

Drainage Diagram for Fraser's Gully
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Fraser's Gully

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Area Listing (all nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
189.6756	43	Woods/grass comb., Fair, HSG A (3S)
678.4000	45	Woods, Poor, HSG A (2S)
213.8767	69	Pasture/grassland/range, Fair, HSG B (2S)
27.6800	74	>75% Grass cover, Good, HSG C (5S)
499.0457	75	flat, slightly suburban clay loam (2S)
221.2882	77	Brush, Fair, HSG D (3S)
24.2403	79	Pasture/grassland/range, Fair, HSG C (6S)
214.1170	84	Pasture/grassland/range, Fair, HSG D (1S)
475.2816	85	1/8 acre lots, 65% imp, HSG B (2S)
189.6756	85	Row crops, SR + CR, Good, HSG D (3S)
31.6162	86	1/3 acre lots, 30% imp, HSG D (3S)
175.1867	87	1/4 acre lots, 38% imp, HSG D (1S)
26.3052	89	Pasture/grassland/range, Poor, HSG D (8S)
52.3700	90	1/8 acre lots, 65% imp, HSG C (6S)
107.5102	91	Urban industrial, 72% imp, HSG C (6S)
9.7000	99	(8S)
3,135.9690		TOTAL AREA

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Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
868.0756	HSG A	2S, 3S
689.1583	HSG B	2S
211.8005	HSG C	5S, 6S
858.1889	HSG D	1S, 3S, 8S
508.7457	Other	2S, 8S
3,135.9690		TOTAL AREA

Fraser's Gully

Type III 24-hr 25 year - OH Rainfall=252 mm

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Time span=8.00-36.00 hrs, dt=0.05 hrs, 561 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Stoney Gully Runoff Area=389.3037 ha 17.10% Impervious Runoff Depth>202 mm
Tc=54.0 min CN=85 Runoff=103.8755 m³/s 784.526 MI

Subcatchment 2S: Top of Fraser's Runoff Area=1,866.6040 ha 16.55% Impervious Runoff Depth=143 mm
Tc=157.0 min CN=66 Runoff=178.6968 m³/s 2,668.943 MI

Subcatchment 3S: Church Pen Gully Runoff Area=632.2556 ha 1.50% Impervious Runoff Depth>156 mm
Tc=119.0 min CN=70 Runoff=80.6170 m³/s 988.281 MI

Subcatchment 5S: New Harbour II (Runoff Area=27.6800 ha 0.00% Impervious Runoff Depth>169 mm
Tc=15.0 min CN=74 Runoff=11.3392 m³/s 46.686 MI

Subcatchment 6S: New Harbour - Runoff Area=184.1205 ha 60.53% Impervious Runoff Depth>212 mm
Flow Length=300.0 m Tc=55.1 min CN=89 Runoff=50.5582 m³/s 389.787 MI

Subcatchment 8S: Floodplain North of Runoff Area=36.0052 ha 26.94% Impervious Runoff Depth>216 mm
Tc=15.0 min CN=92 Runoff=18.2363 m³/s 77.704 MI

Reach 4R: Confluence north of Avg. Depth=4.40 m Max Vel=4.16 m/s Inflow=160.3236 m³/s 2,799.076 MI
n=0.035 L=516.00 m S=0.0119 m/m Capacity=179.8534 m³/s Outflow=160.1544 m³/s 2,798.869 MI

Reach 5R: Existing channel Avg. Depth=1.46 m Max Vel=3.27 m/s Inflow=174.0053 m³/s 3,583.395 MI
n=0.035 L=150.00 m S=0.0100 m/m Capacity=306.1457 m³/s Outflow=173.9761 m³/s 3,583.016 MI

Reach 17R: existing channel Avg. Depth=5.78 m Max Vel=4.00 m/s Inflow=221.2827 m³/s 4,617.983 MI
n=0.035 L=50.00 m S=0.0100 m/m Capacity=44.4671 m³/s Outflow=221.2859 m³/s 4,617.946 MI

Pond 6P: micro dam area Peak Elev=11.996 m Storage=829.815 MI Inflow=189.0927 m³/s 3,058.731 MI
Outflow=159.2572 m³/s 2,721.371 MI

Total Runoff Area = 3,135.9690 ha Runoff Volume = 4,955.928 MI Average Runoff Depth = 158 mm
83.86% Pervious = 2,629.8323 ha 16.14% Impervious = 506.1367 ha

Fraser's Gully

Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Subcatchment 1S: Stoney Gully

