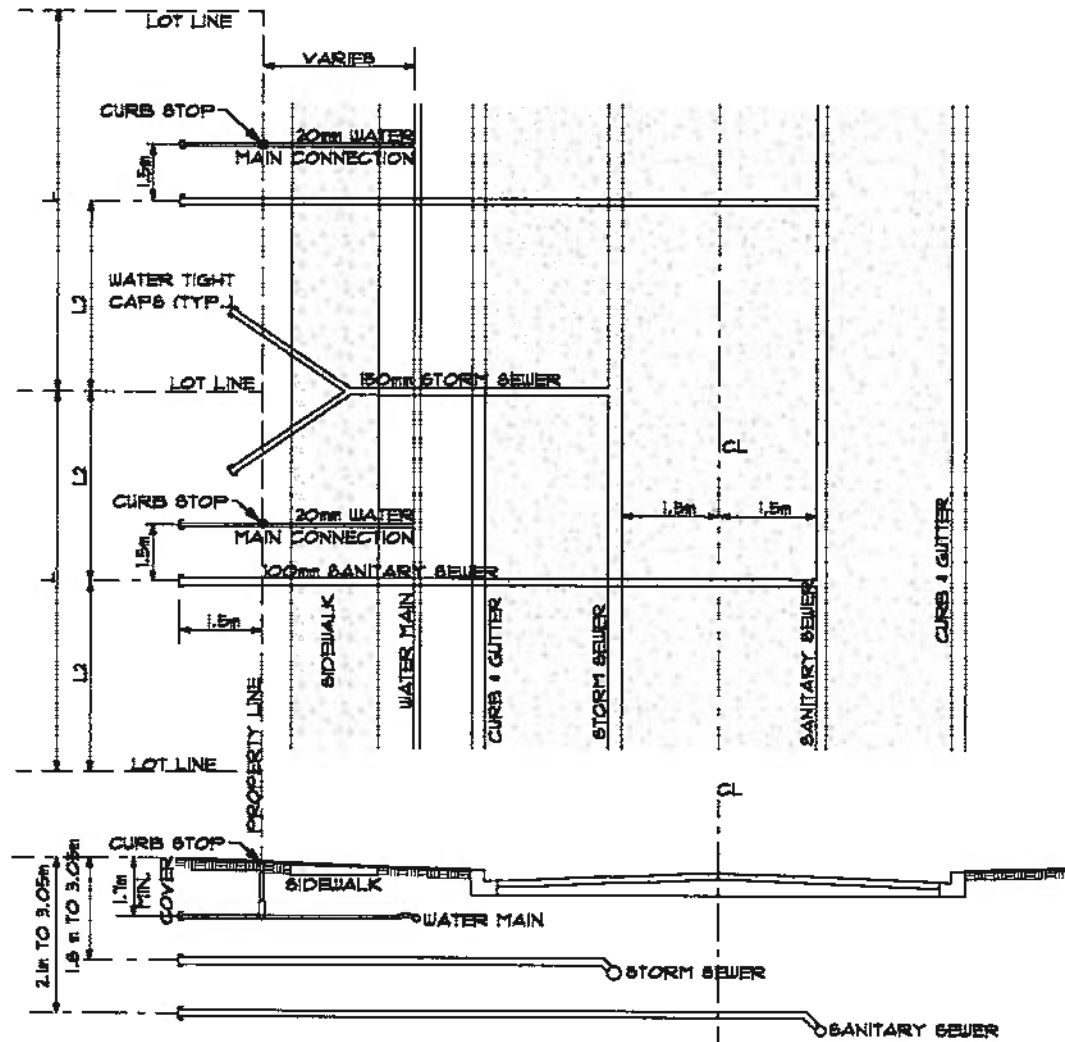
5 Year Return Period		
a	b	c
843.799	7.500	0.783
Duration	Intensity	
5	121.0	
10	87.7	
15	73.1	
30	47.8	
60	30.1	
120	19.9	
360	8.7	
720	4.9	
1440	2.7	

10 Year Return Period		
a	b	c
1034.243	8.265	0.791
Duration	Intensity	
5	140.2	
10	100.7	
15	84.5	
30	55.6	
60	35.4	
120	23.9	
360	10.2	
720	5.7	
1440	3.1	

25 Year Return Period		
a	b	c
1263.414	9.012	0.795
Duration	Intensity	
5	164.4	
10	117.0	
15	98.8	
30	65.5	
60	42.1	
120	29.0	
360	12.2	
720	6.7	
1440	3.7	

50 Year Return Period		
a	b	c
1468.915	9.751	0.801
Duration	Intensity	
5	182.3	
10	129.1	
15	109.4	
30	72.9	
60	47.1	
120	32.7	
360	13.6	
720	7.5	
1440	4.1	

100 Year Return Period		
a	b	c
1696.952	10.502	0.808
Duration	Intensity	
5	200.2	
10	141.1	
15	120.0	
30	80.2	
60	52.0	
120	36.4	
360	15.0	
720	8.2	
1440	4.5	



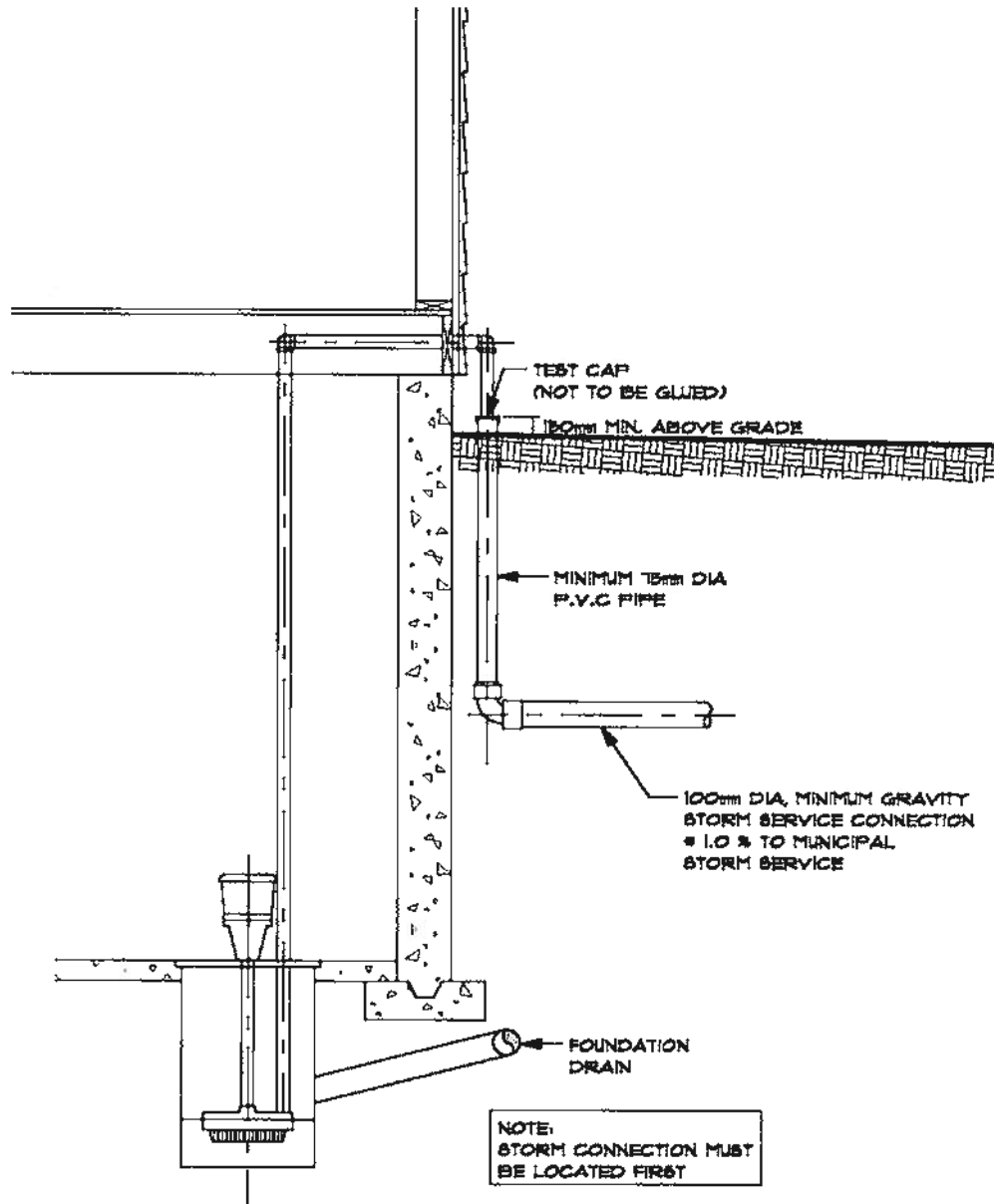
- NOTES:
1. WATERTIGHT CAPS ON ALL SERVICES.
 2. ALL DIMENSIONS SHOWN ARE CENTRE TO CENTRE.
 3. STORM PIPE MATERIALS IS TO BE FIVE SDR 26 AND WHITE IN COLOUR
 4. L = FRONTAGE OF ONE UNIT

TOWNSHIP OF
CAVAN MONAGHAN

**STORM SERVICE RESIDENTIAL
SERVICE CONNECTION**

SCALE: NOT TO SCALE

DATE: AUGUST 2018



TOWNSHIP OF
CAVAN MONAGHAN

**SUMP PUMP TO
STORM SEWER CONNECTION**

SCALE: NOT TO SCALE

DATE: AUGUST 2013

STD.
S2

APPENDIX “E”

Flood Plain Analysis

VALDOR ENGINEERING INC.

File: 19121

Date: April 2021

Table E.1: VO Model Parameters - Floodplain							
Catchment	Area (ha)	VO5 Routine	TIMP	XIMP	CN II	IA (mm)	Tp (hr)
401	28.90	StandHyd	0.60	0.45	61	5.0	-
402	15.49	NasHyd	-	-	62	8.6	0.31
403	23.90	NasHyd	-	-	64	8.0	0.36
Total	68.29						

Table E.2: Calculation of CN Values, Initial Abstractions and Runoff Coefficients - Floodplain									
Catchment	Area (ha)	Land Use and Land Cover		CN II	Area Weighted CN II	IA (mm)	Area Weighted IA (mm)	C-Value	Area Weighted C-Value
		Type	Area (ha)						
402	15.49	Forest (HSG 'B')	12.64	55	62	10	8.6	0.30	0.39
		Meadow (HSG 'B')	0.00	58		8		0.40	
		Row Crops (HSG 'B')	0.00	81		7		0.65	
		Open Space (HSG 'B')	0.55	61		5		0.25	
		Other Impervious	2.30	98		2		0.95	
403	23.90	Forest (HSG 'B')	9.16	55	64	10	8.0	0.30	0.43
		Meadow (HSG 'B')	5.60	58		8		0.40	
		Row Crops (HSG 'B')	5.99	81		7		0.65	
		Open Space (HSG 'B')	2.36	61		5		0.25	
		Other Impervious	0.79	98		2		0.95	

VALDOR ENGINEERING INC.

File: 19121

Date: April 2021

Table E.3: Calculation of Time to Peak - Floodplain

Catchment	A Area (ha)	C Runoff Coefficient (Area Weighted)	L (m) Catchment Length	Highest Elevation (m)	Lowest Elevation (m)	S (%) Catchment Slope	^{1,2} T _c Method	T _c (min)	^{1,2} T _p (hr)
402	15.49	0.39	830.0	247.00	218.00	3.49	Airport	28.0	0.31
403	23.90	0.43	725.0	255.00	209.50	6.28	Bransby-Williams	32.2	0.36

Notes:1) T_p calculation for catchments with C < 0.40 is based on the Airport Formula:

$$T_c = 3.26 \times (1.1 - C) \times L^{0.5} / S_w^{0.33}$$

2) T_p calculation for catchments with C > 0.40 is based on the Bransby-Williams Formula:

$$T_c = (0.057)(L) / (S_w)^{0.2} (A)^{0.1}$$

$$T_p = 0.67 T_c$$

VALDOR ENGINEERING INC.

File: 19121

Date: April 2021

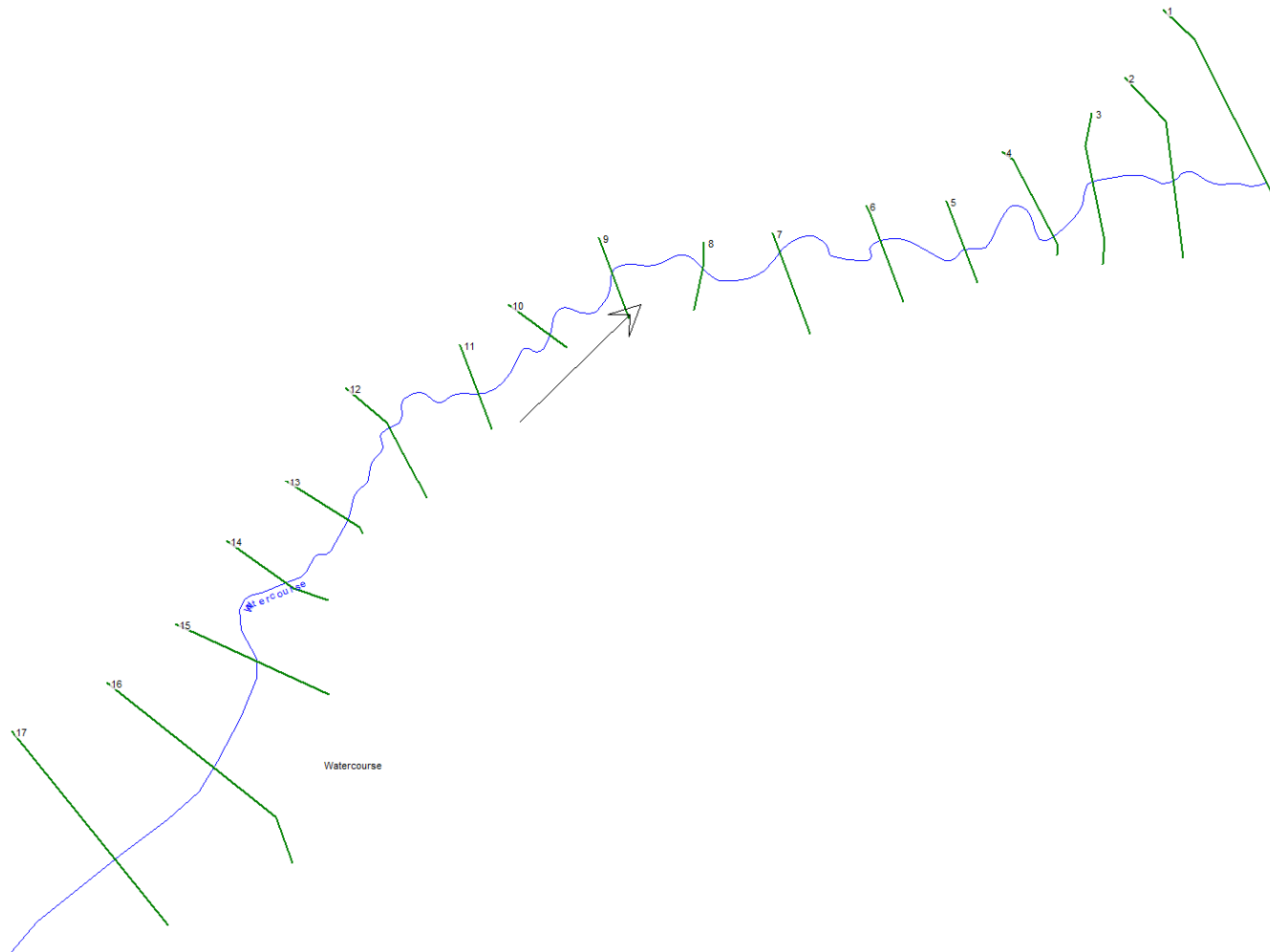
Table E.4: HEC-RAS Output - Pre-Development												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Watercourse	17	Regional	5.62	215.00	215.65		215.75	0.008913	1.45	4.15	14.01	0.73
Watercourse	16	Regional	5.62	214.60	215.43		215.50	0.004385	1.38	8.08	28.49	0.55
Watercourse	15	Regional	5.62	214.20	215.10	215.10	215.27	0.010098	1.99	4.71	18.98	0.82
Watercourse	14	Regional	5.62	213.80	214.70	214.70	214.90	0.010138	2.27	4.92	15.36	0.83
Watercourse	13	Regional	5.62	213.60	214.41	214.41	214.61	0.011091	2.14	4.14	13.01	0.86
Watercourse	12	Regional	5.62	213.20	214.00	214.00	214.13	0.007421	1.83	6.62	31.2	0.7
Watercourse	11	Regional	5.62	213.00	213.70		213.79	0.004605	1.48	6.52	16.75	0.57
Watercourse	10	Regional	5.62	212.60	213.42	213.42	213.59	0.008749	2.2	5.37	15.65	0.78
Watercourse	9	Regional	5.62	211.80	212.43	212.40	212.58	0.009132	1.92	4.67	14.25	0.79
Watercourse	8	Regional	5.62	211.40	212.10	212.10	212.29	0.010575	2.09	4.02	12.78	0.82
Watercourse	7	Regional	5.62	211.00	211.61	211.61	211.73	0.009449	1.85	6.52	25.74	0.77
Watercourse	6	Regional	5.62	210.20	210.99	210.99	211.12	0.010905	2.19	6.52	23.2	0.82
Watercourse	5	Regional	5.62	210.00	210.62	210.62	210.78	0.010477	2.03	4.94	16.82	0.84
Watercourse	4	Regional	5.62	209.40	210.12	210.09	210.28	0.009584	1.89	4.33	14.53	0.79
Watercourse	3	Regional	5.62	209.20	209.92	209.92	210.08	0.010477	2.07	5.52	20.68	0.82
Watercourse	2	Regional	5.62	209.00	209.57	209.57	209.69	0.01154	1.99	6.71	28.46	0.86
Watercourse	1	Regional	5.62	208.80	209.17	209.17	209.23	0.022516	2.01	8.18	48.84	1.09

VALDOR ENGINEERING INC.

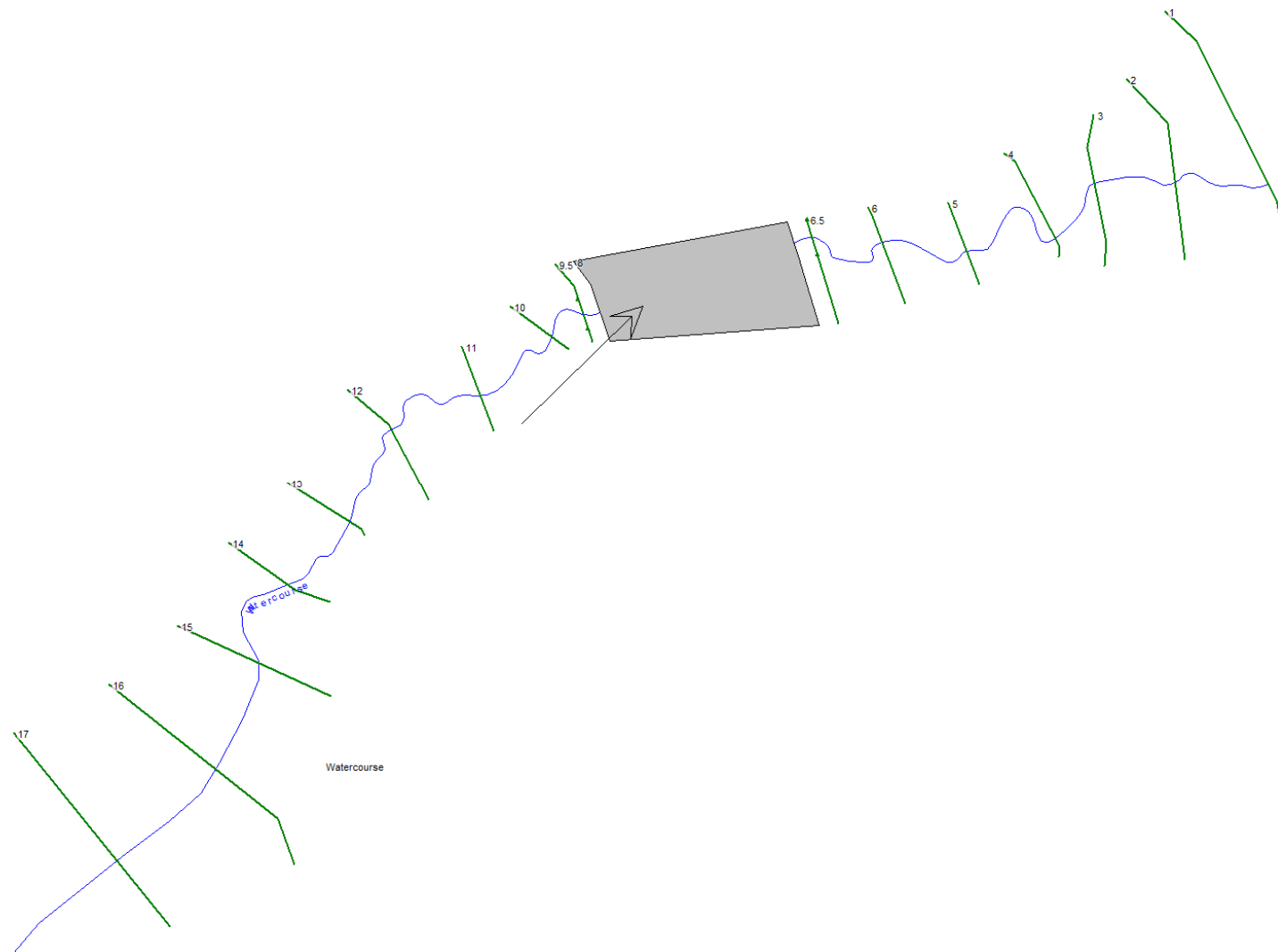
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Date: April 2021

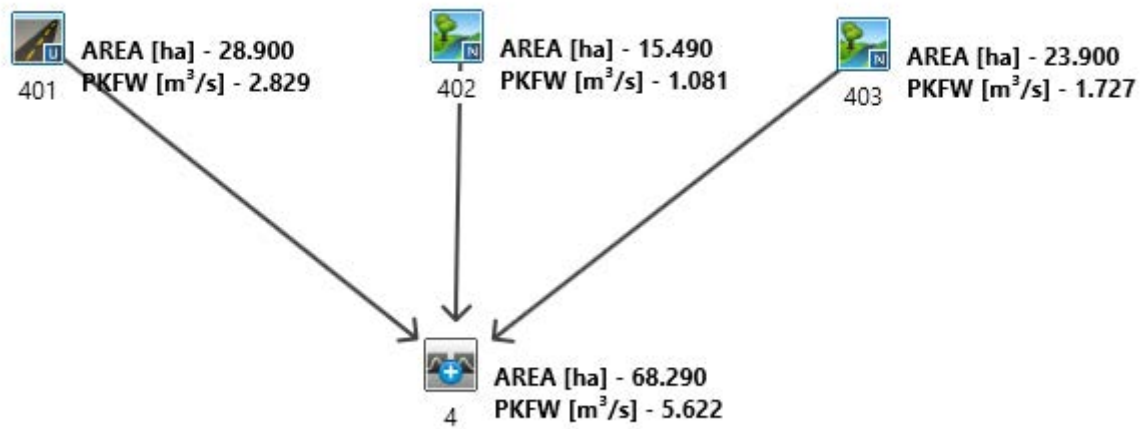
Table E.5: HEC-RAS Output - Post-Development												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Watercourse	17	Regional	5.62	215.00	215.65		215.75	0.008913	1.45	4.15	14.01	0.73
Watercourse	16	Regional	5.62	214.60	215.43		215.50	0.004385	1.38	8.08	28.49	0.55
Watercourse	15	Regional	5.62	214.20	215.10	215.10	215.27	0.010098	1.99	4.71	18.98	0.82
Watercourse	14	Regional	5.62	213.80	214.70	214.70	214.90	0.010138	2.27	4.92	15.36	0.83
Watercourse	13	Regional	5.62	213.60	214.41	214.41	214.61	0.011091	2.14	4.14	13.01	0.86
Watercourse	12	Regional	5.62	213.20	214.00	214.00	214.13	0.007421	1.83	6.62	31.2	0.7
Watercourse	11	Regional	5.62	213.00	213.70		213.79	0.004601	1.48	6.52	16.75	0.57
Watercourse	10	Regional	5.62	212.60	213.42	213.42	213.59	0.008767	2.2	5.37	15.65	0.78
Watercourse	10	Regional	5.62	211.99	213.42	212.53	213.43	0.000265	0.54	11.08	21.33	0.15
Watercourse	8		Culvert									
Watercourse	7	Regional	5.62	210.79	211.41	211.41	211.65	0.014983	2.37	3.31	22.45	0.98
Watercourse	6	Regional	5.62	210.20	210.99	210.99	211.12	0.010905	2.19	6.52	23.2	0.82
Watercourse	5	Regional	5.62	210.00	210.62	210.62	210.78	0.010477	2.03	4.94	16.82	0.84
Watercourse	4	Regional	5.62	209.40	210.12	210.09	210.28	0.009584	1.89	4.33	14.53	0.79
Watercourse	3	Regional	5.62	209.20	209.92	209.92	210.08	0.010477	2.07	5.52	20.68	0.82
Watercourse	2	Regional	5.62	209.00	209.57	209.57	209.69	0.01154	1.99	6.71	28.46	0.86
Watercourse	1	Regional	5.62	208.80	209.17	209.17	209.23	0.022516	2.01	8.18	48.84	1.09



