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Via Email

Date: March 24th, 2025
Revised Date: April 29th, 2025
L&M Project: 1944-01

Attention: **Garry Gatzke**
Property Owner

Reference: **4225 Turner Road**
Servicing Brief .

1.0 INTRODUCTION

On behalf of Garry Gatzke, L&M Engineering is pleased to provide this Servicing Brief for the property located at 4225 Turner Road. The subject property is currently zoned RS2m: Single Residential and is occupied by 3 dwellings and a detached garage. The RS2m zone permits a maximum density of one principal dwelling and one secondary dwelling or suite. Therefore, the existing lot configuration does not conform with the zoning regulations.

The developer intends to rezone the property from RS2m to RM1: Multiple Residential to be compliant with zoning regulations. Additionally, the developer proposes adding one dwelling and secondary suite to the property to bring the total number of dwellings to five (4 principal dwellings and one secondary dwelling).

The Servicing Brief is being written to address the water, sanitary, and storm sewer infrastructure in the surrounding area.

2.0 BACKGROUND REPORTS AND DATA

L&M Engineering has reviewed the following reports in relation to subject property development:

- City of Prince George – 2017 Sanitary Sewer Services Master Plan prepared by AECOM;
- City of Prince George – 2014 Opus Dayton and Knight Water Master Plan
- City of Prince George – Development Services Department: Design Guidelines; and PG Map.

3.0 EXISTING SERVICING

Based on the lot history card for this property, the site is serviced via a 20mmø water service off the end of Turner Road. The property is serviced by two onsite septic fields and there is no onsite storm infrastructure.

4.0 SANITARY SEWER

The existing dwellings on the property are currently being serviced by onsite septic systems and have been for over 60 years. The City has indicated that the developer will need to install a municipal sanitary service to service the additional dwelling and suite on the property.

The existing sanitary infrastructure in the vicinity of the subject property consists of a 200mmø sanitary main located within a statutory right-of-way on the neighbouring property (4331 Turner Road). Only six single family lots are currently draining into the mains located within the right-of-way and the 2017 Sanitary Sewer Services Master Plan indicates that this main is less than 50% full. As a result, this main has the capacity to accommodate the sewage flows from the proposed fourth dwelling. Additionally, the existing mains have the capacity to accommodate the existing three dwellings, if the developer wishes to replumb the property and direct all flows to the main.

4.1 Fixture Units

The BC Building Code sanitary fixture units have been calculated for the existing and proposed dwelling units. Table 1 summarizes the number of fixtures and total fixture units that are currently installed in the existing three dwelling units on the property.

Table 1: Existing Sanitary Fixtures Units (3 Existing Dwellings)

Fixture Type	Number of Fixtures	Fixture Units per Fixture	Total Fixture Units
Kitchen Sink	3	1.5	4.5
Toilet	3	4	12
Shower	3	1.5	4.5
Bathroom Sink	3	1.5	4.5
Washing Machine	1	2	2
		Total Fixture Units	**27.5**

Table 2 summarizes the number of fixtures and fixture units that will be installed in the proposed fourth dwelling.

Table 2: Proposed Fourth Dwelling and Secondary Suite Sanitary Fixture Units			
Fixture Type	**Number of Fixtures**	**Fixture Units per Fixture**	**Total Fixture Units**
Kitchen Sink	1	1.5	1.5
Dishwasher	1	1.5	1.5
Toilet	3	4	12
Shower	3	1.5	4.5
Bathroom Sink	3	1.5	4.5
Washing Machine	1	2	2
		Total Fixture Units	**26**

Based on Table 1 and 2, the total sanitary fixture units for the property will be 53.5 fixture units once the fourth dwelling and secondary suite are constructed. To service all dwellings with sanitary sewer the proposed service will need to be a minimum of 100mmø and have a minimum grade of 1%.

5.0 WATER SYSTEM

Based on the lot history card for the subject property, the site is currently serviced by a 3m long 20mmø municipal water service and an unknown size and length of onsite service.

The City has indicated that the fire flows along Turner Road do not meet the recommended fire flows for single family residential or multiple family residential housing. Due to this being an existing infrastructure constraint along Turner Road, the City has waved this requirement from the rezoning.