Runoff = 103.8755 m³/s @ 12.71 hrs, Volume= 784.526 MI, Depth>202 mm

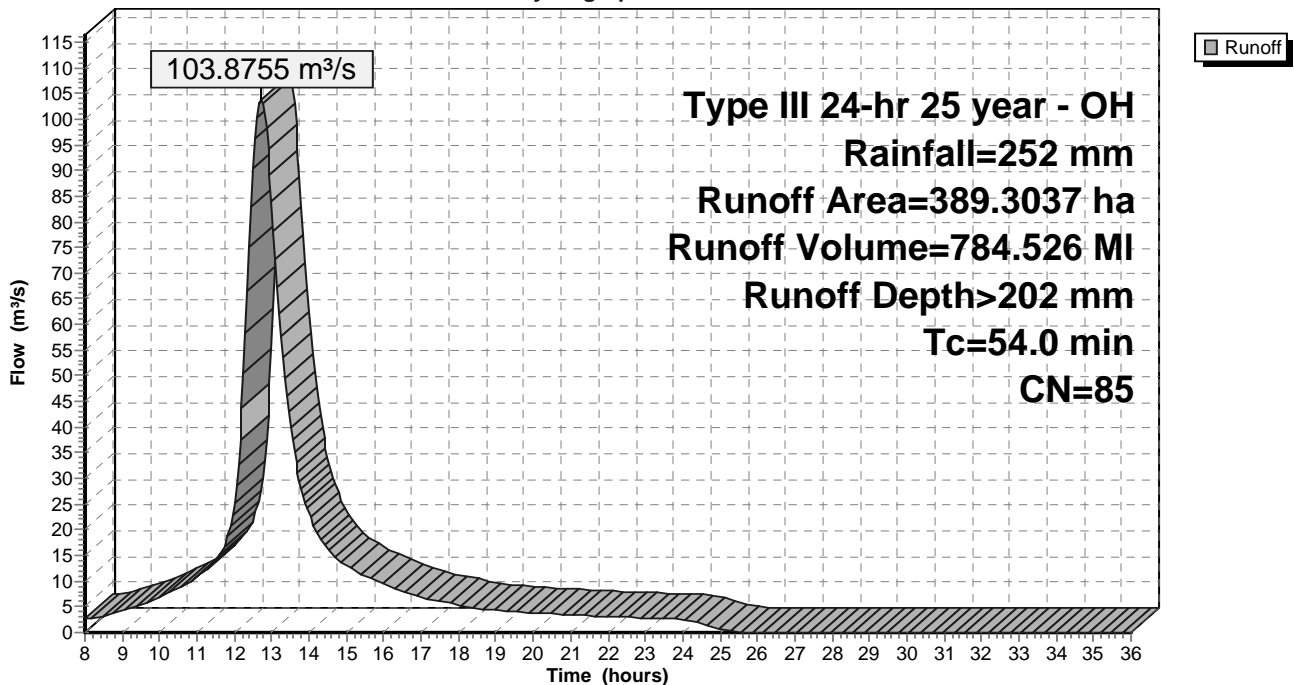
Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
214.1170	84	Pasture/grassland/range, Fair, HSG D
175.1867	87	1/4 acre lots, 38% imp, HSG D
389.3037	85	Weighted Average
322.7328		82.90% Pervious Area
66.5709		17.10% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
54.0					Direct Entry,

Subcatchment 1S: Stoney Gully

Hydrograph



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Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Subcatchment 2S: Top of Fraser's Gully

Runoff = 178.6968 m³/s @ 14.12 hrs, Volume= 2,668.943 MI, Depth=143 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs

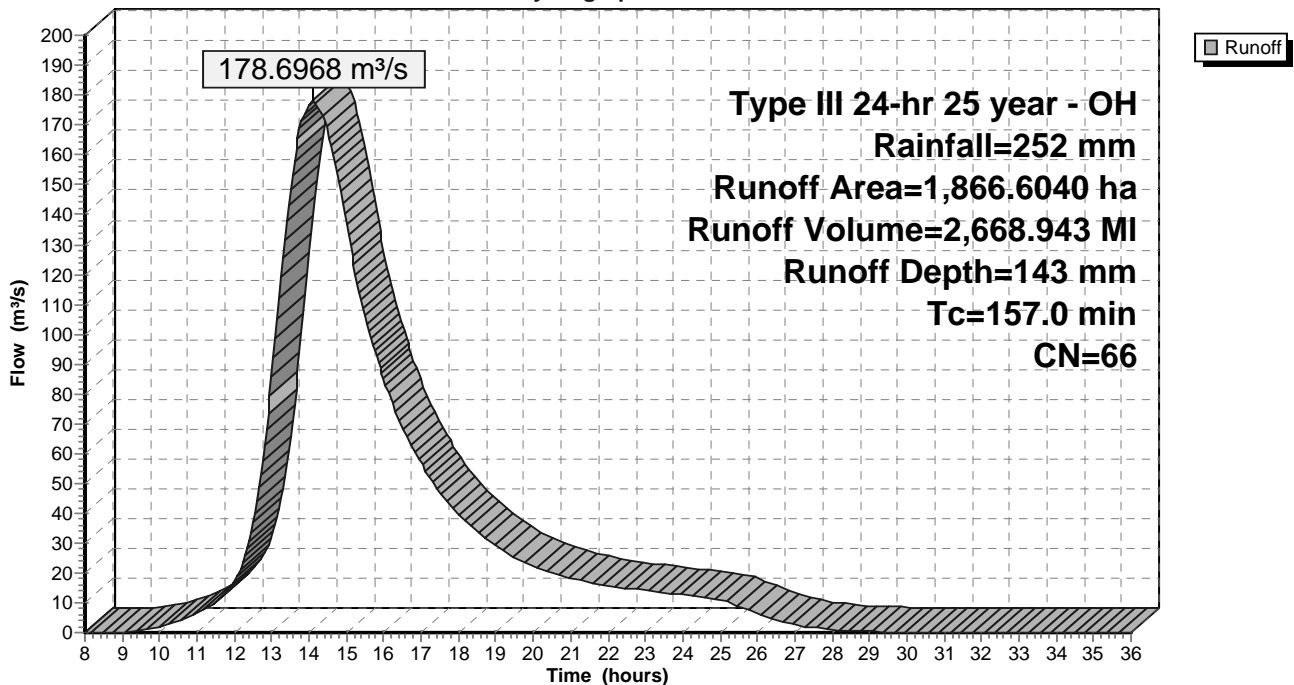
Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
678.4000	45	Woods, Poor, HSG A
213.8767	69	Pasture/grassland/range, Fair, HSG B
475.2816	85	1/8 acre lots, 65% imp, HSG B
* 499.0457	75	flat, slightly suburban clay loam
1,866.6040	66	Weighted Average
1,557.6710		83.45% Pervious Area
308.9330		16.55% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
157.0					Direct Entry, Ja II with CN= 82