HEC-RAS Model Schematic – Pre-Development



HEC-RAS Model Schematic – Post-Development



VO5 Model Schematic – Floodplain Drainage Area

=====

[ID= 1 DT= 5.0 min | Ia (mm)= 8.60 # of Linear Res.(N)= 3.00
----- U.H. Tp(hrs)= 0.31

V V I SSSS U U A L (v 5.1.2000)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voindat
Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\7fdd357-1c95-4bd4-82ec-370d078da8ea\eedc244d-1a38-449f-b5ca-e6faabe92b22\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\7fdd357-1c95-4bd4-82ec-370d078da8ea\eedc244d-1a38-449f-b5ca-e6faabe92b22\scena

DATE: 04-19-2021 TIME: 01:28:31

USER:

COMMENTS: _____

** SIMULATION : TIMMINS **

| READ STORM | Filename: C:\Users\Valdor\AppData\Local\Temp\
| | 44278a65-27fd-4285-a333-278861f3c23c\bb7158b5
| Ptotal=193.00 mm | Comments: TIMMINS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

| CALIB |
| NASHYD (0402) | Area (ha)= 15.49 Curve Number (CN)= 62.0

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 1.909

PEAK FLOW (cms)= 1.081 (i)
TIME TO PEAK (hrs)= 7.000
RUNOFF VOLUME (mm)= 99.953
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.518

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| READ STORM | Filename: C:\Users\Valdor\AppData\Local\Temp\
| | 44278a65-27fd-4285-a333-278861f3c23c\bb7158b5
| Ptotal=193.00 mm | Comments: TIMMINS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00

1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB				Area (ha)= 23.90				Curve Number (CN)= 64.0			
NASHYD (0403)				Ia (mm)= 5.00				# of Linear Res.(N)= 3.00			
ID= 1 DT= 5.0 min				U.H. Tp(hrs)= 0.36							

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 2.536

PEAK FLOW (cms)= 1.727 (i)
 TIME TO PEAK (hrs)= 7.083
 RUNOFF VOLUME (mm)= 106.800
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.553

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM		Filename: C:\Users\Valdor\AppData\Local\Temp\44278a65-27fd-4285-a333-278861f3c23c\bb7158b5
Ptotal=193.00 mm		Comments: TIMMINS

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB		Area (ha)= 28.90
STANDHYD (0401)		Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00
ID= 1 DT= 5.0 min		

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	17.34	11.56
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	438.94	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00

2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 43.10
 over (min) 5.00 20.00
 Storage Coeff. (min)= 7.06 (ii) 16.95 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.06

TOTALS

PEAK FLOW (cms)= 1.55 1.28 2.829 (iii)
 TIME TO PEAK (hrs)= 7.00 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 116.62 150.09
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.60 0.78

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0004)|
| 1 + 2 = 3 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 0401): 28.90 2.829 7.00 150.09
+ ID2= 2 ( 0402): 15.49 1.081 7.00 99.95
=====
ID = 3 ( 0004): 44.39 3.909 7.00 132.60
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0004)|
| 3 + 2 = 1 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 3 ( 0004): 44.39 3.909 7.00 132.60
+ ID2= 2 ( 0403): 23.90 1.727 7.00 106.80
=====
ID = 1 ( 0004): 68.29 5.622 7.00 123.57
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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APPENDIX “F”

Stormwater Management Calculations

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: April 2021

Table F.1: Existing Condition - VO Model Parameters							
Catchment	Area (ha)	VO5 Routine	TIMP	XIMP	CN II	IA (mm)	Tp (hr)
101	11.77	NasHyd	-	-	70	7.6	0.18
102	3.68	NasHyd	-	-	56	9.6	0.15
103	4.27	NasHyd	-	-	62	7.0	0.21
Total	19.72						

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: April 2021

Table F.2: Proposed Condition - VO Model Parameters							
Catchment	Area (ha)	VO5 Routine	TIMP	XIMP	CN II	IA (mm)	Tp (hr)
201	14.95	StandHyd	0.80	0.70	61	5.0	-
202	4.27	StandHyd	0.60	0.45	61	5.0	-
203	1.39	StandHyd	0.50	0.50	61	5.0	-
204	2.93	StandHyd	0.50	0.30	61	5.0	-
Total	23.54						

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: April 2021

Table F.3: Calculation of CN Values, Initial Abstractions and Runoff Coefficients

Catchment	Area (ha)	Land Use and Land Cover		CN II	Area Weighted CN II	IA (mm)	Area Weighted IA (mm)	C-Value	Area Weighted C-Value
		Type	Area (ha)						
101	11.77	Forest (HSG 'B')	0.91	55	70	10	7.6	0.30	0.53
		Meadow (HSG 'B')	4.56	58		8		0.40	
		Row Crops (HSG 'B')	6.28	81		7		0.65	
		Open Space (HSG 'B')	0.00	61		5		0.25	
		Other Impervious	0.02	98		2		0.95	
102	3.68	Forest (HSG 'B')	2.94	55	56	10	9.6	0.30	0.32
		Meadow (HSG 'B')	0.74	58		8		0.40	
		Row Crops (HSG 'B')	0.00	81		7		0.65	
		Open Space (HSG 'B')	0.00	61		5		0.25	
		Other Impervious	0.00	98		2		0.95	
103	4.27	Forest (HSG 'B')	1.43	55	62	10	7.0	0.30	0.37
		Meadow (HSG 'B')	0.89	58		8		0.40	
		Row Crops (HSG 'B')	0.00	81		7		0.65	
		Open Space (HSG 'B')	1.52	61		5		0.25	
		Other Impervious	0.43	98		2		0.95	

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: April 2021

Table F.4: SWM Analysis - Calculation of Time to Peak

Catchment	A Area (ha)	C Runoff Coefficient (Area Weighted)	L (m) Catchment Length	Highest Elevation (m)	Lowest Elevation (m)	S (%) Catchment Slope	^{1,2} T _c Method	T _c (min)	^{1,2} T _p (hr)
101	11.77	0.53	540	254.50	215.00	7.31	Bransby-Williams	16.2	0.18
102	3.68	0.32	300	216.50	211.00	1.83	Airport	13.3	0.15
103	4.27	0.37	285	243.50	216.50	9.47	Airport	19.2	0.21

Notes:1) T_p calculation for catchments with C < 0.40 is based on the Airport Formula:

$$T_c = 3.26 \times (1.1 - C) \times L^{0.5} / S_w^{0.33}$$

2) T_p calculation for catchments with C > 0.40 is based on the Bransby-Williams Formula:

$$T_c = (0.057)(L) / (S_w)^{0.2} (A)^{0.1}$$

$$T_p = 0.67 T_c$$

Table F.5: SWM Pond Stage-Storage-Discharge Table

Stage Storage Curve						Outlet Structure						Comments:
Elevation	Sec Area	Avg Area	Sec Volume	Cumulative Volume	Volume Above NWL	Invert Elevation (m) Diameter (mm)/Length (m) Height (m) Orifice Area (m ²)	Stage Active (m)	¹ Discharge m ³ /s				
(m)	(m ²)	(m ²)	(m ³)	(m ³)	(m ³)			Orifice #1	Weir #1	Spillway	Total	
								212.50	213.20	214.00	Flow	
								140	1.20	6.00		
						-	-	-				
						0.0154	-	-				
Forebay Below NWL						Bottom of Forebay					Weir Equation: Q=1.837xLxH ^{1.5} Orifice Eq'n: Q = 0.6A(2gH) ^{0.5} Spillway Design: Q=1.67xLxH ^{1.5}	
210.50	434	-	-	0								
211.50	791	613	613	613								
211.90	956	874	349	962								
212.50	1,337	1,147	688	1,650	NWL							
Main Cell Below NWL						Bottom of Main Cell						
211.00	1,692	-	-	0								
211.50	2,055	1,874	937	937								
211.90	2,359	2,207	883	1,820								
212.50	3,066	2,713	1,627	3,447	NWL							
Forebay & Main Cell Above NWL						NWL	0.00	0.000		0.000	Permanent Pool Provided	
212.50	4,403	-	-	5,097	0							
212.70	4,804	4,604	921	6,018	921							
212.90	5,206	5,005	1,001	7,019	1,922							
213.10	5,607	5,406	1,081	8,100	3,003							
213.20	5,792	5,699	570	8,670	3,573			0.000		0.030		
213.30	5,977	5,884	588	9,258	4,161			0.032		0.063		
213.40	6,162	6,069	607	9,865	4,768			0.037		0.179		
213.50	6,347	6,254	625	10,491	5,394			0.039		0.329		
213.60	6,503	6,425	643	11,133	6,036			0.042		0.507		
213.70	6,660	6,581	658	11,791	6,694			0.043		0.709		
213.80	6,816	6,738	674	12,465	7,368			0.045		0.931		
213.90	6,972	6,894	689	13,154	8,058			0.047		1.174		
214.00	7,128	7,050	705	13,860	8,763	Emergency Spillway	1.50	0.049	1.434	0.000	1.483	100-year Storage Provided
214.10	7,285	7,207	721	14,580	9,483		1.60	0.051	1.711	0.317	2.079	
214.20	7,441	7,363	736	15,316	10,220		1.70	0.052	2.004	0.896	2.952	
214.30	7,597	7,519	752	16,068	10,972		1.80	0.054	2.312	1.646	4.012	
214.40	7,754	7,676	768	16,836	11,739		1.90	0.055	2.634	2.535	5.225	
214.50	7,910	7,832	783	17,619	12,522		2.00	0.057	2.970	3.543	6.570	
214.70	8,203	8,057	1,611	19,230	14,134		2.20	0.060	3.682	5.868	9.610	
215.00	8,643	8,423	2,527	21,757	16,661	Top of Berm	2.50	0.064	4.840	10.020	14.923	Top of Berm

Table F.6: Permanent Pool Volume Requirements

Protection Level	SWMP Type	Storage Volume (m ³ /ha) for			
		Impervious Level			
		35%	55%	70%	85%
Level 1	<i>Infiltration</i>	25	30	35	40
	<i>Wetlands</i> ²	80	105	120	140
	<i>Wet Pond</i> ²	140	190	225	250
	<i>Hybrid Wet Pond/Wetland</i> ⁴	110	150	175	195
Level 2	<i>Infiltration</i>	20	20	25	30
	<i>Wetlands</i>	60	70	80	90
	<i>Wet Pond</i>	90	110	130	150
	<i>Hybrid Wet Pond/Wetland</i>	75	90	105	120
Level 3	<i>Infiltration</i>	20	20	20	20
	<i>Wetlands</i>	60	60	60	60
	<i>Wet Pond</i>	60	75	85	95
	<i>Hybrid Wet Pond/Wetland</i>	60	70	75	80
	<i>Dry Pond</i>	90	150	200	240

Source: Stormwater Management Planning and Design Manual (Table 3.2),
Ministry of the Environment, Ontario, March 2003

- Table 3.2 was based on specific design parameters (depth, length to width ratio) for each type of end-of-pipe stormwater management facility. The values of these parameters are provided in Appendix I of the Manual. All values in Table 4.1 are based on a 24 hour detention.
- For wetlands, wet ponds and hybrid ponds, all of the storage, except 40 m³/ha, in Table 3.2 represents the permanent pool volume. The 40 m³/ha represents the extended detention storage.
- For hybrid ponds, 50% to 60% of the permanent pool volume shall be contained in deeper portions of the facility.

PERMANENT POOL VOLUME CALCULATOR			
SWMP Type:	WET POND	(IN - infiltration, WET - wetlands, WP - wet pond, HYB - hybrid wet pond/wetland, DP - dry pond)	
Protection Level:	1	(1 - 80% TSS, 2 - 70% TSS, 3 - 60% TSS)	
Average Imperviousness:	75.0 %		
Volume Level:	193.3 m ³ /ha	Excluding Extended Detention	
Area:	20.61 ha		
Total Required Volume:	3,985 m ³		

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Date: April 2021

Table F.7: Extended Detention Requirements

Event	Area (ha)	R.V. (mm)	Required Ext. Det. Volume (m ³)	Provided Ext. Det. Volume (m ³)
25mm 4-hour Chicago Storm	20.61	15.85	3,267	3,573

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File: 19121

Date: April 2021

Table F.8: Extended Detention Drawdown Time

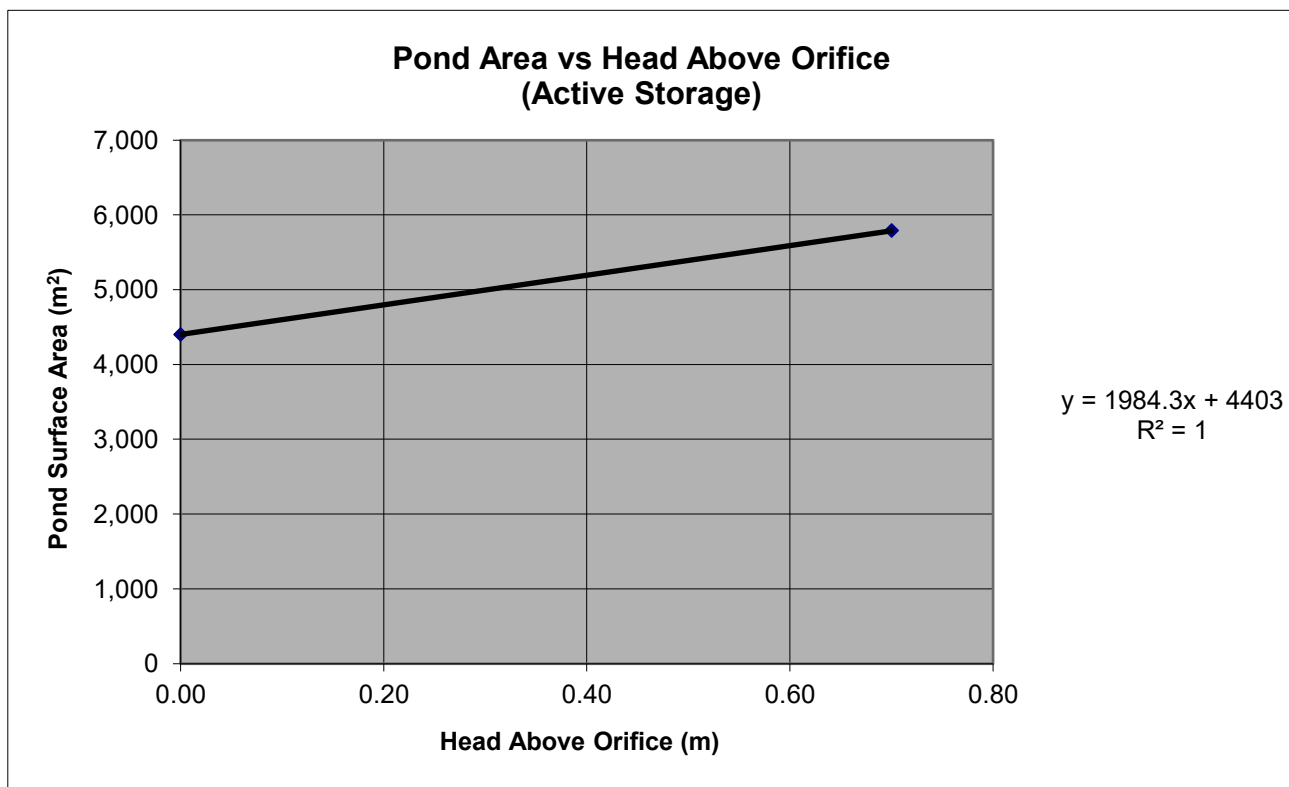
Extended Detention - SWM Pond

Orifice Sizing	
Orifice Size	140 mm
Orifice Inve	212.50 m
Orifice Area	0.015393804 sq. m
¹ EDL _{erosion}	213.20 m
NWL	212.50 m
C ₂	1984.3
C ₃	4403.0
h	0.6300 m
Drawdown τ	50.2 hr

$$y = mx + b$$

$$C_2 = m$$

$$C_3 = b$$



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File: 19121

Date: April 2021

Table F.9: Critical Storm Analysis

Storm Distribution	Theoretical 100-year Storage Volume Required (m ³)	Note
6-hour AES	7,145	Critical Storm
12-hour AES	7,000	
24-hour AES	6,373	
6-hour SCS	7,137	
12-hour SCS	6,590	
24-hour SCS	6,004	
4-hour Chicago	7,105	

SWM Pond: Forebay Weir

Project Description

Solve For Discharge

Input Data

Headwater Elevation		213.20	m
Crest Elevation		212.50	m
Tailwater Elevation		212.50	m
Crest Surface Type	Gravel		
Crest Breadth		8.00	m
Crest Length		4.00	m

Results

Discharge	3.88	m³/s
Headwater Height Above Crest	0.70	m
Tailwater Height Above Crest	0.00	m
Weir Coefficient	1.66	SI
Submergence Factor	1.00	
Adjusted Weir Coefficient	1.66	SI
Flow Area	2.80	m²
Velocity	1.39	m/s
Wetted Perimeter	5.40	m
Top Width	4.00	m

Culvert Calculator Report

SWM Pond: Outlet Pipe, 100yr Cont.

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 m	Headwater Depth/Height	1.66
Computed Headwater Elevation	212.99 m	Discharge	1.3160 m³/s
Inlet Control HW Elev.	212.90 m	Tailwater Elevation	211.41 m
Outlet Control HW Elev.	212.99 m	Control Type	Outlet Control
Grades			
Upstream Invert	211.60 m	Downstream Invert	211.15 m
Length	86.00 m	Constructed Slope	0.005233 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.69 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.69 m
Velocity Downstream	2.72 m/s	Critical Slope	0.007711 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.84 m
Section Size	825 mm	Rise	0.84 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	212.99 m	Upstream Velocity Head	0.29 m
Ke	0.50	Entrance Loss	0.14 m
Inlet Control Properties			
Inlet Control HW Elev.	212.90 m	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	0.6 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

SWM Pond: Emergency Spillway, 100yr Uncont.

Project Description

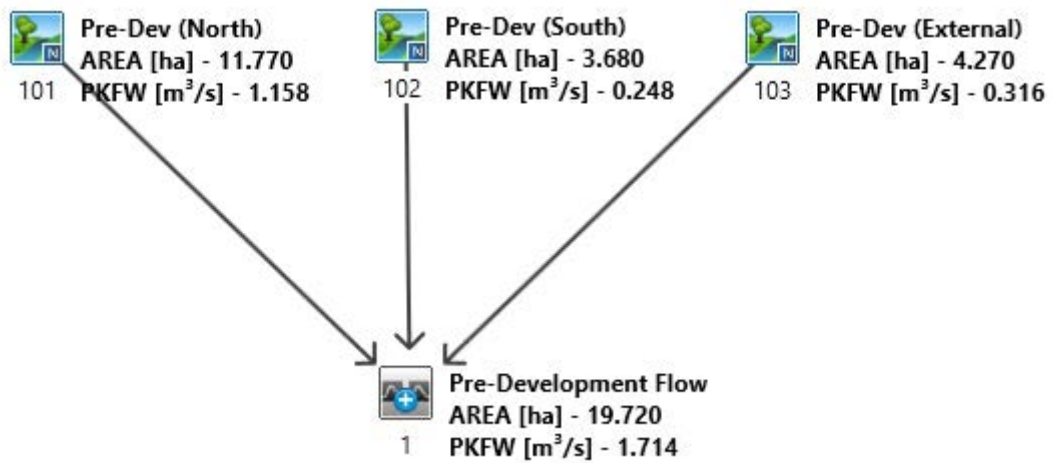
Solve For Headwater Elevation

Input Data

Discharge		3.77	m³/s
Crest Elevation		214.00	m
Tailwater Elevation		214.00	m
Crest Surface Type	Gravel		
Crest Breadth		40.00	m
Crest Length		6.00	m

Results

Headwater Elevation	214.53	m
Headwater Height Above Crest	0.53	m
Tailwater Height Above Crest	0.00	m
Weir Coefficient	1.63	SI
Submergence Factor	1.00	
Adjusted Weir Coefficient	1.63	SI
Flow Area	3.18	m²
Velocity	1.19	m/s
Wetted Perimeter	7.06	m
Top Width	6.00	m



VO5 Model Schematic – Pre-Development

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*****
V   V   I   SSSSS   U   U   A   L   (v 5.1.2000)
V   V   I   SS      U   U   A A   L
V   V   I   SS      U   U   AAAAA L
V   V   I   SS      U   U   A   A   L
V   V   I   SSSSS   UUUUU   A   A   LLLLL

000   TTTT   TTTT   H   H   Y   Y   M   M   000   TM
0   0   T   T   H   H   Y   Y   MM   MM   0   0
0   0   T   T   H   H   Y   M   M   0   0
000   T   T   H   H   Y   M   M   000

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***** D E T A I L E D O U T P U T *****

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DATE: 04-19-2021 TIME: 02:59:48

USER:

COMMENTS: _____

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** SIMULATION : AES_06hr_002yr **
*****

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|             | ata\Local\Temp\
|             | 92cdec3c-c601-4243-b9a3-c9e9cee41067\69f2813f
| Ptotal= 38.69 mm | Comments: AES_06hr_002yr
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TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	'	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77	
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77	
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77	
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77	
1.25	0.77	3.00	10.06	4.75	1.55			
1.50	4.64	3.25	10.06	5.00	0.77			
1.75	4.64	3.50	5.42	5.25	0.77			

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 70.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
|             | U.H. Tp(hrs)= 0.18
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr ' hrs mm/hr hrs mm/hr
0.083 0.00 1.667 4.64 3.250 10.06 4.83 0.77
0.167 0.00 1.750 4.64 3.333 5.42 4.92 0.77
0.250 0.00 1.833 13.16 3.417 5.42 5.00 0.77
0.333 0.77 1.917 13.16 3.500 5.42 5.08 0.77
0.417 0.77 2.000 13.16 3.583 5.42 5.17 0.77
0.500 0.77 2.083 13.16 3.667 5.42 5.25 0.77
0.583 0.77 2.167 13.16 3.750 5.42 5.33 0.77
0.667 0.77 2.250 13.16 3.833 3.10 5.42 0.77
0.750 0.77 2.333 35.60 3.917 3.10 5.50 0.77
0.833 0.77 2.417 35.60 4.000 3.10 5.58 0.77
0.917 0.77 2.500 35.60 4.083 3.10 5.67 0.77
1.000 0.77 2.583 35.60 4.167 3.10 5.75 0.77
1.083 0.77 2.667 35.60 4.250 3.10 5.83 0.77
1.167 0.77 2.750 35.60 4.333 1.55 5.92 0.77
1.250 0.77 2.833 10.06 4.417 1.55 6.00 0.77
1.333 4.64 2.917 10.06 4.500 1.55 6.08 0.77
1.417 4.64 3.000 10.06 4.583 1.55 6.17 0.77
1.500 4.64 3.083 10.06 4.667 1.55 6.25 0.77
1.583 4.64 3.167 10.06 4.750 1.55

```

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.215 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 6.887
TOTAL RAINFALL (mm)= 38.690
RUNOFF COEFFICIENT = 0.178

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

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```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	'	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77	
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77	
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77	
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77	
1.25	0.77	3.00	10.06	4.75	1.55			
1.50	4.64	3.25	10.06	5.00	0.77			
1.75	4.64	3.50	5.42	5.25	0.77			

