

**URLIUP ROAD CULVERT UPGRADE
LOTS 2 & 3 BILAMBIL ROAD BILAMBIL**

REVISION A
OUR REF: O8418

REVISION	DATE	AMENDMENTS
A	4/08/10	Issue Date
-	-	-

CLA CONSULTANTS
8/43 TALLEBUDGERA CREEK ROAD
WEST BURLEIGH
PH (07) 5520 1066
Fax (07) 5520 1077
mail@claconsultants.com.au

Proposed Subdivision Development Lots 2 & 3 Bilambil Road Bilambil

Proposed Upgrade of Culvert Outlet Urliup Road

1. General

This report has been prepared at the request of the Applicant in respect of the Development Approval for the subdivision of the subject lots. The aim of the analysis is to examine the impacts of the replacement of the existing open channel traversing the North Western corner of the site with a pipe drainage system in order to increase the useable area of the proposed allotment.

2. Current Situation

Currently the proposed allotment is adversely affected by the existence of an open unlined drain that traverses the lot. The drain provides an outlet to the existing 1500mm diameter culvert that crosses Urliup Road. The outlet channel is generally contained within the subject site for approximately 15m of its length. It crosses to the neighbouring property at that point, and traverses a section of that property before discharging to Bilambil Creek.

The current subdivisional approval anticipates the maintenance of the current flow regime. The existing drain is tidied up by the construction of a low, non structural retaining wall (ie less than 1.2m in height) along the Eastern bank of the Drain.

3. Proposal

The proposed works comprise the construction of a manhole at the outlet of the existing culvert together with the installation of approximately 14.5m length of 1200mm Dia pipe. This pipe discharges to a point a short distance upstream of the downstream property. Overland flows not conveyed by the new pipe drainage system a catered for by the grading of a shallow trapezoidal drain located with the subject property, and discharging to the same point as the pipe drain.

Details of the proposal are given on Drg No 08418-13 Attachment A.

Details of the calculations used in the analysis of the impacts of the proposal are given at Attachment B. The key index is seen to be the flow depths at the downstream channel, which is seen to be unaffected by the works.

4. Discussion/Comment

3.1 Legal Point of Discharge

The point of discharge from the neighbouring site is not changed. The existing drain provides drainage to the upstream catchment, as such becoming a Council asset. The legality of the discharge point is without question.

3.2 Impact on Approved Earthworks

The proposal has no significant impact on the earthworks previously approved. A marginal amount of additional fill will be used, and placement of same is achieved in accordance with the requirements of the LEP.

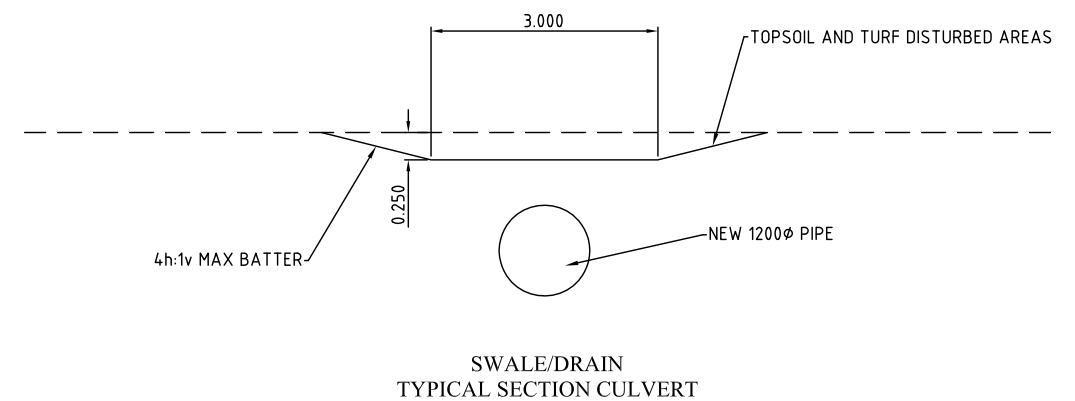
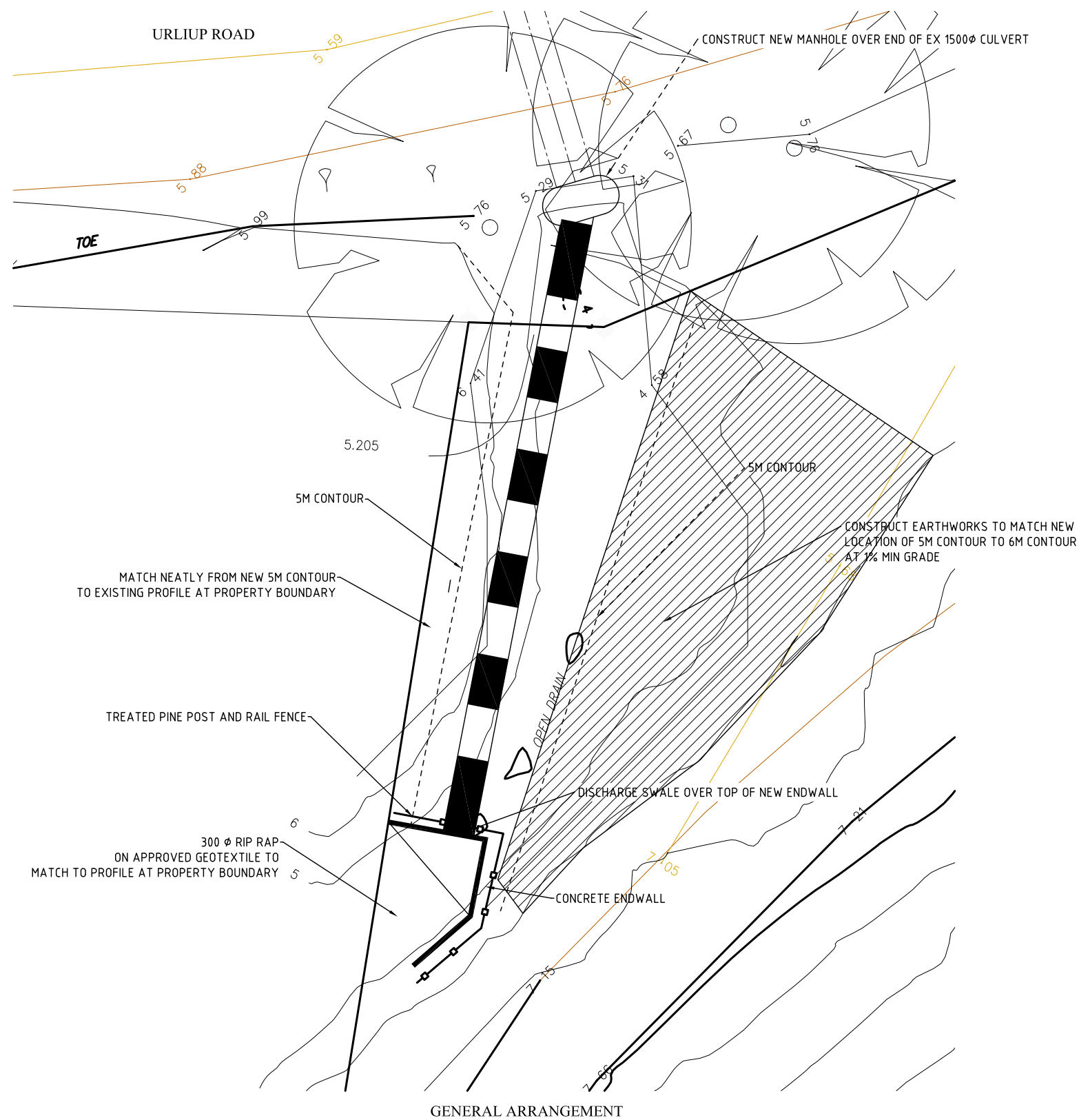
3.3 Impacts on Downstream Properties.

There is no impact on the peak flow rates experienced at the downstream boundary of the site. The outlet of the new pipe culvert is located upstream of the boundary. The placement of 300Dia rip rap serves to dissipate energy at the outlet, ensuring that flow velocity at the downstream boundary does not exceed that of the pre development flow regime.

3.4 Extents of Earthworks Generally.

Earthworks are limited to the subject site, and to the area around the existing culvert outlet, located within the confines of the Urliup Road reserve.

Attachment A
Culvert Outlet Proposal



CLA Consultants
Civil & Structural Engineers
8/43 Tallebudgera Creek Road
West Burleigh Qld 4219
Ph: 07 5520 1066
Fax: 07 5520 1077
mail@claconsultants.com.au

CLIENT
JACKSON INTERNATIONAL PTY LTD

PROJECT
**LOTS 2 & 3
BILAMBIL ROAD
BILAMBIL**

ASSOCIATED CONSULTANTS
-

PROPERTY DESCRIPTION	LOTS 2 & 3 DP244652
UBD REF.	
DESIGNED	CBL
DRAWN	ACAD
REVIEWED	CBL
DATE	24 FEB 2010
APPROVED	 FIEAust CPEng RPEQ 4293

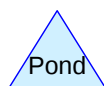
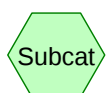
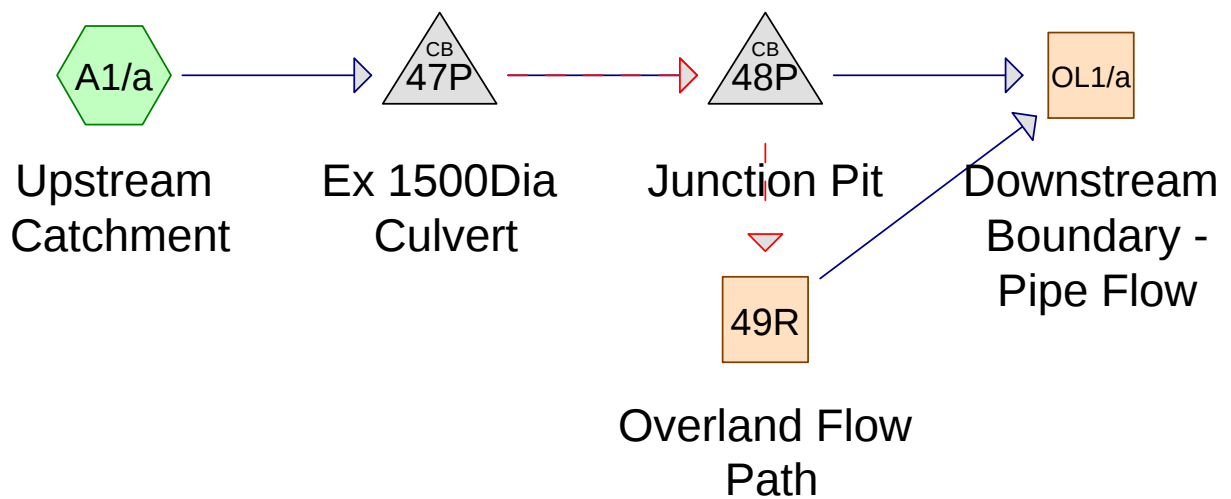
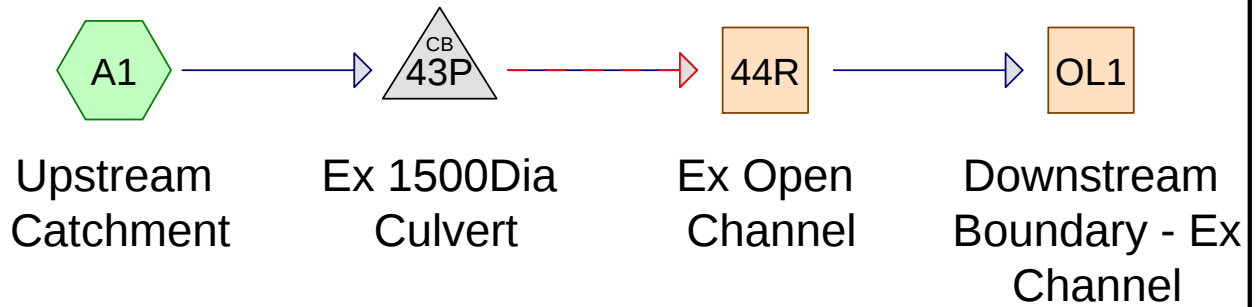
REV.	DESCRIPTION	BY	DATE	APPR'D

NAME
URLIUP ROAD CULVERT

PROJECT REF.	DRAWING NO.	REVISION
08418	013	-

1:100 @ A1 0 2 4 6 8 10M

Attachment B
Calculations



Summary for Subcatchment A1: Upstream Catchment

Runoff = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 MI, Depth= 23 mm

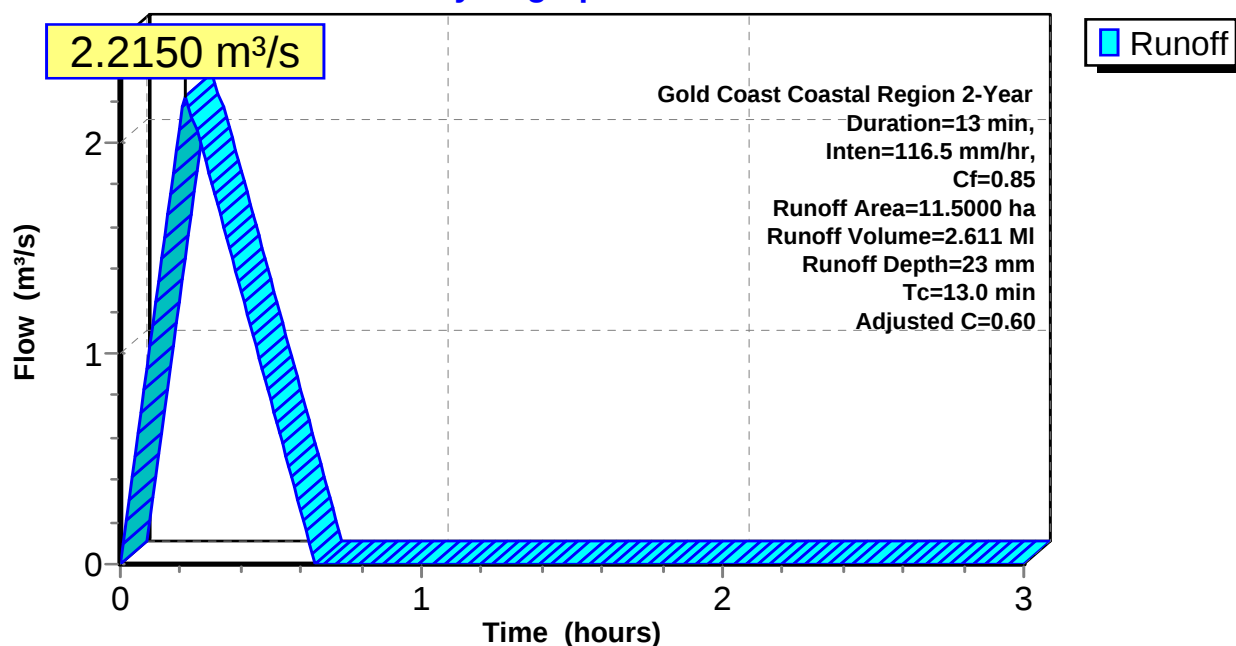
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 2-Year Duration=13 min, Inten=116.5 mm/hr, Cf=0.85

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.60
11.5000		Pervious Area

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

Subcatchment A1: Upstream Catchment

Hydrograph



Summary for Subcatchment A1/a: Upstream Catchment

Runoff = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 ML, Depth= 23 mm

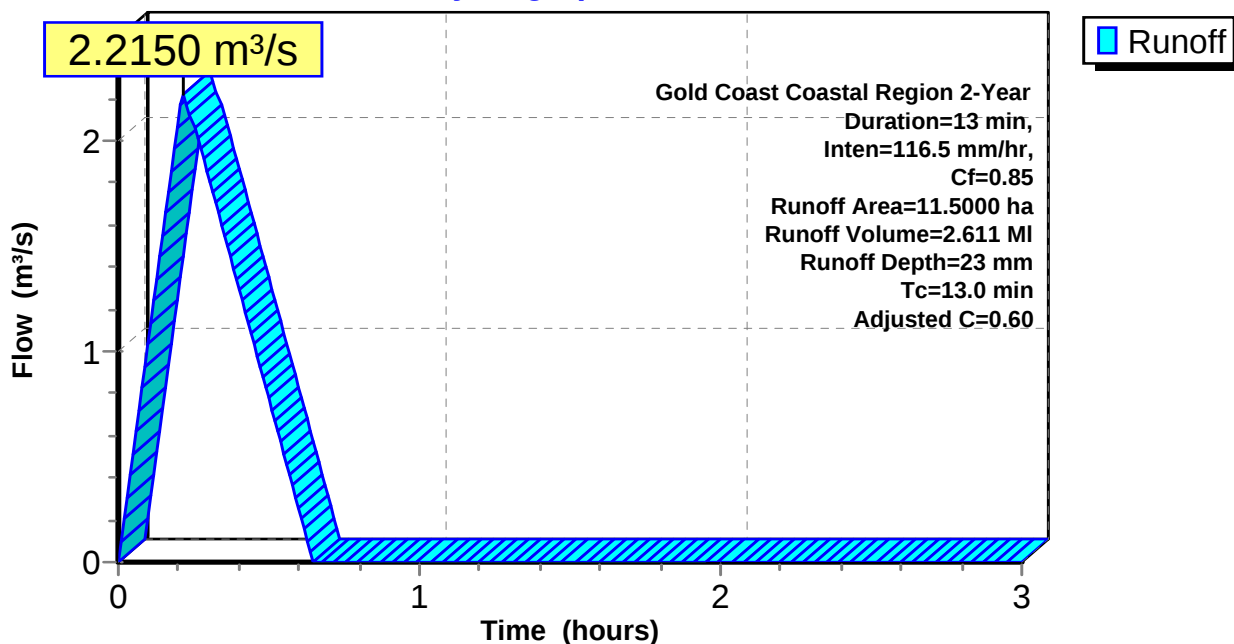
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 2-Year Duration=13 min, Inten=116.5 mm/hr, Cf=0.85

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.60
11.5000		Pervious Area

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

Subcatchment A1/a: Upstream Catchment

Hydrograph



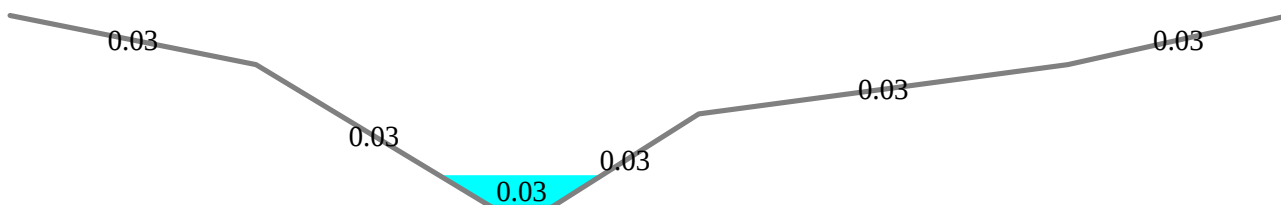
Summary for Reach 44R: Ex Open Channel

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 ML
 Outflow = 2.2109 m³/s @ 0.22 hrs, Volume= 2.611 ML, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.50 m/s, Min. Travel Time= 0.2 min
 Avg. Velocity= 1.09 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 21.3 m³ @ 0.22 hrs, Average Depth at Peak Storage= 0.65 m
 Bank-Full Depth= 3.900 m, Capacity at Bank-Full= 149.3841 m³/s

Custom cross-section, Length= 14.50 m Slope= 0.0069 m/m (102 Elevation Intervals)
 Flow calculated by Manning's Subdivision method
 Inlet Invert= 3.100 m, Outlet Invert= 3.000 m

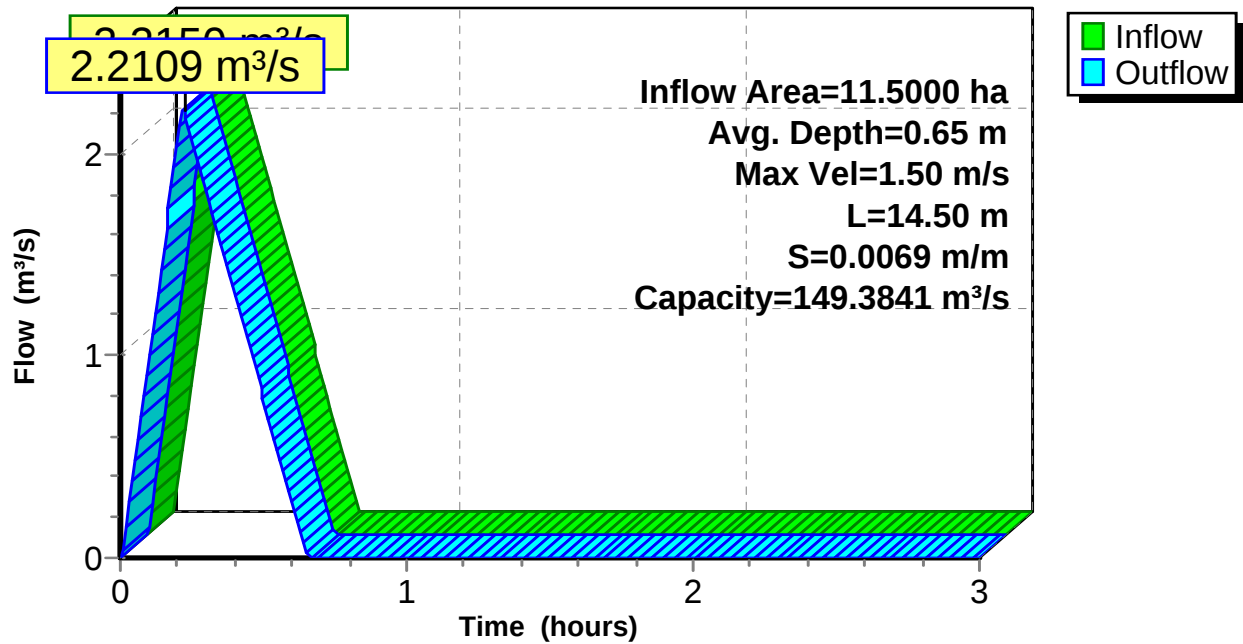


Offset (meters)	Elevation (meters)	Chan.Depth (meters)	n	Description
0.000	7.000	0.00		
5.000	6.000	1.00	0.030	
9.800	3.100	3.90	0.030	
11.000	3.100	3.90	0.030	
14.000	5.000	2.00	0.030	
21.500	6.000	1.00	0.030	
26.000	7.000	0.00	0.030	