Subcatchment 2S: Top of Fraser's Gully

Hydrograph



Fraser's Gully

Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Subcatchment 3S: Church Pen Gully

Runoff = 80.6170 m³/s @ 13.60 hrs, Volume= 988.281 MI, Depth>156 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs

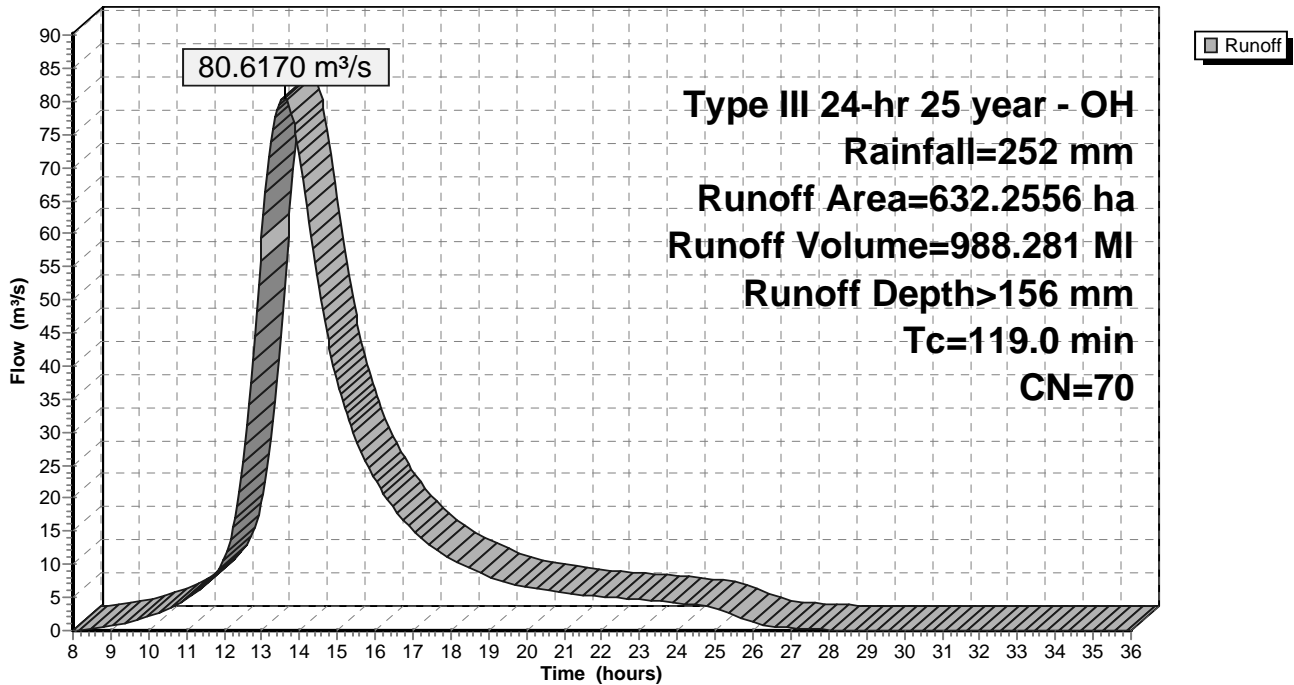
Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
189.6756	85	Row crops, SR + CR, Good, HSG D
189.6756	43	Woods/grass comb., Fair, HSG A
221.2882	77	Brush, Fair, HSG D
31.6162	86	1/3 acre lots, 30% imp, HSG D
632.2556	70	Weighted Average
622.7707		98.50% Pervious Area
9.4849		1.50% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
119.0					Direct Entry,

Subcatchment 3S: Church Pen Gully

Hydrograph



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Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Subcatchment 5S: New Harbour II (East)

Runoff = 11.3392 m³/s @ 12.21 hrs, Volume= 46.686 MI, Depth>169 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs

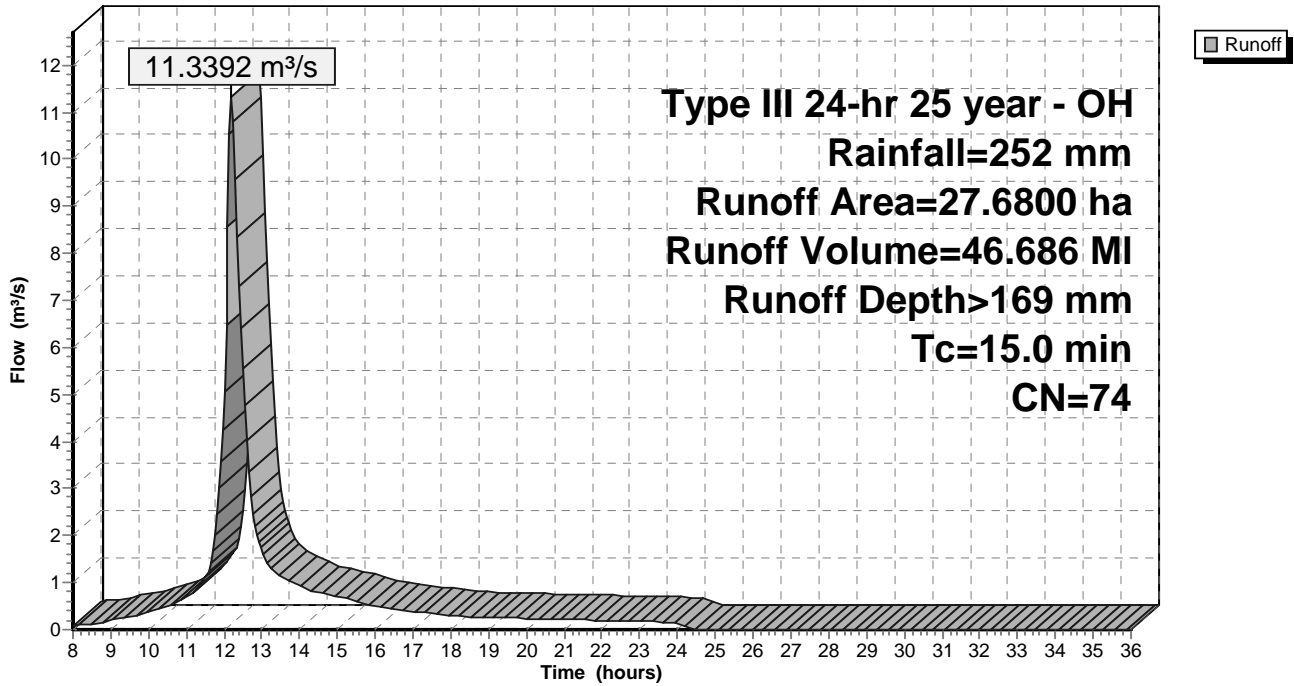
Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
27.6800	74	>75% Grass cover, Good, HSG C
27.6800		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry, 1
10.0	0.0	Total, Increased to minimum Tc = 15.0 min			

Subcatchment 5S: New Harbour II (East)

Hydrograph



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Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Subcatchment 6S: New Harbour - Fraser's Bottom

Runoff = 50.5582 m³/s @ 12.71 hrs, Volume= 389.787 MI, Depth>212 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs

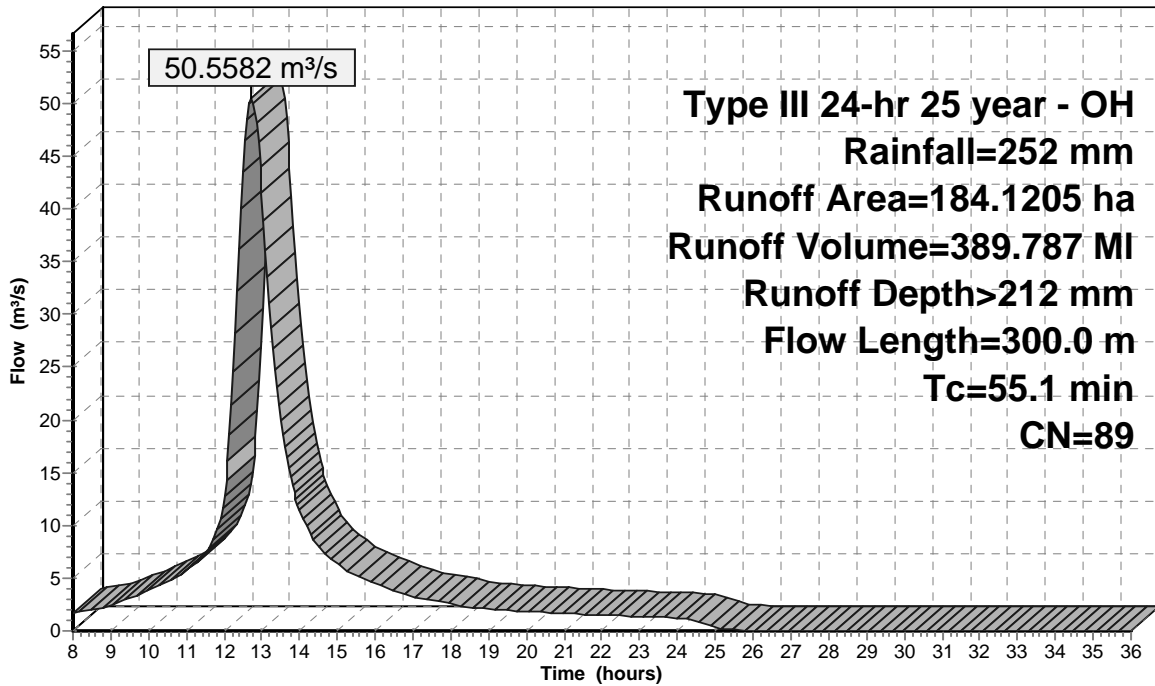
Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
52.3700	90	1/8 acre lots, 65% imp, HSG C
107.5102	91	Urban industrial, 72% imp, HSG C
24.2403	79	Pasture/grassland/range, Fair, HSG C
184.1205	89	Weighted Average
72.6727		39.47% Pervious Area
111.4478		60.53% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
54.0					Direct Entry,
1.1	300.0		4.43		Lake or Reservoir,
					Mean Depth= 2.00 m
55.1	300.0	Total			

