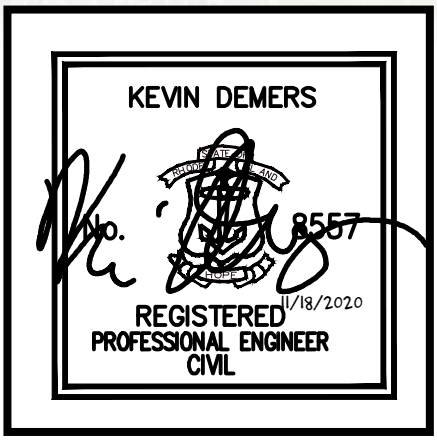
DiPrete Engineering

Stormwater Management Report



Newport National West Course

Located in Middletown, RI

Applicant: Combined Properties, Inc.

08-28-2018

Revised 01-13-2020

Revised 06-12-2020

Revised 11-03-2020

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Executive Summary

On behalf of the Client, we are submitting drainage calculations for the proposed development at 425 Mitchell's Lane in Middletown, RI. The site is located on Assessors' Plat 124 Lot 29. The site exists today as vast stretches of open field from previous farming activities, a variety of previously established pathways and stone walls, areas dominated by forested habitat, and several wetland features. The client proposes to construct a new nine-hole golf course addition along with associated buildings and pervious parking.

The post development stormwater will be treated for water quality using Best Management Practices (BMPs). The Site has been designed to meet the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM). The development meets the RISDISM in place at the time of initial approval in 2007, with treatment to the 2010 Standards to the extent possible.

To mitigate post development flows on site, a series of swales and drainage catch basins and piping are utilized to convey runoff to the irrigation pond. The irrigation pond is designed with a permanent water level below the top of berm elevation. With this design, the pond will control runoff for the 1 through 100-year storm events. The drainage system is designed with overland grassed channels and large sumps near the structure rims to act as pretreatment. The irrigation pond will then promote further settling and treatment to remove 85% or more of TSS (total suspended solids) generated by the proposed project.

This report details how the site will show no net increase in stormwater runoff from pre-development to post-development conditions, and how the proposed BMPs will provide water quality treatment for stormwater runoff.

Pre-development Conditions versus Post-Development Conditions for each watershed are summarized below:

Subwatershed (design point)	1-yr Peak Flow		10-yr Peak Flow		25-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1 (Mitchell's Lane)	6.66	5.85	21.03	18.60	30.31	26.81	50.57	44.72
DP-2 (Maidford River/Wyatt Road)	51.94	16.17	165.44	54.18	238.67	82.99	398.58	193.63

All flows in cubic feet per second (cfs)

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME Newport National West Course	**(RIDEM USE ONLY)**
TOWN Middletown	**STW/WQC File #:**
BRIEF PROJECT DESCRIPTION: Construction of 9-hole golf course	**Date Received:**

Stormwater Management Plan (SMP) Elements – Minimum Standards

Submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity.

Note: **All stormwater construction projects must submit a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

☐ Residential	☒ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION

☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See Guidance to identify receiving waters.

☐ **Groundwater**	☐ **Surface Water**	☐ **MS4**
☐ GAA	☐ Isolated Wetland	☐ RIDOT
☒ GA	☐ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☐ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

☐ Groundwater or Disconnected Wetland	☒ SRWP Critical Habitat (Rare and Endangered Species), Drinking Water Supply		
☒ Waterbody Name: Maidford River	☐ Coldwater	☒ Warmwater	☐ Unassessed
☒ Waterbody ID: RI0007035R-02A	☐ 4th order stream of pond 50 acres or more		
☒ TMDL for: Fecal Coliform	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☒ Contributes stormwater to a public beach		
☒ 303(d) list – Impairment(s) for: Benthic-Macroinvertebrate Bioassessments, Lead, Fecal Coliform, Total Phosphorus, Turbidity	☐ Contributes to shellfishing grounds		

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☐ Municipal Master Plan Approval	Approval Date:	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☐ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site	
☐ Delineated from FEMA Maps	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY):
	Amount of Cut (CY):
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway	
☐ Floodplain storage capacity is impacted	
☒ Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION
☐ CRMC Assent required
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
☐ Sea level rise mitigation has been designed into this project