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.20	0.0	0.0000
1.90	8.12	8.43	117.7	21.9205
2.90	20.04	17.93	290.6	59.7554
3.90	41.29	27.63	598.7	149.3841

Reach 44R: Ex Open Channel

Hydrograph



Summary for Reach 49R: Overland Flow Path

[80] Warning: Exceeded Pond 48P by 1.750 m @ 0.00 hrs (0.6556 m³/s 7.080 ML)

Inflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 ML
 Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 m/s, Avg. Travel Time= 0.0 min

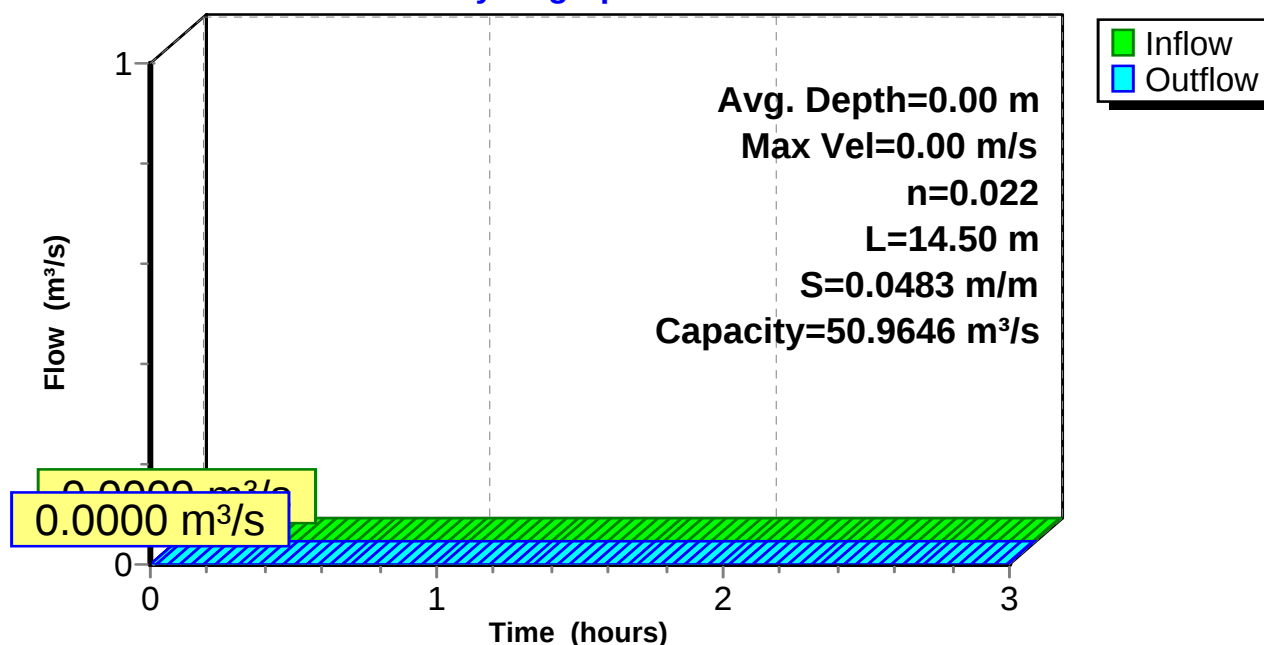
Peak Storage= 0.0 m³ @ 0.00 hrs, Average Depth at Peak Storage= 0.00 m
 Bank-Full Depth= 1.000 m, Capacity at Bank-Full= 50.9646 m³/s

3.00 m x 1.00 m deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 4.0 m/m Top Width= 11.00 m
 Length= 14.50 m Slope= 0.0483 m/m
 Inlet Invert= 4.800 m, Outlet Invert= 4.100 m



Reach 49R: Overland Flow Path

Hydrograph



Summary for Reach OL1: Downstream Boundary - Ex Channel

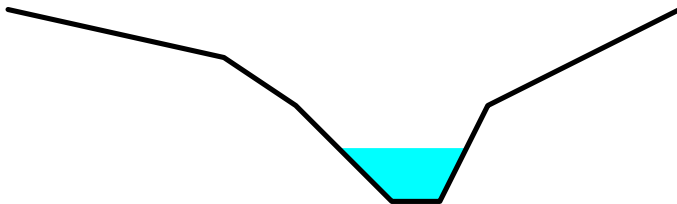
[63] Warning: Exceeded Reach 44R INLET depth by 0.458 m @ 0.22 hrs

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2109 m³/s @ 0.22 hrs, Volume= 2.611 Ml
 Outflow = 2.2101 m³/s @ 0.22 hrs, Volume= 2.611 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.09 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.78 m/s, Avg. Travel Time= 0.1 min

Peak Storage= 6.1 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.11 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

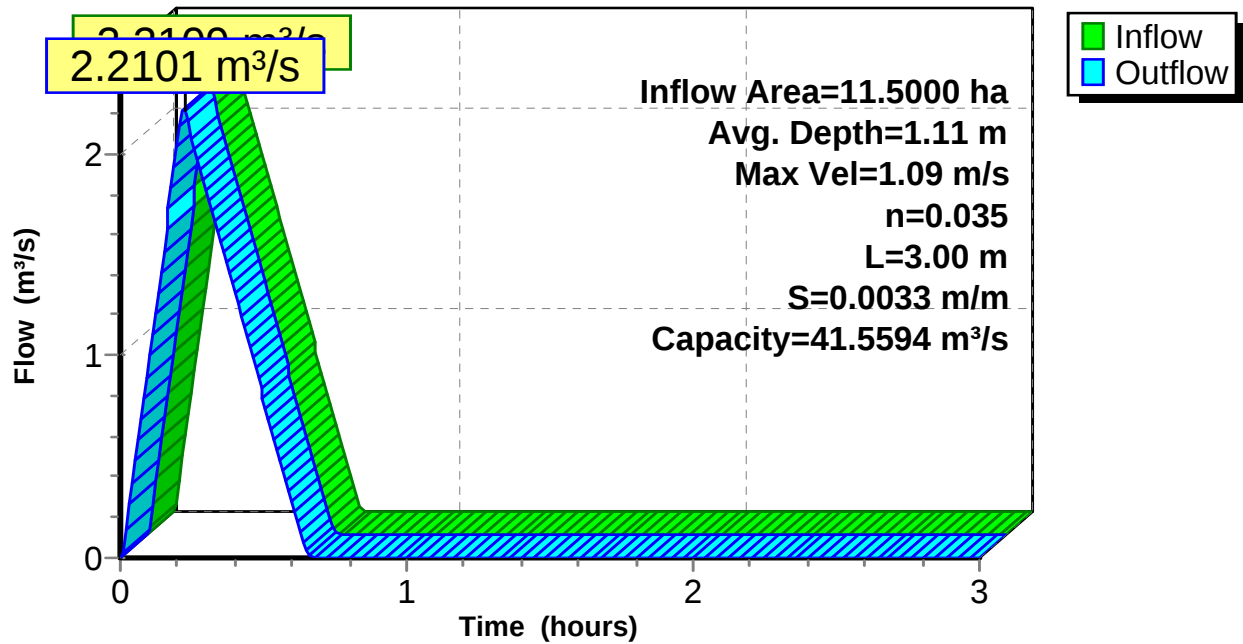


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1: Downstream Boundary - Ex Channel

Hydrograph



Summary for Reach OL1/a: Downstream Boundary - Pipe Flow

[62] Warning: Exceeded Reach 49R OUTLET depth by 0.112 m @ 0.22 hrs

[80] Warning: Exceeded Pond 48P by 0.070 m @ 0.02 hrs (0.3119 m³/s 0.071 ML)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 ML
 Outflow = 2.2146 m³/s @ 0.22 hrs, Volume= 2.611 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.09 m/s, Min. Travel Time= 0.0 min

Avg. Velocity= 0.86 m/s, Avg. Travel Time= 0.1 min

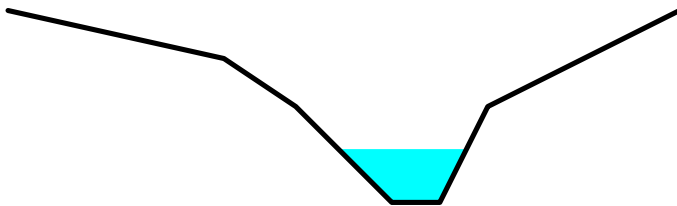
Peak Storage= 6.1 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.11 m

Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m

Constant n= 0.035 Earth, dense weeds

Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

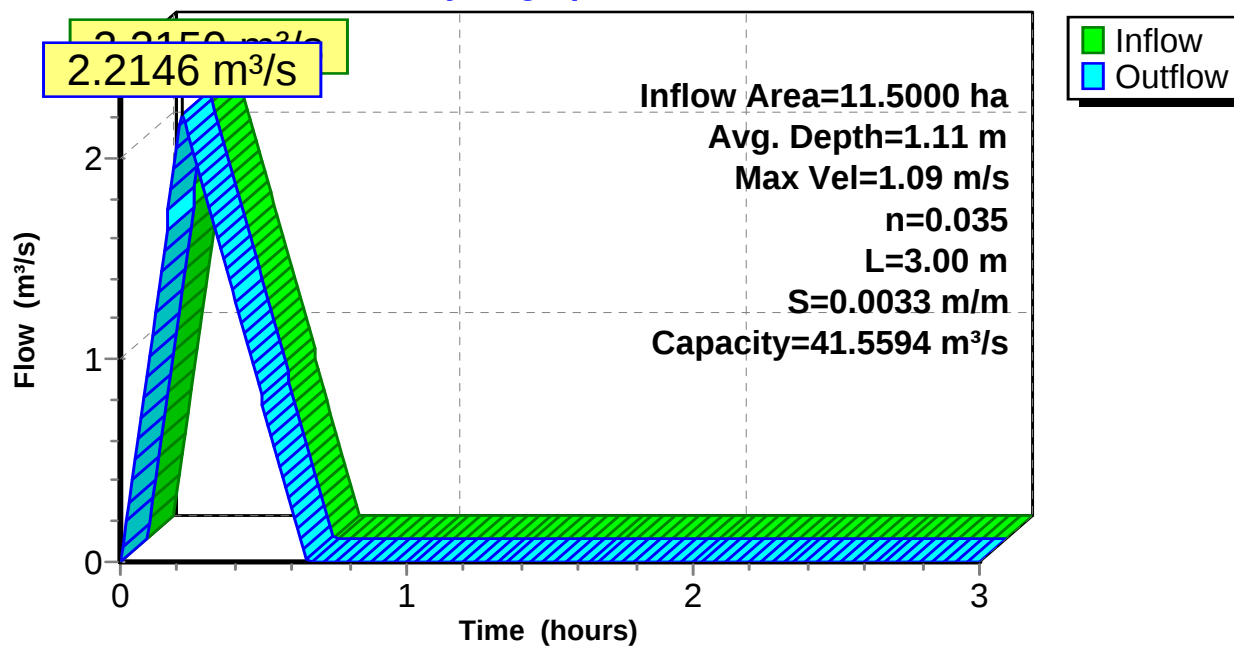


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1/a: Downstream Boundary - Pipe Flow

Hydrograph



Summary for Pond 43P: Ex 1500Dia Culvert

[57] Hint: Peaked at 4.475 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml
 Outflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.475 m @ 0.22 hrs

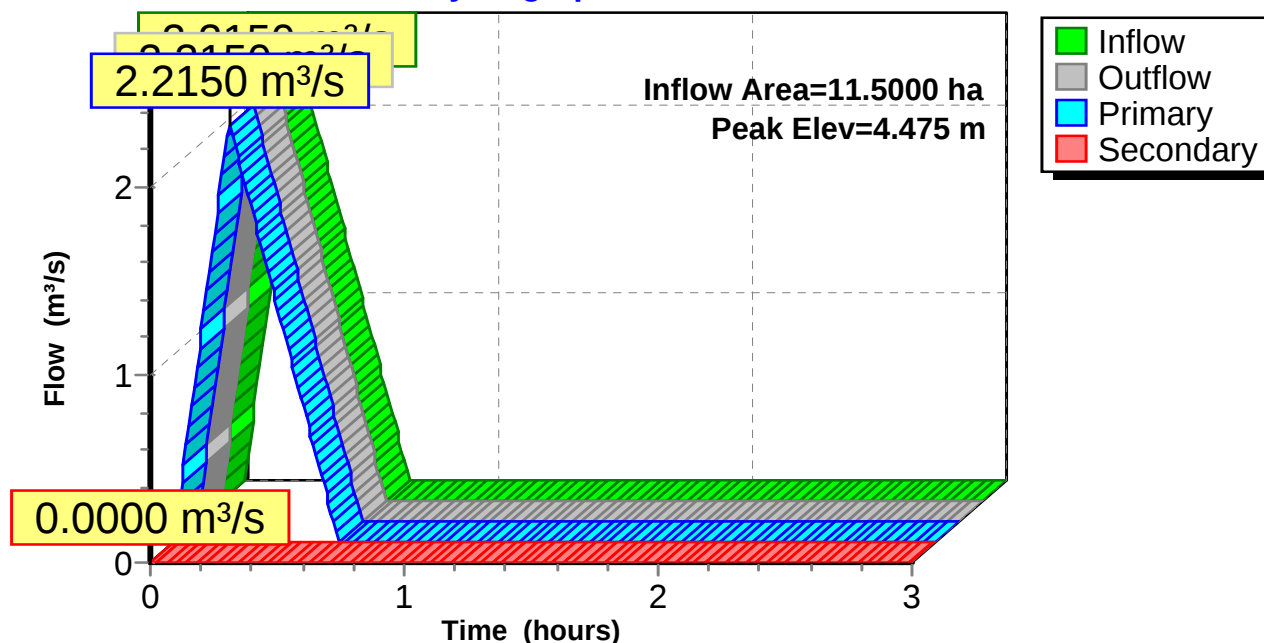
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 13.00 m long Culvert RCP, square edge headwall, $K_e=0.500$ Outlet Invert= 3.240 m $S=0.0023$ m/m $C_c=0.900$ $n=0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=2.2150 m³/s @ 0.22 hrs HW=4.475 m TW=3.752 m (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 2.2150 m³/s @ 1.99 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.100 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 43P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 47P: Ex 1500Dia Culvert

[57] Hint: Peaked at 4.533 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 MI
 Outflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 MI, Atten= 0%, Lag= 0.0 min
 Primary = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 MI
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.533 m @ 0.23 hrs

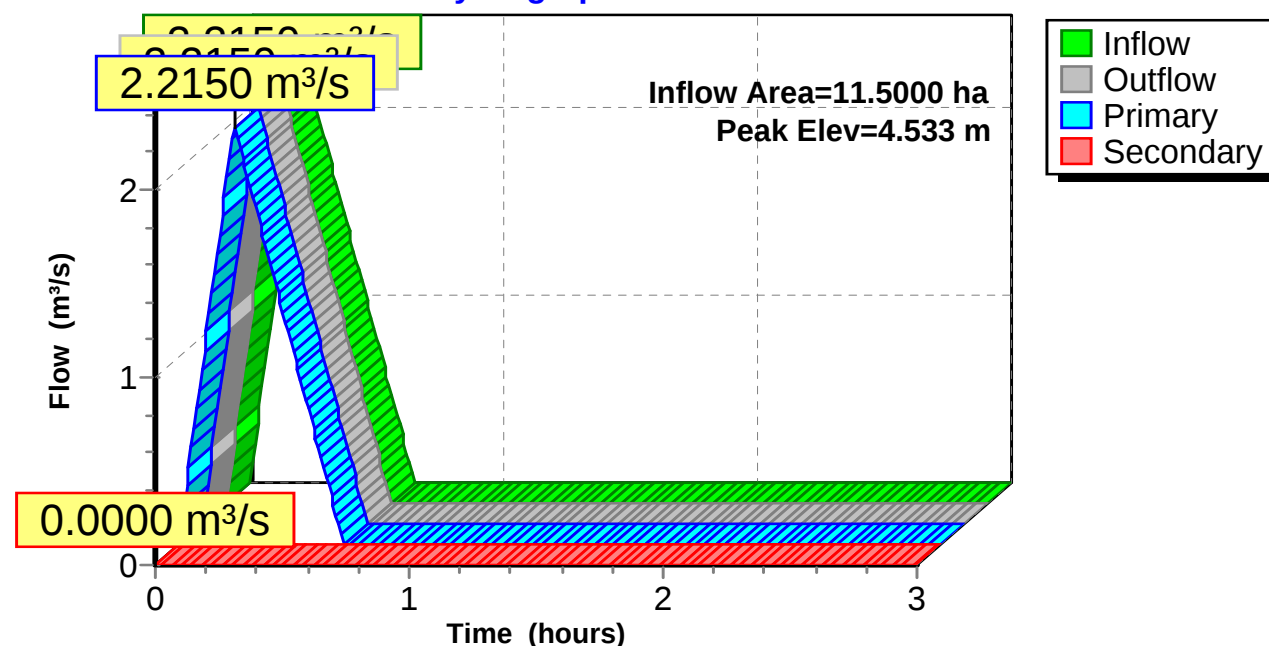
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 27.00 m long Culvert RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 3.240 m S= 0.0011 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=2.0916 m³/s @ 0.22 hrs HW=4.521 m TW=4.294 m (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.0916 m³/s @ 1.80 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.050 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 47P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 48P: Junction Pit

[57] Hint: Peaked at 4.303 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 23 mm for 2-Year event
 Inflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml
 Outflow = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 2.2150 m³/s @ 0.22 hrs, Volume= 2.611 Ml
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.303 m @ 0.23 hrs

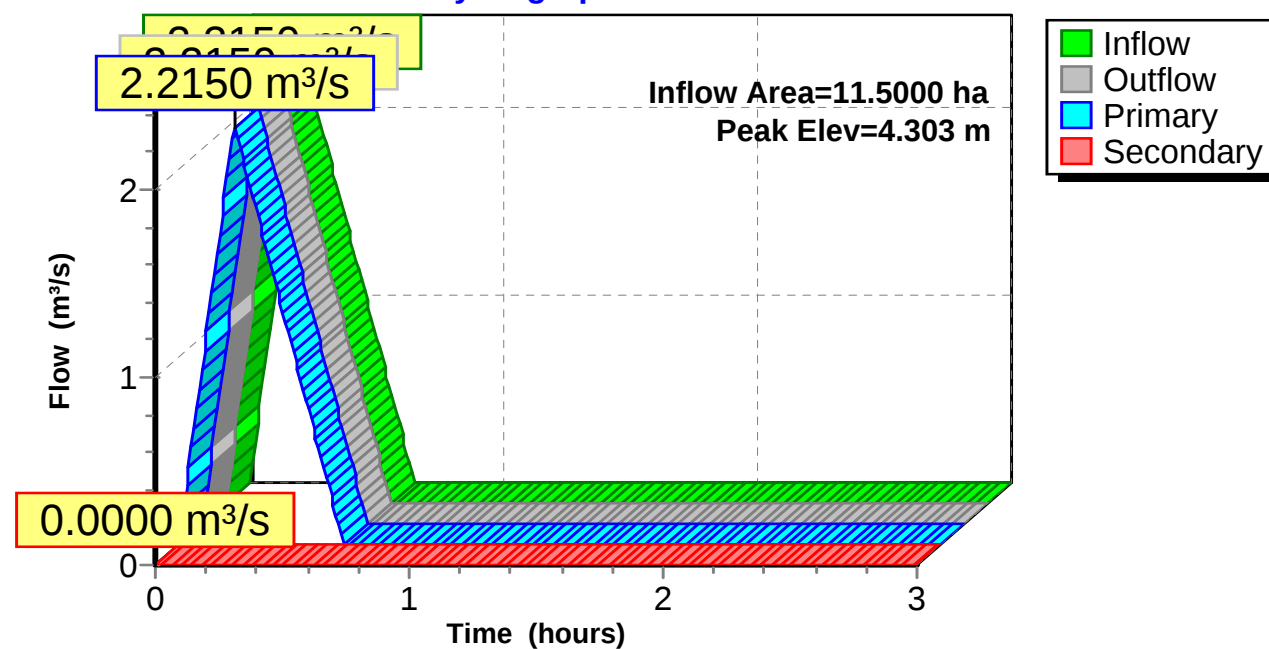
Device	Routing	Invert	Outlet Devices
#1	Primary	3.050 m	1,200 mm x 14.50 m long Culvert X 2.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 3.000 m S= 0.0034 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	4.600 m	4.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=2.0372 m³/s @ 0.22 hrs HW=4.294 m TW=4.212 m (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.0372 m³/s @ 1.08 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.050 m TW=4.800 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 48P: Junction Pit