The Average Day Demand (ADD) and Peak Hour Demand (PHD) pressures in the vicinity of the subject site are approximately 63psi and 59 psi, respectively.

5.1 Fixture Units

The BC Building Code water fixture units have been calculated for the existing and proposed dwelling units. Table 3 summarizes the number of fixtures and total fixture units that are currently installed in the existing three dwelling units on the property.

Table 3: Existing Water Fixtures Units (3 Existing Dwellings)			
Fixture Type	**Number of Fixtures**	**Fixture Units per Fixture**	**Total Fixture Units**
Kitchen Sink	3	1.4	4.2
Toilet	3	2.2	6.6
Shower	3	1.4	4.2
Bathroom Sink	3	1.4	4.2
Washing Machine	1	1.4	1.4
Hose Bibb	3	2.5	5
		Total Fixture Units	**25.6**

Table 4 summarizes the number of fixtures and fixture units that will be installed in the proposed fourth dwelling and secondary suite.

Table 4: Proposed Fourth Dwelling and Secondary Suite Fixture Units			
Fixture Type	**Number of Fixtures**	**Fixture Units per Fixture**	**Total Fixture Units**
Kitchen Sink	1	1.4	1.4
Dishwasher	1	1.4	1.4
Toilet	3	2.2	6.6
Shower	3	1.4	4.2
Bathroom Sink	3	1.4	4.2
Washing Machine	1	1.4	1.4
Hose Bibb	2	2.5	5
		Total Fixture Units	**24.2**

Based on Table 3 and 4, the total water fixture units for the property will be 49.8 fixture units once the fourth dwelling is constructed. Using the Hunter's curve this equates to a demand of 2.12 L/s. The furthest building on the property is located approximately 145m from the municipal service location. Assuming the existing onsite service size is a 1 ½"ø (40mmø) service, the expected pressure drop over the length of the service is 31 psi which would result in a PHD pressure of 28 psi at the building, which is sufficient. Therefore, a 1 ½"ø onsite service would be adequate to service all four onsite buildings. Since the onsite service size is unknown, the size of the existing service should be confirmed prior to construction of the fourth dwelling to ensure that adequate pressure can be provided. If the existing service is smaller than 1 ½"ø then a new service may be required.

6.0 STORM SEWER

The topography of the site grades slightly from northwest to south east and approximately 50% of the lot is treed. Based on our knowledge of the surrounding area, and previous geotechnical investigations on neighbouring sites, the soils in the area consist primarily of sand over top of a layer of sandy silt. The sand layer varies in depth but generally extends at least 3m deep. As a result, the majority of the site is quite permeable with the exception of the gravel driveway and building structures.

In order ensure that onsite drainage does not drain onto neighbouring properties, it is recommended that a swale be installed along the east property line to capture the drainage from the site and direct the water toward a proposed infiltration gallery in the southeast corner of the site.

Based on the anticipated onsite soils, a conservative infiltration rate of 100mm/hr was used to calculate the size of the infiltration gallery.

Utilizing HydroCAD 10.0 software, the hydrograph method was used to model a 10-year, 24-hour return period storm event and size the proposed infiltration gallery. Below is a summary of the following key HydroCAD model input parameters used for the modelling of the stormwater system:

- *Runoff Curve Numbers (CN)*
  In order to develop an accurate model, each sub-catchment area must be characterized by land use and corresponding impervious and pervious areas identified as a runoff curve number (CN). These values dictate how much of the rainfall is absorbed back into the ground vs. captured and conveyed by storm infrastructure. For this analysis the following CN values were utilized:

Roofs	98
Gravel Driveway	85
Landscaped Areas	61
Trees	55

- *Times of Concentration* - The individual inlet times of concentrations for the property were calculated using a combination of sheet flow and shallowed concentrated flow.

- *Rainfall Intensity* - Rainfall intensity duration frequency information for the 10-year return periods was based on the CoPG Draft Design Guidelines and the Prince George Airport's IDF curves.

The 10-year design storm flow generated by the developed site is 9.2 L/s. To sufficiently service the property during a 10-year storm event the infiltration gallery requires approximately 10.2 m^3 of storage. Using a void ratio of 30% results in approximately 34 m^3 of drain rock.

The full HydroCad model results are enclosed.

7.0 SUMMARY

The existing municipal infrastructure has the capacity to accommodate the proposed development.