Subcatchment 6S: New Harbour - Fraser's Bottom

Hydrograph



Runoff

Type III 24-hr 25 year - OH
 Rainfall=252 mm
 Runoff Area=184.1205 ha
 Runoff Volume=389.787 MI
 Runoff Depth>212 mm
 Flow Length=300.0 m
 Tc=55.1 min
 CN=89

Summary for Subcatchment 8S: Floodplain North of Bampton

Runoff = 18.2363 m³/s @ 12.20 hrs, Volume= 77.704 MI, Depth>216 mm

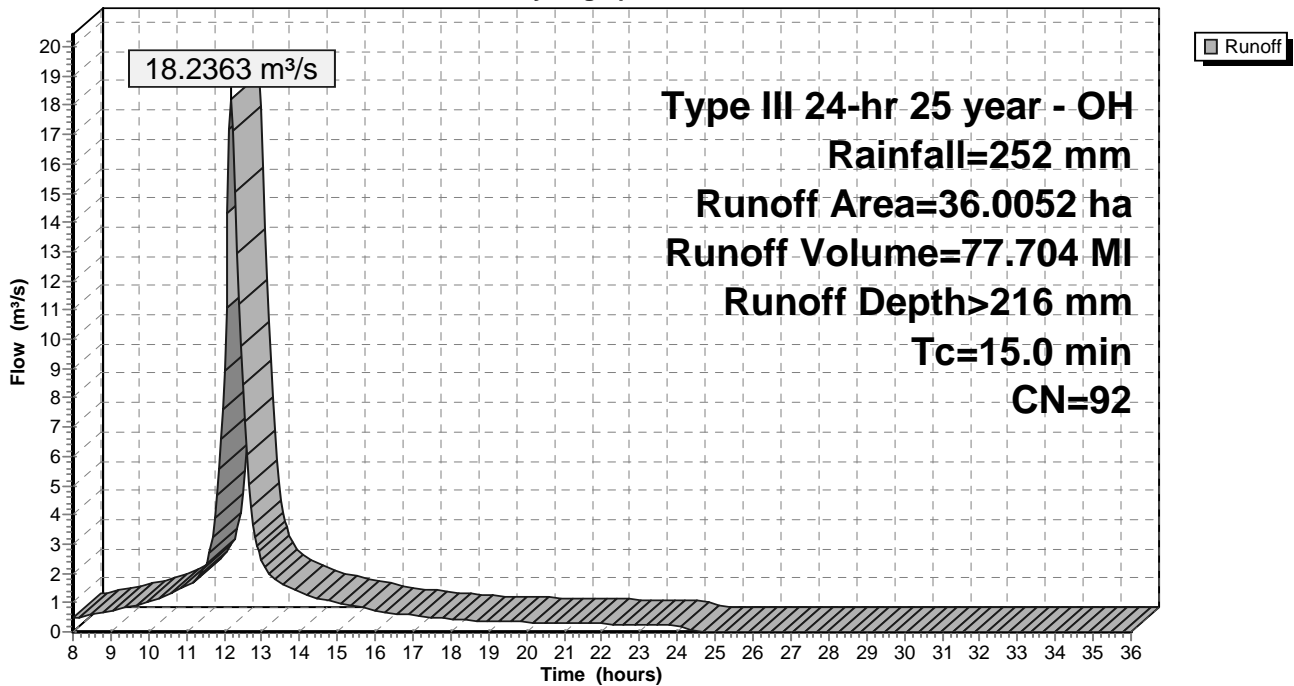
Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 year - OH Rainfall=252 mm

Area (ha)	CN	Description
26.3052	89	Pasture/grassland/range, Poor, HSG D
* 4.0000	99	
* 5.7000	99	
36.0052	92	Weighted Average
26.3052		73.06% Pervious Area
9.7000		26.94% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
14.0					Direct Entry,
14.0	0.0				Total, Increased to minimum Tc = 15.0 min

Subcatchment 8S: Floodplain North of Bampton

Hydrograph



Fraser's Gully

Type III 24-hr 25 year - OH Rainfall=252 mm

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Summary for Reach 4R: Confluence north of STP

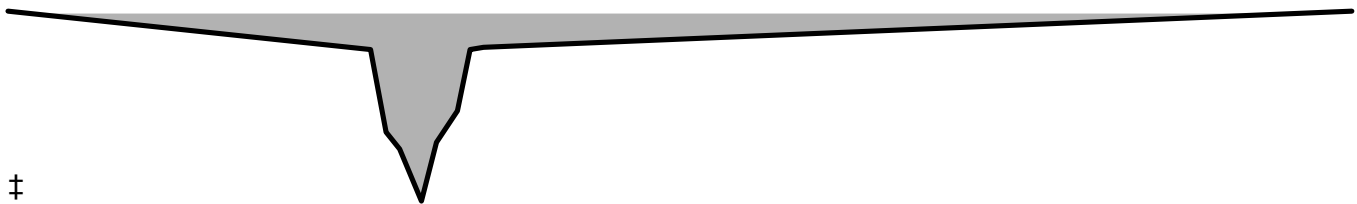
- [82] Warning: Early inflow requires earlier time span
- [85] Warning: Oscillations may require Finer Routing>1
- [81] Warning: Exceeded Pond 6P by 1.093 m @ 17.70 hrs