Hydrograph



Summary for Subcatchment A1: Upstream Catchment

Runoff = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 ML, Depth= 33 mm

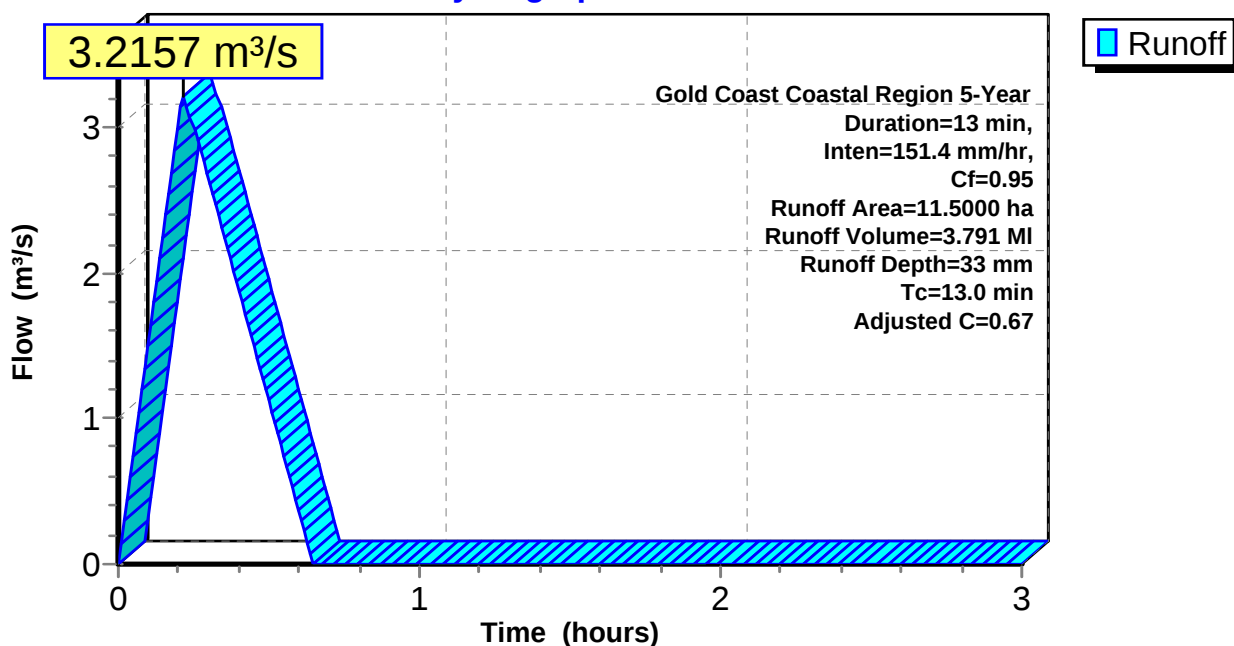
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 5-Year Duration=13 min, Inten=151.4 mm/hr, Cf=0.95

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.67
11.5000		Pervious Area

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

Subcatchment A1: Upstream Catchment

Hydrograph



Summary for Subcatchment A1/a: Upstream Catchment

Runoff = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 ML, Depth= 33 mm

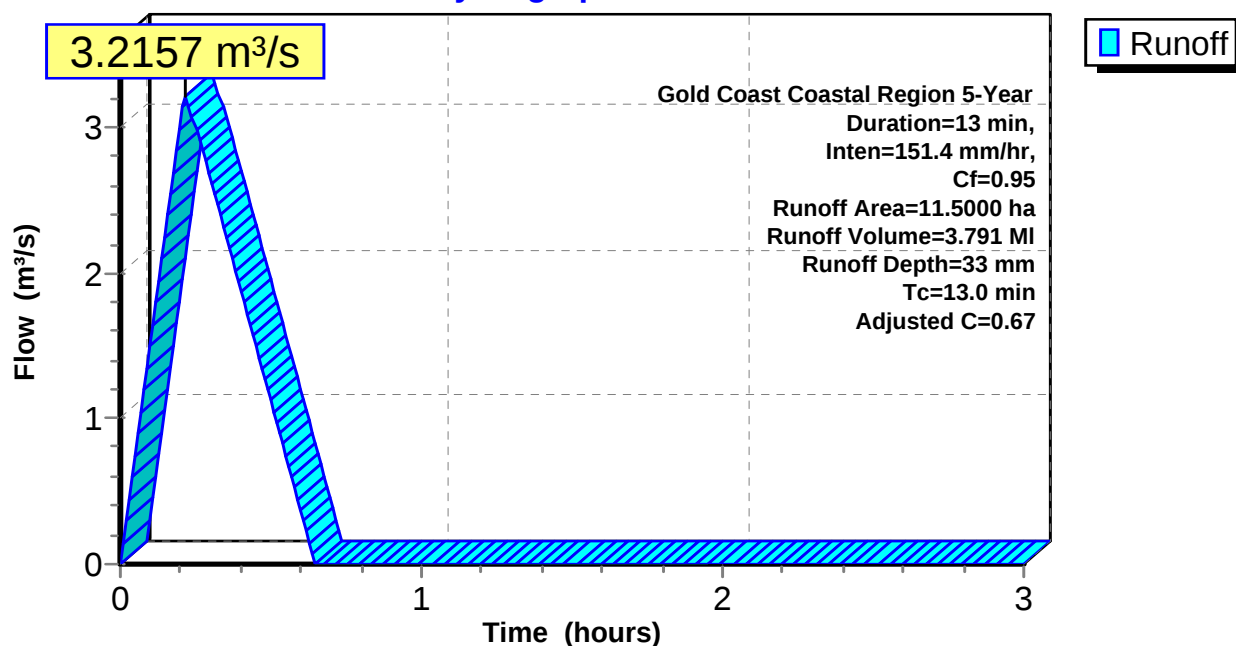
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 5-Year Duration=13 min, Inten=151.4 mm/hr, Cf=0.95

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.67
11.5000		Pervious Area

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

Subcatchment A1/a: Upstream Catchment

Hydrograph



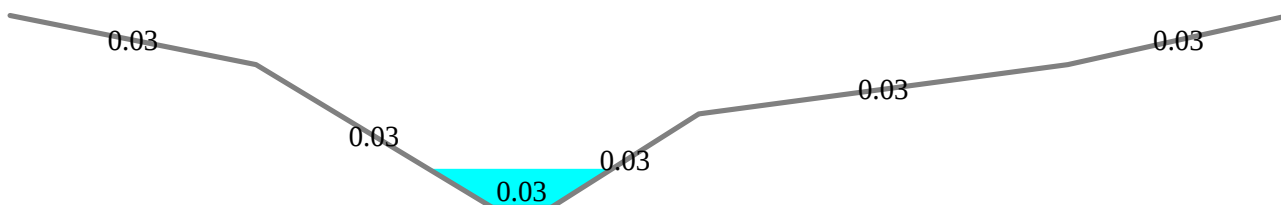
Summary for Reach 44R: Ex Open Channel

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 ML
 Outflow = 3.2110 m³/s @ 0.22 hrs, Volume= 3.791 ML, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.66 m/s, Min. Travel Time= 0.1 min
 Avg. Velocity= 1.20 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 28.1 m³ @ 0.22 hrs, Average Depth at Peak Storage= 0.78 m
 Bank-Full Depth= 3.900 m, Capacity at Bank-Full= 149.3841 m³/s

Custom cross-section, Length= 14.50 m Slope= 0.0069 m/m (102 Elevation Intervals)
 Flow calculated by Manning's Subdivision method
 Inlet Invert= 3.100 m, Outlet Invert= 3.000 m

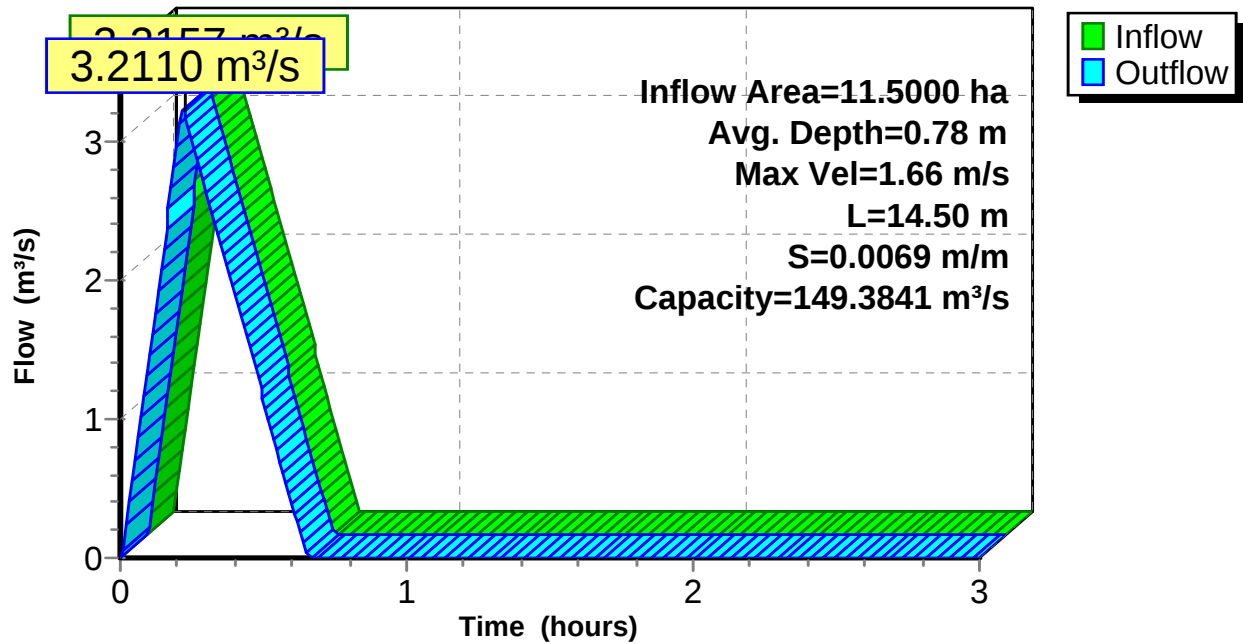


Offset (meters)	Elevation (meters)	Chan.Depth (meters)	n	Description
0.000	7.000	0.00		
5.000	6.000	1.00	0.030	
9.800	3.100	3.90	0.030	
11.000	3.100	3.90	0.030	
14.000	5.000	2.00	0.030	
21.500	6.000	1.00	0.030	
26.000	7.000	0.00	0.030	

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m ³ /s)
0.00	0.00	1.20	0.0	0.0000
1.90	8.12	8.43	117.7	21.9205
2.90	20.04	17.93	290.6	59.7554
3.90	41.29	27.63	598.7	149.3841

Reach 44R: Ex Open Channel

Hydrograph



Summary for Reach 49R: Overland Flow Path

[80] Warning: Exceeded Pond 48P by 1.750 m @ 0.00 hrs (0.6556 m³/s 7.080 ML)

Inflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 ML
 Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 m/s, Avg. Travel Time= 0.0 min

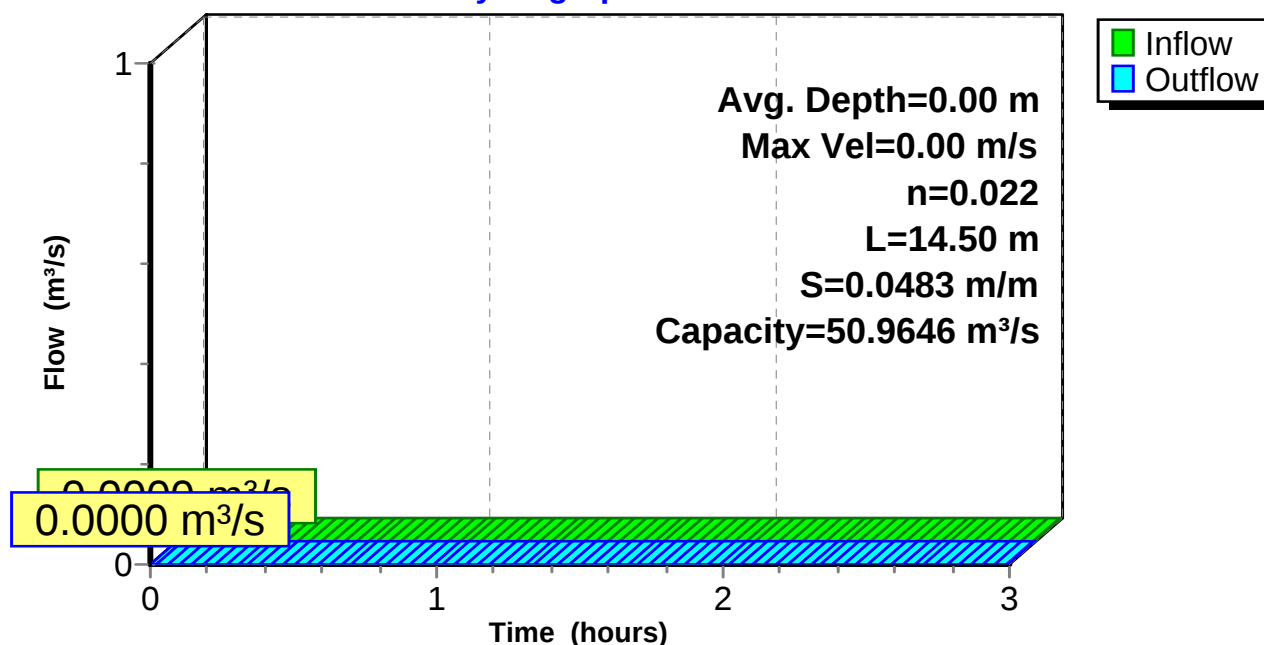
Peak Storage= 0.0 m³ @ 0.00 hrs, Average Depth at Peak Storage= 0.00 m
 Bank-Full Depth= 1.000 m, Capacity at Bank-Full= 50.9646 m³/s

3.00 m x 1.00 m deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 4.0 m/m Top Width= 11.00 m
 Length= 14.50 m Slope= 0.0483 m/m
 Inlet Invert= 4.800 m, Outlet Invert= 4.100 m



Reach 49R: Overland Flow Path

Hydrograph



Summary for Reach OL1: Downstream Boundary - Ex Channel

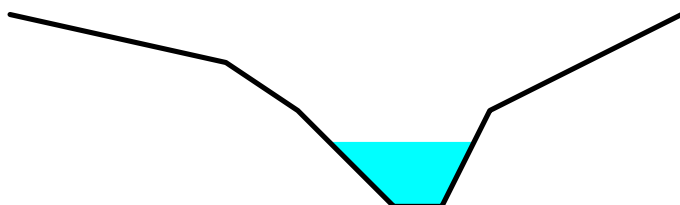
[63] Warning: Exceeded Reach 44R INLET depth by 0.558 m @ 0.22 hrs

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2110 m³/s @ 0.22 hrs, Volume= 3.791 Ml
 Outflow = 3.2099 m³/s @ 0.22 hrs, Volume= 3.791 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.19 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.86 m/s, Avg. Travel Time= 0.1 min

Peak Storage= 8.1 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.34 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

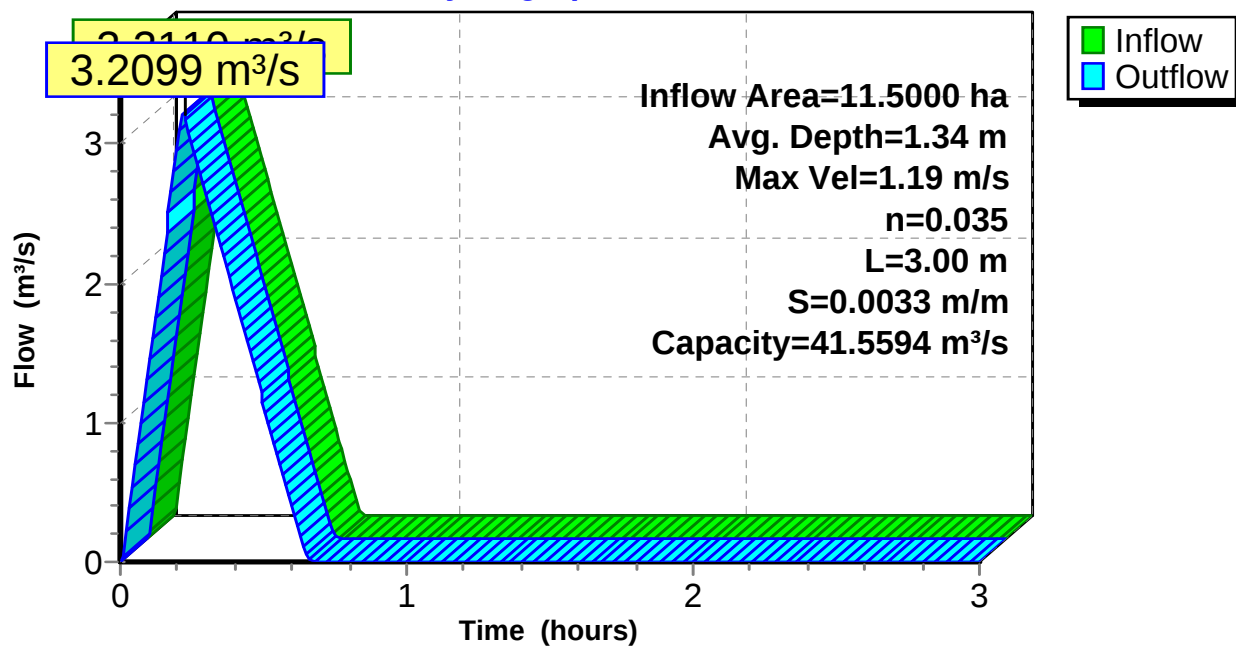


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1: Downstream Boundary - Ex Channel

Hydrograph



Summary for Reach OL1/a: Downstream Boundary - Pipe Flow

[62] Warning: Exceeded Reach 49R OUTLET depth by 0.344 m @ 0.22 hrs

[80] Warning: Exceeded Pond 48P by 0.089 m @ 0.02 hrs (0.4774 m³/s 0.098 ML)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 ML
 Outflow = 3.2153 m³/s @ 0.22 hrs, Volume= 3.791 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.19 m/s, Min. Travel Time= 0.0 min

Avg. Velocity= 0.95 m/s, Avg. Travel Time= 0.1 min

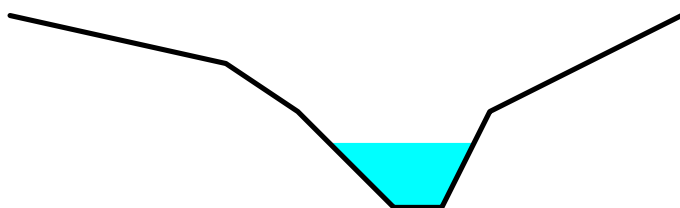
Peak Storage= 8.1 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.34 m

Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m

Constant n= 0.035 Earth, dense weeds

Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

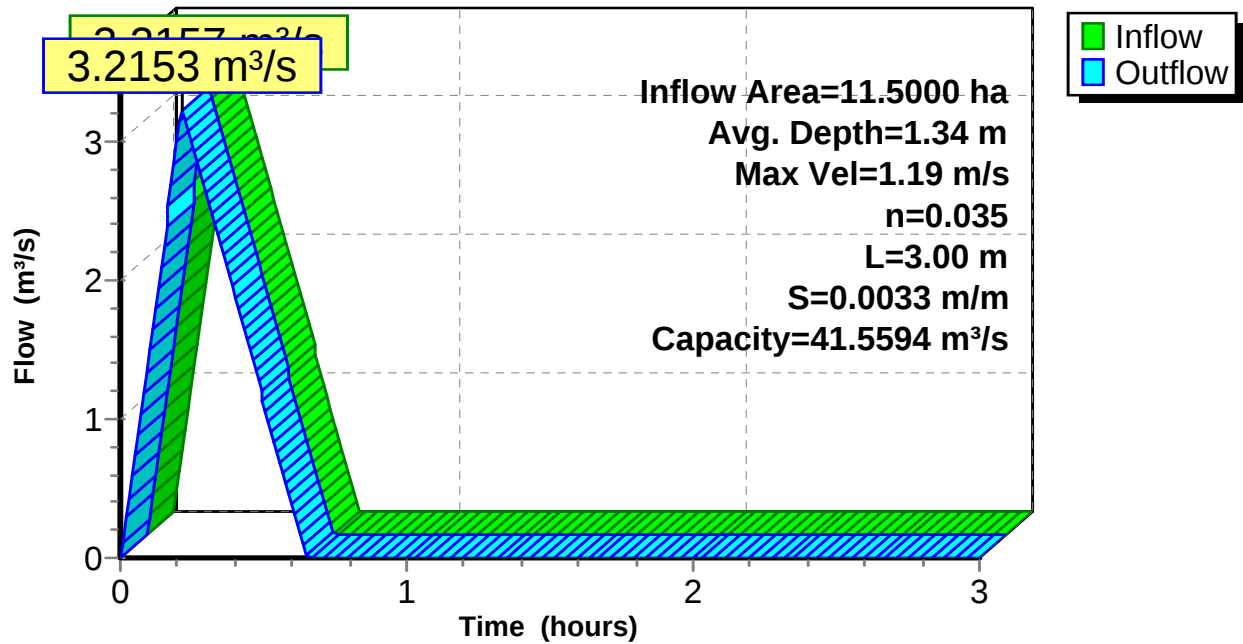


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1/a: Downstream Boundary - Pipe Flow