```

-----
| CALIB |
| NASHYD ( 0102) | Area (ha)= 3.68 Curve Number (CN)= 56.0
| ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
|             | U.H. Tp(hrs)= 0.15
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr ' hrs mm/hr hrs mm/hr
0.083 0.00 1.667 4.64 3.250 10.06 4.83 0.77
0.167 0.00 1.750 4.64 3.333 5.42 4.92 0.77
0.250 0.00 1.833 13.16 3.417 5.42 5.00 0.77
0.333 0.77 1.917 13.16 3.500 5.42 5.08 0.77

```

0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.038 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 3.679
 TOTAL RAINFALL (mm)= 38.690
 RUNOFF COEFFICIENT = 0.095

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

CALIB	Area (ha)	Curve Number (CN)
NASHYD (0103)	4.27	62.0
ID= 1 DT= 5.0 min	Ia (mm)= 7.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.21	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77

1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.057 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 5.351
 TOTAL RAINFALL (mm)= 38.690
 RUNOFF COEFFICIENT = 0.138

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	11.77	0.215	2.83	6.89
+ ID2= 2 (0102):	3.68	0.038	2.75	3.68
ID = 3 (0001):	15.45	0.251	2.83	6.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	15.45	0.251	2.83	6.12
+ ID2= 2 (0103):	4.27	0.057	2.83	5.35
ID = 1 (0001):	19.72	0.308	2.83	5.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V	V	I	SSSS	U	U	A	L	(v 5.1.2000)
V	V	I	SS	U	U	A	A	L
V	V	I	SS	U	U	A	A	A
V	V	I	SS	U	U	A	A	L
V	V	I	SSSS	UUUU	A	A	LLLL	

000	TTTT	TTTT	H	H	Y	Y	M	M	000	TM
0	0	T	T	H	H	Y	Y	MM	MM	0
0	0	T	T	H	H	Y	Y	M	M	0
000	T	T	H	H	Y	Y	M	M	000	

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DATE: 04-19-2021

TIME: 02:59:48

USER:

COMMENTS: _____

** SIMULATION : AES_06hr_005yr

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Ptotal= 52.41 mm	Comments: AES_06hr_005yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

CALIB	Area (ha)= 11.77	Curve Number (CN)= 70.0
NASHYD (0101)	Ia (mm)= 7.60	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 0.18	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.414 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 13.029
TOTAL RAINFALL (mm)= 52.410
RUNOFF COEFFICIENT = 0.249

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\92cdec3c-c601-4243-b9a3-c9e9cee41067\3f7ed82
Ptotal= 52.41 mm	Comments: AES_06hr_005yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

CALIB	Area (ha)= 3.68	Curve Number (CN)= 56.0
NASHYD (0102)	Ia (mm)= 9.60	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.080 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 7.518
TOTAL RAINFALL (mm)= 52.410
RUNOFF COEFFICIENT = 0.143

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| READ STORM | Filename: C:\Users\Valdor\AppData
|             |   ata\Local\Temp\
|             |   92cdec3c-c601-4243-b9a3-c9e9cee41067\3f7ed82
| Ptotal= 52.41 mm | Comments: AES_06hr_005yr
-----

```

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

```

-----
| CALIB      |
| NASHYD ( 0103) | Area (ha)= 4.27 Curve Number (CN)= 62.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
|             | U.H. Tp(hrs)= 0.21
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
| TRANSFORMED HYETOGRAPH |
|-----|
| TIME RAIN TIME RAIN TIME RAIN TIME RAIN |
| hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr |
|-----|
| 0.083 0.00 1.667 6.29 3.250 13.62 4.83 1.05 |
| 0.167 0.00 1.750 6.29 3.333 7.34 4.92 1.05 |
| 0.250 0.00 1.833 17.82 3.417 7.34 5.00 1.05 |
| 0.333 1.05 1.917 17.82 3.500 7.34 5.08 1.05 |
| 0.417 1.05 2.000 17.82 3.583 7.34 5.17 1.05 |
| 0.500 1.05 2.083 17.82 3.667 7.34 5.25 1.05 |
| 0.583 1.05 2.167 17.82 3.750 7.34 5.33 1.05 |
| 0.667 1.05 2.250 17.82 3.833 4.19 5.42 1.05 |
| 0.750 1.05 2.333 48.21 3.917 4.19 5.50 1.05 |
| 0.833 1.05 2.417 48.21 4.000 4.19 5.58 1.05 |
| 0.917 1.05 2.500 48.21 4.083 4.19 5.67 1.05 |
| 1.000 1.05 2.583 48.21 4.167 4.19 5.75 1.05 |
| 1.083 1.05 2.667 48.21 4.250 4.19 5.83 1.05 |
| 1.167 1.05 2.750 48.21 4.333 2.10 5.92 1.05 |
| 1.250 1.05 2.833 13.62 4.417 2.10 6.00 1.05 |
| 1.333 6.29 2.917 13.62 4.500 2.10 6.08 1.05 |
| 1.417 6.29 3.000 13.62 4.583 2.10 6.17 1.05 |
| 1.500 6.29 3.083 13.62 4.667 2.10 6.25 1.05 |
| 1.583 6.29 3.167 13.62 4.750 2.10 6.33 1.05 |
|-----|

```

Unit Hyd Qpeak (cms)= 0.777

```

PEAK FLOW (cms)= 0.111 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 10.238
TOTAL RAINFALL (mm)= 52.410
RUNOFF COEFFICIENT = 0.195

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
|-----|
| AREA QPEAK TPEAK R.V. |
| (ha) (cms) (hrs) (mm) |
|-----|

```

```

ID1= 1 ( 0101): 11.77 0.414 2.75 13.03
+ ID2= 2 ( 0102): 3.68 0.080 2.75 7.52
=====
ID = 3 ( 0001): 15.45 0.494 2.75 11.72

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
|-----|
| AREA QPEAK TPEAK R.V. |
| (ha) (cms) (hrs) (mm) |
|-----|
ID1= 3 ( 0001): 15.45 0.494 2.75 11.72
+ ID2= 2 ( 0103): 4.27 0.111 2.83 10.24
=====
ID = 1 ( 0001): 19.72 0.599 2.75 11.40

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 5.1.2000)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLL

```

```

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y Y M M 0 0
000 T T H H Y M M 000

```

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***** D E T A I L E D O U T P U T *****

```

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-
e2ef03acaa05\c20ecb39-822c-4776-b17e-5502bc06d379\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-
e2ef03acaa05\c20ecb39-822c-4776-b17e-5502bc06d379\scena

```

DATE: 04-19-2021

TIME: 02:59:48

USER:

COMMENTS: _____

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*****
** SIMULATION : AES_06hr_010yr **
*****

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| READ STORM | Filename: C:\Users\Valdor\AppData
|             |   ata\Local\Temp\
|             |   92cdec3c-c601-4243-b9a3-c9e9cee41067\b0a61c61
| Ptotal= 61.50 mm | Comments: AES_06hr_010yr
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		
1.50	7.38	3.25	15.99	5.00	1.23		
1.75	7.38	3.50	8.61	5.25	1.23		

1.50	7.38	3.25	15.99	5.00	1.23
1.75	7.38	3.50	8.61	5.25	1.23

CALIB			
NASHYD (0102)			
ID= 1 DT= 5.0 min	Area (ha)=	3.68	Curve Number (CN)= 56.0
	Ia (mm)=	9.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

CALIB			
NASHYD (0101)			
ID= 1 DT= 5.0 min	Area (ha)=	11.77	Curve Number (CN)= 70.0
	Ia (mm)=	7.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.18	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.573 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 17.799
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.289

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM			
Filename: C:\Users\Valdor\AppData\Local\Temp\92cdec3c-c601-4243-b9a3-c9e9cee41067\b0a61c61			
Ptotal= 61.50 mm			
Comments: AES_06hr_010yr			

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.114 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 10.650
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.173

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	
Filename: C:\Users\Valdor\AppData\Local\Temp\92cdec3c-c601-4243-b9a3-c9e9cee41067\b0a61c61	
Ptotal= 61.50 mm	
Comments: AES_06hr_010yr	

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		
1.50	7.38	3.25	15.99	5.00	1.23		
1.75	7.38	3.50	8.61	5.25	1.23		

CALIB			
NASHYD (0103)			
Area (ha)=	4.27	Curve Number (CN)=	62.0

ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
 ----- U.H. Tp(hrs)= 0.21

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.153 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 14.110
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.229

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0101):	11.77	0.573	2.75	17.80
+ ID2= 2 (0102):	3.68	0.114	2.75	10.65
ID = 3 (0001):	15.45	0.687	2.75	16.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	15.45	0.687	2.75	16.10
+ ID2= 2 (0103):	4.27	0.153	2.83	14.11
ID = 1 (0001):	19.72	0.834	2.75	15.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 5.1.2000)

V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y Y M M 0 0
 000 T T H H Y M M 000
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\50fd2681-1f64-4a49-8197-7f7a552026a4\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\50fd2681-1f64-4a49-8197-7f7a552026a4\scena

DATE: 04-19-2021

TIME: 02:59:49

USER:

COMMENTS:

 ** SIMULATION : AES_06hr_025yr **

READ STORM	Filename:
	C:\Users\Valdor\AppData\Local\Temp\92cdec3c-c601-4243-b9a3-c9e9cee41067\ea9f6f15
Ptotal= 72.91 mm	Comments: AES_06hr_025yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

CALIB	Area (ha)	Curve Number (CN)
NASHYD (0101)	11.77	70.0
ID= 1 DT= 5.0 min	Ia (mm)= 7.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.18	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr

0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.793 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 24.420
 TOTAL RAINFALL (mm)= 72.910
 RUNOFF COEFFICIENT = 0.335

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46

0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.163 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 15.159
 TOTAL RAINFALL (mm)= 72.910
 RUNOFF COEFFICIENT = 0.208

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

1.417 8.75 | 3.000 18.95 | 4.583 2.92 | 6.17 1.46
1.500 8.75 | 3.083 18.95 | 4.667 2.92 | 6.25 1.46
1.583 8.75 | 3.167 18.95 | 4.750 2.92 |

```

Unit Hyd Qpeak (cms)= 0.777

```

PEAK FLOW (cms)= 0.214 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 19.574
TOTAL RAINFALL (mm)= 72.910
RUNOFF COEFFICIENT = 0.268

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
-----
          AREA   QPEAK   TPEAK   R.V.
          (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 0101): 11.77 0.793 2.75 24.42
+ ID2= 2 ( 0102): 3.68 0.163 2.75 15.16
-----
ID = 3 ( 0001): 15.45 0.956 2.75 22.21

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
          AREA   QPEAK   TPEAK   R.V.
          (ha)   (cms)   (hrs)   (mm)
ID1= 3 ( 0001): 15.45 0.956 2.75 22.21
+ ID2= 2 ( 0103): 4.27 0.214 2.83 19.57
-----
ID = 1 ( 0001): 19.72 1.163 2.75 21.64

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
=====

```

```

V V I SSSS U U A L (v 5.1.2000)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLLL

```

```

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voindat
Output filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f90c0da-2c51-41af-bf26-0b08f13e6b04\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f90c0da-2c51-41af-bf26-0b08f13e6b04\scena

DATE: 04-19-2021

TIME: 02:59:49

USER:

COMMENTS:

```

*****
** SIMULATION : AES_06hr_050yr **
*****

```

```

-----
| READ STORM | Filename: C:\Users\Valdor\AppData
|            | ata\Local\Temp\
|            | 92cdec3c-c601-4243-b9a3-c9e9cee41067\12dd90ee
| Ptotal= 81.41 mm | Comments: AES_06hr_050yr
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 70.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
| U.H. Tp(hrs)= 0.18
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 9.77 3.250 21.16 4.83 1.63
0.167 0.00 1.750 9.77 3.333 11.40 4.92 1.63
0.250 0.00 1.833 27.68 3.417 11.40 5.00 1.63
0.333 1.63 1.917 27.68 3.500 11.40 5.08 1.63
0.417 1.63 2.000 27.68 3.583 11.40 5.17 1.63
0.500 1.63 2.083 27.68 3.667 11.40 5.25 1.63
0.583 1.63 2.167 27.68 3.750 11.40 5.33 1.63
0.667 1.63 2.250 27.68 3.833 6.51 5.42 1.63
0.750 1.63 2.333 74.89 3.917 6.51 5.50 1.63
0.833 1.63 2.417 74.89 4.000 6.51 5.58 1.63
0.917 1.63 2.500 74.89 4.083 6.51 5.67 1.63
1.000 1.63 2.583 74.89 4.167 6.51 5.75 1.63
1.083 1.63 2.667 74.89 4.250 6.51 5.83 1.63
1.167 1.63 2.750 74.89 4.333 3.26 5.92 1.63
1.250 1.63 2.833 21.16 4.417 3.26 6.00 1.63
1.333 9.77 2.917 21.16 4.500 3.26 6.08 1.63
1.417 9.77 3.000 21.16 4.583 3.26 6.17 1.63
1.500 9.77 3.083 21.16 4.667 3.26 6.25 1.63
1.583 9.77 3.167 21.16 4.750 3.26 |

```

Unit Hyd Qpeak (cms)= 2.498

```

PEAK FLOW (cms)= 0.971 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 29.739

```


TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.365

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM		Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 92cdec3c-c601-4243-b9a3-c9e9cee41067\12dd90ee							
Ptotal= 81.41 mm		Comments: AES_06hr_050yr							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN		
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr		
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63		
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63		
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63		
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63		
1.25	1.63	3.00	21.16	4.75	3.26				
1.50	9.77	3.25	21.16	5.00	1.63				
1.75	9.77	3.50	11.40	5.25	1.63				

CALIB	Area (ha)= 3.68	Curve Number (CN)= 56.0
NASHYD (0102)	Ia (mm)= 9.60	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.204 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 18.892
 TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.232

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 92cdec3c-c601-4243-b9a3-c9e9cee41067\12dd90ee
Ptotal= 81.41 mm	Comments: AES_06hr_050yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

CALIB	Area (ha)= 4.27	Curve Number (CN)= 62.0
NASHYD (0103)	Ia (mm)= 7.00	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 0.21	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.263 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 24.026
 TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.295

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0101):	11.77	0.971	2.75	29.74
+ ID2= 2 (0102):	3.68	0.204	2.75	18.89
ID = 3 (0001):	15.45	1.175	2.75	27.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
ID1= 3 ( 0001): 15.45 1.175 2.75 27.16
+ ID2= 2 ( 0103): 4.27 0.263 2.83 24.03
-----
ID = 1 ( 0001): 19.72 1.431 2.75 26.48

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 5.1.2000)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y M M 0 0
0 0 T T H H Y Y M M 0 0
000 T T H H Y Y M M 000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voindat
Output filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\bf469b88-6845-4a25-8bd3-1abf8d15d0ba\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\bf469b88-6845-4a25-8bd3-1abf8d15d0ba\scena

DATE: 04-19-2021 TIME: 02:59:49

USER:

COMMENTS: _____

```

*****
** SIMULATION : AES_06hr_100yr **
*****

```

```

-----
| READ STORM | Filename: C:\Users\Valdor\AppData
|             | ata\Local\Temp\
|             | 92cdec3c-c601-4243-b9a3-c9e9cee41067\1ec3a0e5
| Ptotal= 89.91 mm | Comments: AES_06hr_100yr
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80

0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 70.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
| U.H. Tp(hrs)= 0.18
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 10.79 3.250 23.37 4.83 1.80
0.167 0.00 1.750 10.79 3.333 12.59 4.92 1.80
0.250 0.00 1.833 30.57 3.417 12.59 5.00 1.80
0.333 1.80 1.917 30.57 3.500 12.59 5.08 1.80
0.417 1.80 2.000 30.57 3.583 12.59 5.17 1.80
0.500 1.80 2.083 30.57 3.667 12.59 5.25 1.80
0.583 1.80 2.167 30.57 3.750 12.59 5.33 1.80
0.667 1.80 2.250 30.57 3.833 7.19 5.42 1.80
0.750 1.80 2.333 82.71 3.917 7.19 5.50 1.80
0.833 1.80 2.417 82.71 4.000 7.19 5.58 1.80
0.917 1.80 2.500 82.71 4.083 7.19 5.67 1.80
1.000 1.80 2.583 82.71 4.167 7.19 5.75 1.80
1.083 1.80 2.667 82.71 4.250 7.19 5.83 1.80
1.167 1.80 2.750 82.71 4.333 3.60 5.92 1.80
1.250 1.80 2.833 23.37 4.417 3.60 6.00 1.80
1.333 10.79 2.917 23.37 4.500 3.60 6.08 1.80
1.417 10.79 3.000 23.37 4.583 3.60 6.17 1.80
1.500 10.79 3.083 23.37 4.667 3.60 6.25 1.80
1.583 10.79 3.167 23.37 4.750 3.60

```

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 1.158 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 35.338
TOTAL RAINFALL (mm)= 89.910
RUNOFF COEFFICIENT = 0.393

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| READ STORM | Filename: C:\Users\Valdor\AppData
|             | ata\Local\Temp\
|             | 92cdec3c-c601-4243-b9a3-c9e9cee41067\1ec3a0e5
| Ptotal= 89.91 mm | Comments: AES_06hr_100yr
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80
0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

```

-----
| CALIB |
| NASHYD ( 0102) | Area (ha)= 3.68 Curve Number (CN)= 56.0
| ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.15

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 10.79 | 3.250 23.37 | 4.83 1.80
0.167 0.00 | 1.750 10.79 | 3.333 12.59 | 4.92 1.80
0.250 0.00 | 1.833 30.57 | 3.417 12.59 | 5.00 1.80
0.333 1.80 | 1.917 30.57 | 3.500 12.59 | 5.08 1.80
0.417 1.80 | 2.000 30.57 | 3.583 12.59 | 5.17 1.80
0.500 1.80 | 2.083 30.57 | 3.667 12.59 | 5.25 1.80
0.583 1.80 | 2.167 30.57 | 3.750 12.59 | 5.33 1.80
0.667 1.80 | 2.250 30.57 | 3.833 7.19 | 5.42 1.80
0.750 1.80 | 2.333 82.71 | 3.917 7.19 | 5.50 1.80
0.833 1.80 | 2.417 82.71 | 4.000 7.19 | 5.58 1.80
0.917 1.80 | 2.500 82.71 | 4.083 7.19 | 5.67 1.80
1.000 1.80 | 2.583 82.71 | 4.167 7.19 | 5.75 1.80
1.083 1.80 | 2.667 82.71 | 4.250 7.19 | 5.83 1.80
1.167 1.80 | 2.750 82.71 | 4.333 3.60 | 5.92 1.80
1.250 1.80 | 2.833 23.37 | 4.417 3.60 | 6.00 1.80
1.333 10.79 | 2.917 23.37 | 4.500 3.60 | 6.08 1.80
1.417 10.79 | 3.000 23.37 | 4.583 3.60 | 6.17 1.80
1.500 10.79 | 3.083 23.37 | 4.667 3.60 | 6.25 1.80
1.583 10.79 | 3.167 23.37 | 4.750 3.60 |

```

Unit Hyd Qpeak (cms)= 0.937

```

PEAK FLOW (cms)= 0.248 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 22.911
TOTAL RAINFALL (mm)= 89.910
RUNOFF COEFFICIENT = 0.255

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| READ STORM |
|-----|
| Ptotal= 89.91 mm |
|-----|
| Filename: C:\Users\Valdor\AppData\Local\Temp\
| 92cdec3c-c601-4243-b9a3-c9e9cee41067\1ec3a0e5
| Comments: AES_06hr_100yr

```

```

TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.25 0.00 | 2.00 30.57 | 3.75 12.59 | 5.50 1.80
0.50 1.80 | 2.25 30.57 | 4.00 7.19 | 5.75 1.80
0.75 1.80 | 2.50 82.71 | 4.25 7.19 | 6.00 1.80
1.00 1.80 | 2.75 82.71 | 4.50 3.60 | 6.25 1.80
1.25 1.80 | 3.00 23.37 | 4.75 3.60 |
1.50 10.79 | 3.25 23.37 | 5.00 1.80 |
1.75 10.79 | 3.50 12.59 | 5.25 1.80 |

```

```

-----
| CALIB |
| NASHYD ( 0103) | Area (ha)= 4.27 Curve Number (CN)= 62.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.21

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 10.79 | 3.250 23.37 | 4.83 1.80
0.167 0.00 | 1.750 10.79 | 3.333 12.59 | 4.92 1.80
0.250 0.00 | 1.833 30.57 | 3.417 12.59 | 5.00 1.80
0.333 1.80 | 1.917 30.57 | 3.500 12.59 | 5.08 1.80
0.417 1.80 | 2.000 30.57 | 3.583 12.59 | 5.17 1.80
0.500 1.80 | 2.083 30.57 | 3.667 12.59 | 5.25 1.80
0.583 1.80 | 2.167 30.57 | 3.750 12.59 | 5.33 1.80
0.667 1.80 | 2.250 30.57 | 3.833 7.19 | 5.42 1.80
0.750 1.80 | 2.333 82.71 | 3.917 7.19 | 5.50 1.80
0.833 1.80 | 2.417 82.71 | 4.000 7.19 | 5.58 1.80
0.917 1.80 | 2.500 82.71 | 4.083 7.19 | 5.67 1.80
1.000 1.80 | 2.583 82.71 | 4.167 7.19 | 5.75 1.80
1.083 1.80 | 2.667 82.71 | 4.250 7.19 | 5.83 1.80
1.167 1.80 | 2.750 82.71 | 4.333 3.60 | 5.92 1.80
1.250 1.80 | 2.833 23.37 | 4.417 3.60 | 6.00 1.80
1.333 10.79 | 2.917 23.37 | 4.500 3.60 | 6.08 1.80
1.417 10.79 | 3.000 23.37 | 4.583 3.60 | 6.17 1.80
1.500 10.79 | 3.083 23.37 | 4.667 3.60 | 6.25 1.80
1.583 10.79 | 3.167 23.37 | 4.750 3.60 |

```

Unit Hyd Qpeak (cms)= 0.777

```

PEAK FLOW (cms)= 0.316 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 28.766
TOTAL RAINFALL (mm)= 89.910
RUNOFF COEFFICIENT = 0.320

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
|-----|
| ID1= 1 ( 0101): 11.77 1.158 2.75 35.34
| + ID2= 2 ( 0102): 3.68 0.248 2.75 22.91
|-----|
| ID = 3 ( 0001): 15.45 1.406 2.75 32.38

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

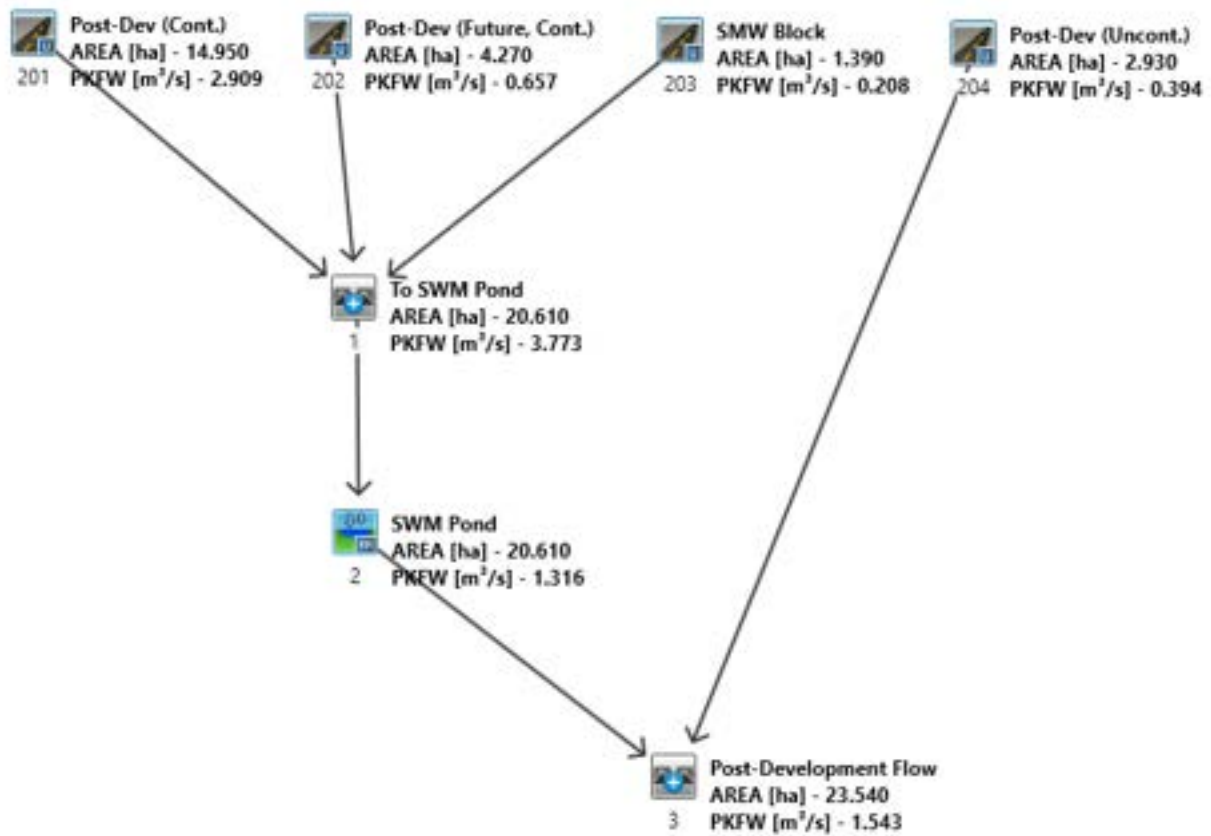
```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
|-----|
| ID1= 3 ( 0001): 15.45 1.406 2.75 32.38
| + ID2= 2 ( 0103): 4.27 0.316 2.83 28.77
|-----|
| ID = 1 ( 0001): 19.72 1.714 2.75 31.60