Inflow Area = 2,086.7297 ha, 20.61% Impervious, Inflow Depth > 134 mm for 25 year - OH event
 Inflow = 160.3236 m³/s @ 14.78 hrs, Volume= 2,799.076 MI
 Outflow = 160.1544 m³/s @ 14.87 hrs, Volume= 2,798.869 MI, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.16 m/s, Min. Travel Time= 2.1 min
 Avg. Velocity = 2.04 m/s, Avg. Travel Time= 4.2 min

Peak Storage= 37,791.9 m³ @ 14.83 hrs, Average Depth at Peak Storage= 4.40 m
 Bank-Full Depth= 4.460 m, Capacity at Bank-Full= 179.8534 m³/s

Custom cross-section, Length= 516.00 m Slope= 0.0119 m/m (106 Elevation Intervals)
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 8.440 m, Outlet Invert= 2.290 m

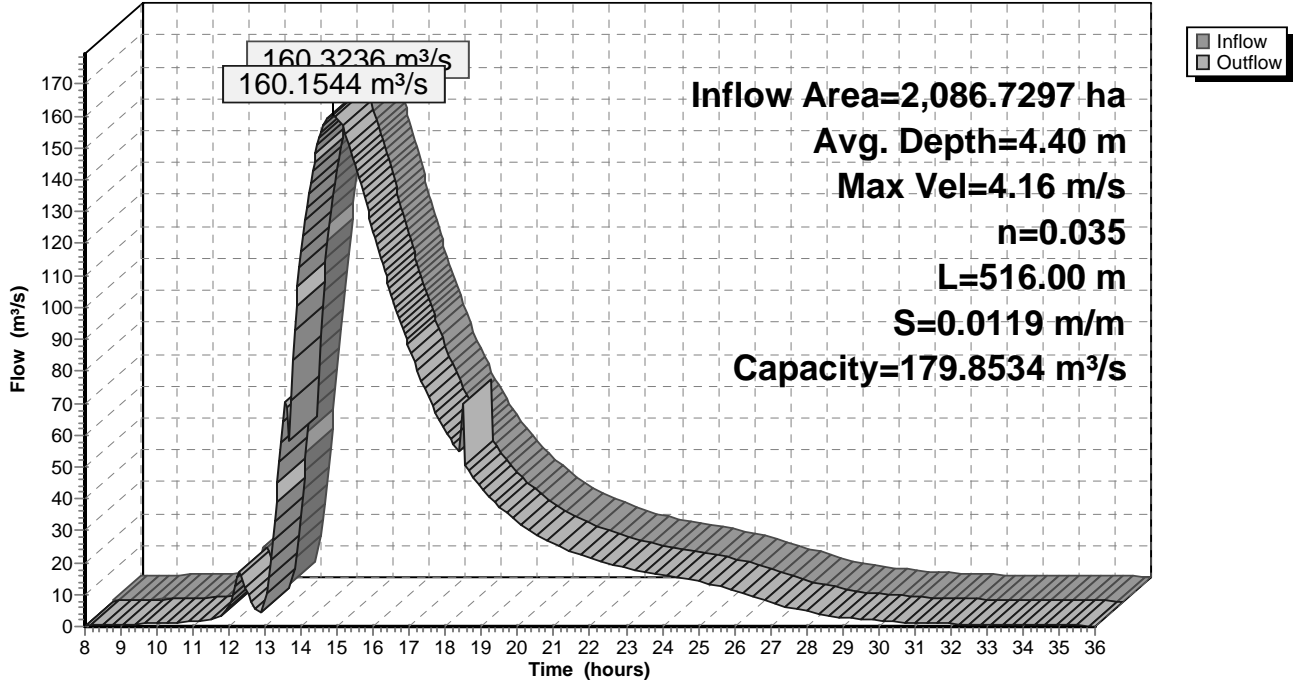


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
-40.000	6.750	0.00
-4.920	5.850	0.90
-3.420	3.910	2.84
-2.110	3.510	3.24
0.000	2.290	4.46
1.450	3.670	3.08
3.480	4.410	2.34
4.700	5.850	0.90
6.000	5.900	0.85
90.000	6.750	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.0	0.0000
1.22	2.07	4.21	1,067.6	4.0212
1.38	2.67	4.99	1,376.2	5.4814
1.62	3.82	6.51	1,971.4	8.3541
2.12	7.02	8.60	3,624.6	19.1429
3.56	19.20	12.31	9,905.7	80.5296
3.61	19.76	15.56	10,195.8	72.2771
4.46	80.48	132.71	41,527.0	179.8534

Reach 4R: Confluence north of STP

Hydrograph



Summary for Reach 5R: Existing channel east of Boundary

[82] Warning: Early inflow requires earlier time span

[61] Hint: Exceeded Reach 4R outlet invert by 1.455 m @ 14.80 hrs

Inflow Area = 2,476.0334 ha, 20.06% Impervious, Inflow Depth > 145 mm for 25 year - OH event
 Inflow = 174.0053 m³/s @ 14.80 hrs, Volume= 3,583.395 MI
 Outflow = 173.9761 m³/s @ 14.83 hrs, Volume= 3,583.016 MI, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.27 m/s, Min. Travel Time= 0.8 min
 Avg. Velocity = 1.46 m/s, Avg. Travel Time= 1.7 min