Hydrograph



Summary for Pond 43P: Ex 1500Dia Culvert

[57] Hint: Peaked at 4.793 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Outflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI, Atten= 0%, Lag= 0.0 min
 Primary = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.793 m @ 0.22 hrs

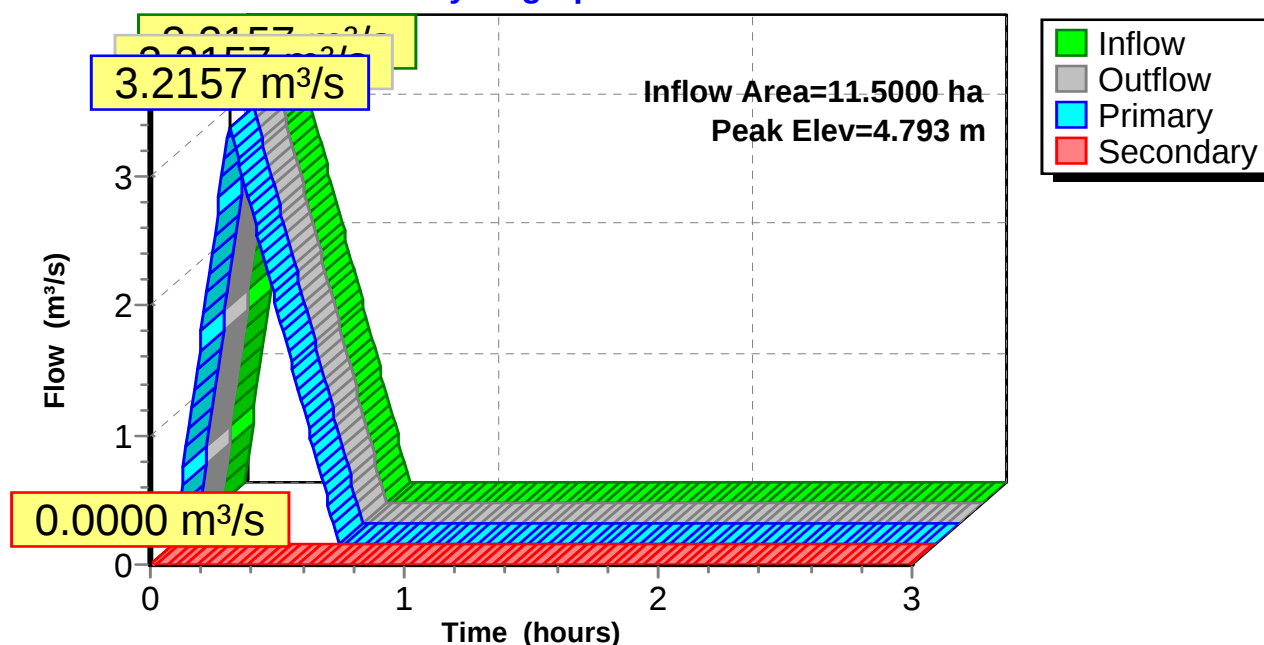
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 13.00 m long Culvert RCP, square edge headwall, $K_e=0.500$ Outlet Invert= 3.240 m $S=0.0023$ m/m $C_c=0.900$ $n=0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.2157 m³/s @ 0.22 hrs HW=4.793 m TW=3.884 m (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 3.2157 m³/s @ 2.23 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.100 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 43P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 47P: Ex 1500Dia Culvert

[57] Hint: Peaked at 4.899 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Outflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI, Atten= 0%, Lag= 0.0 min
 Primary = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.899 m @ 0.23 hrs

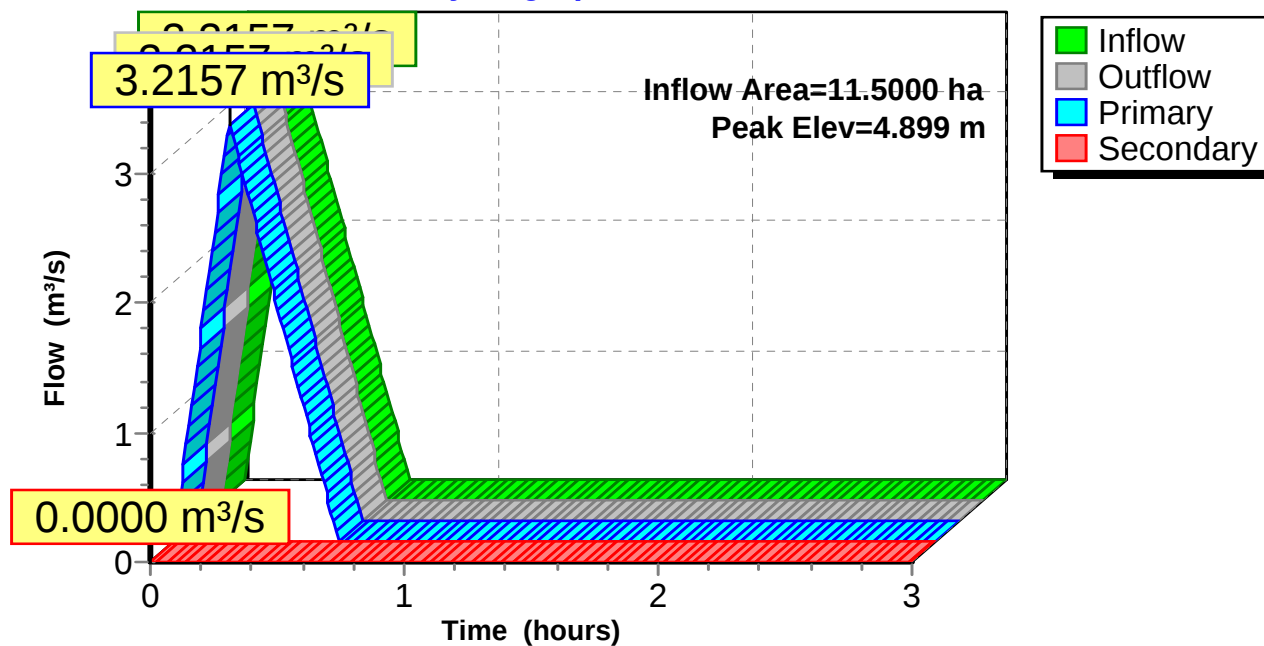
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 27.00 m long Culvert RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 3.240 m S= 0.0011 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=2.9951 m³/s @ 0.22 hrs HW=4.878 m TW=4.610 m (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.9951 m³/s @ 1.97 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.050 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 47P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 48P: Junction Pit

[57] Hint: Peaked at 4.620 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 33 mm for 5-Year event
 Inflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Outflow = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI, Atten= 0%, Lag= 0.0 min
 Primary = 3.2157 m³/s @ 0.22 hrs, Volume= 3.791 MI
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.620 m @ 0.23 hrs

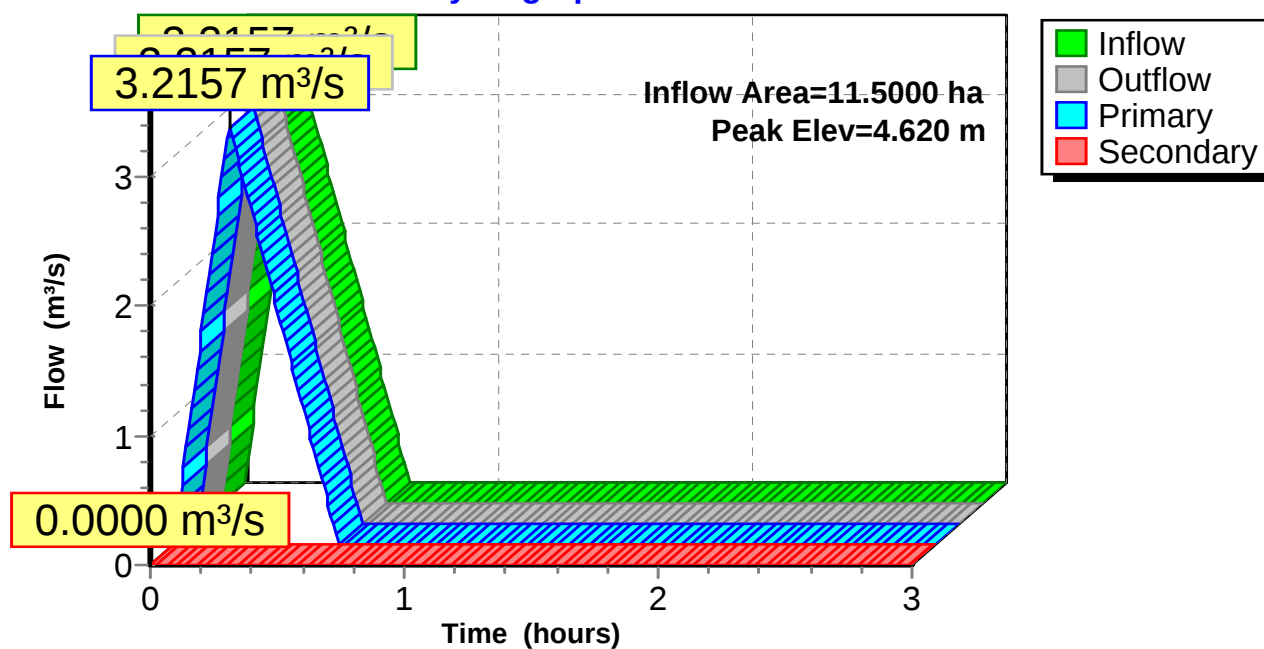
Device	Routing	Invert	Outlet Devices
#1	Primary	3.050 m	1,200 mm x 14.50 m long Culvert X 2.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 3.000 m S= 0.0034 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	4.600 m	4.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.0595 m³/s @ 0.22 hrs HW=4.610 m TW=4.444 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 3.0595 m³/s @ 1.35 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.050 m TW=4.800 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 48P: Junction Pit

Hydrograph



Summary for Subcatchment A1: Upstream Catchment

Runoff = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 ML, Depth= 39 mm

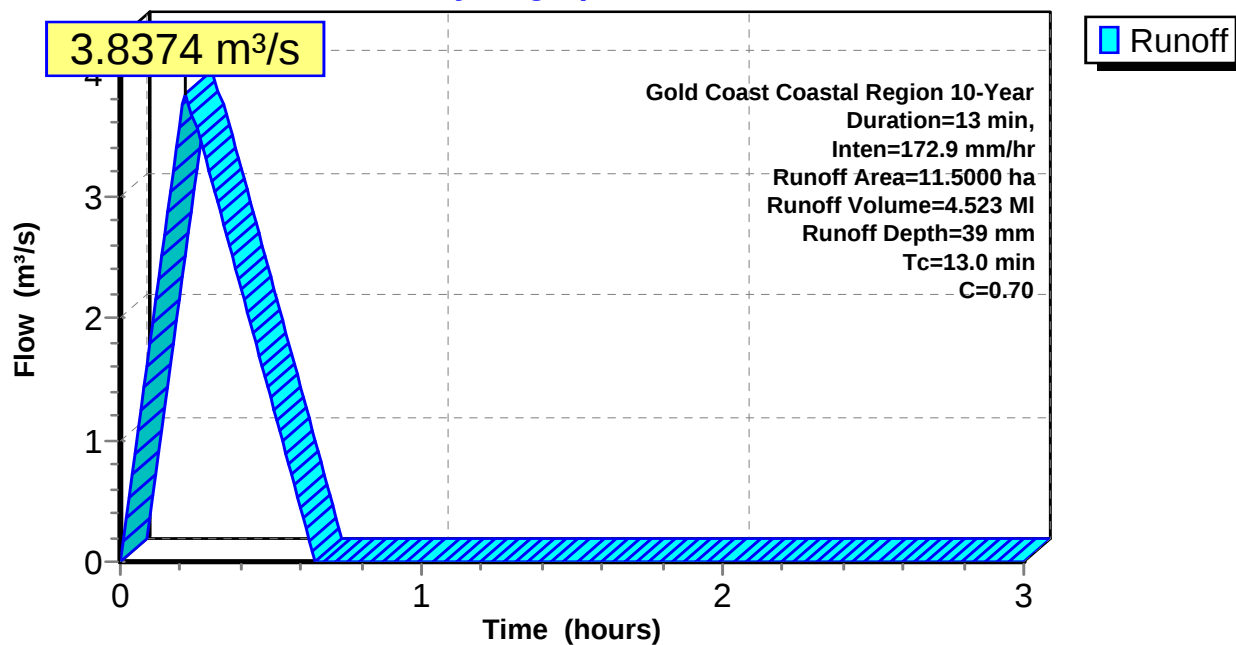
Runoff by Rational method, Rise/Fall=1.0/2.0 xT_c, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 10-Year Duration=13 min, Inten=172.9 mm/hr

Area (ha)	C	Description
11.5000	0.70	
11.5000		Pervious Area

T _c (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
13.0					Direct Entry,

Subcatchment A1: Upstream Catchment

Hydrograph



Summary for Subcatchment A1/a: Upstream Catchment

Runoff = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 ML, Depth= 39 mm

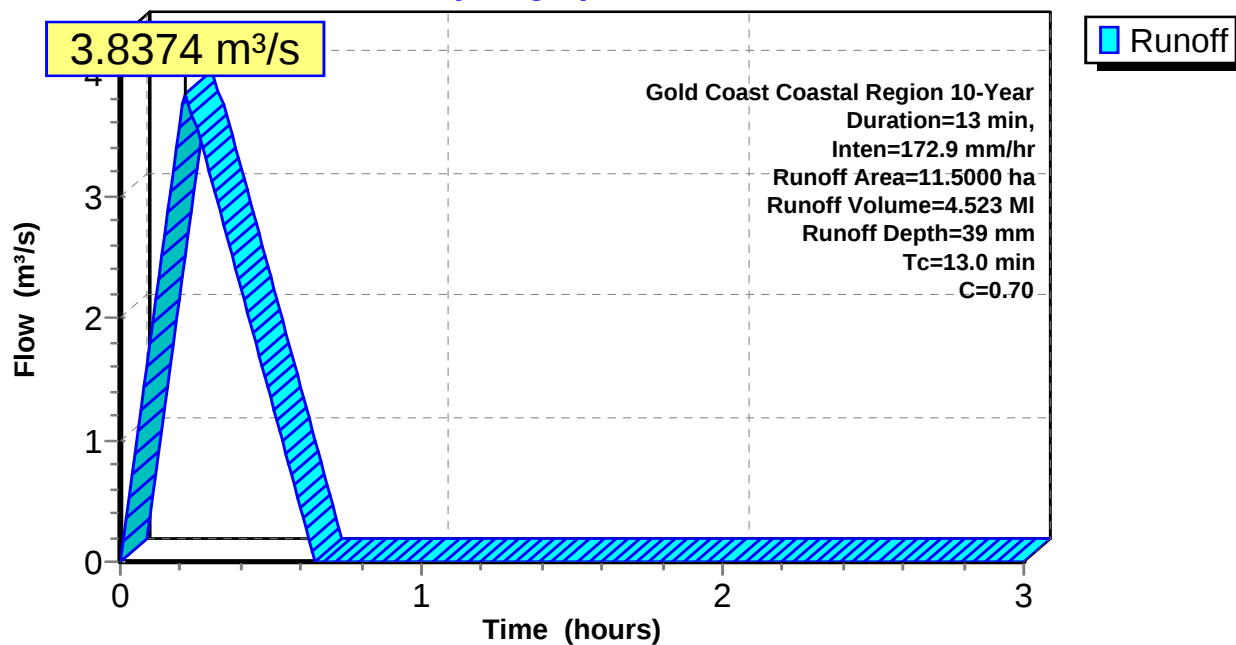
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 10-Year Duration=13 min, Inten=172.9 mm/hr

Area (ha)	C	Description
11.5000	0.70	
11.5000		Pervious Area

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

Subcatchment A1/a: Upstream Catchment

Hydrograph



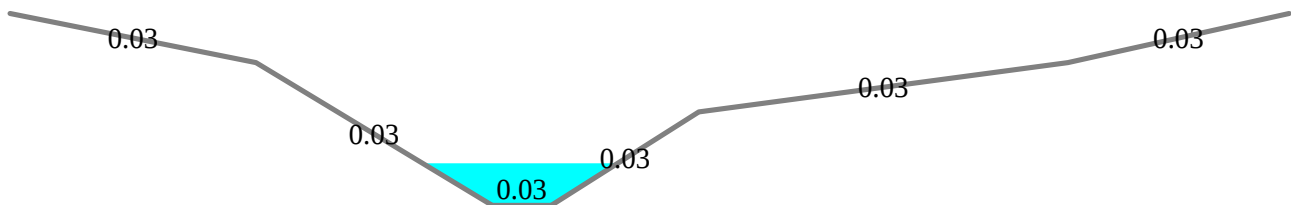
Summary for Reach 44R: Ex Open Channel

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 ML
 Outflow = 3.8317 m³/s @ 0.22 hrs, Volume= 4.523 ML, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.73 m/s, Min. Travel Time= 0.1 min
 Avg. Velocity= 1.25 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 32.0 m³ @ 0.22 hrs, Average Depth at Peak Storage= 0.86 m
 Bank-Full Depth= 3.900 m, Capacity at Bank-Full= 149.3841 m³/s

Custom cross-section, Length= 14.50 m Slope= 0.0069 m/m (102 Elevation Intervals)
 Flow calculated by Manning's Subdivision method
 Inlet Invert= 3.100 m, Outlet Invert= 3.000 m

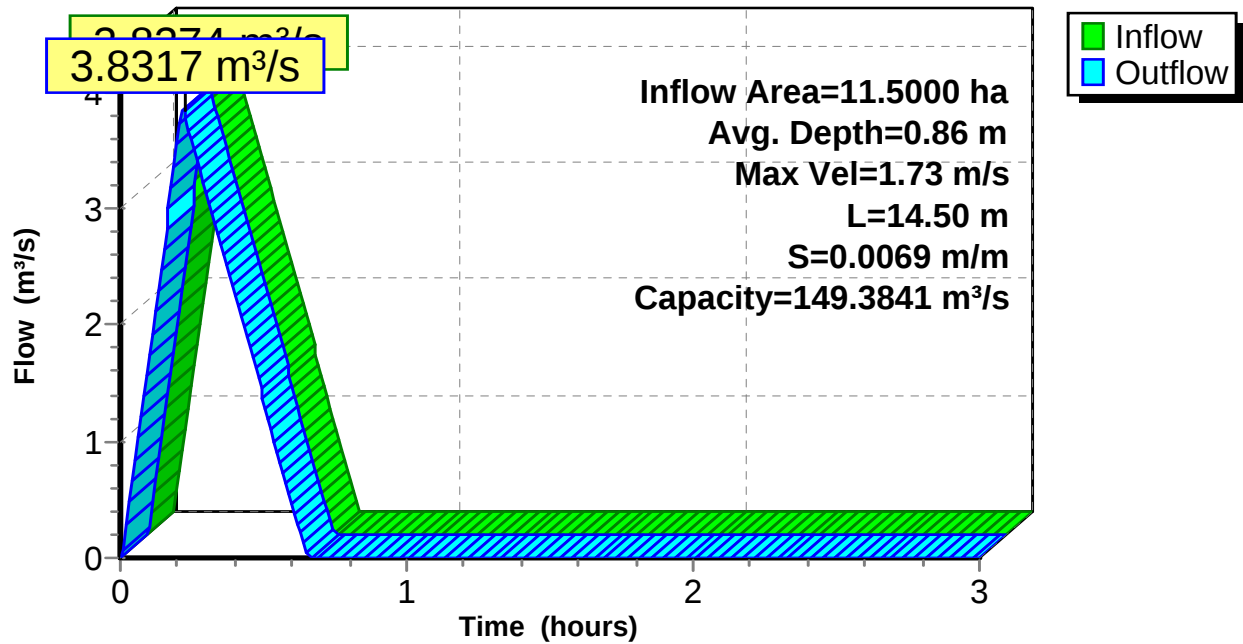


Offset (meters)	Elevation (meters)	Chan.Depth (meters)	n	Description
0.000	7.000	0.00		
5.000	6.000	1.00	0.030	
9.800	3.100	3.90	0.030	
11.000	3.100	3.90	0.030	
14.000	5.000	2.00	0.030	
21.500	6.000	1.00	0.030	
26.000	7.000	0.00	0.030	