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH



VO5 Model Schematic – Post-Development

=====

```

V   V   I   SSSS   U   U   A   L   (v 5.1.2000)
V   V   I   SS     U   U   A A   L
V   V   I   SS     U   U   AAAAA L
V   V   I   SS     U   U   A   A   L
VV    I   SSSS   UUUU   A   A   LLLLL

```

```

000  TTTT  TTTT  H  H  Y  Y  M  M  000  TM
0 0  T  T  H  H  Y  Y  MM MM 0 0
0 0  T  T  H  H  Y  Y  M  M  0 0
000  T  T  H  H  Y  Y  M  M  000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\fid7867a-3ea6-4a2c-88c8-033814afaac7\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\fid7867a-3ea6-4a2c-88c8-033814afaac7\scena

DATE: 04-19-2021 TIME: 03:01:23

USER:

COMMENTS: _____

```

*****
** SIMULATION : 1-Chicago_25mm **
*****

```

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\d5485b0b
Ptotal= 25.02 mm	Comments: Chicago_25mm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.17	1.17	6.20	2.17	5.62	3.17	2.95
0.33	2.38	1.33	12.18	2.33	4.80	3.33	2.76
0.50	2.66	1.50	41.67	2.50	4.21	3.50	2.62
0.67	3.03	1.67	15.28	2.67	3.78	3.67	2.47
0.83	3.58	1.83	9.22	2.83	3.45	3.83	2.35
1.00	4.47	2.00	6.88	3.00	3.18	4.00	2.23

CALIB	Area (ha)= 14.95
STANDHYD (0201)	Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00
ID= 1 DT= 5.0 min	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00

Length (m)= 315.70 40.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.17	1.083	6.20	2.083	5.62	3.08	2.95
0.167	2.17	1.167	6.20	2.167	5.62	3.17	2.95
0.250	2.38	1.250	12.18	2.250	4.80	3.25	2.76
0.333	2.38	1.333	12.18	2.333	4.80	3.33	2.76
0.417	2.66	1.417	41.67	2.417	4.21	3.42	2.62
0.500	2.66	1.500	41.67	2.500	4.21	3.50	2.62
0.583	3.03	1.583	15.28	2.583	3.78	3.58	2.47
0.667	3.03	1.667	15.28	2.667	3.78	3.67	2.47
0.750	3.58	1.750	9.22	2.750	3.45	3.75	2.35
0.833	3.58	1.833	9.22	2.833	3.45	3.83	2.35
0.917	4.47	1.917	6.88	2.917	3.18	3.92	2.23
1.000	4.47	2.000	6.88	3.000	3.18	4.00	2.23

Max.Eff.Inten.(mm/hr)=	41.67	4.80
over (min)	5.00	30.00
Storage Coeff. (min)=	4.46 (ii)	28.25 (ii)
Unit Hyd. Tpeak (min)=	5.00	30.00
Unit Hyd. peak (cms)=	0.23	0.04
PEAK FLOW (cms)=	1.12	0.02
TIME TO PEAK (hrs)=	1.50	2.08
RUNOFF VOLUME (mm)=	23.02	3.62
TOTAL RAINFALL (mm)=	25.02	25.02
RUNOFF COEFFICIENT =	0.92	0.14

TOTALS

1.122 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\d5485b0b
Ptotal= 25.02 mm	Comments: Chicago_25mm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.17	1.17	6.20	2.17	5.62	3.17	2.95
0.33	2.38	1.33	12.18	2.33	4.80	3.33	2.76
0.50	2.66	1.50	41.67	2.50	4.21	3.50	2.62
0.67	3.03	1.67	15.28	2.67	3.78	3.67	2.47
0.83	3.58	1.83	9.22	2.83	3.45	3.83	2.35
1.00	4.47	2.00	6.88	3.00	3.18	4.00	2.23

CALIB	Area (ha)= 4.27
STANDHYD (0202)	Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00
ID= 1 DT= 5.0 min	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00

Length (m)= 168.72 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.17	1.083	6.20	2.083	5.62	3.08	2.95
0.167	2.17	1.167	6.20	2.167	5.62	3.17	2.95
0.250	2.38	1.250	12.18	2.250	4.80	3.25	2.76
0.333	2.38	1.333	12.18	2.333	4.80	3.33	2.76
0.417	2.66	1.417	41.67	2.417	4.21	3.42	2.62
0.500	2.66	1.500	41.67	2.500	4.21	3.50	2.62
0.583	3.03	1.583	15.28	2.583	3.78	3.58	2.47
0.667	3.03	1.667	15.28	2.667	3.78	3.67	2.47
0.750	3.58	1.750	9.22	2.750	3.45	3.75	2.35
0.833	3.58	1.833	9.22	2.833	3.45	3.83	2.35
0.917	4.47	1.917	6.88	2.917	3.18	3.92	2.23
1.000	4.47	2.000	6.88	3.000	3.18	4.00	2.23

Max.Eff.Inten.(mm/hr)= 41.67 3.67
 over (min) 5.00 30.00
 Storage Coeff. (min)= 3.06 (ii) 29.53 (ii)
 Unit Hyd. Tpeak (min)= 5.00 30.00
 Unit Hyd. peak (cms)= 0.27 0.04

TOTALS

PEAK FLOW (cms)= 0.22 0.01 0.218 (iii)
 TIME TO PEAK (hrs)= 1.50 2.08 1.50
 RUNOFF VOLUME (mm)= 23.02 3.28 12.16
 TOTAL RAINFALL (mm)= 25.02 25.02 25.02
 RUNOFF COEFFICIENT = 0.92 0.13 0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM | Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\d5485b0b
 | Ptotal= 25.02 mm | Comments: Chicago_25mm

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.17	2.17	1.17	6.20	2.17	5.62	3.17	2.95
0.33	2.38	1.33	12.18	2.33	4.80	3.33	2.76
0.50	2.66	1.50	41.67	2.50	4.21	3.50	2.62
0.67	3.03	1.67	15.28	2.67	3.78	3.67	2.47
0.83	3.58	1.83	9.22	2.83	3.45	3.83	2.35
1.00	4.47	2.00	6.88	3.00	3.18	4.00	2.23

CALIB |
 STANDHYD (0203) | Area (ha)= 1.39
 ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

IMPERVIOUS PVIOUS (i)
 Surface Area (ha)= 0.69 0.69
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 5.00 2.00

Length (m)= 96.26 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.17	1.083	6.20	2.083	5.62	3.08	2.95
0.167	2.17	1.167	6.20	2.167	5.62	3.17	2.95
0.250	2.38	1.250	12.18	2.250	4.80	3.25	2.76
0.333	2.38	1.333	12.18	2.333	4.80	3.33	2.76
0.417	2.66	1.417	41.67	2.417	4.21	3.42	2.62
0.500	2.66	1.500	41.67	2.500	4.21	3.50	2.62
0.583	3.03	1.583	15.28	2.583	3.78	3.58	2.47
0.667	3.03	1.667	15.28	2.667	3.78	3.67	2.47
0.750	3.58	1.750	9.22	2.750	3.45	3.75	2.35
0.833	3.58	1.833	9.22	2.833	3.45	3.83	2.35
0.917	4.47	1.917	6.88	2.917	3.18	3.92	2.23
1.000	4.47	2.000	6.88	3.000	3.18	4.00	2.23

Max.Eff.Inten.(mm/hr)= 41.67 1.50
 over (min) 5.00 45.00
 Storage Coeff. (min)= 2.19 (ii) 40.09 (ii)
 Unit Hyd. Tpeak (min)= 5.00 45.00
 Unit Hyd. peak (cms)= 0.31 0.03

TOTALS

PEAK FLOW (cms)= 0.08 0.00 0.080 (iii)
 TIME TO PEAK (hrs)= 1.50 2.50 1.50
 RUNOFF VOLUME (mm)= 23.02 2.20 12.59
 TOTAL RAINFALL (mm)= 25.02 25.02 25.02
 RUNOFF COEFFICIENT = 0.92 0.09 0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001) |
 | 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	14.95	1.122	1.50	17.20
+ ID2= 2 (0202):	4.27	0.218	1.50	12.16
=====				
ID = 3 (0001):	19.22	1.340	1.50	16.08

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001) |
 | 3 + 2 = 1 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	19.22	1.340	1.50	16.08
+ ID2= 2 (0203):	1.39	0.080	1.50	12.59
=====				
ID = 1 (0001):	20.61	1.420	1.50	15.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)
IN= 2--> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.9767	0.7368
0.0148	0.0921	1.2208	0.8058
0.0235	0.1922	1.4829	0.8763
0.0298	0.3003	2.0785	0.9483
0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	1.420	1.50	15.85
OUTFLOW: ID= 1 (0002)	20.610	0.030	4.17	15.77

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.08
TIME SHIFT OF PEAK FLOW (min)=160.00
MAXIMUM STORAGE USED (ha.m.)= 0.2969

READ STORM
Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\d5485b0b
Ptotal= 25.02 mm
Comments: Chicago_25mm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.17	1.17	6.20	2.17	5.62	3.17	2.95
0.33	2.38	1.33	12.18	2.33	4.80	3.33	2.76
0.50	2.66	1.50	41.67	2.50	4.21	3.50	2.62
0.67	3.03	1.67	15.28	2.67	3.78	3.67	2.47
0.83	3.58	1.83	9.22	2.83	3.45	3.83	2.35
1.00	4.47	2.00	6.88	3.00	3.18	4.00	2.23

CALIB
STANDHYD (0204)
ID= 1 DT= 5.0 min
Area (ha)= 2.93
Total Imp(%)= 50.00
Dir. Conn.(%)= 30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.17	1.083	6.20	2.083	5.62	3.08	2.95
0.167	2.17	1.167	6.20	2.167	5.62	3.17	2.95
0.250	2.38	1.250	12.18	2.250	4.80	3.25	2.76
0.333	2.38	1.333	12.18	2.333	4.80	3.33	2.76
0.417	2.66	1.417	41.67	2.417	4.21	3.42	2.62
0.500	2.66	1.500	41.67	2.500	4.21	3.50	2.62
0.583	3.03	1.583	15.28	2.583	3.78	3.58	2.47
0.667	3.03	1.667	15.28	2.667	3.78	3.67	2.47
0.750	3.58	1.750	9.22	2.750	3.45	3.75	2.35

	0.833	3.58	1.833	9.22	2.833	3.45	3.83	2.35
0.917	4.47	1.917	6.88	2.917	3.18	3.92	2.23	
1.000	4.47	2.000	6.88	3.000	3.18	4.00	2.23	

Max.Eff.Inten.(mm/hr)= 41.67 over (min)= 5.00
Storage Coeff. (min)= 2.73 (ii) 28.77 (ii)
Unit Hyd. Tpeak (min)= 5.00 30.00
Unit Hyd. peak (cms)= 0.29 0.04
TOTALS
PEAK FLOW (cms)= 0.10 0.01 0.101 (iii)
TIME TO PEAK (hrs)= 1.50 2.08 1.50
RUNOFF VOLUME (mm)= 23.02 3.35 9.24
TOTAL RAINFALL (mm)= 25.02 25.02 25.02
RUNOFF COEFFICIENT = 0.92 0.13 0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)
1 + 2 = 3
ID1= 1 (0002): 20.61 0.030 4.17 15.77
+ ID2= 2 (0204): 2.93 0.101 1.50 9.24
ID = 3 (0003): 23.54 0.117 1.50 14.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 5.1.2000)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\23f44255-71e9-48cb-a278-a505d53fe45d\scena
Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\23f44255-71e9-48cb-a278-a505d53fe45d\scena

DATE: 04-19-2021 TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_002yr

 | READ STORM | Filename: C:\Users\Valdor\AppData
 | | ata\Local\Temp\
 | | 72ca0d1b-dd09-486c-bf8b-e373ec690825\69f2813f
 | Ptotal= 38.69 mm | Comments: AES_06hr_002yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

 | CALIB |
 | STANDHYD (0201) | Area (ha)= 14.95
 | ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)= 35.60 14.18
 over (min) 5.00 25.00

Storage Coeff. (min)=	4.75 (ii)	20.17 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.22	0.05	
TOTALS			
PEAK FLOW (cms)=	1.03	0.08	1.089 (iii)
TIME TO PEAK (hrs)=	2.75	3.00	2.75
RUNOFF VOLUME (mm)=	36.69	8.70	28.29
TOTAL RAINFALL (mm)=	38.69	38.69	38.69
RUNOFF COEFFICIENT =	0.95	0.22	0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | READ STORM | Filename: C:\Users\Valdor\AppData
 | | ata\Local\Temp\
 | | 72ca0d1b-dd09-486c-bf8b-e373ec690825\69f2813f
 | Ptotal= 38.69 mm | Comments: AES_06hr_002yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

 | CALIB |
 | STANDHYD (0202) | Area (ha)= 4.27
 | ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77

1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)= 35.60 11.97
 over (min) 5.00 20.00
 Storage Coeff. (min)= 3.26 (ii) 19.76 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.27 0.06

PEAK FLOW (cms)= 0.19 0.04
 TIME TO PEAK (hrs)= 2.75 2.92
 RUNOFF VOLUME (mm)= 36.69 8.02
 TOTAL RAINFALL (mm)= 38.69 38.69
 RUNOFF COEFFICIENT = 0.95 0.21 0.54

TOTALS

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\69f2813f
Ptotal= 38.69 mm	Comments: AES_06hr_002yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

CALIB	STANDHYD (0203)	Area (ha)= 1.39	Dir. Conn.(%)= 50.00
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77

0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)= 35.60 5.73
 over (min) 5.00 25.00
 Storage Coeff. (min)= 2.33 (ii) 24.48 (ii)
 Unit Hyd. Tpeak (min)= 5.00 25.00
 Unit Hyd. peak (cms)= 0.30 0.05

TOTALS

PEAK FLOW (cms)= 0.07 0.01 0.073 (iii)
 TIME TO PEAK (hrs)= 2.75 3.08 2.75
 RUNOFF VOLUME (mm)= 36.69 5.79 21.23
 TOTAL RAINFALL (mm)= 38.69 38.69 38.69
 RUNOFF COEFFICIENT = 0.95 0.15 0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	14.95	1.089	2.75	28.29
+ ID2= 2 (0202):	4.27	0.221	2.75	20.92
ID = 3 (0001):	19.22	1.310	2.75	26.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	19.22	1.310	2.75	26.66
+ ID2= 2 (0203):	1.39	0.073	2.75	21.23
ID = 1 (0001):	20.61	1.384	2.75	26.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1				
DT= 5.0 min				
	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8058
	0.0235	0.1922	1.4829	0.8763
	0.0298	0.3003	2.0785	0.9483

0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	1.384	2.75	26.29
OUTFLOW: ID= 1 (0002)	20.610	0.148	4.25	26.21

PEAK FLOW REDUCTION [Qout/Qin](%)= 10.67
 TIME SHIFT OF PEAK FLOW (min)= 90.00
 MAXIMUM STORAGE USED (ha.m.)= 0.4415

 READ STORM | Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\69f2813f
 Ptotal= 38.69 mm | Comments: AES_06hr_002yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

 CALIB |
 STANDHYD (0204) | Area (ha)= 2.93
 ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77

1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)=	35.60	12.40
over (min)	5.00	20.00
Storage Coeff. (min)=	2.91 (ii)	19.18 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.28	0.06
PEAK FLOW (cms)=	0.09	0.03
TIME TO PEAK (hrs)=	2.75	2.92
RUNOFF VOLUME (mm)=	36.69	8.16
TOTAL RAINFALL (mm)=	38.69	38.69
RUNOFF COEFFICIENT =	0.95	0.21

TOTALS
 0.115 (iii)
 2.75
 16.72
 38.69
 0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ADD HYD (0003) |
 1 + 2 = 3 |
 AREA QPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)
 ID1= 1 (0002): 20.61 0.148 4.25 26.21
 + ID2= 2 (0204): 2.93 0.115 2.75 16.72
 ID = 3 (0003): 23.54 0.166 3.75 25.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 V V I SSSSS U U A L (v 5.1.2000)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSSS UUUUU A A LLLLL
 000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\855f20eb-f569-45b5-b34e-c4b1b22ceb1a\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\855f20eb-f569-45b5-b34e-c4b1b22ceb1a\scena

DATE: 04-19-2021 TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_005yr

 | READ STORM | Filename: C:\Users\Valdor\AppData
 | | ata\Local\Temp\
 | | 72ca0d1b-dd09-486c-bf8b-e373ec690825\3f7ed82
 | Ptotal= 52.41 mm | Comments: AES_06hr_005yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

 | CALIB |
 | STANDHYD (0201) | Area (ha)= 14.95
 | ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 26.48
 over (min) 5.00 20.00

Storage Coeff. (min)=	4.21 (ii)	16.22 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.24	0.06	
			TOTALS
PEAK FLOW (cms)=	1.40	0.15	1.531 (iii)
TIME TO PEAK (hrs)=	2.75	2.92	2.75
RUNOFF VOLUME (mm)=	50.41	15.31	39.88
TOTAL RAINFALL (mm)=	52.41	52.41	52.41
RUNOFF COEFFICIENT =	0.96	0.29	0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | READ STORM | Filename: C:\Users\Valdor\AppData
 | | ata\Local\Temp\
 | | 72ca0d1b-dd09-486c-bf8b-e373ec690825\3f7ed82
 | Ptotal= 52.41 mm | Comments: AES_06hr_005yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

 | CALIB |
 | STANDHYD (0202) | Area (ha)= 4.27
 | ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05

1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 22.63
 over (min) 5.00 20.00
 Storage Coeff. (min)= 2.89 (ii) 15.68 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.28 0.07

PEAK FLOW (cms)= 0.26 0.07
 TIME TO PEAK (hrs)= 2.75 2.92
 RUNOFF VOLUME (mm)= 50.41 14.26
 TOTAL RAINFALL (mm)= 52.41 52.41
 RUNOFF COEFFICIENT = 0.96 0.27

TOTALS

0.321 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\af7ed82
Ptotal= 52.41 mm	Comments: AES_06hr_005yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

CALIB	Area (ha)= 1.39
STANDHYD (0203)	Total Imp(%)= 50.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05

0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 11.62
 over (min) 5.00 20.00
 Storage Coeff. (min)= 2.06 (ii) 18.76 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.31 0.06

TOTALS

0.106 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	14.95	1.531	2.75	39.88
+ ID2= 2 (0202):	4.27	0.321	2.75	30.52
ID = 3 (0001):	19.22	1.852	2.75	37.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	19.22	1.852	2.75	37.80
+ ID2= 2 (0203):	1.39	0.106	2.75	30.55
ID = 1 (0001):	20.61	1.958	2.75	37.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1				
DT= 5.0 min				
	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8058
	0.0235	0.1922	1.4829	0.8763
	0.0298	0.3003	2.0785	0.9483

0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	1.958	2.75	37.31
OUTFLOW: ID= 1 (0002)	20.610	0.386	3.58	37.23

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.71
 TIME SHIFT OF PEAK FLOW (min)= 50.00
 MAXIMUM STORAGE USED (ha.m.)= 0.5456

 READ STORM Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\af3f7ed82
 Ptotal= 52.41 mm Comments: AES_06hr_005yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

 CALIB Area (ha)= 2.93
 STANDHYD (0204) Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
 ID= 1 DT= 5.0 min

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05

1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)=	48.21	23.38
over (min)	5.00	20.00
Storage Coeff. (min)=	2.58 (ii)	15.20 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.29	0.07
PEAK FLOW (cms)=	0.12	0.07
TIME TO PEAK (hrs)=	2.75	2.92
RUNOFF VOLUME (mm)=	50.41	14.47
TOTAL RAINFALL (mm)=	52.41	52.41
RUNOFF COEFFICIENT =	0.96	0.28

TOTALS

0.175 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ADD HYD (0003) |
 1 + 2 = 3 |
 ID1= 1 (0002): 20.61 0.386 3.58 37.23
 + ID2= 2 (0204): 2.93 0.175 2.75 25.25
 =====
 ID = 3 (0003): 23.54 0.439 3.25 35.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 V V I SSSS U U A L (v 5.1.2000)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLLL
 000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\36af06f8-e4e9-4e89-86d7-f320de46ddb9\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\36af06f8-e4e9-4e89-86d7-f320de46ddb9\scena

DATE: 04-19-2021

TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_010yr

READ STORM		Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 72ca0d1b-dd09-486c-bf8b-e373ec690825\b0a61c61							
Ptotal= 61.50 mm		Comments: AES_06hr_010yr							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN		
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23		
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23		
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23		
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23		
1.25	1.23	3.00	15.99	4.75	2.46				
1.50	7.38	3.25	15.99	5.00	1.23				
1.75	7.38	3.50	8.61	5.25	1.23				

CALIB			
STANDHYD (0201)	Area (ha)=	14.95	
ID= 1 DT= 5.0 min	Total Imp(%)=	80.00	Dir. Conn.(%)= 70.00
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	11.96	2.99	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	5.00	2.00	
Length (m)=	315.70	40.00	
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		
Max.Eff.Inten.(mm/hr)=	56.58	35.08					
over (min)	5.00	15.00					

Storage Coeff. (min)=	3.95 (ii)	14.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.24	0.08	
			TOTALS
PEAK FLOW (cms)=	1.64	0.22	1.848 (iii)
TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	59.50	20.33	47.75
TOTAL RAINFALL (mm)=	61.50	61.50	61.50
RUNOFF COEFFICIENT =	0.97	0.33	0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM		Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 72ca0d1b-dd09-486c-bf8b-e373ec690825\b0a61c61							
Ptotal= 61.50 mm		Comments: AES_06hr_010yr							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN		
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr		
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23		
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23		
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23		
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23		
1.25	1.23	3.00	15.99	4.75	2.46				
1.50	7.38	3.25	15.99	5.00	1.23				
1.75	7.38	3.50	8.61	5.25	1.23				

CALIB			
STANDHYD (0202)		Area (ha)=	4.27
ID= 1 DT= 5.0 min		Total Imp(%)=	60.00
		Dir. Conn.(%)=	45.00
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.56	1.71
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	5.00	2.00
Length	(m)=	168.72	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23

1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)= 56.58 30.14
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.71 (ii) 14.11 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.29 0.08

PEAK FLOW (cms)= 0.30 0.11
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 59.50 19.03
 TOTAL RAINFALL (mm)= 61.50 61.50
 RUNOFF COEFFICIENT = 0.97 0.31

TOTALS

0.403 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\b0a61c61
Ptotal= 61.50 mm	Comments: AES_06hr_010yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		
1.50	7.38	3.25	15.99	5.00	1.23		
1.75	7.38	3.50	8.61	5.25	1.23		

CALIB	STANDHYD (0203)	Area (ha)= 1.39	Dir. Conn.(%)= 50.00
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23

0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)= 56.58 16.88
 over (min) 5.00 20.00
 Storage Coeff. (min)= 1.93 (ii) 16.31 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.31 0.06

TOTALS

0.128 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	14.95	1.848	2.75	47.75
+ ID2= 2 (0202):	4.27	0.403	2.75	37.24
ID = 3 (0001):	19.22	2.251	2.75	45.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	19.22	2.251	2.75	45.41
+ ID2= 2 (0203):	1.39	0.128	2.75	37.03
ID = 1 (0001):	20.61	2.379	2.75	44.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2--> OUT= 1				
DT= 5.0 min				
	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8058
	0.0235	0.1922	1.4829	0.8763
	0.0298	0.3003	2.0785	0.9483

0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	2.379	2.75	44.85
OUTFLOW: ID= 1 (0002)	20.610	0.589	3.33	44.77

PEAK FLOW REDUCTION [Qout/Qin](%)= 24.76
 TIME SHIFT OF PEAK FLOW (min)= 35.00
 MAXIMUM STORAGE USED (ha.m.)= 0.6171

 READ STORM Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\b0a61c61
 Ptotal= 61.50 mm Comments: AES_06hr_010yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		
1.50	7.38	3.25	15.99	5.00	1.23		
1.75	7.38	3.50	8.61	5.25	1.23		

 CALIB Area (ha)= 2.93
 STANDHYD (0204) Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
 ID= 1 DT= 5.0 min

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23

1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)=	56.58	31.11
over (min)	5.00	15.00
Storage Coeff. (min)=	2.42 (ii)	13.68 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.30	0.08
PEAK FLOW (cms)=	0.14	0.10
TIME TO PEAK (hrs)=	2.75	2.83
RUNOFF VOLUME (mm)=	59.50	19.29
TOTAL RAINFALL (mm)=	61.50	61.50
RUNOFF COEFFICIENT =	0.97	0.31

TOTALS
 0.229 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ADD HYD (0003) |
1 + 2 = 3
 ID1= 1 (0002): 20.61 0.589 3.33 44.77
 + ID2= 2 (0204): 2.93 0.229 2.75 31.35
 =====
 ID = 3 (0003): 23.54 0.674 3.25 43.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 =====
 V V I SSSS U U A L (v 5.1.2000)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLLL
 000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f9b1644-02ba-4d1f-932a-12bed054710c\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f9b1644-02ba-4d1f-932a-12bed054710c\scena

DATE: 04-19-2021

TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_025yr

 READ STORM Filename: C:\Users\Valdor\AppData
 ata\Local\Temp\
 72ca0d1b-dd09-486c-bf8b-e373ec690825\ea9f6f15
 Ptotal= 72.91 mm Comments: AES_06hr_025yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

 CALIB
 STANDHYD (0201) Area (ha)= 14.95
 ID= 1 DT= 5.0 min Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)= 67.07 48.89
 over (min) 5.00 15.00

Storage Coeff. (min)=	3.69 (ii)	13.08 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.25	0.08	
TOTALS			
PEAK FLOW (cms)=	1.95	0.30	2.238 (iii)
TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	70.91	27.22	57.80
TOTAL RAINFALL (mm)=	72.91	72.91	72.91
RUNOFF COEFFICIENT =	0.97	0.37	0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 READ STORM Filename: C:\Users\Valdor\AppData
 ata\Local\Temp\
 72ca0d1b-dd09-486c-bf8b-e373ec690825\ea9f6f15
 Ptotal= 72.91 mm Comments: AES_06hr_025yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

 CALIB
 STANDHYD (0202) Area (ha)= 4.27
 ID= 1 DT= 5.0 min Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46

1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)= 67.07 42.31
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.53 (ii) 12.49 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.29 0.08

PEAK FLOW (cms)= 0.36 0.15
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 70.91 25.61
 TOTAL RAINFALL (mm)= 72.91 72.91
 RUNOFF COEFFICIENT = 0.97 0.35

TOTALS
 0.502 (iii)
 2.75
 45.99
 72.91
 0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\ea9f6f15
Ptotal= 72.91 mm	Comments: AES_06hr_025yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

CALIB	Area (ha)= 1.39	Dir. Conn.(%)= 50.00
STANDHYD (0203)	Total Imp(%)= 50.00	
ID= 1 DT= 5.0 min		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46

0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)= 67.07 23.12
 over (min) 5.00 15.00
 Storage Coeff. (min)= 1.81 (ii) 14.49 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.32 0.08

PEAK FLOW (cms)= 0.13 0.03
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 70.91 20.02
 TOTAL RAINFALL (mm)= 72.91 72.91
 RUNOFF COEFFICIENT = 0.97 0.27

TOTALS
 0.160 (iii)
 2.75
 45.46
 72.91
 0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0201):	14.95	2.238	2.75	57.80
+ ID2= 2 (0202):	4.27	0.502	2.75	45.99
ID = 3 (0001):	19.22	2.740	2.75	55.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	19.22	2.740	2.75	55.18
+ ID2= 2 (0203):	1.39	0.160	2.75	45.46
ID = 1 (0001):	20.61	2.900	2.75	54.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2--> OUT= 1				
DT= 5.0 min				
0.0000	0.0000	0.9767	0.7368	
0.0148	0.0921	1.2208	0.8058	
0.0235	0.1922	1.4829	0.8763	
0.0298	0.3003	2.0785	0.9483	

0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	2.900	2.75	54.52
OUTFLOW: ID= 1 (0002)	20.610	0.861	3.25	54.45

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.69
 TIME SHIFT OF PEAK FLOW (min)= 30.00
 MAXIMUM STORAGE USED (ha.m.)= 0.7035

 READ STORM | Filename: C:\Users\Valdor\AppData
 | | Local\Temp\
 | | 72ca0d1b-dd09-486c-bf8b-e373ec690825\ea9f6f15
 | Ptotal= 72.91 mm | Comments: AES_06hr_025yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

 CALIB |
 STANDHYD (0204) | Area (ha)= 2.93
 ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46

1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)=	67.07	43.61	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.26 (ii)	12.10 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.30	0.09	
PEAK FLOW (cms)=	0.16	0.13	*TOTALS*
TIME TO PEAK (hrs)=	2.75	2.83	0.292 (iii)
RUNOFF VOLUME (mm)=	70.91	25.94	2.75
TOTAL RAINFALL (mm)=	72.91	72.91	39.43
RUNOFF COEFFICIENT =	0.97	0.36	72.91
			0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ADD HYD (0003) |
1 + 2 = 3
 ID1= 1 (0002): 20.61 0.861 3.25 54.45
 + ID2= 2 (0204): 2.93 0.292 2.75 39.43
 =====
 ID = 3 (0003): 23.54 0.978 3.25 52.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 =====
 V V I SSSS U U A L (v 5.1.2000)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLLL
 000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\4fd6c071-ca0c-40ec-891d-69e0991c9ada\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\4fd6c071-ca0c-40ec-891d-69e0991c9ada\scena

DATE: 04-19-2021

TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_050yr

 READ STORM Filename: C:\Users\Valdor\AppData
 ata\Local\Temp\
 72ca0d1b-dd09-486c-bf8b-e373ec690825\12dd90ee
 Ptotal= 81.41 mm Comments: AES_06hr_050yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

 CALIB
 STANDHYD (0201)
 ID= 1 DT= 5.0 min
 Area (ha)= 14.95
 Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Max.Eff.Inten.(mm/hr)= 74.89 58.48
 over (min) 5.00 10.00

Storage Coeff. (min)=	3.53 (ii)	8.33 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.26	0.13
TOTALS		
PEAK FLOW (cms)=	2.18	0.43
TIME TO PEAK (hrs)=	2.75	2.75
RUNOFF VOLUME (mm)=	79.41	32.71
TOTAL RAINFALL (mm)=	81.41	81.41
RUNOFF COEFFICIENT =	0.98	0.40
		0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 READ STORM Filename: C:\Users\Valdor\AppData
 ata\Local\Temp\
 72ca0d1b-dd09-486c-bf8b-e373ec690825\12dd90ee
 Ptotal= 81.41 mm Comments: AES_06hr_050yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

 CALIB
 STANDHYD (0202)
 ID= 1 DT= 5.0 min
 Area (ha)= 4.27
 Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63

1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Max.Eff.Inten.(mm/hr)= 74.89 50.79
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.42 (ii) 11.68 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.30 0.09

PEAK FLOW (cms)= 0.40 0.19
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 79.41 30.88
 TOTAL RAINFALL (mm)= 81.41 81.41
 RUNOFF COEFFICIENT = 0.98 0.38

TOTALS
 0.578 (iii)
 2.75
 52.72
 81.41
 0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename:
	C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\12dd90ee
Ptotal= 81.41 mm	Comments: AES_06hr_050yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

CALIB	Area (ha)=	Dir. Conn.(%)=
STANDHYD (0203)	1.39	50.00
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00	50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63

0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Max.Eff.Inten.(mm/hr)= 74.89 28.18
 over (min) 5.00 15.00
 Storage Coeff. (min)= 1.73 (ii) 13.44 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.32 0.08

PEAK FLOW (cms)= 0.14 0.04
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 79.41 24.45
 TOTAL RAINFALL (mm)= 81.41 81.41
 RUNOFF COEFFICIENT = 0.98 0.30

TOTALS
 0.184 (iii)
 2.75
 51.92
 81.41
 0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0201):	14.95	2.602	2.75	65.40
+ ID2= 2 (0202):	4.27	0.578	2.75	52.72
ID = 3 (0001):	19.22	3.180	2.75	62.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	19.22	3.180	2.75	62.58
+ ID2= 2 (0203):	1.39	0.184	2.75	51.92
ID = 1 (0001):	20.61	3.364	2.75	61.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2--> OUT= 1				
DT= 5.0 min				
	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8058
	0.0235	0.1922	1.4829	0.8763
	0.0298	0.3003	2.0785	0.9483

0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	3.364	2.75	61.86
OUTFLOW: ID= 1 (0002)	20.610	1.081	3.17	61.79

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.14
 TIME SHIFT OF PEAK FLOW (min)= 25.00
 MAXIMUM STORAGE USED (ha.m.)= 0.7664

 READ STORM Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\12dd90ee
 Ptotal= 81.41 mm Comments: AES_06hr_050yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

 CALIB Area (ha)= 2.93
 STANDHYD (0204) Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
 ID= 1 DT= 5.0 min

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63

1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Max.Eff.Inten.(mm/hr)=	74.89	52.31
over (min)	5.00	15.00
Storage Coeff. (min)=	2.16 (ii)	11.31 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.31	0.09
PEAK FLOW (cms)=	0.18	0.17
TIME TO PEAK (hrs)=	2.75	2.83
RUNOFF VOLUME (mm)=	79.41	31.26
TOTAL RAINFALL (mm)=	81.41	81.41
RUNOFF COEFFICIENT =	0.98	0.38

TOTALS
 0.342 (iii)
 2.75
 45.70
 81.41
 0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ADD HYD (0003) |
1 + 2 = 3
 ID1= 1 (0002): 20.61 1.081 3.17 61.79
 + ID2= 2 (0204): 2.93 0.342 2.75 45.70
 =====
 ID = 3 (0003): 23.54 1.255 2.92 59.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 =====
 V V I SSSS U U A L (v 5.1.2000)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLLL
 000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\341b89af-c95d-45b3-a9b8-cc0f7699e01f\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05\341b89af-c95d-45b3-a9b8-cc0f7699e01f\scena

DATE: 04-19-2021

TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_100yr **

READ STORM	Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 72ca0d1b-dd09-486c-bf8b-e373ec690825\1ec3a0e5
Ptotal= 89.91 mm	Comments: AES_06hr_100yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80
0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

CALIB	Area (ha)= 14.95
STANDHYD (0201)	Total Imp(%)= 80.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)=	82.71	68.47
over (min)	5.00	10.00

Storage Coeff. (min)=	3.39 (ii)	8.00 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.26	0.13

PEAK FLOW (cms)=	2.40	0.50	*TOTALS*
TIME TO PEAK (hrs)=	2.75	2.75	2.909 (iii)
RUNOFF VOLUME (mm)=	87.91	38.47	73.08
TOTAL RAINFALL (mm)=	89.91	89.91	89.91
RUNOFF COEFFICIENT =	0.98	0.43	0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData ata\Local\Temp\ 72ca0d1b-dd09-486c-bf8b-e373ec690825\1ec3a0e5
Ptotal= 89.91 mm	Comments: AES_06hr_100yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80
0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

CALIB	Area (ha)= 4.27
STANDHYD (0202)	Total Imp(%)= 60.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80

1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)= 82.71 59.65
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.33 (ii) 11.01 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.30 0.09

PEAK FLOW (cms)= 0.44 0.22
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 87.91 36.42
 TOTAL RAINFALL (mm)= 89.91 89.91
 RUNOFF COEFFICIENT = 0.98 0.41

TOTALS
 0.657 (iii)
 2.75
 59.59
 89.91
 0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM
 Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\1ec3a0e5
 Ptotal= 89.91 mm
 Comments: AES_06hr_100yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80
0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

CALIB
 STANDHYD (0203)
 ID= 1 DT= 5.0 min
 Area (ha)= 1.39
 Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80

0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)= 82.71 33.55
 over (min) 5.00 15.00
 Storage Coeff. (min)= 1.66 (ii) 12.59 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.32 0.08

PEAK FLOW (cms)= 0.16 0.05
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 87.91 29.15
 TOTAL RAINFALL (mm)= 89.91 89.91
 RUNOFF COEFFICIENT = 0.98 0.32

TOTALS
 0.208 (iii)
 2.75
 58.53
 89.91
 0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)
 1 + 2 = 3
 AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 ID1= 1 (0201): 14.95 2.909 2.75 73.08
 + ID2= 2 (0202): 4.27 0.657 2.75 59.59
 ID = 3 (0001): 19.22 3.565 2.75 70.08

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)
 3 + 2 = 1
 AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 ID1= 3 (0001): 19.22 3.565 2.75 70.08
 + ID2= 2 (0203): 1.39 0.208 2.75 58.53
 ID = 1 (0001): 20.61 3.773 2.75 69.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)
 IN= 2---> OUT= 1
 DT= 5.0 min
 OUTFLOW (cms) STORAGE (ha.m.) OUTFLOW (cms) STORAGE (ha.m.)
 0.0000 0.0000 0.9767 0.7368
 0.0148 0.0921 1.2208 0.8058
 0.0235 0.1922 1.4829 0.8763
 0.0298 0.3003 2.0785 0.9483

	0.0325	0.3573	2.9524	1.0220		1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
	0.0983	0.4161	4.0123	1.0972		1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
	0.2165	0.4768	5.2246	1.1739		1.583	10.79	3.167	23.37	4.750	3.60		
	0.3687	0.5394	6.5698	1.2522									
	0.5485	0.6036	9.6096	1.4134									
	0.7520	0.6694	14.9233	1.6661									

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	3.773	2.75	69.30
OUTFLOW: ID= 1 (0002)	20.610	1.316	3.00	69.22

PEAK FLOW REDUCTION [Qout/Qin](%)=	34.89
TIME SHIFT OF PEAK FLOW (min)=	15.00
MAXIMUM STORAGE USED (ha.m.)=	0.8317

Max.Eff.Inten.(mm/hr)=	82.71	61.39
over (min)	5.00	15.00
Storage Coeff. (min)=	2.08 (ii)	10.66 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.31	0.09
PEAK FLOW (cms)=	0.20	0.20
TIME TO PEAK (hrs)=	2.75	2.83
RUNOFF VOLUME (mm)=	87.91	36.84
TOTAL RAINFALL (mm)=	89.91	89.91
RUNOFF COEFFICIENT =	0.98	0.41

	TOTALS
0.394 (iii)	
2.75	
52.16	
89.91	
0.58	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\1ec3a0e5
Ptotal= 89.91 mm	Comments: AES_06hr_100yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	30.57	3.75	12.59	5.50	1.80
0.50	1.80	2.25	30.57	4.00	7.19	5.75	1.80
0.75	1.80	2.50	82.71	4.25	7.19	6.00	1.80
1.00	1.80	2.75	82.71	4.50	3.60	6.25	1.80
1.25	1.80	3.00	23.37	4.75	3.60		
1.50	10.79	3.25	23.37	5.00	1.80		
1.75	10.79	3.50	12.59	5.25	1.80		

ADD HYD (0003)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0002):	20.61	1.316	3.00	69.22
+ ID2= 2 (0204):	2.93	0.394	2.75	52.16
ID = 3 (0003):	23.54	1.543	2.92	67.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	Area (ha)=	2.93
STANDHYD (0204)	Total Imp(%)=	50.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)=	30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80

FINISH

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V	V	I	SSSS	U	U	A	L	(v 5.1.2000)
V	V	I	SS	U	U	A	A	L
V	V	I	SS	U	U	AAAA	L	
V	V	I	SS	U	U	A	A	L
V	V	I	SSSS	UUUU	A	A	LLLL	

000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
 Output filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\345de98e-f053-418f-9bed-81f22e84d47b\scena
 Summary filename: C:\Users\Valdor\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\345de98e-f053-418f-9bed-81f22e84d47b\scena

DATE: 04-19-2021

TIME: 03:01:23

USER:

COMMENTS: _____

 ** SIMULATION : TIMMINS **

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\2f835815
Ptotal=193.00 mm	Comments: TIMMINS

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB	Area (ha)= 14.95
STANDHYD (0201)	Total Imp(%)= 80.00 Dir. Conn.(%)= 70.00
ID= 1 DT= 5.0 min	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.96	2.99
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	315.70	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00

1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	48.49
over (min)	5.00	15.00
Storage Coeff. (min)=	4.40 (ii)	13.83 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.23	0.08

PEAK FLOW (cms)=	1.25	0.38	*TOTALS*
TIME TO PEAK (hrs)=	6.92	7.00	1.634 (iii)
RUNOFF VOLUME (mm)=	191.00	120.74	169.92
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.63	0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\2f835815
Ptotal=193.00 mm	Comments: TIMMINS

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

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| CALIB |
| STANDHYD ( 0202) |
| ID= 1 DT= 5.0 min |
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Area (ha)= 4.27
Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 2.56 1.71
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 168.72 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00