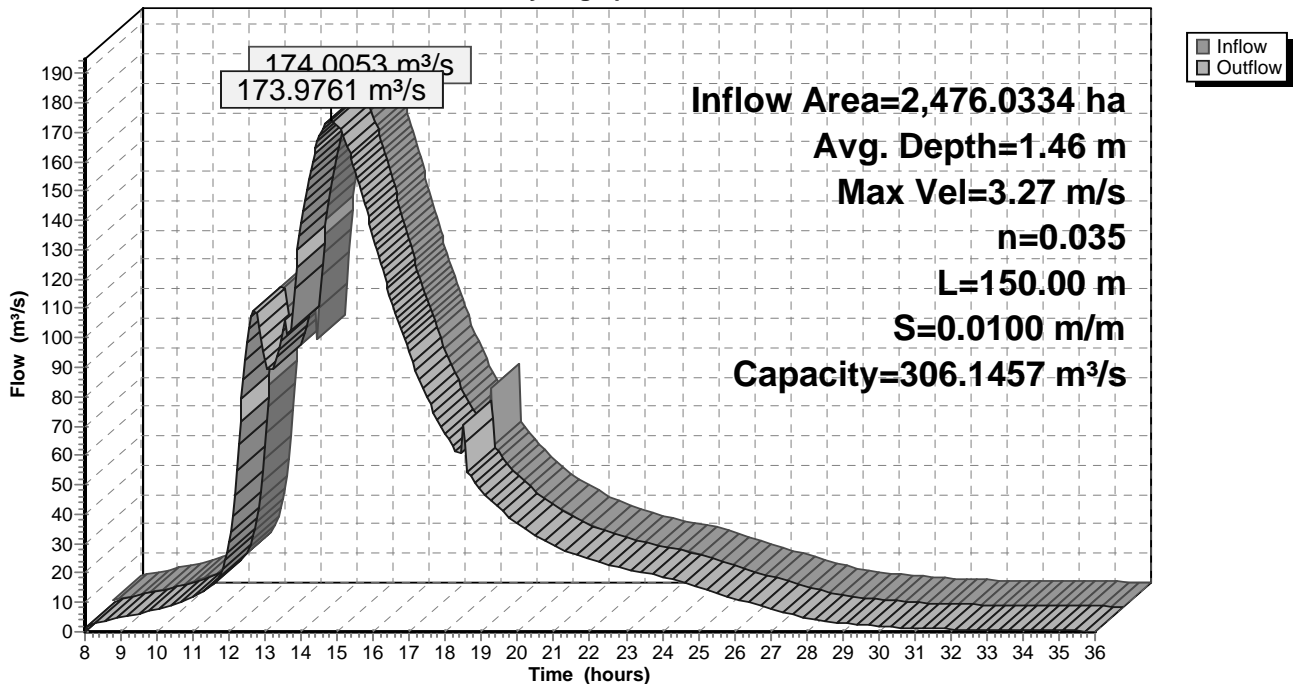
Peak Storage= 7,978.8 m³ @ 14.81 hrs, Average Depth at Peak Storage= 1.46 m
 Bank-Full Depth= 2.000 m, Capacity at Bank-Full= 306.1457 m³/s

30.00 m x 2.00 m deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 4.0 5.0 m/m Top Width= 48.00 m
 Length= 150.00 m Slope= 0.0100 m/m
 Inlet Invert= 2.290 m, Outlet Invert= 0.790 m



Reach 5R: Existing channel east of Boundary

Hydrograph



Summary for Reach 17R: existing channel

- [91] Warning: Storage range exceeded by 3.775 m
- [55] Hint: Peak inflow is 498% of Manning's capacity
- [88] Warning: Qout>Qin may require Finer Routing>1
- [63] Warning: Exceeded Reach 5R INLET depth by 4.363 m @ 14.30 hrs

Inflow Area = 3,135.9690 ha, 16.14% Impervious, Inflow Depth > 147 mm for 25 year - OH event
 Inflow = 221.2827 m³/s @ 14.47 hrs, Volume= 4,617.983 MI
 Outflow = 221.2859 m³/s @ 14.48 hrs, Volume= 4,617.946 MI, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.00 m/s, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.41 m/s, Avg. Travel Time= 0.3 min