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.20	0.0	0.0000
1.90	8.12	8.43	117.7	21.9205
2.90	20.04	17.93	290.6	59.7554
3.90	41.29	27.63	598.7	149.3841

Reach 44R: Ex Open Channel

Hydrograph



Summary for Reach 49R: Overland Flow Path

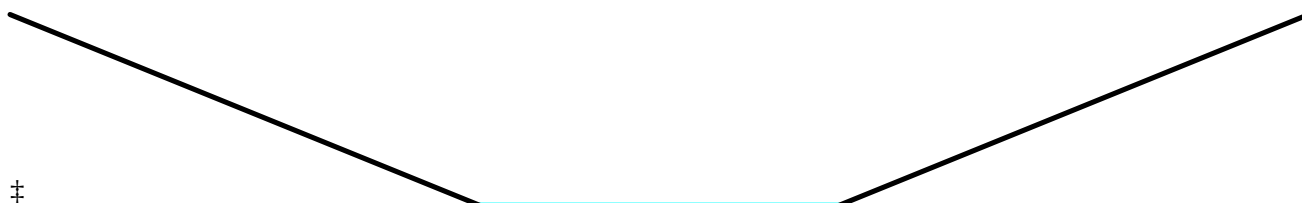
[80] Warning: Exceeded Pond 48P by 1.750 m @ 0.00 hrs (0.6556 m³/s 6.999 ML)

Inflow = 0.0760 m³/s @ 0.22 hrs, Volume= 0.003 ML
 Outflow = 0.0416 m³/s @ 0.23 hrs, Volume= 0.003 ML, Atten= 45%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.69 m/s, Min. Travel Time= 0.3 min
 Avg. Velocity = 0.53 m/s, Avg. Travel Time= 0.5 min

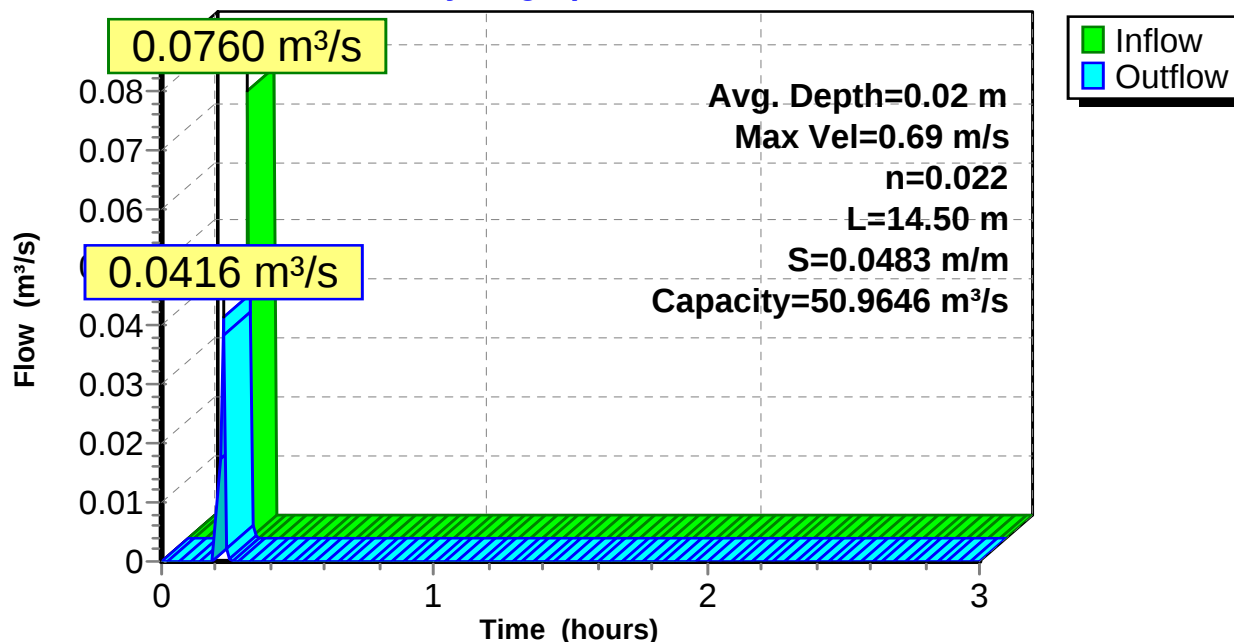
Peak Storage= 0.9 m³ @ 0.23 hrs, Average Depth at Peak Storage= 0.02 m
 Bank-Full Depth= 1.000 m, Capacity at Bank-Full= 50.9646 m³/s

3.00 m x 1.00 m deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 4.0 m/m Top Width= 11.00 m
 Length= 14.50 m Slope= 0.0483 m/m
 Inlet Invert= 4.800 m, Outlet Invert= 4.100 m



Reach 49R: Overland Flow Path

Hydrograph



Summary for Reach OL1: Downstream Boundary - Ex Channel

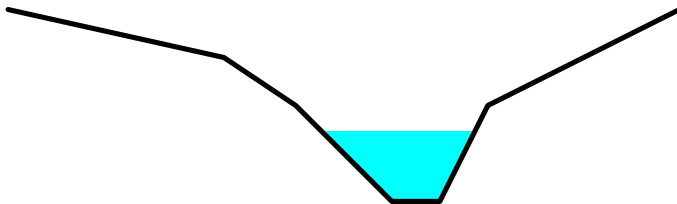
[63] Warning: Exceeded Reach 44R INLET depth by 0.612 m @ 0.22 hrs

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.8317 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Outflow = 3.8307 m³/s @ 0.22 hrs, Volume= 4.523 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.24 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.90 m/s, Avg. Travel Time= 0.1 min

Peak Storage= 9.2 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.47 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

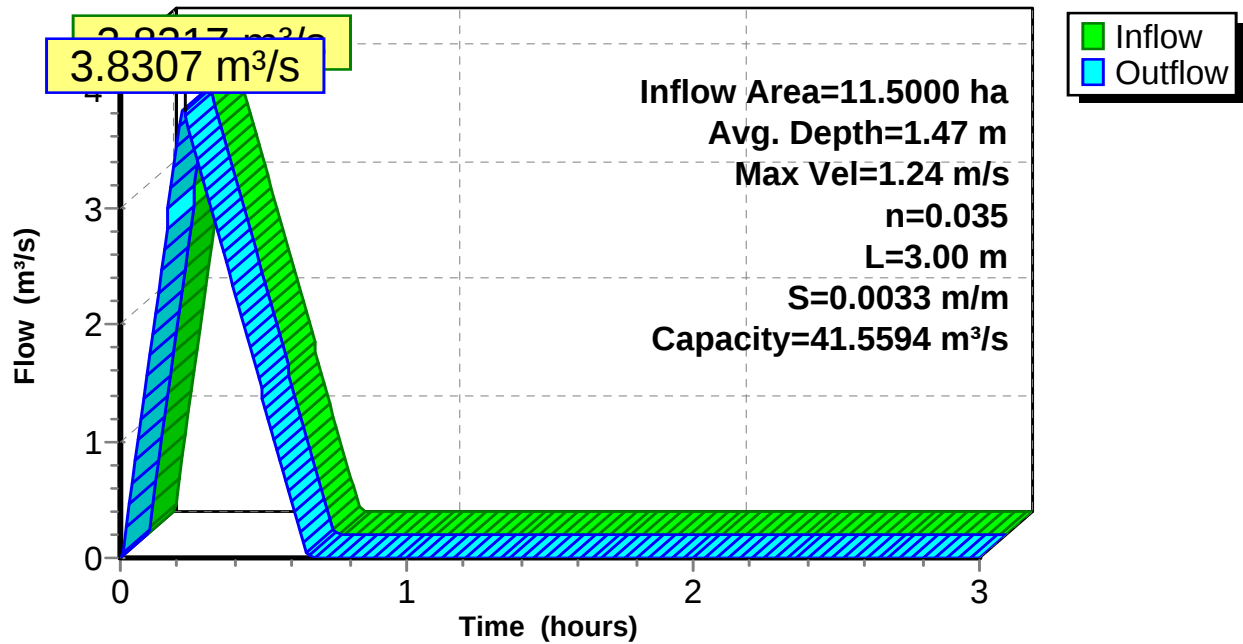


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m ³ /s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1: Downstream Boundary - Ex Channel

Hydrograph



Summary for Reach OL1/a: Downstream Boundary - Pipe Flow

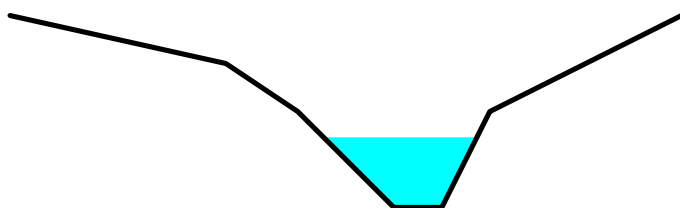
[90] Warning: Qout>Qin may require Finer Routing or smaller dt
 [62] Warning: Exceeded Reach 49R OUTLET depth by 0.450 m @ 0.21 hrs
 [80] Warning: Exceeded Pond 48P by 0.109 m @ 0.65 hrs (0.0431 m³/s 0.115 Ml)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.7992 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Outflow = 3.8026 m³/s @ 0.22 hrs, Volume= 4.524 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.24 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity= 0.99 m/s, Avg. Travel Time= 0.1 min

Peak Storage= 9.2 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.46 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

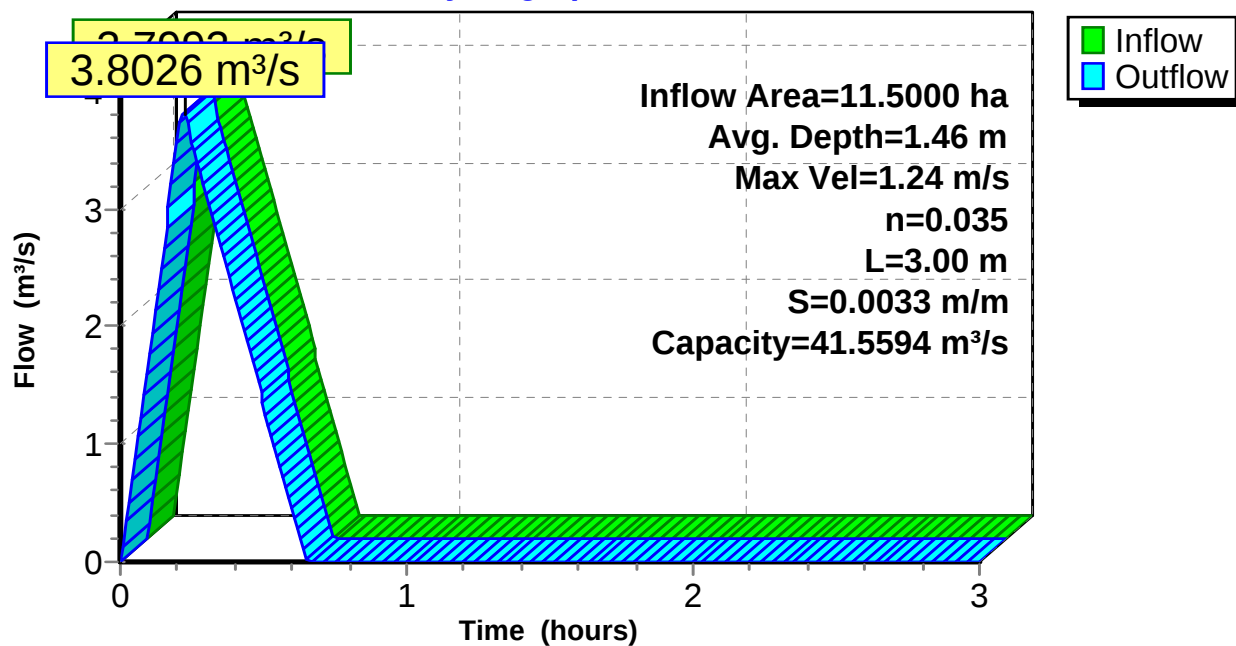


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1/a: Downstream Boundary - Pipe Flow

Hydrograph



Summary for Pond 43P: Ex 1500Dia Culvert

[57] Hint: Peaked at 4.999 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Outflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.999 m @ 0.22 hrs

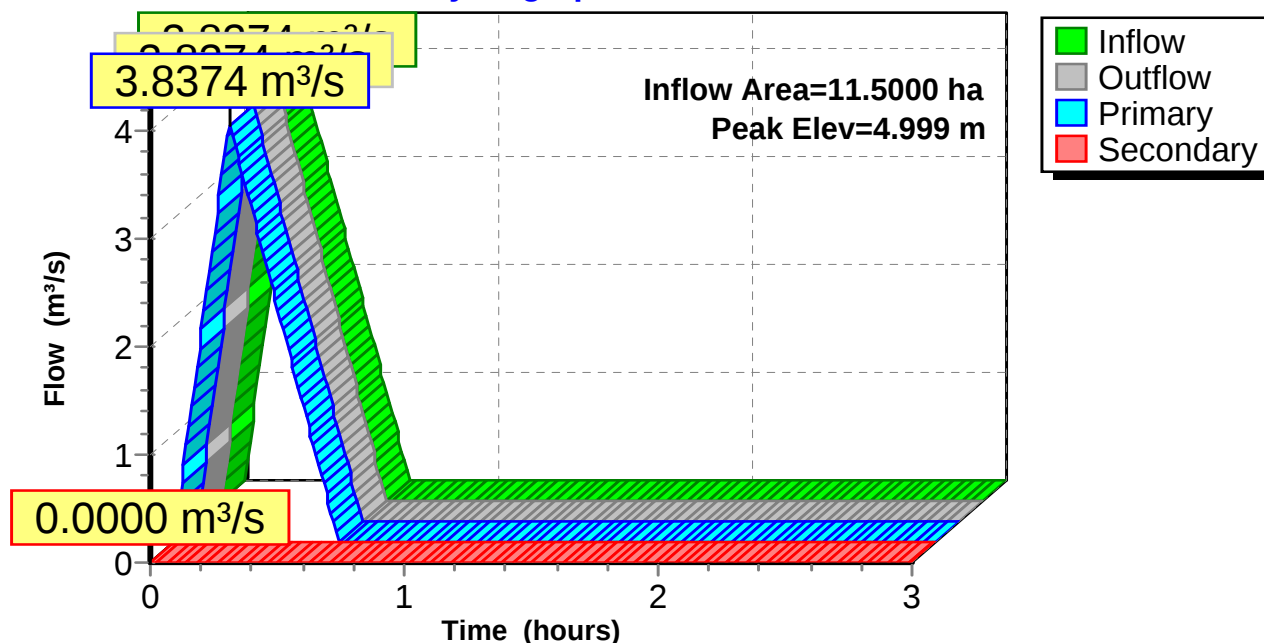
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 13.00 m long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 3.240 m S= 0.0023 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.8374 m³/s @ 0.22 hrs HW=4.999 m TW=3.955 m (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 3.8374 m³/s @ 2.36 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.100 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 43P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 47P: Ex 1500Dia Culvert

[57] Hint: Peaked at 5.144 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Outflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.144 m @ 0.23 hrs

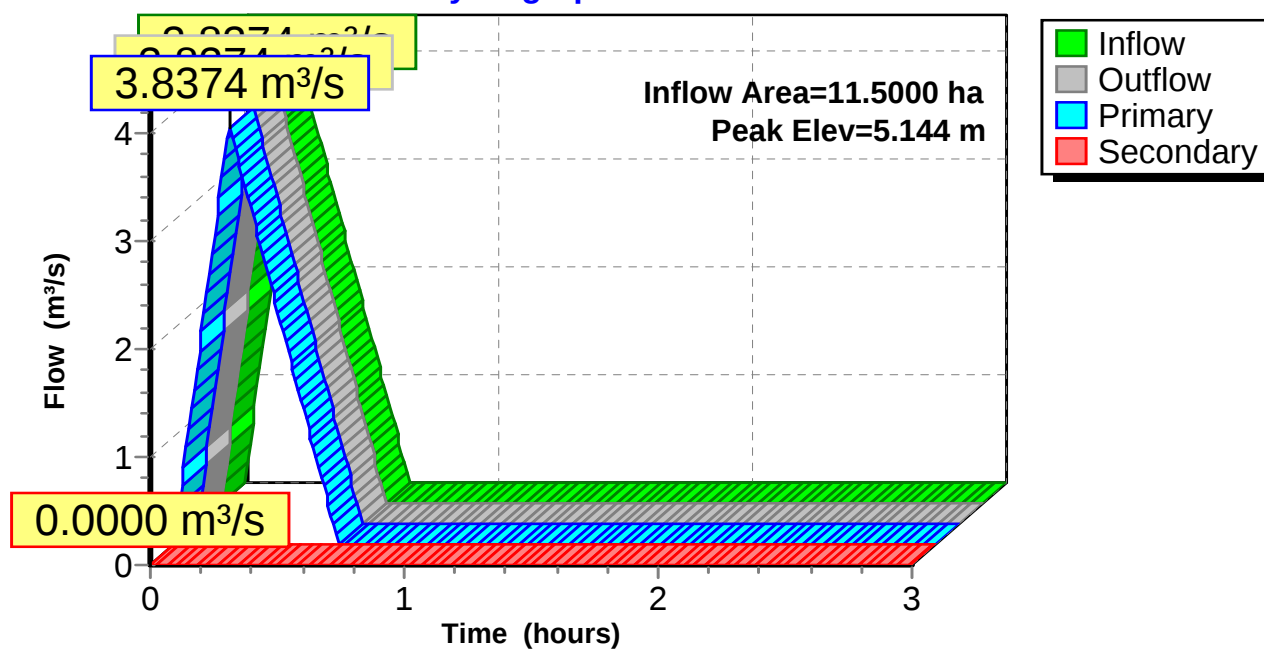
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 27.00 m long Culvert RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 3.240 m S= 0.0011 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.6362 m³/s @ 0.22 hrs HW=5.123 m TW=4.800 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 3.6362 m³/s @ 2.06 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.050 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 47P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 48P: Junction Pit

[57] Hint: Peaked at 4.810 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 39 mm for 10-Year event
 Inflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml
 Outflow = 3.8374 m³/s @ 0.22 hrs, Volume= 4.523 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 3.7614 m³/s @ 0.22 hrs, Volume= 4.521 Ml
 Secondary = 0.0760 m³/s @ 0.22 hrs, Volume= 0.003 Ml

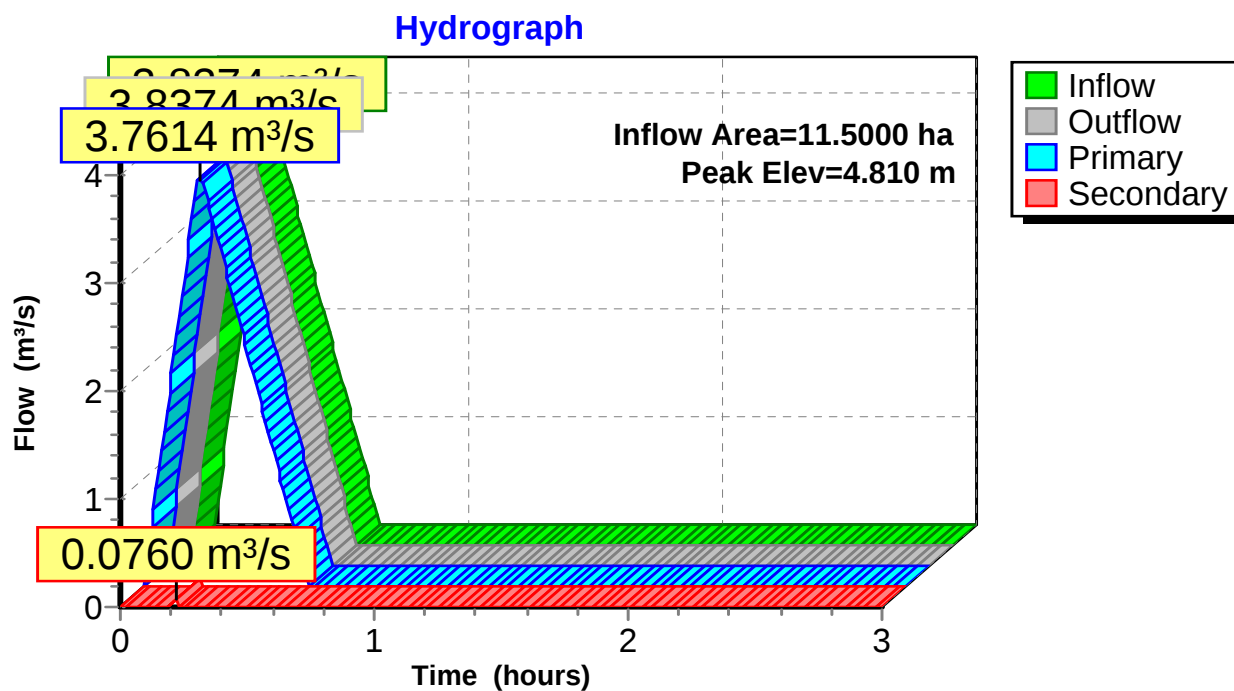
Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.810 m @ 0.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	3.050 m	1,200 mm x 14.50 m long Culvert X 2.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 3.000 m S= 0.0034 m/m Cc= 0.900 n= 0.013 Concrete pipe, straight & clean
#2	Secondary	4.600 m	4.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.6739 m³/s @ 0.22 hrs HW=4.800 m TW=4.561 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 3.6739 m³/s @ 1.62 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.22 hrs HW=4.800 m TW=4.817 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 48P: Junction Pit