```

```

Max.Eff.Inten.(mm/hr)= 43.00 43.10
over (min) 5.00 15.00
Storage Coeff. (min)= 3.02 (ii) 12.91 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.27 0.08

```

```

*TOTALS*
PEAK FLOW (cms)= 0.23 0.20 0.425 (iii)
TIME TO PEAK (hrs)= 6.75 7.00 7.00
RUNOFF VOLUME (mm)= 191.00 116.63 150.09
TOTAL RAINFALL (mm)= 193.00 193.00 193.00
RUNOFF COEFFICIENT = 0.99 0.60 0.78

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```

CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| READ STORM |
| Ptotal=193.00 mm |
-----
Filename: C:\Users\Valdor\AppData
Local\Temp\
72ca0d1b-dd09-486c-bf8b-e373ec690825\2f835815
Comments: TIMMINS

```

```

TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.25 15.00 3.25 3.00 6.25 43.00 9.25 13.00
0.50 15.00 3.50 3.00 6.50 43.00 9.50 13.00
0.75 15.00 3.75 3.00 6.75 43.00 9.75 13.00
1.00 15.00 4.00 3.00 7.00 43.00 10.00 13.00
1.25 20.00 4.25 5.00 7.25 20.00 10.25 13.00
1.50 20.00 4.50 5.00 7.50 20.00 10.50 13.00
1.75 20.00 4.75 5.00 7.75 20.00 10.75 13.00
2.00 20.00 5.00 5.00 8.00 20.00 11.00 13.00
2.25 10.00 5.25 20.00 8.25 23.00 11.25 8.00
2.50 10.00 5.50 20.00 8.50 23.00 11.50 8.00
2.75 10.00 5.75 20.00 8.75 23.00 11.75 8.00
3.00 10.00 6.00 20.00 9.00 23.00 12.00 8.00

```

```

-----
| CALIB |
| STANDHYD ( 0203) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 1.39
Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

```

```

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 0.69 0.69
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 96.26 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00

```

1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 27.21
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.16 (ii) 14.04 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.31 0.08

PEAK FLOW (cms)= 0.08 0.05 0.133 (iii)
 TIME TO PEAK (hrs)= 6.75 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 100.87 145.93
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.52 0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0201):	14.95	1.634	7.00	169.92
+ ID2= 2 (0202):	4.27	0.425	7.00	150.09
ID = 3 (0001):	19.22	2.059	7.00	165.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	19.22	2.059	7.00	165.52
+ ID2= 2 (0203):	1.39	0.133	7.00	145.93
ID = 1 (0001):	20.61	2.192	7.00	164.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2--> OUT= 1				
DT= 5.0 min				
	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8958
	0.0235	0.1922	1.4829	0.8763

0.0298	0.3003	2.0785	0.9483
0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	20.610	2.192	7.00	164.20
OUTFLOW: ID= 1 (0002)	20.610	1.839	7.08	164.12

PEAK FLOW REDUCTION [Qout/Qin](%)= 83.90
 TIME SHIFT OF PEAK FLOW (min)= 5.00
 MAXIMUM STORAGE USED (ha.m.)= 0.9232

READ STORM	Filename:
	C:\Users\Valdor\AppData\Local\Temp\72ca0d1b-dd09-486c-bf8b-e373ec690825\2f835815
Ptotal=193.00 mm	Comments: TIMMINS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB	Area (ha)	STANDHYD (0204)	Total Imp(%)	Dir. Conn.(%)
ID= 1 DT= 5.0 min	2.93	50.00	50.00	30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.47	1.47
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	139.76	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00

0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 44.17
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.70 (ii) 12.49 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.29 0.08

TOTALS

PEAK FLOW (cms)= 0.10 0.17 0.277 (iii)
 TIME TO PEAK (hrs)= 6.75 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 117.49 139.54
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.61 0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 61.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