8.0 CLOSURE

This design brief has been prepared for the exclusive use of Garry Gatzke and the City of Prince George. Any use that a third party makes of this report or any reliance on or decisions to be made based on it are the responsibility of such third parties. L&M Engineering Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this study. The information and data contained within this document represent L&M Engineering Limited's professional judgment in accordance with the knowledge and information available to L&M Engineering Limited at the time of the report preparation. No other warranty, expressed or implied, is made.

Yours very truly,
L&M ENGINEERING LIMITED

Prepared by:

PERMIT TO PRACTICE
NO 1002375
2025-04-29

Tanner Fjellstrom, P.Eng
Associate

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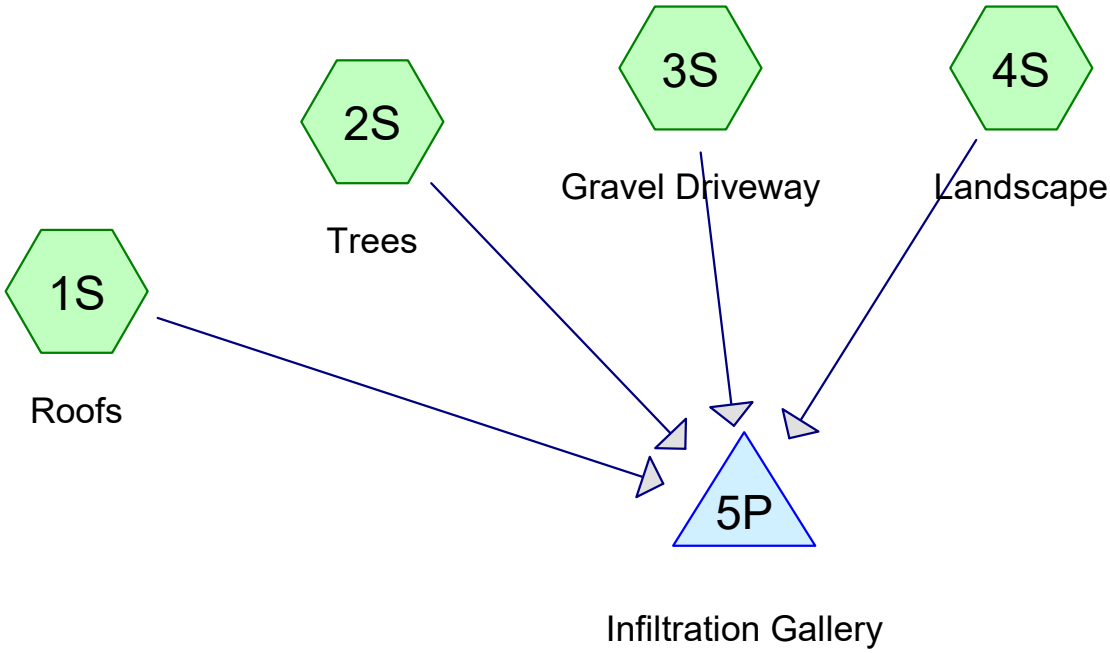


Subcat Reach Pond Link

Routing Diagram for Infiltration Gallery
Prepared by Tanner Fjellstrom, Printed 2025-03-24

Area Listing (all nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
0.4300	61	>75% Grass cover, Good, HSG B (4S)
0.0600	85	Gravel roads, HSG B (3S)
0.0500	98	Paved parking, HSG B (1S)
0.5000	55	Woods, Good, HSG B (2S)
1.0400	**61**	**TOTAL AREA**

Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
1.0400	HSG B	1S, 2S, 3S, 4S
0.0000	HSG C	
0.0000	HSG D	
0.0000	Other	
1.0400		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatchment Numbers
0.0000	0.4300	0.0000	0.0000	0.0000	0.4300	>75% Grass cover, Good	4S
0.0000	0.0600	0.0000	0.0000	0.0000	0.0600	Gravel roads	3S
0.0000	0.0500	0.0000	0.0000	0.0000	0.0500	Paved parking	1S
0.0000	0.5000	0.0000	0.0000	0.0000	0.5000	Woods, Good	2S
0.0000	**1.0400**	**0.0000**	**0.0000**	**0.0000**	**1.0400**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Roofs Runoff Area=500.0 m² 100.00% Impervious Runoff Depth=38 mm
Flow Length=145.0 m Tc=14.0 min CN=98 Runoff=0.0065 m³/s 0.019 Ml