Summary for Subcatchment A1: Upstream Catchment

Runoff = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml, Depth= 47 mm

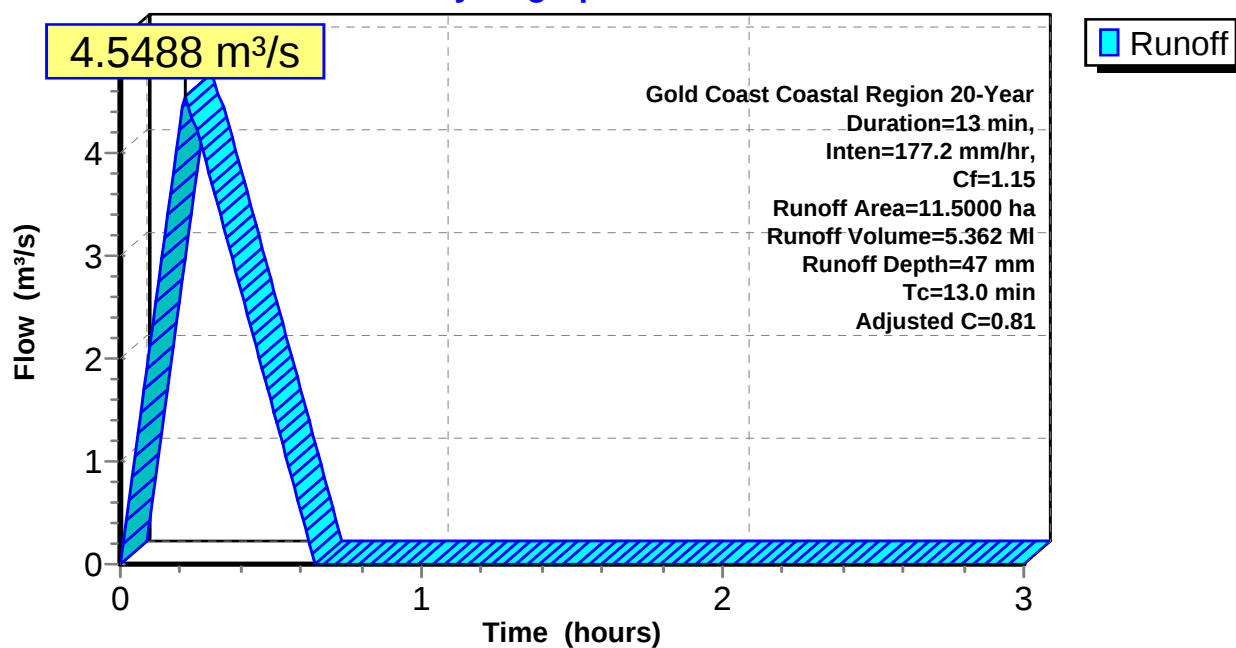
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 20-Year Duration=13 min, Inten=177.2 mm/hr, Cf=1.15

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.81
11.5000		Pervious Area

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

Subcatchment A1: Upstream Catchment

Hydrograph



Summary for Subcatchment A1/a: Upstream Catchment

Runoff = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 ML, Depth= 47 mm

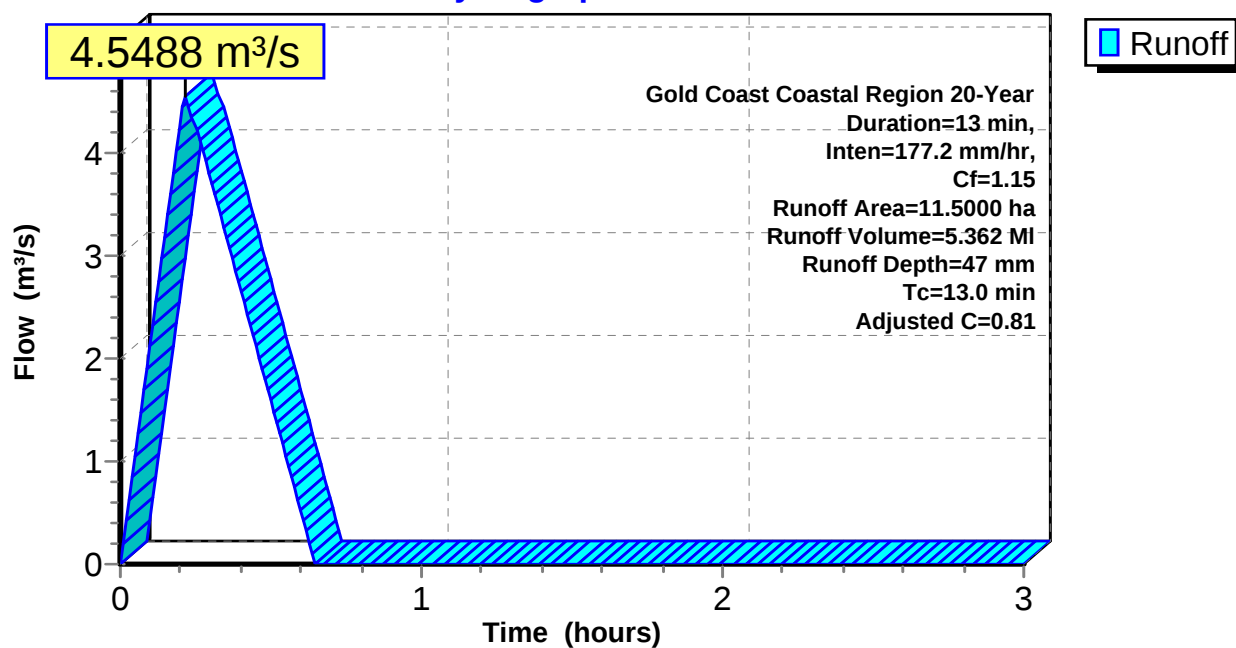
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 20-Year Duration=13 min, Inten=177.2 mm/hr, Cf=1.15

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.81
11.5000		Pervious Area

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

Subcatchment A1/a: Upstream Catchment

Hydrograph



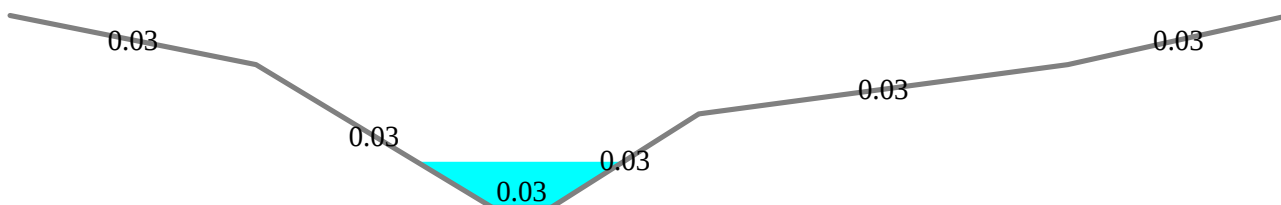
Summary for Reach 44R: Ex Open Channel

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 ML
 Outflow = 4.5428 m³/s @ 0.22 hrs, Volume= 5.362 ML, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.81 m/s, Min. Travel Time= 0.1 min
 Avg. Velocity= 1.31 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 36.3 m³ @ 0.22 hrs, Average Depth at Peak Storage= 0.93 m
 Bank-Full Depth= 3.900 m, Capacity at Bank-Full= 149.3841 m³/s

Custom cross-section, Length= 14.50 m Slope= 0.0069 m/m (102 Elevation Intervals)
 Flow calculated by Manning's Subdivision method
 Inlet Invert= 3.100 m, Outlet Invert= 3.000 m

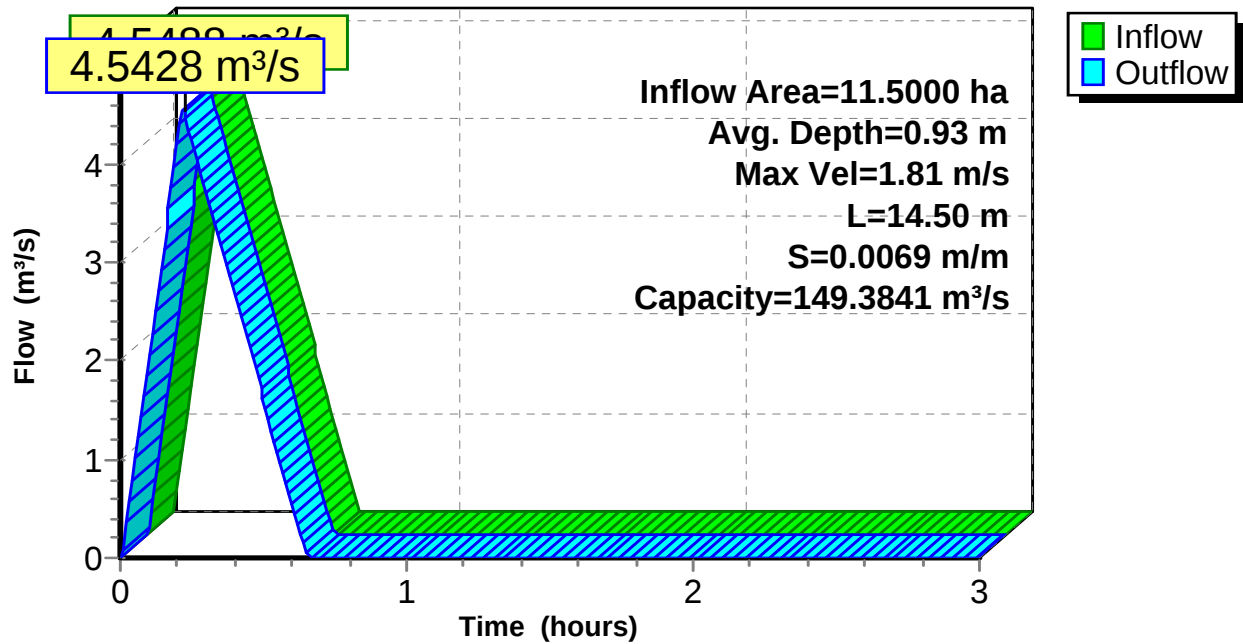


Offset (meters)	Elevation (meters)	Chan.Depth (meters)	n	Description
0.000	7.000	0.00		
5.000	6.000	1.00	0.030	
9.800	3.100	3.90	0.030	
11.000	3.100	3.90	0.030	
14.000	5.000	2.00	0.030	
21.500	6.000	1.00	0.030	
26.000	7.000	0.00	0.030	

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m ³ /s)
0.00	0.00	1.20	0.0	0.0000
1.90	8.12	8.43	117.7	21.9205
2.90	20.04	17.93	290.6	59.7554
3.90	41.29	27.63	598.7	149.3841

Reach 44R: Ex Open Channel

Hydrograph



Summary for Reach 49R: Overland Flow Path

[90] Warning: $Q_{out} > Q_{in}$ may require Finer Routing or smaller dt

[80] Warning: Exceeded Pond 48P by 1.750 m @ 0.00 hrs (0.6556 m³/s 6.786 ML)

Inflow = 0.7318 m³/s @ 0.23 hrs, Volume= 0.163 ML
 Outflow = 0.7589 m³/s @ 0.22 hrs, Volume= 0.163 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.06 m/s, Min. Travel Time= 0.1 min

Avg. Velocity = 1.60 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 5.3 m³ @ 0.22 hrs, Average Depth at Peak Storage= 0.11 m

Bank-Full Depth= 1.000 m, Capacity at Bank-Full= 50.9646 m³/s

3.00 m x 1.00 m deep channel, n= 0.022 Earth, clean & straight

Side Slope Z-value= 4.0 m/m Top Width= 11.00 m

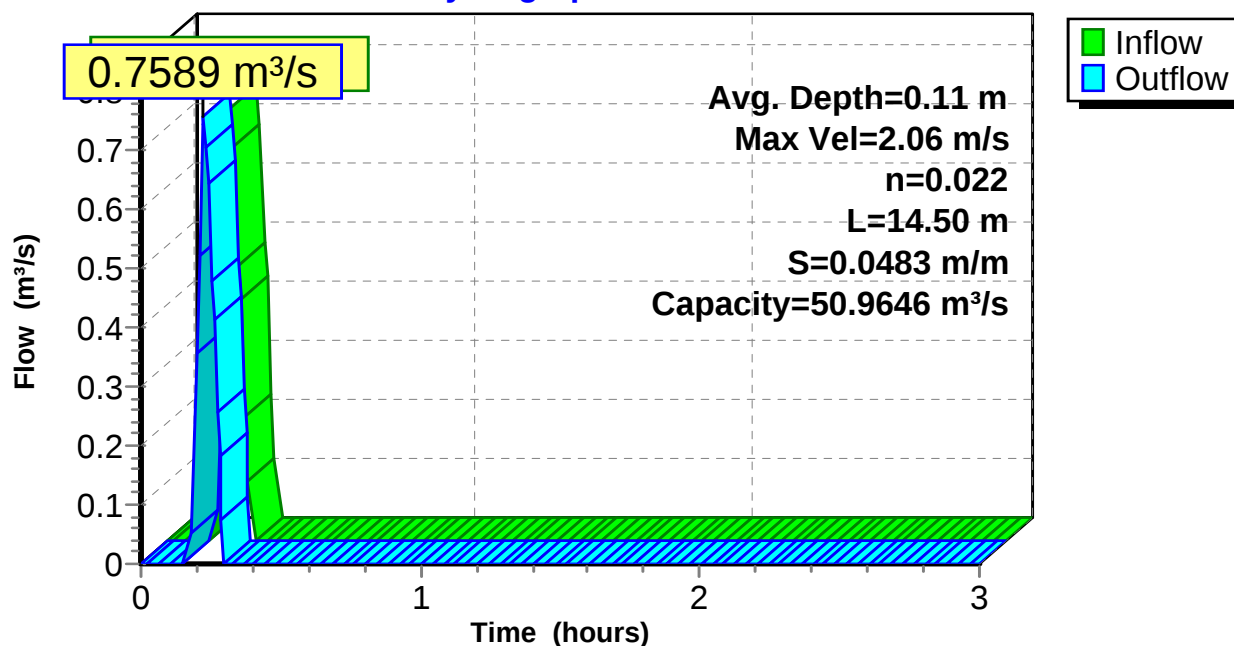
Length= 14.50 m Slope= 0.0483 m/m

Inlet Invert= 4.800 m, Outlet Invert= 4.100 m



Reach 49R: Overland Flow Path

Hydrograph



Summary for Reach OL1: Downstream Boundary - Ex Channel

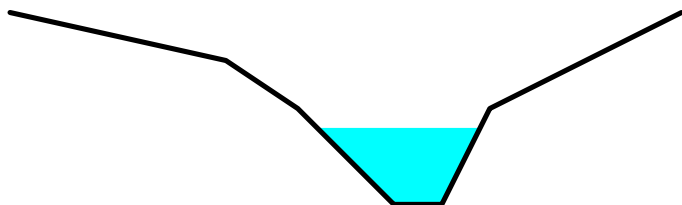
[63] Warning: Exceeded Reach 44R INLET depth by 0.668 m @ 0.22 hrs

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5428 m³/s @ 0.22 hrs, Volume= 5.362 Ml
 Outflow = 4.5414 m³/s @ 0.22 hrs, Volume= 5.362 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.29 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.93 m/s, Avg. Travel Time= 0.1 min

Peak Storage= 10.5 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.60 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

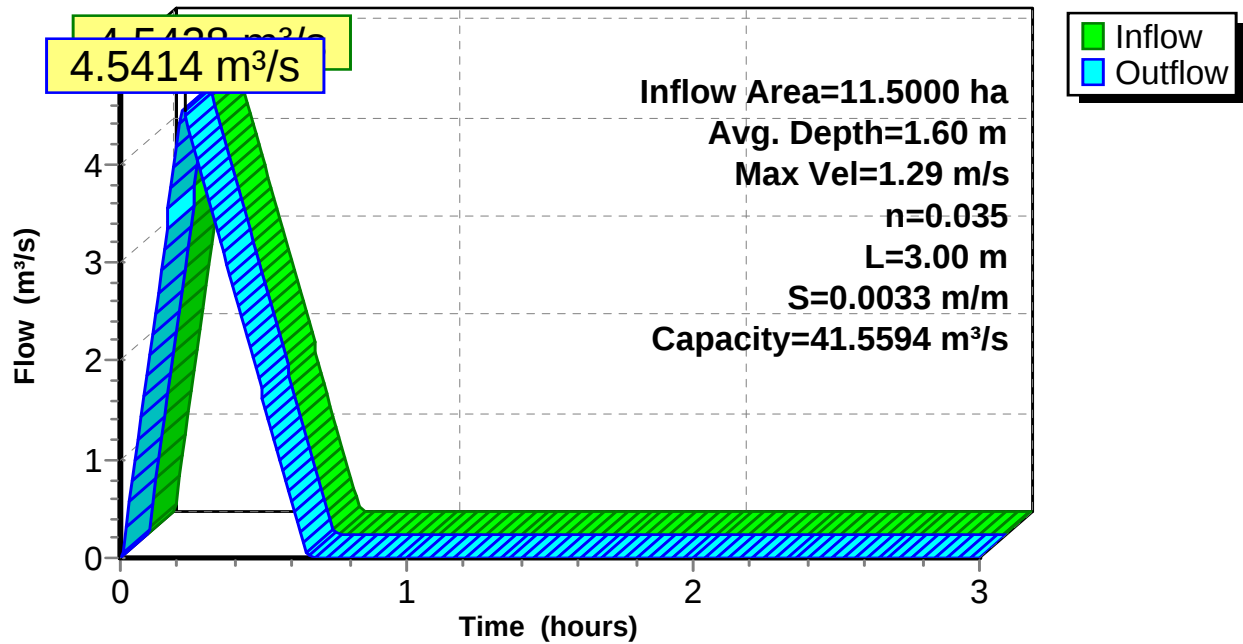


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1: Downstream Boundary - Ex Channel

Hydrograph



Summary for Reach OL1/a: Downstream Boundary - Pipe Flow

[62] Warning: Exceeded Reach 49R OUTLET depth by 0.490 m @ 0.22 hrs

[80] Warning: Exceeded Pond 48P by 0.114 m @ 0.65 hrs (0.0473 m³/s 0.131 ML)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5754 m³/s @ 0.22 hrs, Volume= 5.362 ML
 Outflow = 4.5450 m³/s @ 0.22 hrs, Volume= 5.362 ML, Atten= 1%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.29 m/s, Min. Travel Time= 0.0 min

Avg. Velocity= 1.04 m/s, Avg. Travel Time= 0.0 min

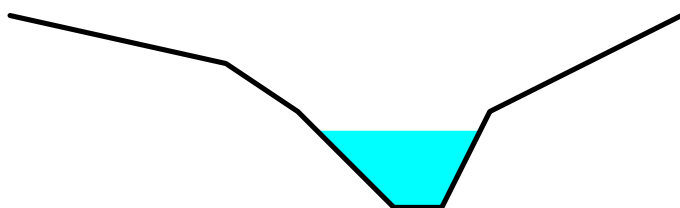
Peak Storage= 10.5 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.60 m

Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m

Constant n= 0.035 Earth, dense weeds

Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

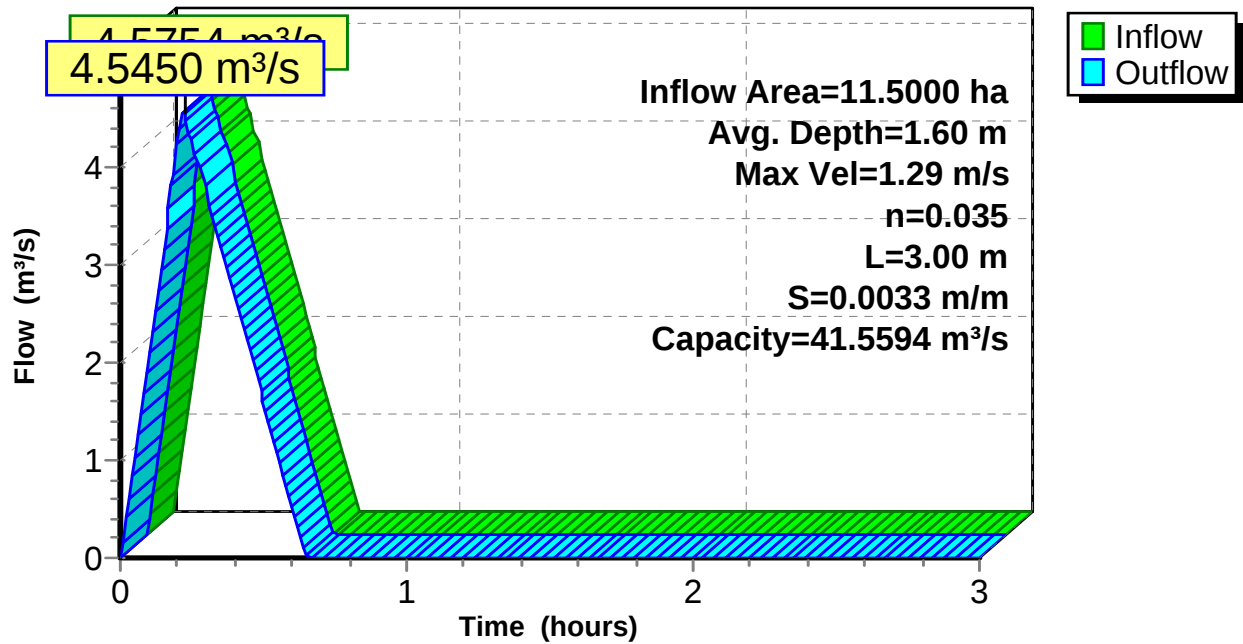


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1/a: Downstream Boundary - Pipe Flow