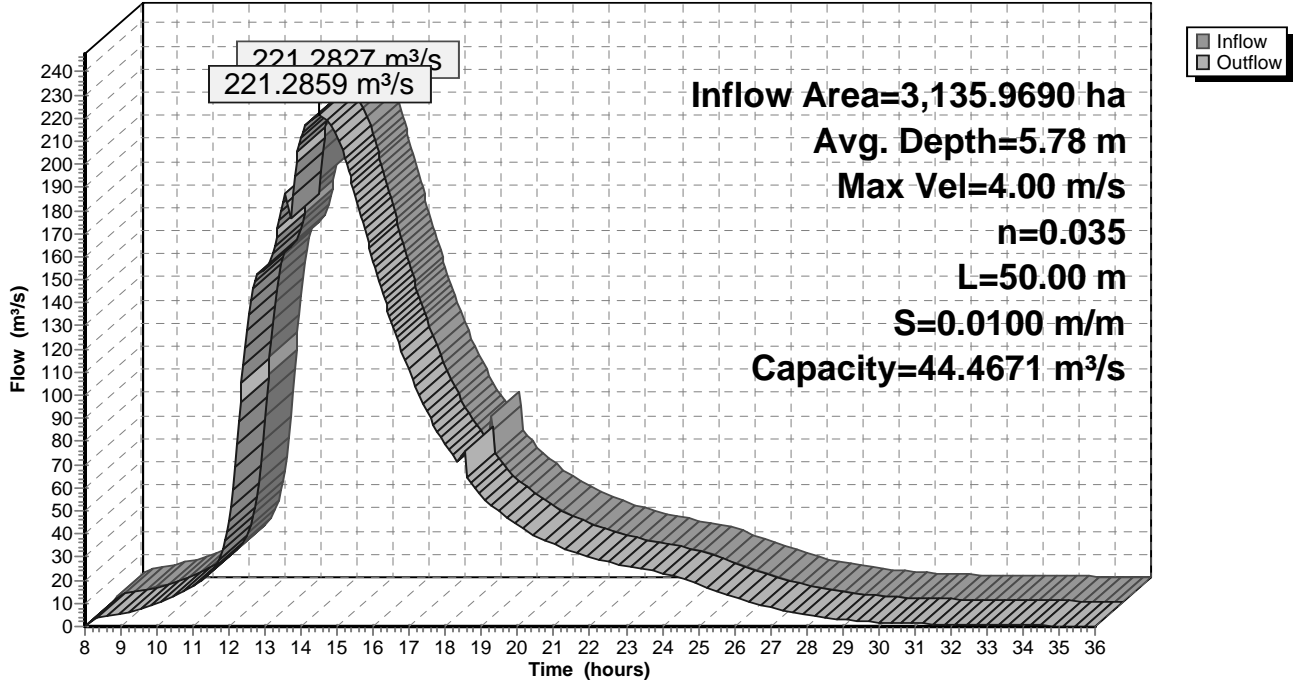
Peak Storage= 2,768.9 m³ @ 14.48 hrs, Average Depth at Peak Storage= 5.78 m
 Bank-Full Depth= 2.000 m, Capacity at Bank-Full= 44.4671 m³/s

3.00 m x 2.00 m deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 2.0 m/m Top Width= 11.00 m
 Length= 50.00 m Slope= 0.0100 m/m
 Inlet Invert= 2.290 m, Outlet Invert= 1.790 m



Reach 17R: existing channel

Hydrograph



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Summary for Pond 6P: micro dam area

[82] Warning: Early inflow requires earlier time span

[95] Warning: Outlet Device #1 rise exceeded

Inflow Area = 2,050.7245 ha, 20.50% Impervious, Inflow Depth > 149 mm for 25 year - OH event
 Inflow = 189.0927 m³/s @ 14.09 hrs, Volume= 3,058.731 MI
 Outflow = 159.2572 m³/s @ 14.78 hrs, Volume= 2,721.371 MI, Atten= 16%, Lag= 41.2 min
 Primary = 159.2572 m³/s @ 14.78 hrs, Volume= 2,721.371 MI

Routing by Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.05 hrs / 6
 Starting Elev= 4.000 m Surf.Area= 0.0000 ha Storage= 0.000 MI
 Peak Elev= 11.996 m @ 14.78 hrs Surf.Area= 39.9678 ha Storage= 829.815 MI

Plug-Flow detention time= 144.8 min calculated for 2,716.496 MI (89% of inflow)
 Center-of-Mass det. time= 91.9 min (1,038.7 - 946.7)

Volume	Invert	Avail.Storage	Storage Description
#1	8.500 m	831.250 MI	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (meters)	Surf.Area (hectares)	Inc.Store (Mega-liters)	Cum.Store (Mega-liters)
8.500	5.0000	0.000	0.000
9.550	18.0000	120.750	120.750
12.000	40.0000	710.500	831.250

Device	Routing	Invert	Outlet Devices
#1	Primary	8.500 m	.5, Cv= 1.45 (C= 1.81) Head (meters) 0.000 1.500 2.000 Width (meters) 15.00 30.00 50.00
#2	Device 1	10.500 m	60.00 m long x 5.00 m breadth Broad-Crested Rectangular Weir Head (meters) 0.061 0.122 0.183 0.244 0.305 0.366 0.427 0.488 Coef. (Metric) 1.48 1.49 1.49 1.46 1.45 1.46 1.46 1.45
#3	Primary	12.000 m	500.00 m long x 3.00 m breadth Broad-Crested Rectangular Weir Head (meters) 0.061 0.122 0.183 0.244 0.305 0.366 0.427 0.488 Coef. (Metric) 1.37 1.41 1.49 1.48 1.48 1.48 1.47 1.46

Primary OutFlow Max=159.2274 m³/s @ 14.78 hrs HW=11.996 m TW=3.000 m (Fixed TW Elev= 3.000 m)

- 1=.5 (Passes 159.2274 m³/s of 220.6222 m³/s potential flow)
- 2=Broad-Crested Rectangular Weir (Weir Controls 159.2274 m³/s @ 1.77 m/s)
- 3=Broad-Crested Rectangular Weir (Controls 0.0000 m³/s)

Pond 6P: micro dam area

Hydrograph