Subcatchment 2S: Trees Runoff Area=5,000.0 m² 0.00% Impervious Runoff Depth=0 mm
Flow Length=100.0 m Slope=0.0200 m/m Tc=161.9 min CN=55 Runoff=0.0000 m³/s 0.000 Ml

Subcatchment 3S: Gravel Driveway Runoff Area=600.0 m² 0.00% Impervious Runoff Depth=15 mm
Flow Length=140.0 m Tc=5.5 min CN=85 Runoff=0.0032 m³/s 0.009 Ml

Subcatchment 4S: Landscape Runoff Area=4,300.0 m² 0.00% Impervious Runoff Depth=1 mm
Flow Length=150.0 m Tc=44.2 min CN=61 Runoff=0.0001 m³/s 0.003 Ml

Pond 5P: Infiltration Gallery Peak Elev=101.403 m Storage=10.2 m³ Inflow=0.0092 m³/s 0.032 Ml
Outflow=0.0014 m³/s 0.032 Ml

Total Runoff Area = 1.0400 ha Runoff Volume = 0.032 Ml Average Runoff Depth = 3 mm
95.19% Pervious = 0.9900 ha 4.81% Impervious = 0.0500 ha

Summary for Subcatchment 1S: Roofs

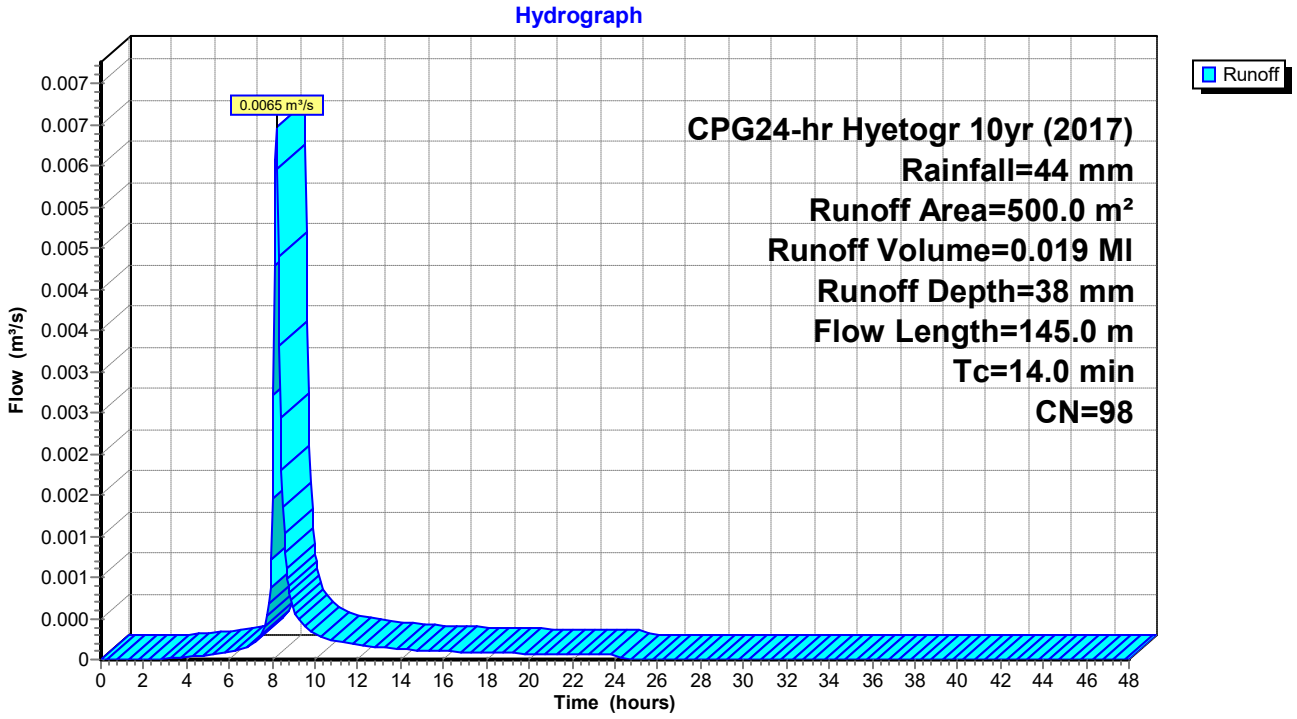
Runoff = 0.0065 m³/s @ 8.20 hrs, Volume= 0.019 Ml, Depth= 38 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm

Area (m²)	CN	Description
500.0	98	Paved parking, HSG B
500.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
9.3	15.0	0.0200	0.03		**Sheet Flow,** Grass: Short n= 0.150 P2= 29 mm
4.7	130.0	0.0100	0.46		**Shallow Concentrated Flow,** Grassed Waterway Kv= 4.57 m/s
14.0	145.0	Total			

Subcatchment 1S: Roofs



Summary for Subcatchment 2S: Trees

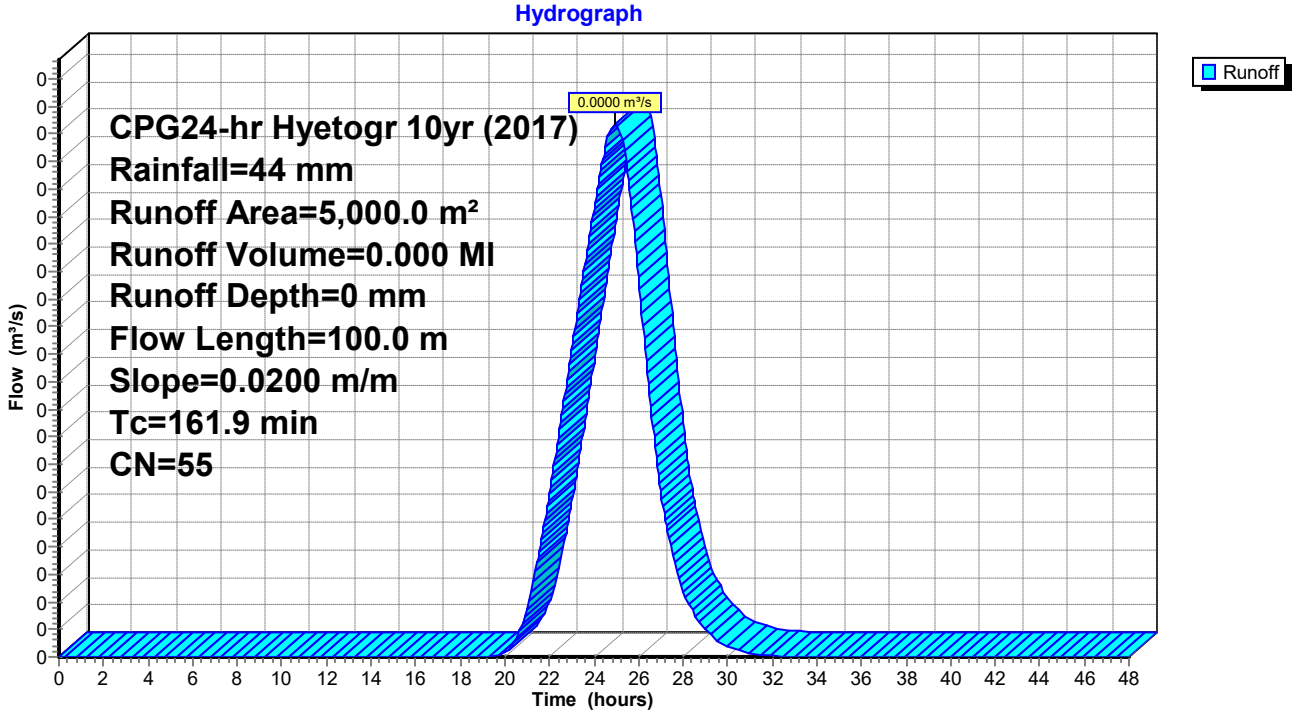
Runoff = 0.0000 m³/s @ 24.99 hrs, Volume= 0.000 Ml, Depth= 0 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm

Area (m²)	CN	Description
5,000.0	55	Woods, Good, HSG B
5,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
161.9	100.0	0.0200	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 29 mm