Hydrograph



Summary for Pond 43P: Ex 1500Dia Culvert

[57] Hint: Peaked at 5.300 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml
 Outflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml
 Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.300 m @ 0.22 hrs

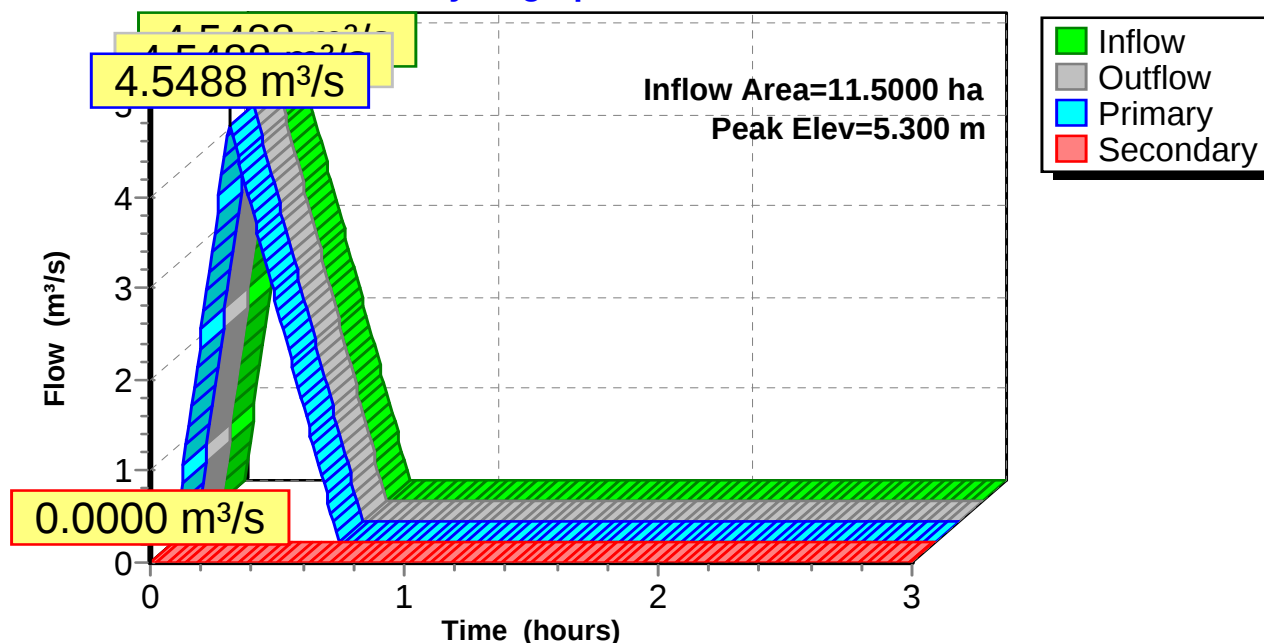
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 13.00 m long Culvert RCP, square edge headwall, $K_e= 0.500$ Outlet Invert= 3.240 m $S= 0.0023$ m/m $C_c= 0.900$ $n= 0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=4.5488 m³/s @ 0.22 hrs HW=5.300 m TW=4.028 m (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 4.5488 m³/s @ 2.57 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=3.270 m TW=3.100 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir(Controls 0.0000 m³/s)

Pond 43P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 47P: Ex 1500Dia Culvert

[57] Hint: Peaked at 5.383 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 MI
 Outflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 MI, Atten= 0%, Lag= 0.0 min
 Primary = 4.4661 m³/s @ 0.21 hrs, Volume= 5.350 MI
 Secondary = 0.1230 m³/s @ 0.23 hrs, Volume= 0.012 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.383 m @ 0.23 hrs

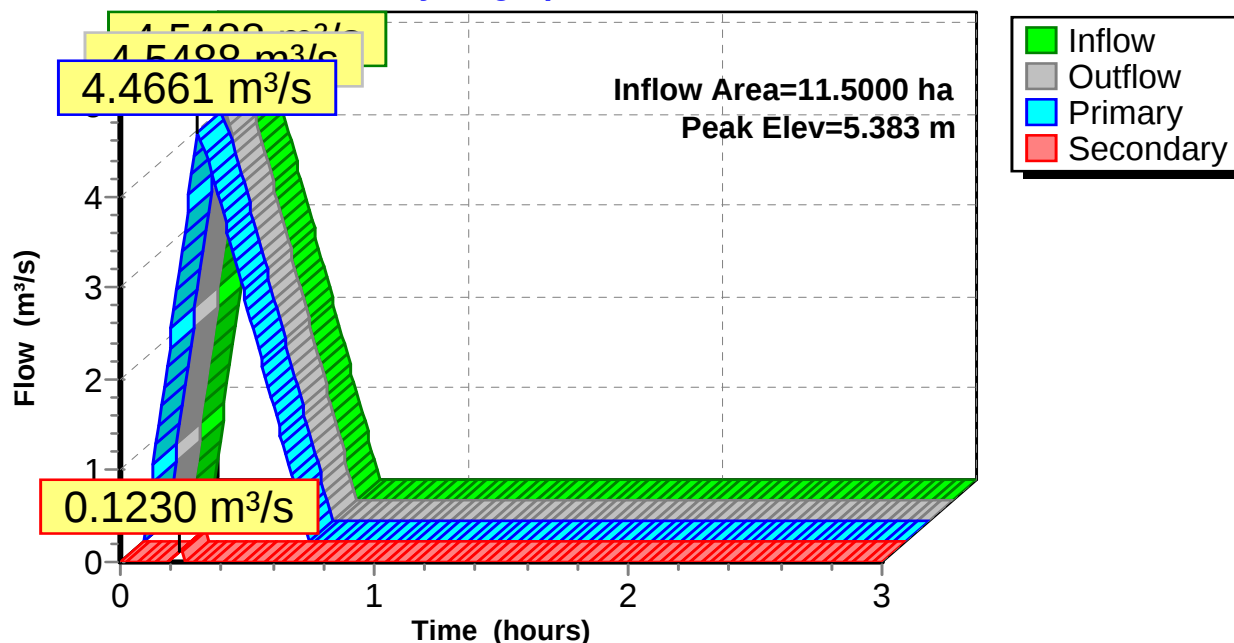
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 27.00 m long Culvert RCP, rounded edge headwall, $K_e=0.100$ Outlet Invert= 3.240 m $S=0.0011$ m/m $C_c=0.900$ $n=0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=4.2590 m³/s @ 0.21 hrs HW=5.356 m TW=4.914 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 4.2590 m³/s @ 2.41 m/s)

Secondary OutFlow Max=0.1200 m³/s @ 0.23 hrs HW=5.382 m TW=4.938 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir (Weir Controls 0.1200 m³/s @ 0.27 m/s)

Pond 47P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 48P: Junction Pit

[57] Hint: Peaked at 4.942 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 47 mm for 20-Year event
 Inflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml
 Outflow = 4.5488 m³/s @ 0.22 hrs, Volume= 5.362 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 3.9104 m³/s @ 0.20 hrs, Volume= 5.199 Ml
 Secondary = 0.7318 m³/s @ 0.23 hrs, Volume= 0.163 Ml

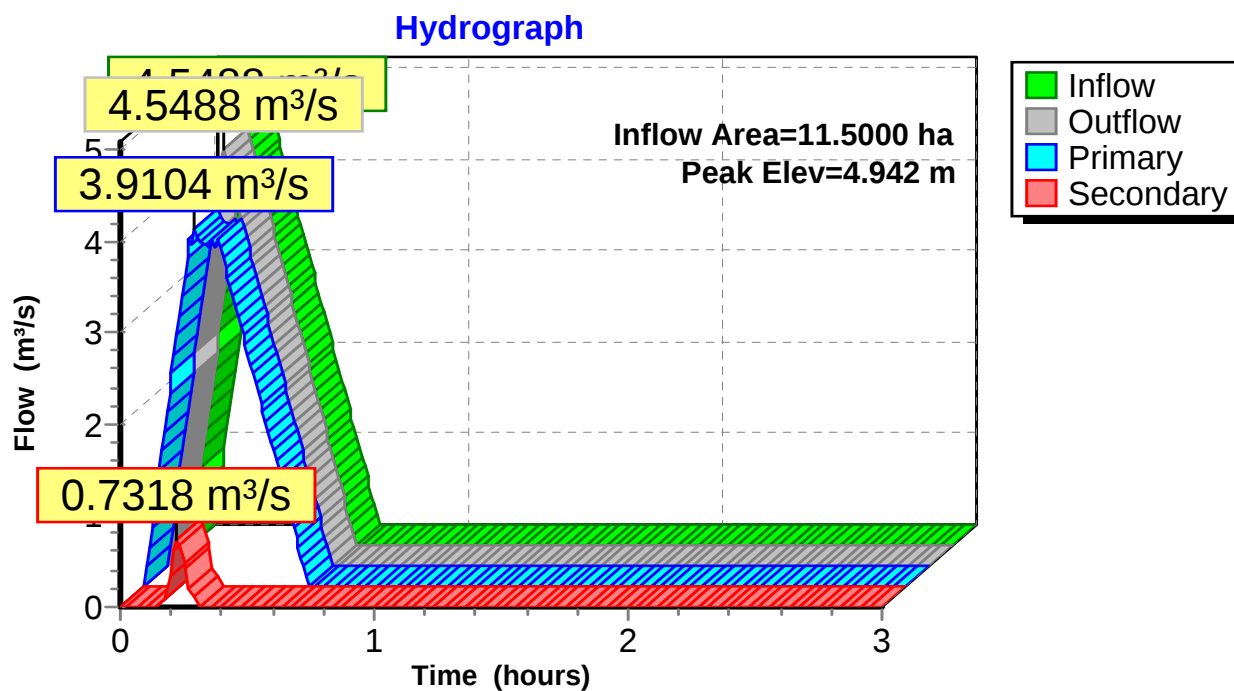
Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 4.942 m @ 0.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	3.050 m	1,200 mm x 14.50 m long Culvert X 2.00 Box, headwall w/3 rounded edges, $K_e= 0.200$ Outlet Invert= 3.000 m $S= 0.0034$ m/m $C_c= 0.900$ $n= 0.013$ Concrete pipe, straight & clean
#2	Secondary	4.600 m	4.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.4875 m³/s @ 0.20 hrs HW=4.862 m TW=4.646 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 3.4875 m³/s @ 1.54 m/s)

Secondary OutFlow Max=0.6595 m³/s @ 0.23 hrs HW=4.934 m TW=4.904 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir (Weir Controls 0.6595 m³/s @ 0.50 m/s)

Pond 48P: Junction Pit



Summary for Subcatchment A1: Upstream Catchment

Runoff = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml, Depth= 71 mm

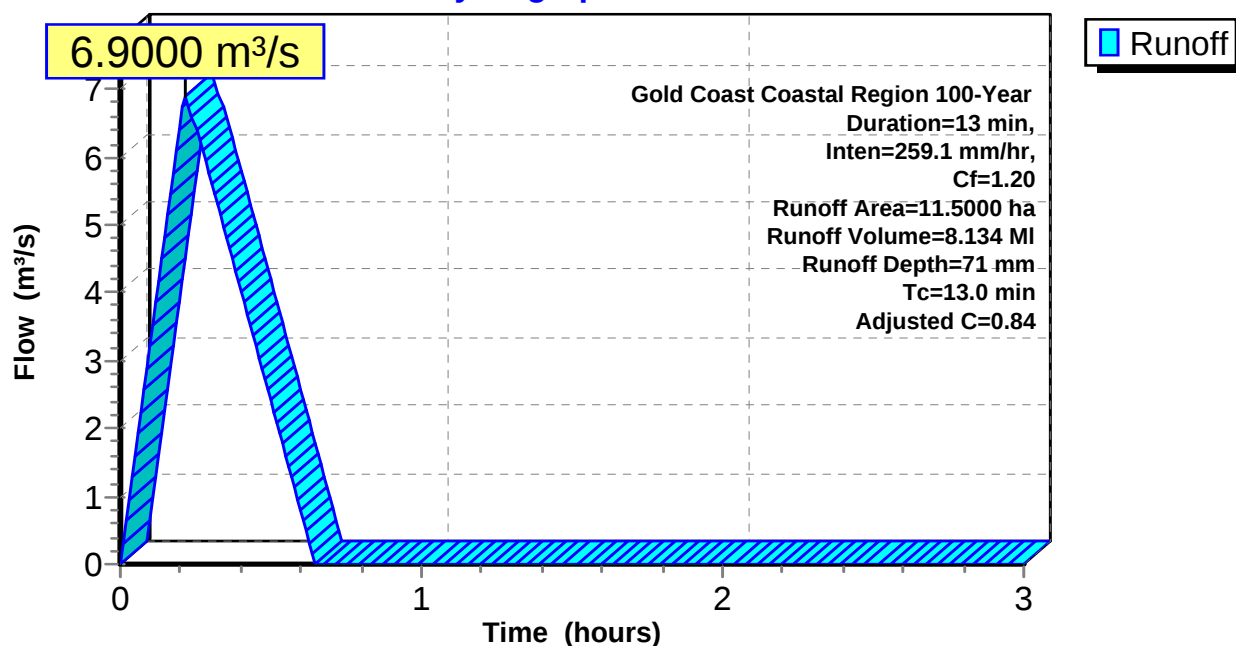
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 100-Year Duration=13 min, Inten=259.1 mm/hr, Cf=1.20

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.84
11.5000		Pervious Area

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

Subcatchment A1: Upstream Catchment

Hydrograph



Summary for Subcatchment A1/a: Upstream Catchment

Runoff = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 MI, Depth= 71 mm

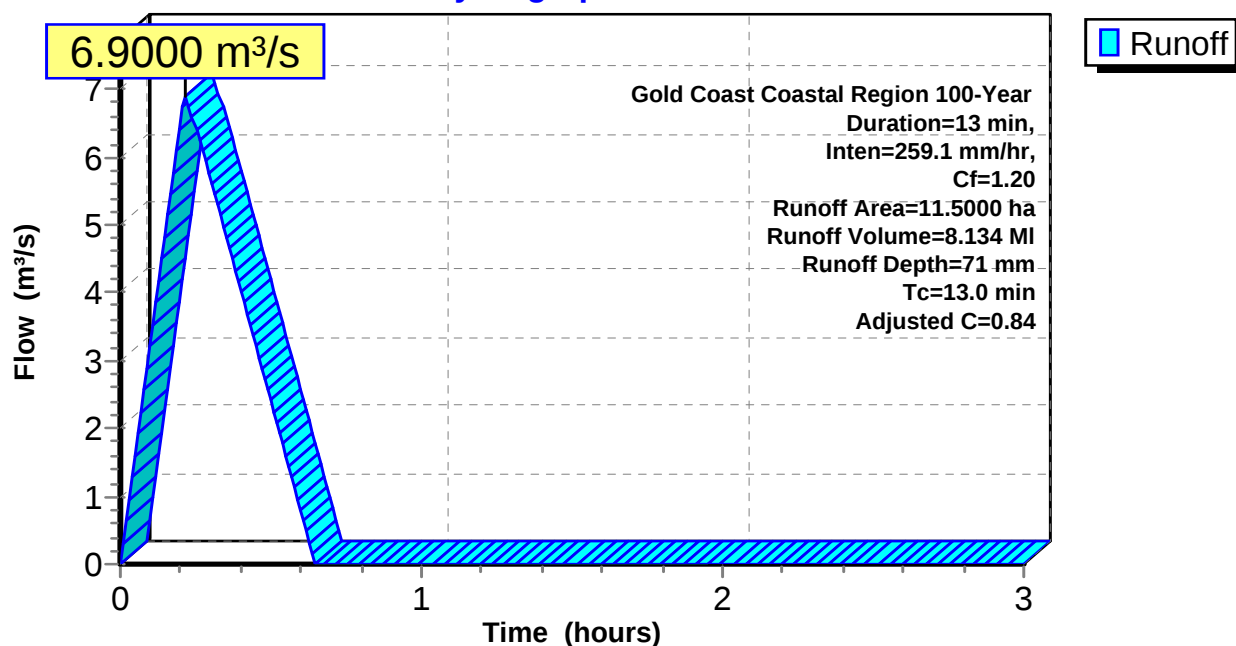
Runoff by Rational method, Rise/Fall=1.0/2.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Gold Coast Coastal Region 100-Year Duration=13 min, Inten=259.1 mm/hr, Cf=1.20

Area (ha)	C	Description
11.5000	0.70	
11.5000	0.70	Weighted Average, Frequency adjusted to C = 0.84
11.5000		Pervious Area

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

Subcatchment A1/a: Upstream Catchment

Hydrograph



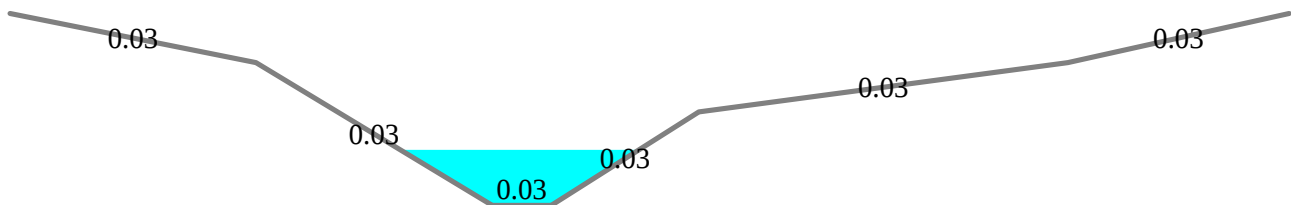
Summary for Reach 44R: Ex Open Channel

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 ML
 Outflow = 6.8922 m³/s @ 0.22 hrs, Volume= 8.134 ML, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.02 m/s, Min. Travel Time= 0.1 min
 Avg. Velocity= 1.46 m/s, Avg. Travel Time= 0.2 min

Peak Storage= 49.5 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.13 m
 Bank-Full Depth= 3.900 m, Capacity at Bank-Full= 149.3841 m³/s

Custom cross-section, Length= 14.50 m Slope= 0.0069 m/m (102 Elevation Intervals)
 Flow calculated by Manning's Subdivision method
 Inlet Invert= 3.100 m, Outlet Invert= 3.000 m

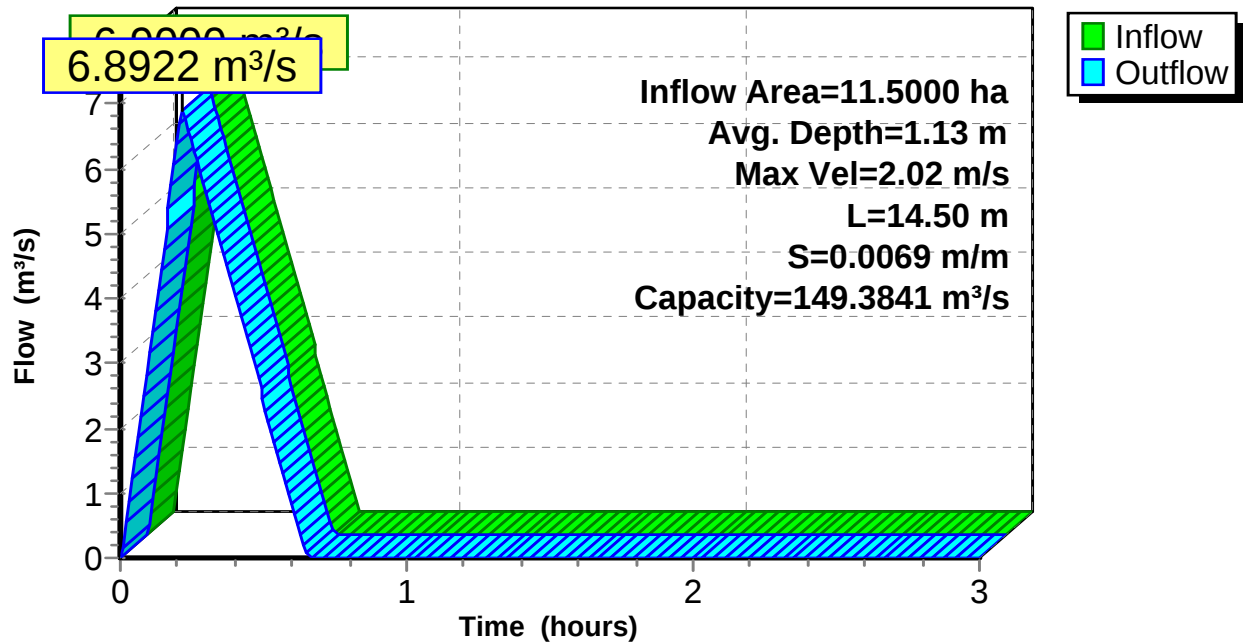


Offset (meters)	Elevation (meters)	Chan.Depth (meters)	n	Description
0.000	7.000	0.00		
5.000	6.000	1.00	0.030	
9.800	3.100	3.90	0.030	
11.000	3.100	3.90	0.030	
14.000	5.000	2.00	0.030	
21.500	6.000	1.00	0.030	
26.000	7.000	0.00	0.030	