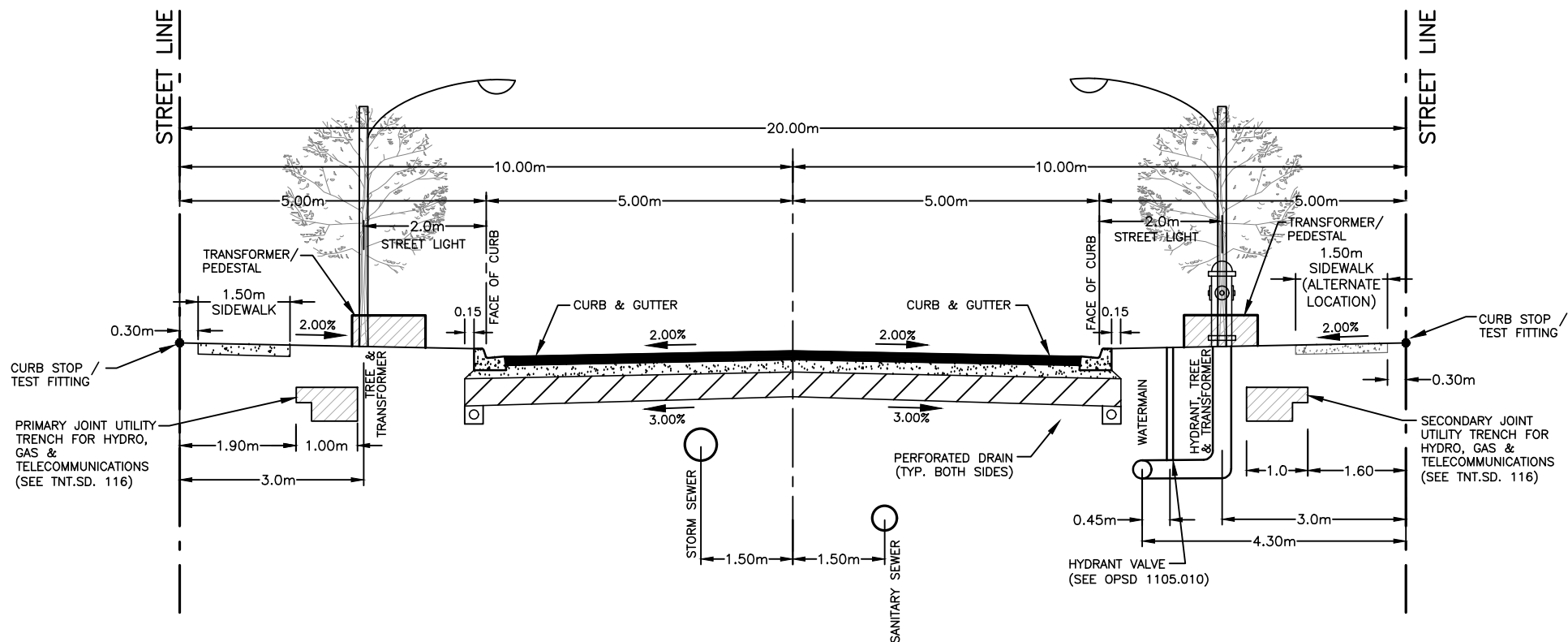
```

-----
| ADD HYD ( 0003)|
| 1 + 2 = 3 |
-----
ID1= 1 ( 0002):  20.61  1.839  7.08 164.12
+ ID2= 2 ( 0204):   2.93  0.277  7.00 139.54
=====
ID = 3 ( 0003):  23.54  2.103  7.00 161.06
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

APPENDIX “G”

Standard Road & Sidewalk Cross Sections



MILLBROOK SOUTH EAST SUBDIVISION

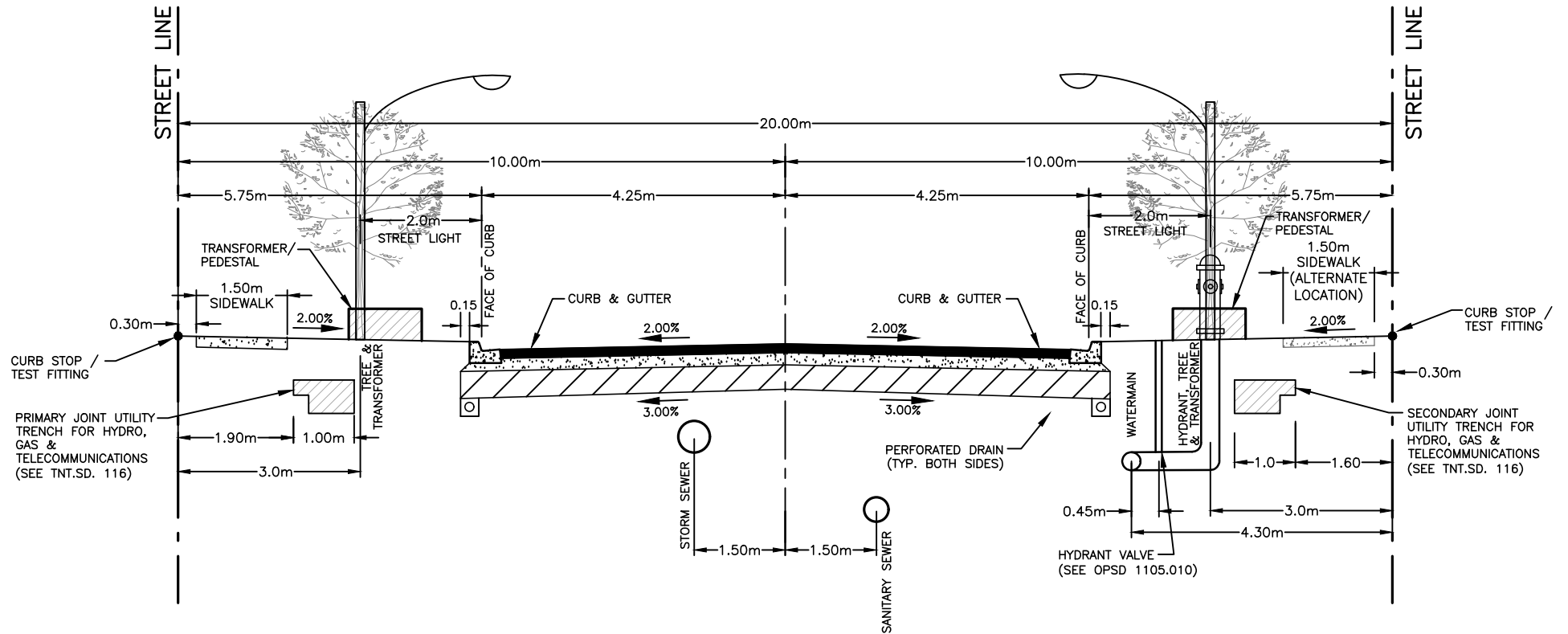
URBAN LOCAL
20.0m RIGHT-OF-WAY (10.0m ROAD)

NO.	REVISIONS	DATE	APR'D

SCALE: N.T.S.

DATE: April 2021

FIGURE G1



MILLBROOK SOUTH EAST SUBDIVISION

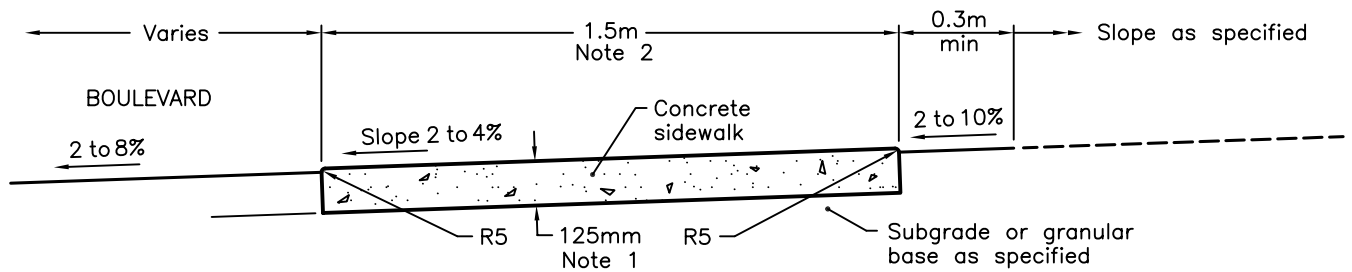
URBAN LOCAL
20.0m RIGHT-OF-WAY (8.50m ROAD)

NO.	REVISIONS	DATE	APR'D

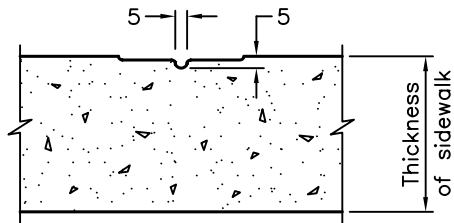
SCALE: N.T.S.

DATE: April 2021

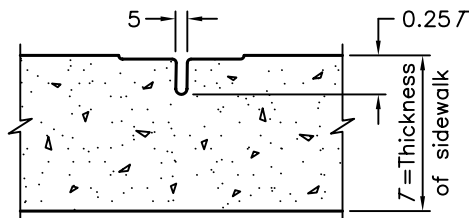
FIGURE G2



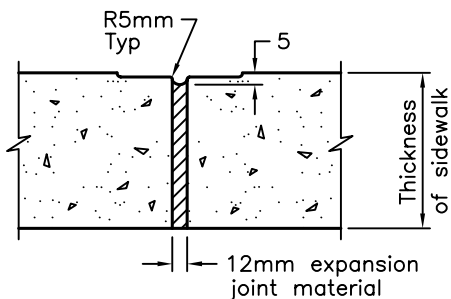
TYPICAL SECTION



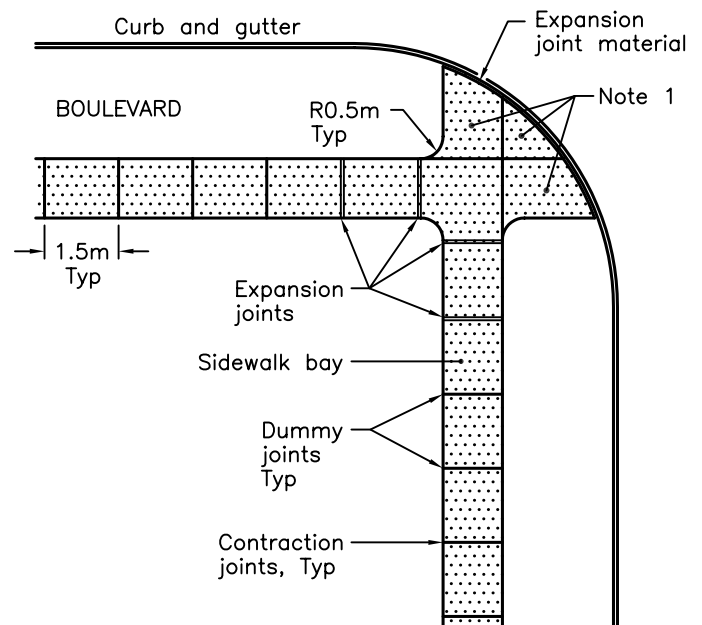
DUMMY JOINT



CONTRACTION JOINT



EXPANSION JOINT



JOINT LAYOUT

NOTES:

- 1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
- 2 Sidewalk width shall be increased to 2.4m at schools, bus stops, and other high pedestrian areas.

- A This OPSD to be read in conjunction with OPSD-310.030.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

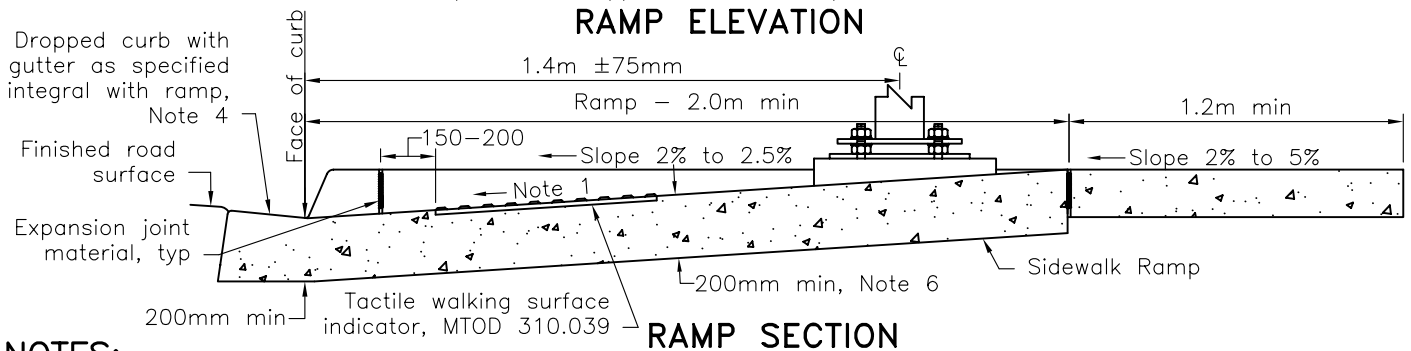
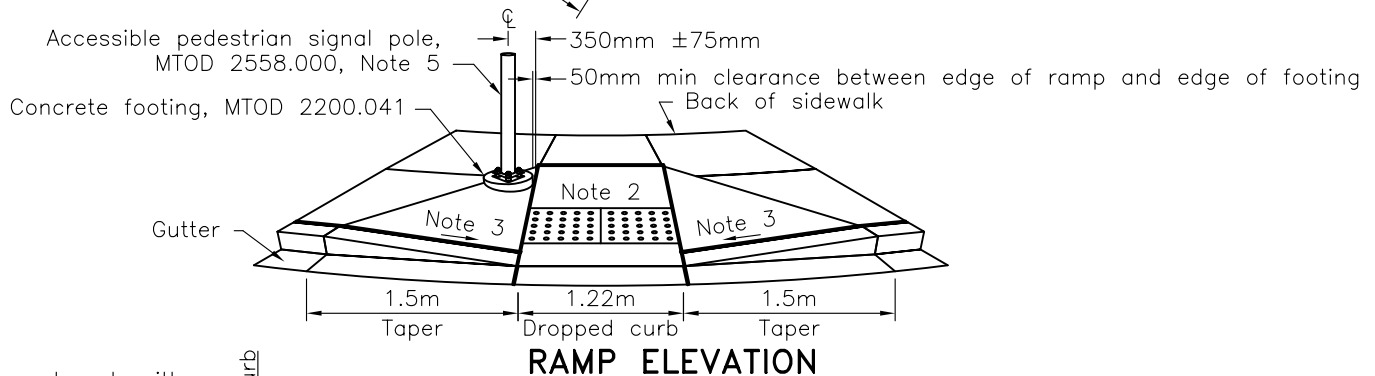
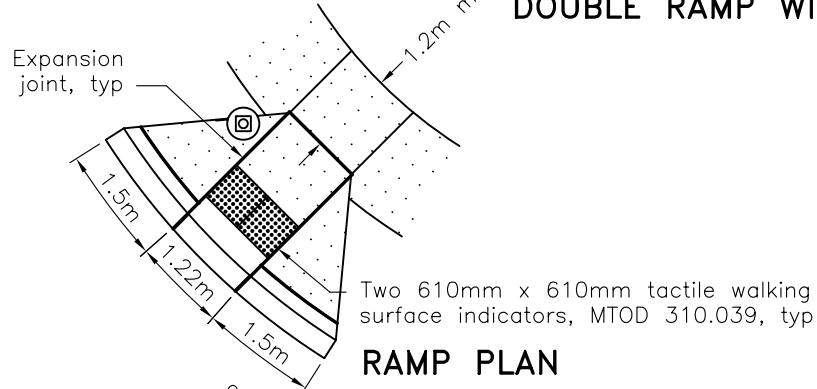
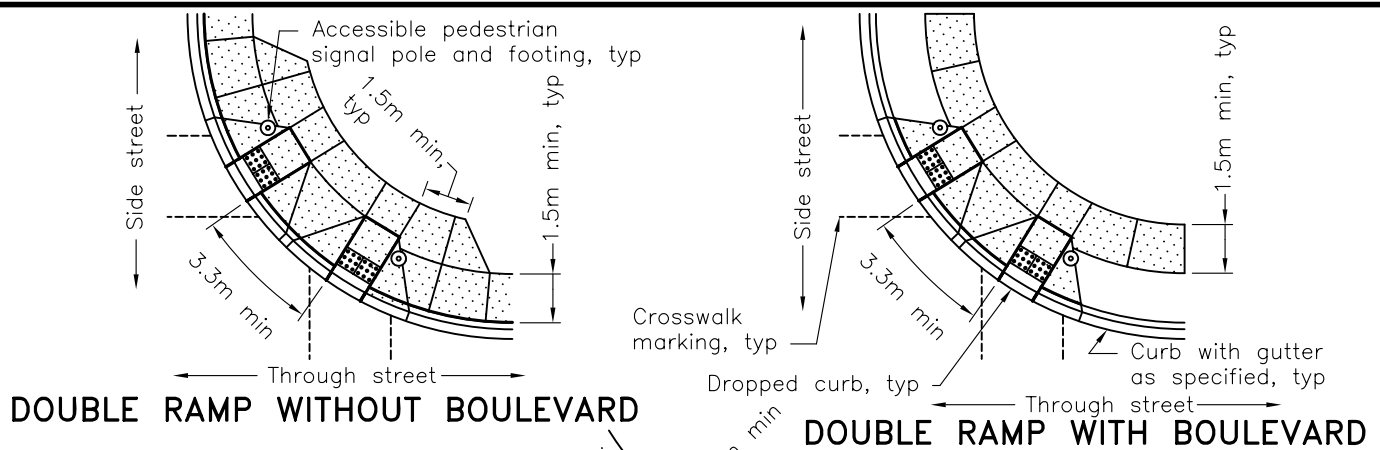
Nov 2005

Rev 1

CONCRETE SIDEWALK

OPSD - 310.010





NOTES:

- 1 Slope of ramp shall not exceed 10%.
 - 2 Cross slope of ramp shall not exceed 2% in either direction.
 - 3 Cross slope of flared side of ramp shall not exceed 10%.
 - 4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter.
 - 5 Accessible pedestrian signal to have tactile arrow that aligns with direction of crosswalk.
 - 6 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
- A Where only one crosswalk is present at an intersection, only one curb ramp is required.
B All dimensions are in millimetres unless otherwise shown.

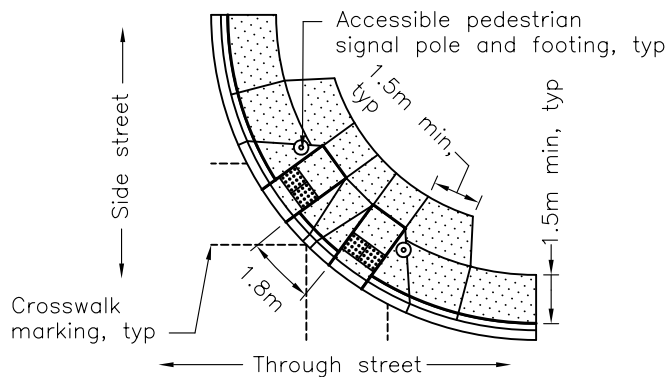
MINISTRY OF TRANSPORTATION ONTARIO DRAWING

Mar 2014

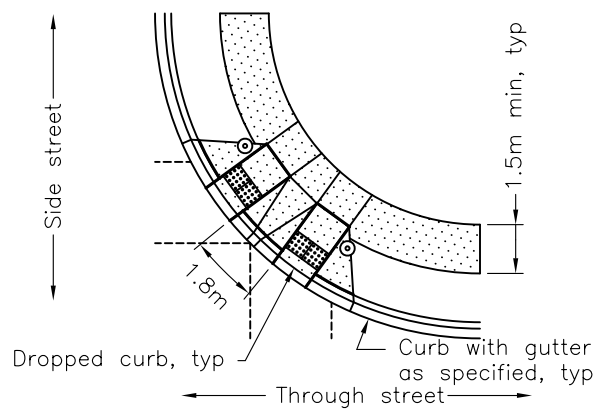
Rev

CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS

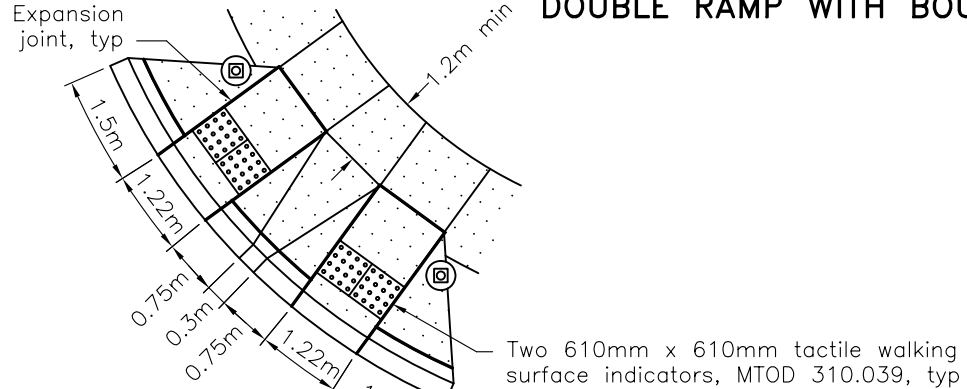
MTOD - 310.030



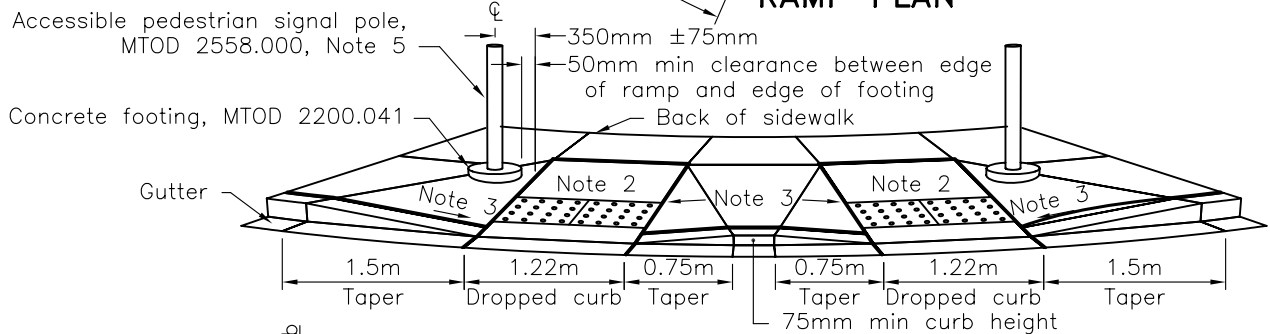
DOUBLE RAMP WITHOUT BOULEVARD



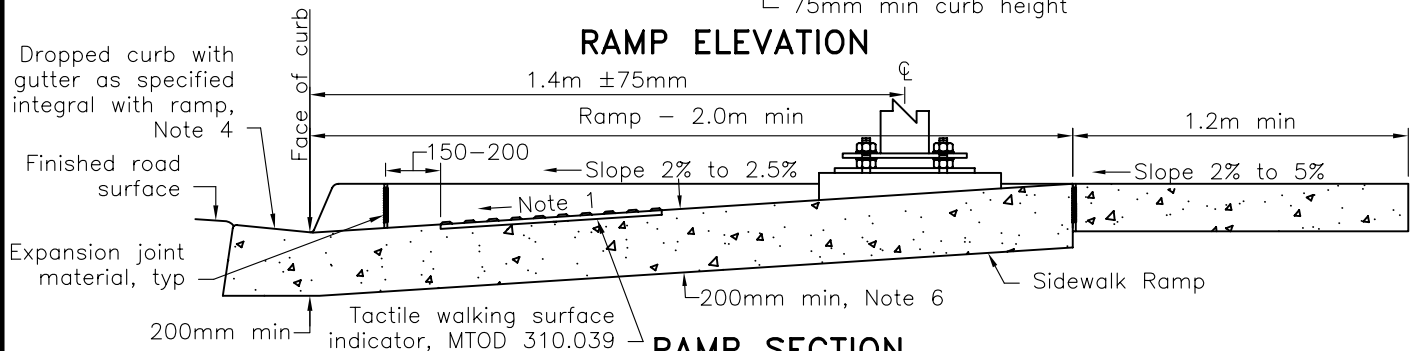
DOUBLE RAMP WITH BOULEVARD



RAMP PLAN



RAMP ELEVATION



RAMP SECTION

NOTES:

- 1 Slope of ramp shall not exceed 10%.
- 2 Cross slope of ramp shall not exceed 2% in either direction.
- 3 Cross slope of flared side of ramp shall not exceed 10%.
- 4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter line.
- 5 Accessible pedestrian signal to have tactile arrow that aligns with direction of crosswalk.
- 6 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.

A All dimensions are in millimetres unless otherwise shown.

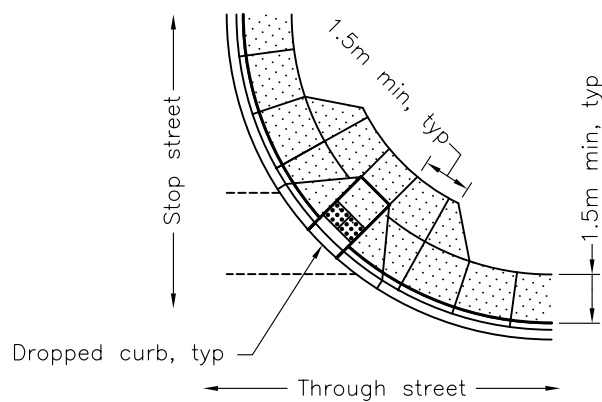
MINISTRY OF TRANSPORTATION ONTARIO DRAWING

Mar 2014

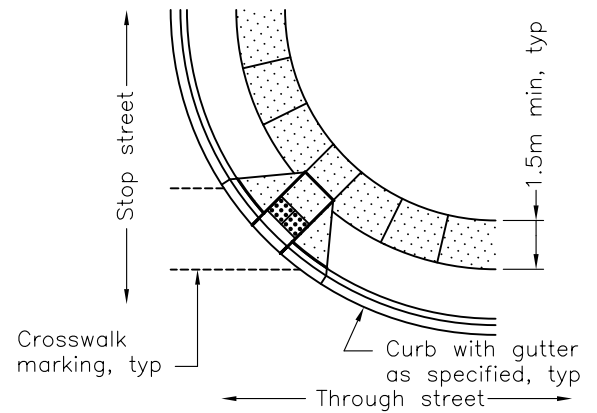
Rev

**CONCRETE SIDEWALK RAMPS AT
SIGNALIZED INTERSECTIONS WITH
INTERSECTING CROSSWALKS**

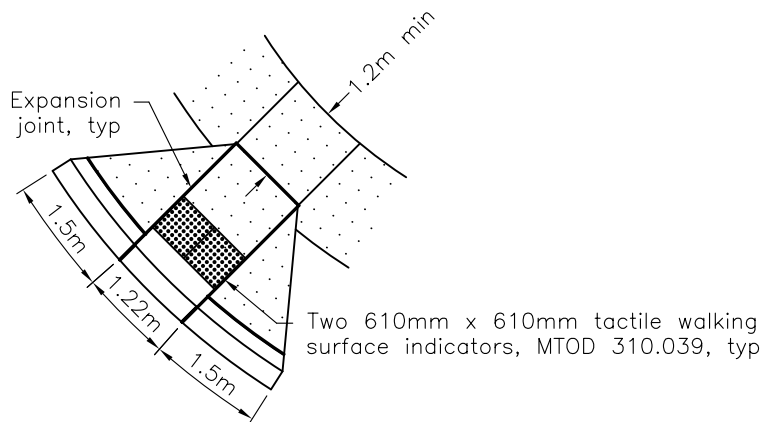
MTOD - 310.031



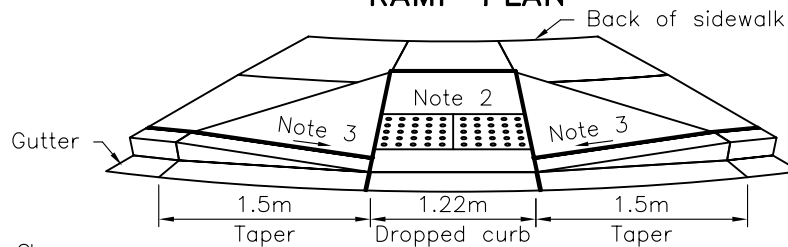
SINGLE RAMP WITHOUT BOULEVARD



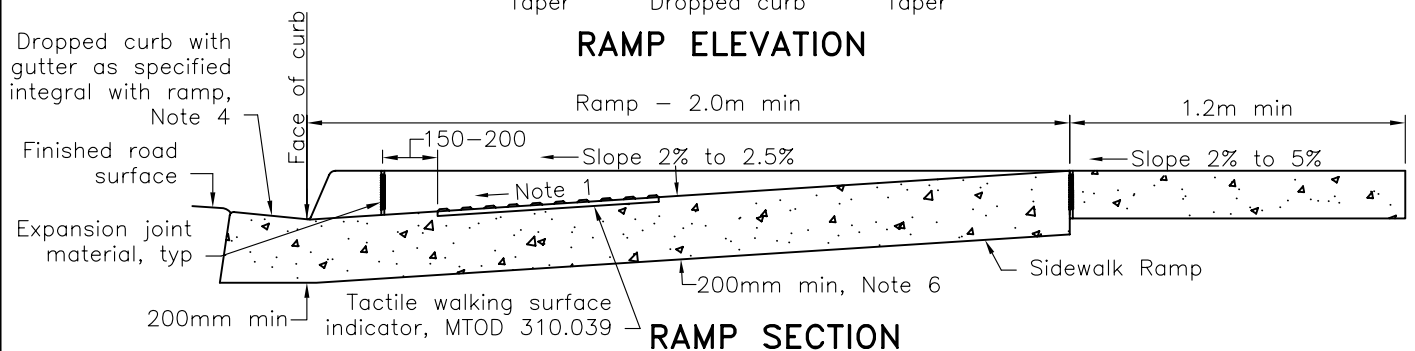
SINGLE RAMP WITH BOULEVARD



RAMP PLAN



RAMP ELEVATION



RAMP SECTION

NOTES:

- 1 Slope of ramp shall not exceed 10%.
- 2 Cross slope of ramp shall not exceed 2% in either direction.
- 3 Cross slope of flared side of ramp shall not exceed 10%.
- 4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter line.
- 5 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
- A All dimensions are in millimetres unless otherwise shown.

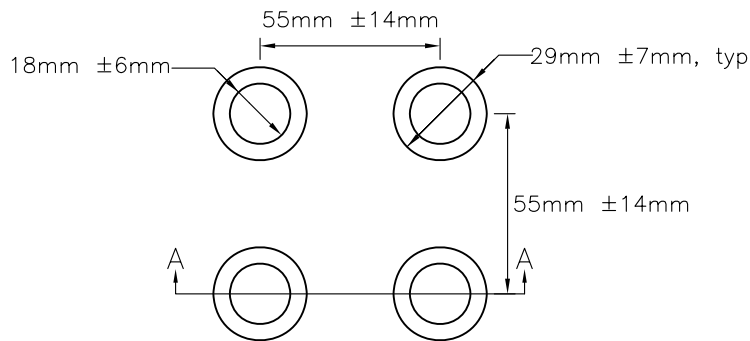
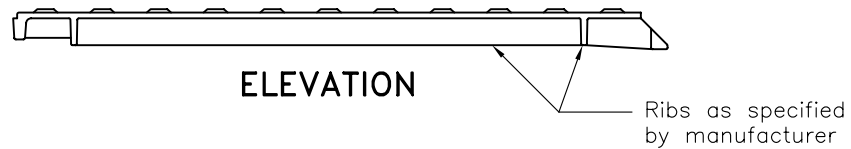
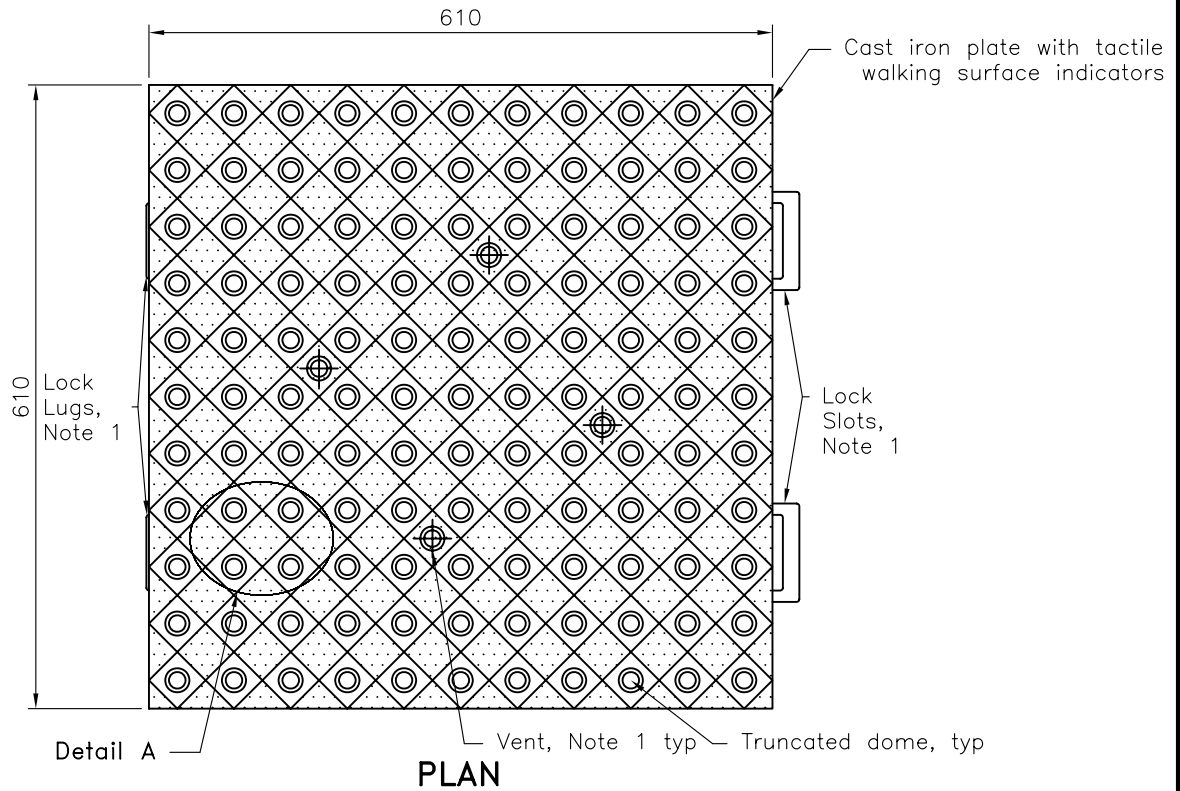
MINISTRY OF TRANSPORTATION ONTARIO DRAWING

Mar 2014

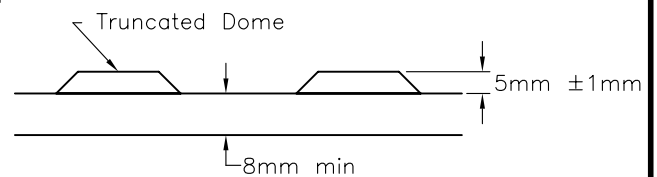
Rev

**CONCRETE SIDEWALK RAMPS AT
UNSIGNALIZED INTERSECTIONS**

MTOD - 310.032



DETAIL A
TRUNCATED DOMES PLAN



SECTION A-A

NOTES:

1 Lock lug and slots to interconnect adjacent cast iron plates, and vents, are proprietary to manufacturer

A The coefficient of friction of the cast iron plate shall not be less than 0.8.

B All dimensions are in millimetres unless otherwise shown.

MINISTRY OF TRANSPORTATION ONTARIO DRAWING

Mar 2014

Rev

**CONCRETE SIDEWALK RAMPS
TACTILE WALKING SURFACE
INDICATORS COMPONENT**

MTOD - 310.039

APPENDIX “H”

Excerpts from the Geotechnical Investigation Report



Geotechnical Investigation Report

Proposed Residential and Commercial Development
Part Lot 13 Concession 5
Millbrook, Ontario

Report for
Vargas Properties Inc.





6. Conclusions and Recommendations

Supporting data upon which our recommendations are based have been presented in the foregoing sections of this report. The following recommendations are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the Site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like.

Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor. Based on the results of the geotechnical investigation, it is our professional opinion that the Site is suitable for the proposed residential development and there is low potential for groundwater impact as a result of developing the Site. It is recommended that good construction and mitigation techniques must be used to minimize the potential for impact. Detailed conclusions and recommendations are presented in the following sections regarding the water balance and potential impacts to groundwater and surface water resources.

6.1 Hydrogeology

6.1.1 Water Balance Evaluation

An evaluation of the water balance was completed to compute the potential impacts that may occur in the recharge/discharge characteristics related to the proposed development. This evaluation is based upon a preliminary conceptual plan. The objective of the water balance is to illustrate that post-development infiltration within the developable area can meet or be close to pre-development values. The computations have used detailed parameters such as precipitation (Peterborough A), regional evapotranspiration, infiltration and runoff. Weather data from Peterborough A was selected as it was the closest weather station to the Site (~10.2km to the northeast). The detailed calculations can be reviewed in Appendix E. The total Site area is 29.5ha based on information provided. The following is a summary of the expected pre-development water balance values for the proposed residential and commercial development based on current information.

Pre development Water Balance

The pre-development water balance incorporated the existing soils, slope and ground cover areas. The infiltration factor for the area was calculated from the table of values presented in the “Land Development Guidelines” (MOEE, 1995). It is based on three sub-factors which are:

- Topography sub-factor;
- Soil sub-factor; and
- Cover sub-factor.

The slope of the site was considered as “hilly” (slope of 28m to 47m per km). The soils are generally comprised of sandy silt, till or silty clay material and will be considered a medium clay and loam to a tight impervious clay as per the water balance calculations. Table 6.1 summarizes the expected pre-development water balance values for the Site.



Table 6.1 Pre Development Summary

Total Precipitation (Peterborough A):	- 855 mm/year
Regional Evapotranspiration:	- 556 mm/year
Recharge Available:	- 299 mm/year
Area of Recharge Available (Site):	- 294,789 m ²
Total Water Surplus:	- 88,193 m ³ /year
Total Estimated Infiltration:	- 41,098 m ³ /year
Total Estimated Runoff:	- 47,095 m ³ /year

Based upon these values, the Site infiltrates on the order of 41,098m³ per year (~140 mm/year).

Post Development Water Balance (No Enhancements)

The computation of the water budget was repeated for the proposed development assuming no mitigation techniques, that is, runoff from impervious surfaces is unrecoverable and not infiltrated into the ground. The anticipated impact of the development is related to increased runoff from impervious surfaces, such as asphalt surface (access roads, driveways and parking areas) and building rooftops. These are assumed to be impervious surfaces with zero infiltration capacity in this model. A summary of the computations is provided in Table 6.2.

Table 6.2 Post Development Summary (No Enhancements)

Area of Site:	- 294,789 m ²
Impervious Surfaces:	- 112,158 m ²
Area Available for Infiltration:	- 182,631 m ²
Total Water Surplus:	- 131,390 m ³ /year
Total Estimated Infiltration:	- 27,375 m ³ /year
Infiltration % Difference (pre- vs. post-):	- (-33%) (decrease)
Total Estimated Runoff:	- 104,016 m ³ /year
Runoff % Difference (pre- vs. post-):	- 121% (increase)

The impermeable surface area of proposed paved areas and building rooftops was estimated based on the concept plan presented in Figure 4 and information provided by the Client. Under this scenario, the total infiltration volume decreased by 33% and runoff volume increased by 121%. Within the areas evaluated, the infiltration has reduced and the runoff increased versus the pre-development values. Groundwater base flow would be expected to decrease over time in this scenario. However, recharge via infiltration through the underlying till and silty clay to the lower aquifer from these lands is expected to be minor. Based upon this scenario, mitigative strategies are required to minimize infiltration losses and reduce storm water runoff. The following section discusses the water balance after considering enhanced infiltration options.



Post Development Water Balance (Enhanced Infiltration)

The post-construction water budget computations were repeated considering enhanced infiltration options which are also known as Low Impact Development (LID) technologies. These technologies include and are not restricted to rainwater harvesting, downspout disconnection, infiltration trenches, vegetated filter strips, bioretention, permeable pavement, enhanced grass swales, dry swales and perforated pipe systems in order to balance the water budget and maintain any wetland features including nearby creeks. The shallow subsurface soils are silty sand/sandy silt over silty clay and/or glacial till material. It is noted that LIDs can work in any soil type. The primary enhancement for this Site is to promote infiltration and to move water from impervious surfaces to areas where infiltration can occur.

The post-development water balance was modelled to include the disconnection of downspouts from storm sewers and directing water from the buildings roof top to sodded areas or undeveloped grass areas which can be enhanced with increased topsoil depths. GHD notes that this was done solely for demonstration purposes and specific LID design criteria will be the responsibility of the stormwater engineer for the development. A summary of the post-construction water budget with enhancements for infiltration is presented in Table 6.3.

Table 6.3 Post Development Summary (With Enhanced Infiltration)

Area of Site:	- 294,789 m ²