Subcatchment 2S: Trees



Summary for Subcatchment 3S: Gravel Driveway

[49] Hint: Tc<2dt may require smaller dt

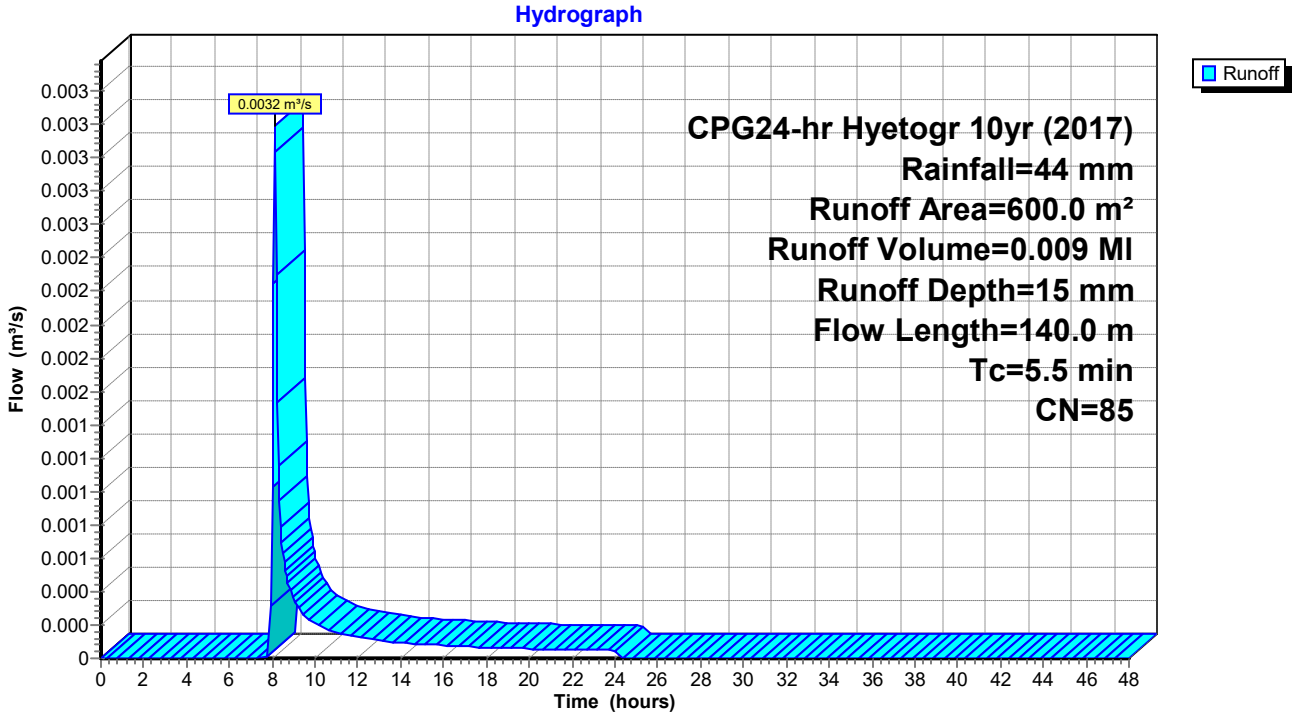
Runoff = 0.0032 m³/s @ 8.12 hrs, Volume= 0.009 Ml, Depth= 15 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm

Area (m²)	CN	Description
600.0	85	Gravel roads, HSG B
600.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
0.8	10.0	0.0200	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 29 mm
4.7	130.0	0.0100	0.46		**Shallow Concentrated Flow,** Grassed Waterway Kv= 4.57 m/s
5.5	140.0	Total			