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.20	0.0	0.0000
1.90	8.12	8.43	117.7	21.9205
2.90	20.04	17.93	290.6	59.7554
3.90	41.29	27.63	598.7	149.3841

Reach 44R: Ex Open Channel

Hydrograph



Summary for Reach 49R: Overland Flow Path

[80] Warning: Exceeded Pond 48P by 1.750 m @ 0.65 hrs (0.6556 m³/s 6.374 ML)

Inflow = 3.2082 m³/s @ 0.22 hrs, Volume= 1.742 ML
 Outflow = 3.1849 m³/s @ 0.23 hrs, Volume= 1.742 ML, Atten= 1%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.32 m/s, Min. Travel Time= 0.1 min
 Avg. Velocity = 2.25 m/s, Avg. Travel Time= 0.1 min

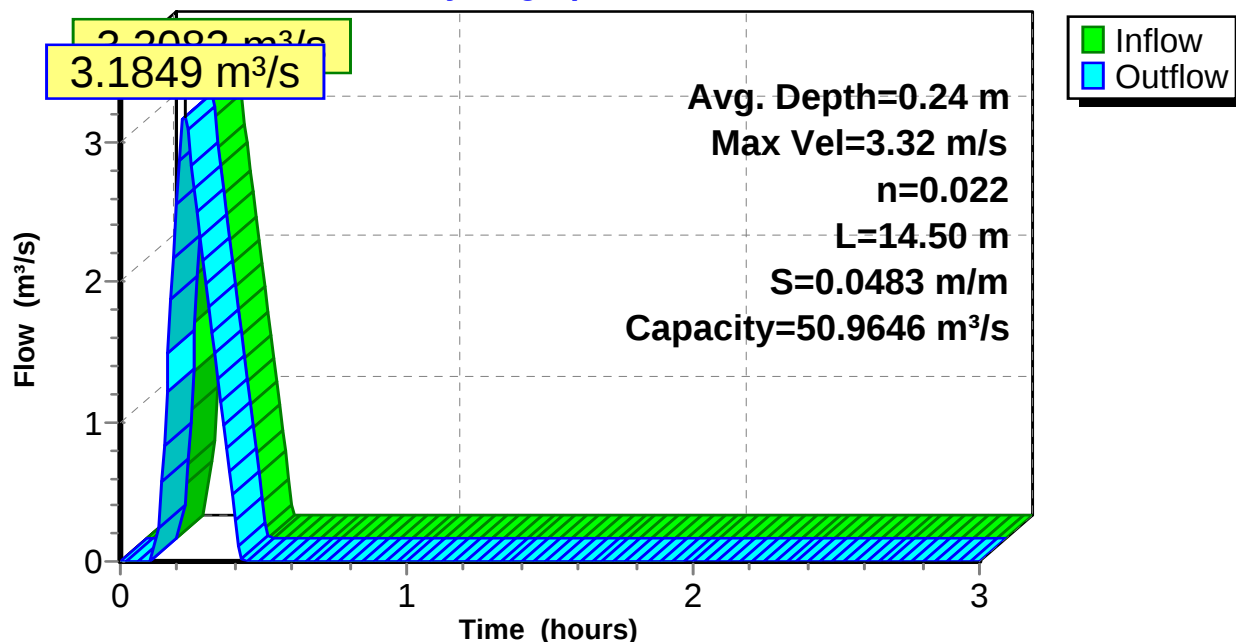
Peak Storage= 13.9 m³ @ 0.23 hrs, Average Depth at Peak Storage= 0.24 m
 Bank-Full Depth= 1.000 m, Capacity at Bank-Full= 50.9646 m³/s

3.00 m x 1.00 m deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 4.0 m/m Top Width= 11.00 m
 Length= 14.50 m Slope= 0.0483 m/m
 Inlet Invert= 4.800 m, Outlet Invert= 4.100 m



Reach 49R: Overland Flow Path

Hydrograph



Summary for Reach OL1: Downstream Boundary - Ex Channel

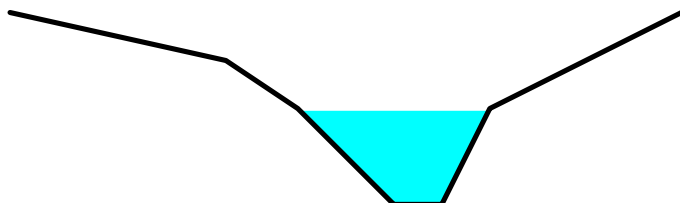
[63] Warning: Exceeded Reach 44R INLET depth by 0.822 m @ 0.22 hrs

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.8922 m³/s @ 0.22 hrs, Volume= 8.134 Ml
 Outflow = 6.8903 m³/s @ 0.22 hrs, Volume= 8.134 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.43 m/s, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.03 m/s, Avg. Travel Time= 0.0 min

Peak Storage= 14.4 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.95 m
 Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m
 Constant n= 0.035 Earth, dense weeds
 Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

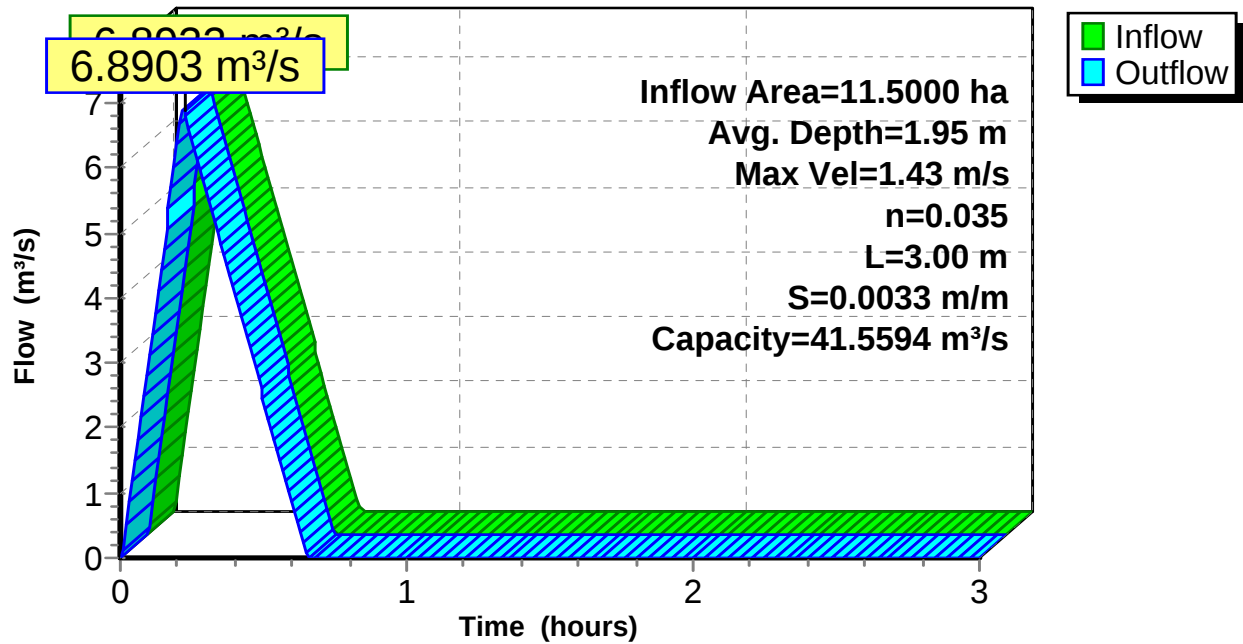


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1: Downstream Boundary - Ex Channel

Hydrograph



Summary for Reach OL1/a: Downstream Boundary - Pipe Flow

[63] Warning: Exceeded Reach 49R INLET depth by 0.007 m @ 0.22 hrs

[80] Warning: Exceeded Pond 48P by 0.137 m @ 0.02 hrs (1.0817 m³/s 0.168 ML)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.8795 m³/s @ 0.22 hrs, Volume= 8.134 ML
 Outflow = 6.8590 m³/s @ 0.22 hrs, Volume= 8.134 ML, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.43 m/s, Min. Travel Time= 0.0 min

Avg. Velocity= 1.15 m/s, Avg. Travel Time= 0.0 min

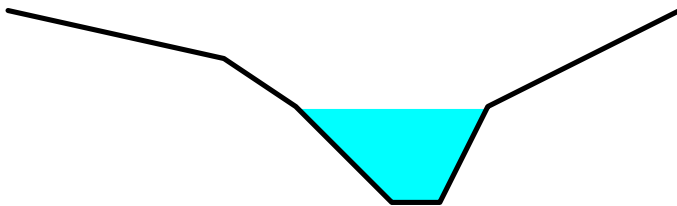
Peak Storage= 14.4 m³ @ 0.22 hrs, Average Depth at Peak Storage= 1.95 m

Bank-Full Depth= 4.000 m, Capacity at Bank-Full= 41.5594 m³/s

Custom cross-section, Length= 3.00 m Slope= 0.0033 m/m

Constant n= 0.035 Earth, dense weeds

Inlet Invert= 3.100 m, Outlet Invert= 3.090 m

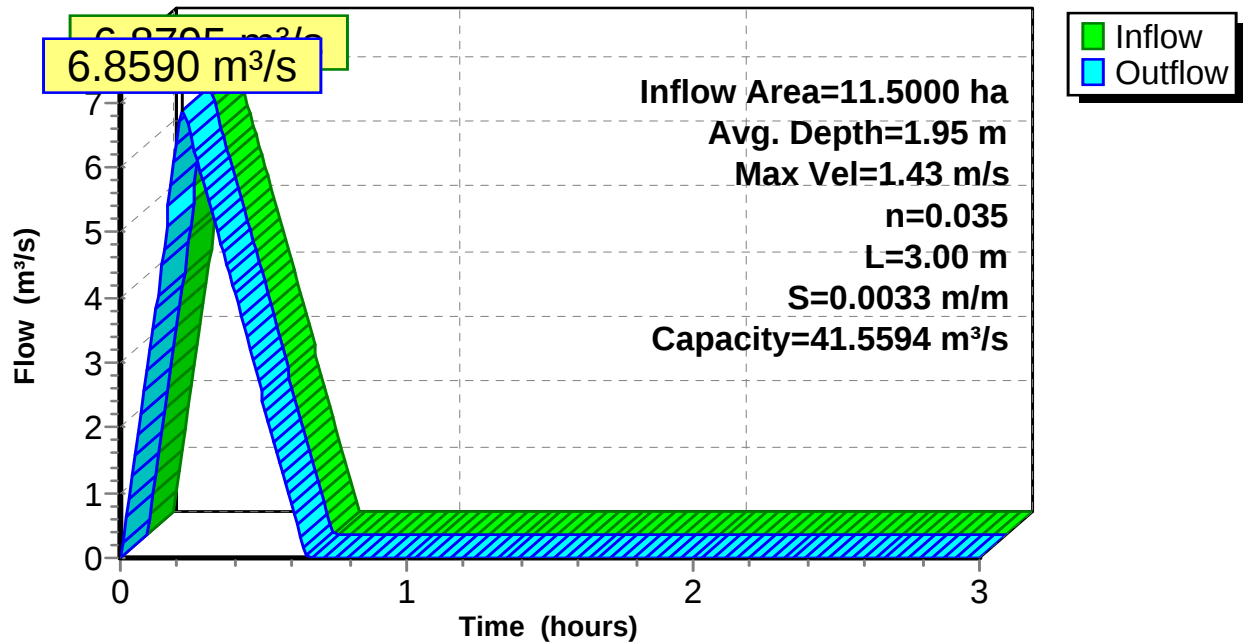


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	7.000	0.00
4.500	6.000	1.00
6.000	5.000	2.00
8.000	3.000	4.00
9.000	3.000	4.00
10.000	5.000	2.00
12.000	6.000	1.00
14.000	7.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	1.00	0.0	0.0000
2.00	5.00	6.06	15.0	7.2520
3.00	10.75	10.10	32.3	18.4817
4.00	21.50	16.95	64.5	41.5594

Reach OL1/a: Downstream Boundary - Pipe Flow

Hydrograph



Summary for Pond 43P: Ex 1500Dia Culvert

[57] Hint: Peaked at 5.487 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml
 Outflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 5.2503 m³/s @ 0.22 hrs, Volume= 7.545 Ml
 Secondary = 1.6497 m³/s @ 0.22 hrs, Volume= 0.588 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.487 m @ 0.22 hrs

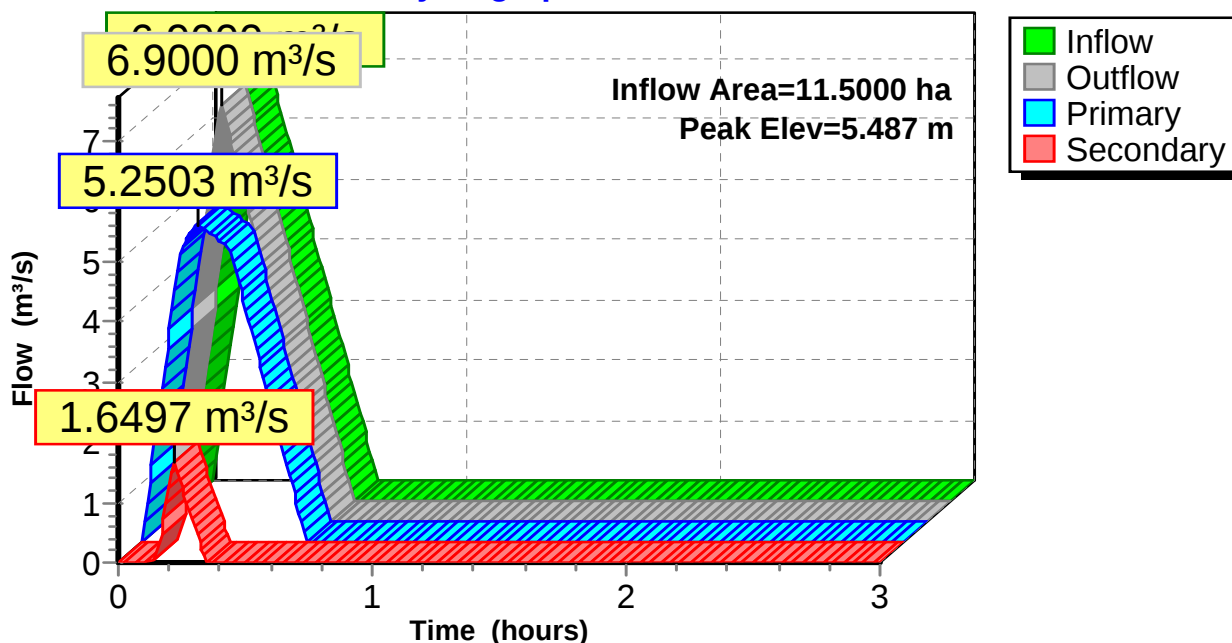
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 13.00 m long Culvert RCP, square edge headwall, $K_e=0.500$ Outlet Invert= 3.240 m $S=0.0023$ m/m $C_c=0.900$ $n=0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=5.2503 m³/s @ 0.22 hrs HW=5.487 m TW=4.229 m (Dynamic Tailwater)
 ↳1=Culvert (Barrel Controls 5.2503 m³/s @ 2.97 m/s)

Secondary OutFlow Max=1.6497 m³/s @ 0.22 hrs HW=5.487 m TW=4.229 m (Dynamic Tailwater)
 ↳2=Sharp-Crested Rectangular Weir (Weir Controls 1.6497 m³/s @ 0.65 m/s)

Pond 43P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 47P: Ex 1500Dia Culvert

[57] Hint: Peaked at 5.560 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml
 Outflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 4.5845 m³/s @ 0.15 hrs, Volume= 6.599 Ml
 Secondary = 3.3163 m³/s @ 0.23 hrs, Volume= 1.535 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.560 m @ 0.23 hrs

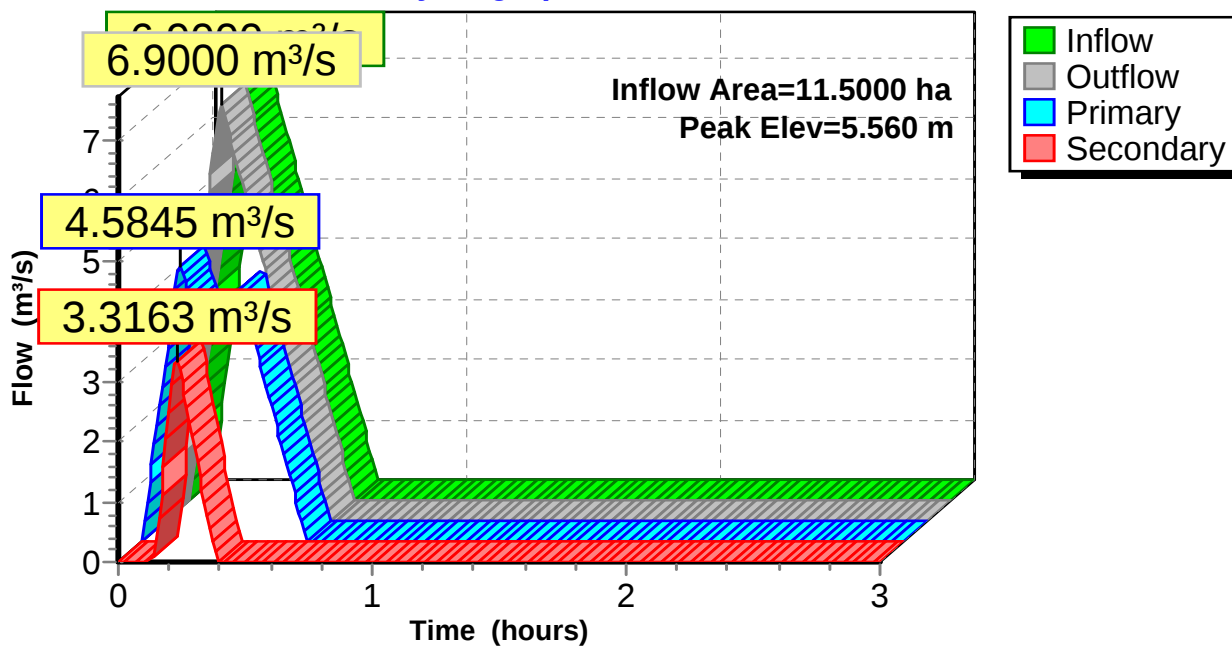
Device	Routing	Invert	Outlet Devices
#1	Primary	3.270 m	1,500 mm x 27.00 m long Culvert RCP, rounded edge headwall, $K_e=0.100$ Outlet Invert= 3.240 m $S=0.0011$ m/m $C_c=0.900$ $n=0.013$ Concrete pipe, straight & clean
#2	Secondary	5.360 m	20.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=4.2444 m³/s @ 0.15 hrs HW=5.384 m TW=4.945 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 4.2444 m³/s @ 2.40 m/s)

Secondary OutFlow Max=3.3010 m³/s @ 0.23 hrs HW=5.560 m TW=5.275 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir (Weir Controls 3.3010 m³/s @ 0.83 m/s)

Pond 47P: Ex 1500Dia Culvert

Hydrograph



Summary for Pond 48P: Junction Pit

[57] Hint: Peaked at 5.277 m (Flood elevation advised)

Inflow Area = 11.5000 ha, 0.00% Impervious, Inflow Depth = 71 mm for 100-Year event
 Inflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml
 Outflow = 6.9000 m³/s @ 0.22 hrs, Volume= 8.134 Ml, Atten= 0%, Lag= 0.0 min
 Primary = 3.9681 m³/s @ 0.14 hrs, Volume= 6.391 Ml
 Secondary = 3.2082 m³/s @ 0.22 hrs, Volume= 1.742 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 5.277 m @ 0.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	3.050 m	1,200 mm x 14.50 m long Culvert X 2.00 Box, headwall w/3 rounded edges, $K_e= 0.200$ Outlet Invert= 3.000 m $S= 0.0034$ m/m $C_c= 0.900$ $n= 0.013$ Concrete pipe, straight & clean
#2	Secondary	4.600 m	4.00 m long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.00 m Crest Height

Primary OutFlow Max=3.3711 m³/s @ 0.14 hrs HW=4.896 m TW=4.694 m (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 3.3711 m³/s @ 1.49 m/s)

Secondary OutFlow Max=3.1347 m³/s @ 0.22 hrs HW=5.274 m TW=5.041 m (Dynamic Tailwater)
 ↑2=Sharp-Crested Rectangular Weir (Weir Controls 3.1347 m³/s @ 1.20 m/s)

Pond 48P: Junction Pit