Total Water Surplus:	- 131,390 m ³ /year
Total Estimated Infiltration:	- 41,098 m ³ /year
Infiltration % Difference (pre- vs. post-):	- (0%) (nil)
Total Estimated Runoff:	- 90,293 m ³ /year
Runoff % Difference (pre- vs. post-):	- 92% (decrease)

Under this scenario, the total infiltration volume is maintained and runoff volume decreased to 92% compared to pre development values. Within the areas evaluated, the infiltration and runoff amounts have improved compared to post development (no mitigation) numbers. Runoff will need to be managed as per the storm water management plan.

It is expected that recharge via infiltration through the till to the lower aquifers is a small component and impacts to the groundwater aquifer are expected to be insignificant. It is our professional opinion that there would be minimal impact to the local groundwater regime and minimal impact to the down-gradient surface water regime from a quantity perspective.

6.1.2 Impact on Groundwater Baseflow

The importance of the groundwater baseflow is that it provides discharge to water bodies, wells and may have some hydraulic functionality with the on-site features. Water balance calculations suggest that the infiltration to the subsurface can be kept near pre-development values if appropriate LID technologies are used. It is GHD's professional opinion that there is not expected to be a significant impact to the shallow groundwater baseflow that may be supplying baseflow to the down-gradient tributaries to Baxter Creek.



Source: Google Earth 2018, Image taken May 6, 2018. ©2018 Google

Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17



Vargas Properties Inc.
963 County Road 10 & Part Lot 13, CON 5
Millbrook, Ontario
Geotechnical Investigation

11209539-01
June, 2020

Test Hole Plan

FIGURE 5



BOREHOLE No.: BH-2
ELEVATION: 248.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
			TOPSOIL (300 mm)								
1	0.3		SANDY SILT - Reddish Brown Sandy Silt, Moist to Wet, Loose	SS-1A	71	27	1	4			
2	0.5			SS-1B		26	2				
3	1.0		TILL - Light Brown Clayey Silt, Trace Sand, Moist to Wet, Compact	SS-2	78	22	6	25			
4							10				
5	1.5		With Gravel, Moist				15				
6	2.0			SS-3	100	10	5	15			
7							7				
8				SS-4	72	8	8	22			
9							14				
10	3.0		Light Brown Silty Sand with Gravel, Trace Clay, Moist, Very Dense	SS-5	44	10	20	75			
11							41				
12							34				
13	4.0										
14											
15				SS-6	94	7	12	61			
16	5.0						28				
17							33				
18											
19											
20	6.0		Grey, Dense	SS-7	78		8	45			
21	6.1						17				
22	6.6		END OF BOREHOLE				28				
23	7.0										
24											
25											
26	8.0										
27											

WL - 2.3 m immediately after drilling
 First encounter of groundwater seepage at 2.4 m

Borehole Caving to 5.3 m at completion on drilling



BOREHOLE No.: BH-3

ELEVATION: 246.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
			TOPSOIL (300 mm)				1				
1	0.3		SANDY SILT - Brown Sandy Silt, Moist, Loose	SS-1	40	7	2	5	X		
2							3				
3							4				
4	1.0	1.1	TILL - Light Brown Sandy Silt with Clay and Gravel, Moist, Compact	SS-2	100	31	6	13	X	O	
5							7				
6	2.0			SS-3	50	12	4	18	O	X	
7							7				
8							11				
9				SS-4	100	12	6	25	O	X	
10	3.0	3.0	Dense				11				
11				SS-5	100	10	3	48	O	X	
12	3.7		Cobble (Inferred From Augers Grinding)				18				
13							30				
14	4.0						22				
15	4.6		Very Dense	SS-6	100	8	50=4"	100+	O		X
16	5.0										
17											
18											
19											
20	6.0			SS-7	100	11	26	50	O	X	
21	6.4		Wet				24				
22	6.6		END OF BOREHOLE				26				
23	7.0										
24											
25											
26	8.0										
27											

Grain Size Data
 SS-4:
 13% Gravel
 29% Sand
 58% Silt and
 Clay-sized
 Particles
 33% Between 5-75
 um

End of borehole
 open and dry upon
 completion of
 drilling



ELEVATION: 244.2 m

BOREHOLE REPORT

Page: 1 of 1

DATE: 13 March 2020

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

	SS	- SPLIT SPOON
	AS	- AUGER SAMPLE
	ST	- SHELBY TUBE
	CS	- CORE SAMPLE
		- WATER LEVEL

[illegible]

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW.GPJ GEOLOGIC.GDT 15/6/20



BOREHOLE No.: BH-5

ELEVATION: 253.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 12 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
		0.3	TOPSOIL (300 mm)				1				
1			SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Loose	SS-1	42	17	2	6	X		
2							4				
3							7				
4	1.0	0.8	TILL - Light Brown Silty Sand With Gravel, Trace Clay, Moist to Wet, Loose to Compact	SS-2	50	14	2	11	X		
5							6				
6							5				
7	2.0			SS-3	100	15	3	5	X		
8							2				
9			- Reddish Brown 75mm Sand Seam at 2.6m	SS-4	78	13	8	20			
10							8				
11	3.0	3.0	Moist, Very Dense	SS-5	72	9	16	65			
12							29				
13							36				
14	4.0										
15											
16				SS-6	100	6	20	64			
17	5.0						30				
18							32				
19											
20	6.0										
21				SS-7	100	8	26	64			
22		6.6	END OF BOREHOLE				30				
23	7.0						38				
24											
25											
26	8.0										
27											

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, GEOLOGIC.GDT 15/6/20

Borehole remained open and dry throughout drilling activities



BOREHOLE No.: BH-6

ELEVATION: 247.1 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
		0.3	TOPSOIL (300 mm)				3				
1	0.3		SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Loose	SS-1	67	22	4	8	X		
2	0.6						4				
3	0.9		TILL - Light Brown Silty Sand with Gravel, Trace Clay, Moist to Wet, Compact / Moist	SS-2	100	9	3	20			
4	1.0						9				
5							11				
6	2.0			SS-3	72	10	13	26			
7							14				
8				SS-4	94	7	4	25			
9							10				
10	3.0		Very Dense	SS-5	100	4	11	100+			
11							30				
12							50=4"				
13	4.0										
14											
15				SS-6	100	5	45	100+			
16	5.0						50=4"				
17											
18											
19											
20	6.0			SS-7	100	5	12	52			
21							19				
22	6.6		END OF BOREHOLE				33				
23	7.0										
24											
25											
26	8.0										
27											

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, J. GEOLOGIC.GDT 15/6/20

Borehole remained open and dry throughout drilling activities



BOREHOLE No.: BH-7
ELEVATION: 238.8 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 12 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S)											COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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1	0.3			SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Soft	SS-1	58	18	2	3	X	O																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, J, GEOLOGIC.GDT 15/6/20



BOREHOLE No.: BH-8

ELEVATION: 231.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, GEOLOGIC.GDT 15/6/20

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m				%	%		N	10 20 30 40 50 60 70 80 90		
	0.0		GROUND SURFACE								
			TOPSOIL (300 mm)				1				
1	0.3		SANDY SILT - Brown Sandy Silt, Moist, Very Loose	SS-1	25	33	1	2	X		
2							1				
3	0.8		TILL - Light Brown Sandy Silt With Clay and Gravel, Moist, Loose	SS-2	60	10	2				
4	1.2		Cobble (Inferred From Augers Grinding)				3				
5	1.5		Clayey Silt with Sand and Gravel, Mottled, Moist, Compact to Dense	SS-3	50	13	5	8	X		
6							7				
7	2.0						4				
8							20	39			
9	2.6		Grey	SS-4	60	9	19				
10	3.0		Wet				3				
11							3				
12				SS-5	60	11	7	34			
13							10				
14							24				
15	4.0						14				
16			Grey Sandy Silt with Clay and Gravel, Moist, Dense	SS-6	50	9	12	31			
17	5.0						19				
18							17				
19							19				
20	6.0						14				
21				SS-7	50	9	16	38			
22	6.7		END OF BOREHOLE				22				
23							10				
24	7.0										
25											
26	8.0										
27											

First encounter of groundwater seepage at 3.0 m Water up to 3.4 m upon completion

Borehole cave-in up to 4.3 m upon completion



BOREHOLE No.: BH-9

ELEVATION: 218.4 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- SS - SPLIT SPOON
 AS - AUGER SAMPLE
 ST - SHELBY TUBE
 CS - CORE SAMPLE
 ▽ - WATER LEVEL

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, J. GEOLOGIC.GDT 15/6/20

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m				%	%		N	10 20 30 40 50 60 70 80 90		
	0.0		GROUND SURFACE								
	0.2		TOPSOIL (150 mm)				1				
1			SANDY SILT - Light Brown Sandy Silt With Clay, Mottled, Wet, Loose	SS-1	60	19	1	4	×	○	
2							3				
3	1.0			SS-2	60	19	2				
4							3	5	×	○	
5							2				
6	1.7		SILTY CLAY - Brown Silty Clay, trace Sand, Mottled, Moist, Soft to Firm	SS-3	60	28	2				
7							2	5	×	○	
8							3				
9				SS-4	100	39	1				
10							1	3	×	○	
11	3.0		Brown Silty Clay with Sand, Wet, Very Soft	SS-5	100	36	1				
12							1	2	×	○	
13							1				
14	4.0						1				
15	4.6		Grey	SS-6	100	42	1				
16							0	1	×	○	
17	5.0						1				
18							1				
19							1				
20	6.0		Soft	SS-7	100	21	1				
21							1	4	×	○	
22							3				
23	7.0						2				
24											
25	7.6		TILL - Grey Sandy Silt, With Gravel, Trace Clay, Moist, Dense	SS-8	90	14	5				
26							13	29	○	×	
27	8.0						16				
	8.2		END OF BOREHOLE				31				

Water up to 2.4 m upon completion
 First encounter of groundwater seepage at 3.0 m
Grain Size Data
 SS-5:
 2% Gravel
 8% Sand
 90% Silt and Clay-sized Particles
 23% Between 5-75 um
Atterberg Limits
 LL = 40%
 PI = 22%

Borehole cave-in up to 5.8 m upon completion



BOREHOLE No.: BH-10

ELEVATION: 216.2 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m				%	%		N	10 20 30 40 50 60 70 80 90		
	0.0		GROUND SURFACE								
	0.2		TOPSOIL (150 mm)								
1			SANDY SILT - Brown Sandy Silt, Moist, Very Loose	SS-1	50	29	1	2	X		
2							1				
3	1.0		Loose				2				
4				SS-2	25	36	3	7	X		
5							4				
6	2.0		SILTY CLAY - Brown Silty Clay, trace Sand, Moist, Stiff	SS-3	75	22	5	13	X		
7							8				
8			Very Stiff				9				
9				SS-4	30	27	8	17	X		
10	3.0		Stiff				9				
11				SS-5	100	25	3	9	X		
12							4				
13	4.0		Wet				5				
14							4				
15	4.6		Grey, Very Soft				1				
16				SS-6	100	26	1	2	X		
17	5.0						1				
18							1				
19							1				
20	6.0		Hard				6				
21				SS-7	25	22	10	34			
22	6.7		END OF BOREHOLE				24				
23	7.0						19				
24											
25											
26	8.0										
27											

Grain Size Data

SS-3:
 0% Gravel
 9% Sand
 91% Silt and Clay-sized Particles
 33% Between 5-75 um

Water up to 3.5 m upon completion

First encounter of groundwater seepage at 4.0 m

Borehole cave-in up to 4.6 m upon completion

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, GEOLOGIC.GDT 15/6/20



BOREHOLE No.: BH-11

ELEVATION: 214.2 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 16 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
			TOPSOIL (300 mm)								
1	0.3		SILTY SAND - Brown Silty Sand, Moist, Very Loose	SS-1	60	25	1	3	X	○	
2	0.5		SILTY CLAY - Light Brown Silty Clay, Trace Sand, Moist, Soft	SS-2	75	25	1	4	X	○	
3	1.0						1				
4							3				
5	1.5		Cobble (Inferred From Augers Grinding), Stiff	SS-3	90	21	6	14	X	○	
6	1.8		Wet				6				
7	2.0						8				
8	2.3		Firm	SS-4	100	23	2	8	X	○	
9							4				
10	3.0		Stiff	SS-5	100	27	2	13	X	○	
11							2				
12	3.5		SILTY SAND - Light Brown Silty Sand, Wet, Compact				11				
13							12				
14	4.0										
15				SS-6A	100	19	3	10	○		
16	4.9		SILTY CLAY - Light Brown Silty Clay, trace Sand, Moist, Stiff	SS-6B		20	2		○		
17							8				
18							5				