Subcatchment 3S: Gravel Driveway



Summary for Subcatchment 4S: Landscape

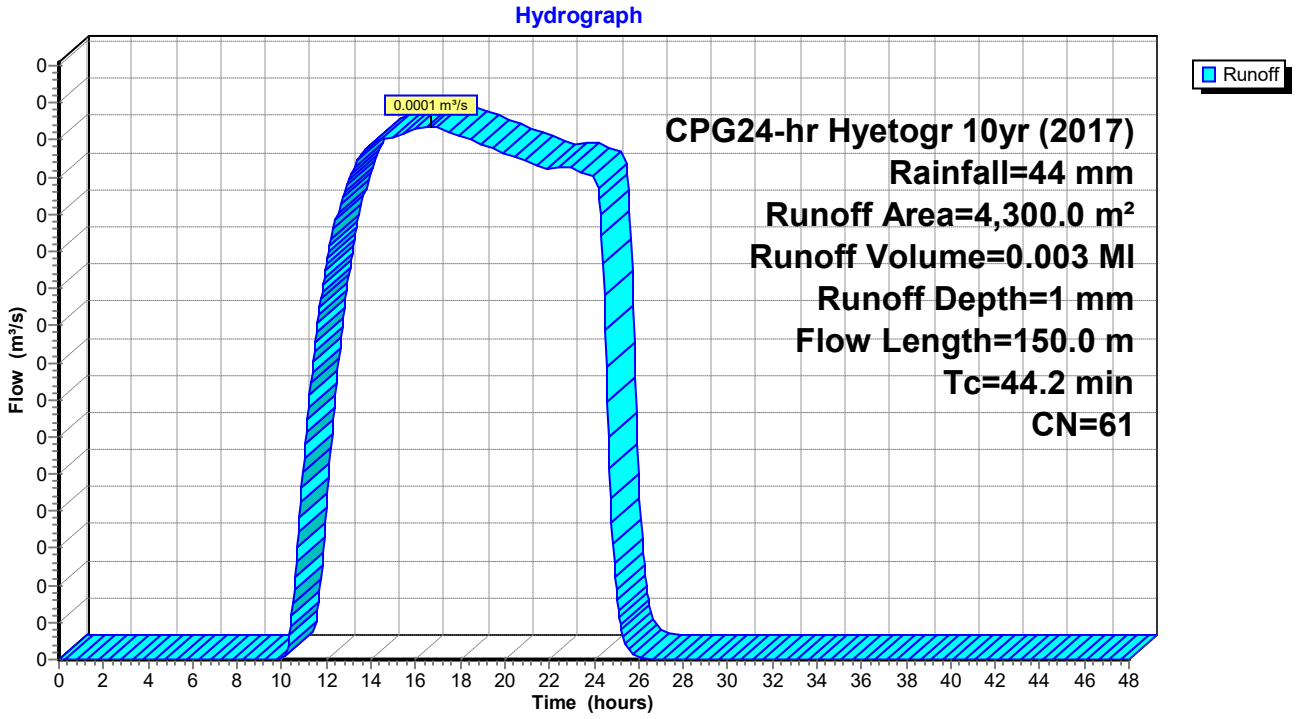
Runoff = 0.0001 m³/s @ 16.65 hrs, Volume= 0.003 Ml, Depth= 1 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm

Area (m²)	CN	Description
4,300.0	61	>75% Grass cover, Good, HSG B
4,300.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
42.4	100.0	0.0200	0.04		**Sheet Flow,** Grass: Short n= 0.150 P2= 29 mm
1.8	50.0	0.0100	0.46		**Shallow Concentrated Flow,** Grassed Waterway Kv= 4.57 m/s
44.2	150.0	Total			

Subcatchment 4S: Landscape



Summary for Pond 5P: Infiltration Gallery

Inflow Area = 1.0400 ha, 4.81% Impervious, Inflow Depth = 3 mm
Inflow = 0.0092 m³/s @ 8.16 hrs, Volume= 0.032 Ml
Outflow = 0.0014 m³/s @ 8.71 hrs, Volume= 0.032 Ml, Atten= 84%, Lag= 32.7 min
Discarded = 0.0014 m³/s @ 8.71 hrs, Volume= 0.032 Ml

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 101.403 m @ 8.71 hrs Surf.Area= 51.7 m² Storage= 10.2 m³

Plug-Flow detention time= 73.1 min calculated for 0.032 Ml (100% of inflow)
Center-of-Mass det. time= 73.0 min (767.2 - 694.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	10.6 m³	**2.50 mD x 1.43 mH Vertical Cone/Cylinder Z=2.0** 35.3 m³ Overall x 30.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.000 m	**100.00 mm/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.0014 m³/s @ 8.71 hrs HW=101.403 m (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0014 m³/s)

Pond 5P: Infiltration Gallery