19											
20	6.0		Grey	SS-7	50	19	6	16	X	○	
21							6				
22	6.7		END OF BOREHOLE				10				
23							9				
24											
25											
26	8.0										
27											

First encounter of groundwater seepage at 1.8 m

Water up to 2.4 m upon completion

Borehole cave-in up to 4.0 m upon completion

Grain Size Data
 SS-6A:
 0% Gravel
 91% Sand
 9% Silt and Clay-sized Particles

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS), 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, GEOLOGIC.GDT, 15/6/20



ELEVATION: 213.8 m

BOREHOLE REPORT

Page: 1 of 1

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- | | | |
|---|----|----------------|
|  | SS | - SPLIT SPOON |
|  | AS | - AUGER SAMPLE |
|  | ST | - SHELBY TUBE |
|  | CS | - CORE SAMPLE |
|  | | - WATER EVEL |

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S)  Water content (%)  Atterberg limits (%)  "N" Value (blows / 0.3 m)  RQD  CONE										 Field  Lab	COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS. JM, EW.GPJ GEOLOGIC.GDT 15/6/20



TEST PIT No.: TP-1

ELEVATION: 247.8 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 6 March 2020

LEGEND

☐ GS - GRAB SAMPLE
☐ - WATER LEVEL

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) H _p H _l Atterberg limits (%)											COMMENTS
ft	m						10	20	30	40	50	60	70	80	90			
		0.0		GROUND SURFACE		%												
		0.2		TOPSOIL (150 mm)														
1		0.3		SANDY SILT - Reddish Brown Sandy Silt, Loose, Moist Occasional Cobbles	AS-1	28			○									No seepage observed during the excavation of the test pit
	0.5																	
2		0.6		TILL - Light Brown Silty Sand and Gravel, Compact, Moist	AS-2	5	○											
3		0.9		Boulders														
4																		
5	1.5																	
6		1.8		Light Brown Clayey Silt, Trace Gravel, Cobbles and Boulders, Dense, Moist	AS-3	19			○									
7	2.0																	
8	2.5																	
9																		
10	3.0																	
11																		
	3.5	3.5		END OF TEST PIT	AS-4	22			○									
12																		
13	4.0																	

TEST PIT LOG GEOTECH 11209539-01-DWG-20-03-31, VARGAS TESTPIT LOGS - GPJ GEOLOGIC.GDT 12/6/20

No seepage observed during the excavation of the test pit



TEST PIT No.: TP-2
ELEVATION: 243.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern DATE: 6 March 2020

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

 GS - GRAB SAMPLE
 - WATER LEVEL

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) ○ Water content (%) Atterberg limits (%) w _p w _L	△ Field □ Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.2		TOPSOIL (200 mm)					
1	0.5			TILL - Light Brown Silty Sand and Gravel, Cobbles, Compact, Moist	AS-1	2	○		No seepage observed during the excavation of the test pit
2									
	0.8			Boulders	AS-2	9	○		
3									
4									
5	1.5								
6									
7	2.0								
8					AS-3	10	○		
9									
10	3.0								
11	3.4			Very Dense	AS-4	8	○		
	3.5	3.5		END OF TEST PIT					
12									
13	4.0								

TEST PIT LOG GEOTECH 11209539-01-DWG-20-03-31, VARGAS TESTPIT LOGS - .GPJ GEOLOGIC.GDT 12/6/20



TEST PIT No.: TP-3

ELEVATION: 223.2 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 6 March 2020

LEGEND

☐ GS - GRAB SAMPLE
☒ - WATER LEVEL

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) H Atterberg limits (%) w _p w _l											COMMENTS
ft	m						10	20	30	40	50	60	70	80	90			
		0.0		GROUND SURFACE		%												
		0.2		TOPSOIL (150 mm)														
1		0.3		SANDY SILT - Reddish Brown Sandy Silt, Loose, Moist to Wet	AS-1	23		○										
	0.5			TILL - Light Brown Silty Sand, Compact, Moist														
2																		
3					AS-2	23		○										
	1.0																	
4																		
5	1.5																	
6																		
7	2.0				AS-3	22		○										
8	2.5																	
9																		
10	3.0				AS-4	23		○										
11	3.4				AS-5	20		○										
	3.5			END OF TEST PIT														
12																		
13	4.0																	



TEST PIT No.: TP-4

ELEVATION: 216.0 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 6 March 2020

LEGEND

☐ GS - GRAB SAMPLE
☒ - WATER LEVEL

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) △ Field □ Lab ○ Water content (%) ▬ Atterberg limits (%)											COMMENTS
ft	m						10 20 30 40 50 60 70 80 90											
		0.0		GROUND SURFACE		%												
				TOPSOIL (150 mm)														No seepage observed during the excavation of the test pit
1		0.3		SANDY SILT - Reddish Brown Sandy Silt, Loose, Moist	AS-1	28												
		0.4		TILL - Light Brown Silty Sand and Gravel, Compact, Moist														
2					AS-2	37												
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
		3.4		END OF TEST PIT	AS-4	27												
12																		
13																		



TEST PIT No.: TP-5

ELEVATION: 215.2 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 6 March 2020

LEGEND

☐ GS - GRAB SAMPLE
☒ - WATER LEVEL

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) ○ Water content (%) H Atterberg limits (%)											COMMENTS
ft	m						w _p	w _l	△ Field	□ Lab								
		0.0		GROUND SURFACE		%	10	20	30	40	50	60	70	80	90			
				TOPSOIL (150 mm)														
1		0.3		SANDY SILT - Reddish Brown Sandy Silt, Loose, Moist	AS-1	33			○							No seepage observed during the excavation of the test pit		
	0.5																	
2																		
3		1.0			AS-2	28			○									
4																		
5		1.5			AS-3	20			○									
6																		
7		2.0																
8		2.5																
9		2.7		TILL - Light Brown Silty Sand and Gravel, Compact, Moist														
10		3.0		END OF TEST PIT	AS-4	16			○									
		3.0																
11																		
	3.5																	
12																		
13		4.0																



TEST PIT No.: TP-6

ELEVATION: 212.7 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 6 March 2020

LEGEND

☐ GS - GRAB SAMPLE
☒ - WATER LEVEL

EXCAVATION COMPANY: Balterre Contracting Limited METHOD: Track Excavator

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

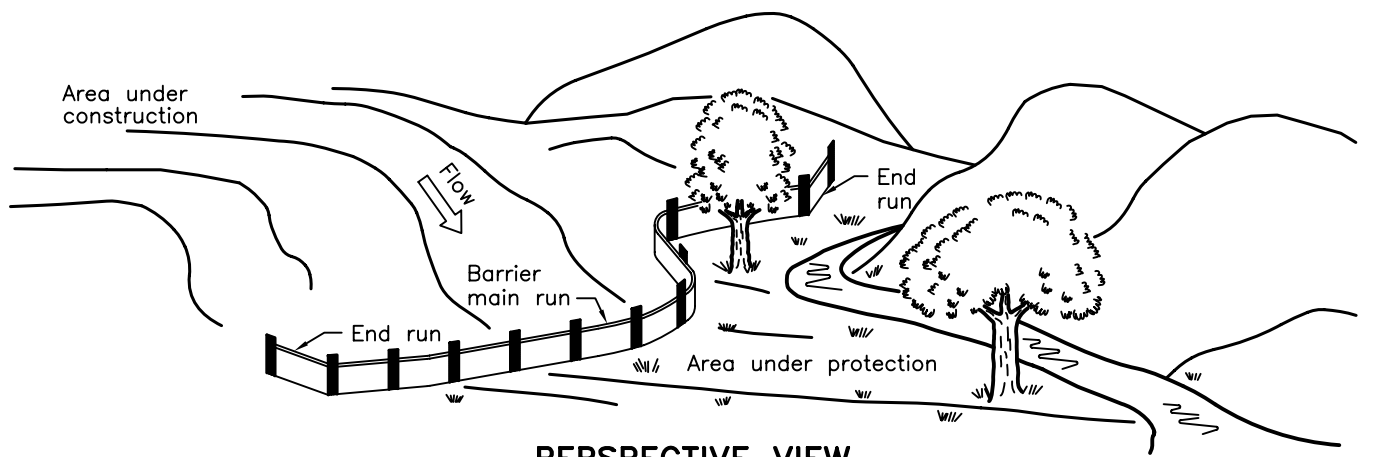
Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) w _p w _L Atterberg limits (%)											COMMENTS
ft	m						10	20	30	40	50	60	70	80	90			
		0.0		GROUND SURFACE		%												
		0.2		TOPSOIL (150 mm)														
1				SANDY SILT - Reddish Brown Sandy Silt, Loose, Moist	AS-1	18		○										No seepage observed during the excavation of the test pit
		0.5		TILL - Light Brown Silty Sand and Gravel, Compact, Moist														
2																		
					AS-2	9		○										
3																		
4																		
5																		
6																		
7																		
8					AS-3	7		○										
9																		
10					AS-4	8		○										
		3.0		END OF TEST PIT														
11																		
12																		
13																		

TEST PIT LOG GEOTECH 11209539-01-DWG-20-03-31, VARGAS TESTPIT LOGS - GPJ GEOLOGIC.GDT 12/6/20

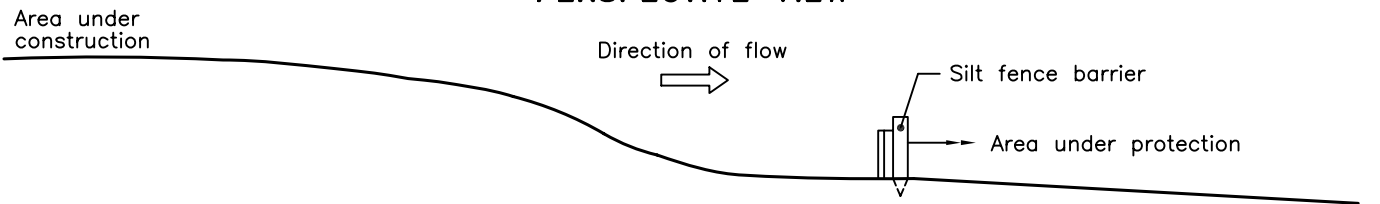
No seepage observed during the excavation of the test pit

APPENDIX “I”

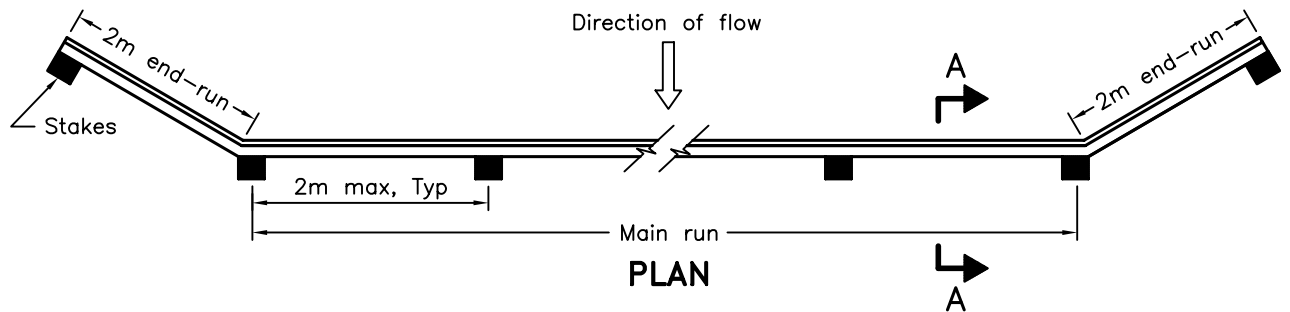
Erosion & Sediment Control Details



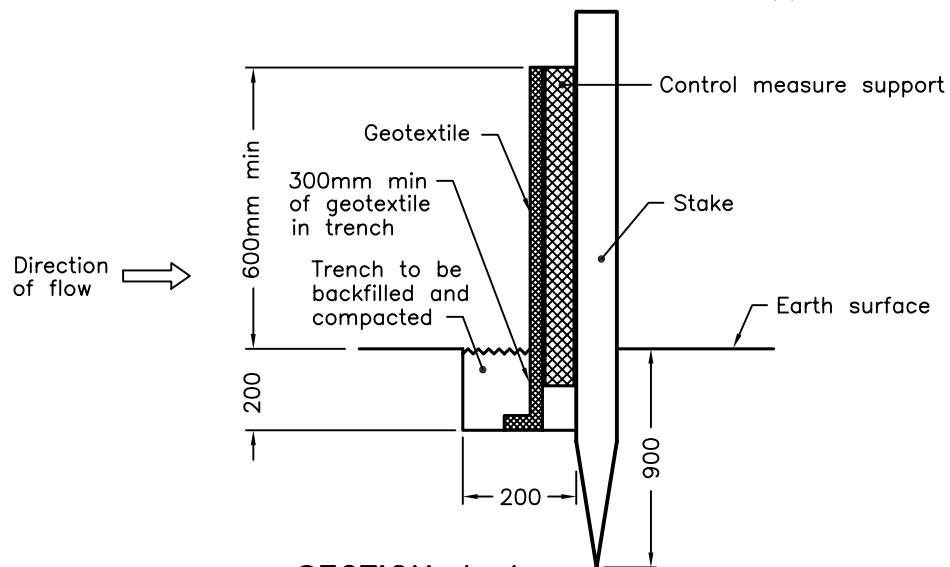
PERSPECTIVE VIEW



SECTION



PLAN



SECTION A-A

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

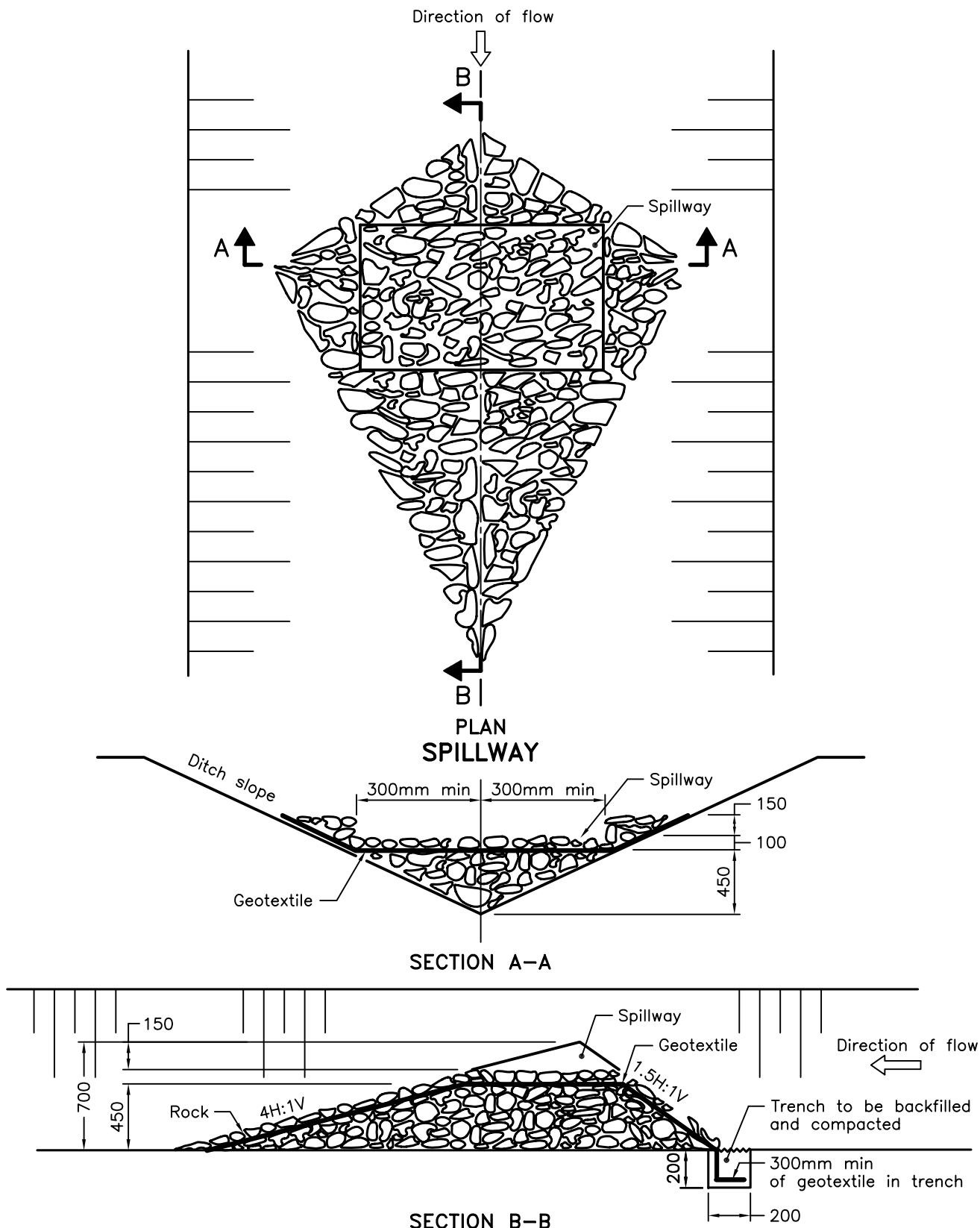
Nov 2006

Rev 1

**HEAVY-DUTY
SILT FENCE BARRIER**



OPSD 219.130



NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2006

Rev 1

ROCK FLOW CHECK DAM

V-DITCH



OPSD 219.210

APPENDIX “J”

Typical Joint Utility Trench & Street Light Detail

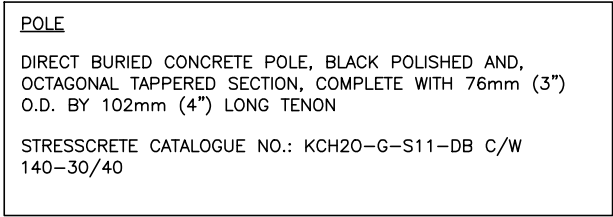
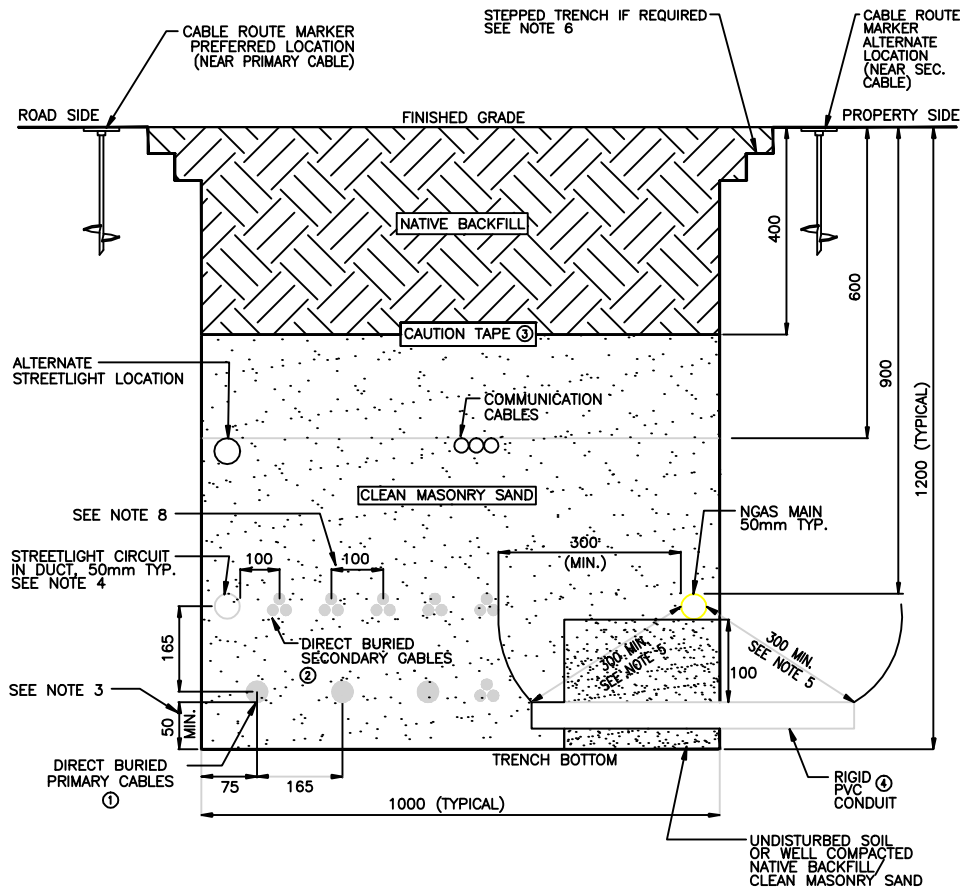


FIGURE J1



NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS STATED OTHERWISE.
2. ALL SEPARATIONS AND DEPTHS OF BURIAL ARE MINIMUM.
3. IN THE PRESENCE OF SHARP ROCK, DEBRIS OR RUBBLE, INCREASE SAND PADDING TO 100mm.
4. STREETLIGHT WIRE DUCT MAY BE INSTALLED AT A REDUCED BURIAL DEPTH, UP TO A MINIMUM DEPTH OF 600mm. SEPARATIONS TO SUPPLY CABLE BASED ON MAXIMUM STREETLIGHT DUCT DIAMETER OF 50mm.
5. MUST MAINTAIN 300mm MINIMUM FROM ALL EXPOSED SUPPLY CABLES TO GAS MAIN. WHEN CROSSING GAS MAIN AND IF 300mm OF CLEAR VERTICAL SEPARATION IS NOT ACHIEVABLE, SECONDARY CABLES SHALL BE INSTALLED IN SHORT LENGTH OF RIGID PVC CONDUIT.
6. CONSTRUCTION, STEPPING AND/OR SUPPORTING OF THE TRENCH WALL TO CONFORM TO THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT.
7. NON-REQUIRED CIRCUITS OR JOINT USE COMPONENTS MAY BE OMITTED PROVIDED THAT CLEARANCES AND SEPARATIONS ARE MAINTAINED. PRIMARY CABLES (IF PRESENT) MUST BE INSTALLED ON THE BOTTOM ROW OF SUPPLY CABLES. SECONDARY CABLE BUNDLES MAY BE SUBSTITUTED IN PLACE OF PRIMARY CABLE(S) WHEN REQUIRED.
8. INTERMITTENT CONTACT IS ALLOWABLE BETWEEN SECONDARY CABLES WHERE REQUIRED.

PART #	MASTER MATERIAL #	DESCRIPTION	QTY.
①	30010134 30008080	CABLE PRIMARY, 28kV, UG/ROUND, 2/0 AWG, AL CABLE PRIMARY, 28kV, UG/ROUND, 300 KCMIL, CU	
②	30005908 30005915	SERVICE CABLE, UG/ROUND, 3/0AWG, 3 COND, AL SERVICE CABLE, UG/ROUND, 250KCMIL, 3 COND, AL	
③	20002181	CAUTION TAPE	
④	30007542	RIGID PVC CONDUIT	

REFERENCES:

SECTION 1 - DEFINITIONS
SECTION 3C - CONSTRUCTION GUIDE
SECTION 16 - MATERIALS

02	JULY 2011	GENERAL REVISIONS	PC
Rev. No.	Issue Date	Revision	Drawn By Date
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Hydro One Networks Inc.

Drawn: P. CIARMOLI

Approved: *

Date: JULY.20.2011

JOINT TRENCH - POWER, COMMUNICATION & GAS DISTRIBUTION LINES - TYPICAL

Dwg. No. **DU-03-206.1**

Rev. **02**



NOTE:
Distances Shown On This Plan Are In Metres And Can Be Converted
To Feet By Dividing By 0.3048.
The Position of Pole Lines, Conduits, Watermain, Sewers and Other
Underground and Overground Utilities and Structures is Not Necessarily
Shown On The Contract Drawing, And Where Shown, The Accuracy Of
The Position Of Such Utilities and Structures is Not Guaranteed.
Before Starting Work, The Contractor Shall Inform Himself Of The
Exact Location Of All Such Utilities and Structures, and Shall
Assume All Liability For Damage To Them.

- LEGEND**
- SUBDIVISION BOUNDARY
 - PROPOSED ELEVATION
 - EXISTING ELEVATION
 - PROPOSED OVERLAND FLOW DIRECTION
 - PROPOSED 1.5m SIDEWALK
 - FRONT DRAINING LOTS
 - WALKOUT DRAINING LOTS
 - SPLIT DRAINING LOTS
 - LOOK OUT DRAINING LOTS
 - FRONT WALKOUT DRAINING LOTS
 - PROP. SANITARY MAINTENANCE HOLE
 - PROP. SANITARY SEWER
 - PROP. STORM SEWER
 - PROP. STORM MAINTENANCE HOLE
 - PROP. WATERMAIN
 - REGIONAL FLOOD LINE

NOTE
THIS PLAN HAS BEEN PREPARED TO DEMONSTRATE FEASIBILITY OF THE
PROPOSED DEVELOPMENT WITH RESPECT TO DRAINAGE IN CONJUNCTION WITH
THE LAND FROM APPLICATION. DETAILED DRAINAGE DESIGN WILL BE
PREPARED AT THE SUBDIVISION ENGINEERING STAGE.

No.	Revision	Date	By	App'd

CONSULTANT:
PRELIMINARY

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BROMONT HOMES INC.

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
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TEL: (905) 477-1111 FAX: (905) 477-1112 www.valdor-engineering.com

CavanMungham
COUNTY OF PETERBOROUGH

**PRELIMINARY SITE DESIGN
AND GRADING PLAN**

Submitted by:	Checked by: P.S.	Project No:
Drawn by: V.L.	Approved by: D.S.	19121
Designed by: V.L.	Date: April 19, 2021	Drawing No:
Scale: 1:750		PSG-1
		Sheet No.