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:			
1. OFFICE OF WASTE MANAGEMENT (OWM)			
	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))		**RIDEM CONTACT:**
	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)		
	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		**SITE ID#:**
		☐ CERCLIS/Superfund (NPL)	
		☐ State Hazardous Waste Site (SHWS)	
		☐ Environmental Land Usage Restriction (ELUR)	
		☐ Leaking Underground Storage Tank (LUST)	
		☐ Closed Landfill	
Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration**.**			
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:			
	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php		
	☐ Auto Fueling Facility (e.g., gas station)		
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		

	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
☒ Pre Construction Impervious Area (in Acres)		
0.00	☒ Total Pre-Construction Impervious Area (**TIA**)	
171.3	☒ Total Site Area (**TSA**)	
111.8	☒ Jurisdictional Wetlands (**JW**)	
0.0	☒ Conservation Land (**CL**)	
☒ Calculate the Site Size (defined as contiguous properties under same ownership)		
59.5	☒ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**)	
	☒ (**TIA**) / (**SS**) = 0.0	☐ (**TIA**) / (**SS**) >**0.4**?
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

This section may be deleted if not required.

Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:

- Town requires … (state the specific local requirement)
- Meets Town's dimensional requirement of …
- Not practical for site because …
- Applying for waiver/variance to achieve this (pending/approved/denied)
- Applying for wavier/variance to seek relief from this (pending/approved/denied)

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS	**IF NOT IMPLEMENTED, EXPLAIN HERE**
☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☒ As much natural vegetation and pre-development hydrology as possible has been maintained	

B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☐ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☒ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☐ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	Forested wetlands will be fenced off and protected, with the exception of designated "fly-over" areas as approved under App No. 07-0229.
D) REDUCE IMPERVIOUS COVER ☐ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☐ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☒ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☒ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☐ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☐ Other (describe):	The only impervious cover is the Clubhouse roof and Maintenance slab, with a total area of 0.43 acres. All other improvements (such as driveways, parking areas, tees and fairways) are pervious. The clubhouse is proposed at less than 10,000 sq. ft. area by proposing multiple stories.

E) DISCONNECT IMPERVIOUS AREA ☐ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	Roof runoff separated from internal golf course drains and is proposed to discharge to the bioretention swale west of the parking area.
F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☐ Small-scale BMPs have been designated to treat runoff as close as possible to the source	Site is 99.7% pervious. Stormwater will be re-used onsite via the irrigation pond and therefore only large storm events will drain from the site.
G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☐ Low-maintenance landscaping has been proposed using native species and cultivars ☐ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☐ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	Proposed site improvements (tees, fairways) are located within almost entirely within existing cleared areas. The irrigation pond is proposed to feature conservation seed mix. The landscaping will be well-maintained based on use (golf course).
H) RESTORE STREAMS/WETLANDS ☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	There are no existing closed drainage systems, or buried/degraded stream channels on site. Invasive species have not been identified on site.

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☐	☒	The project has been designed to meet the groundwater recharge standard.
☒	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D); **(See below)**
☐	☐	Your waiver request has been explained in the Narrative, if applicable. ***The only impervious area on site will be the Clubhouse roof and Maintenance slab totaling 0.43 acres. This corresponds to a recharge requirement of 0.01 acre-feet. The slab and roof runoff will be directed to the bioretention swale at the western edge of the parking area. Based on the desire to re-use stormwater runoff for watering activities in the form of an irrigation pond, promoting recharge at the BMP is specifically detrimental to this re-use. Of course, natural infiltration will occur around the golf course both when precipitation occurs, and again when the grounds are watered from the irrigation pond storage.***
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☐	☒	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☐	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☐	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☒	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☒	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☐	☒	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☐	☒	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☒	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)

Design Point and WB ID	Impervious area treated (sq ft)	Total WQ_v Required (cu ft)	LID Stormwater Credits (see RICR 8.18) WQv directed to a QPA (cu ft)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
DP-1:					
DP-2:	0	69,696 (based on 0.2"x total disturbed)	N/A	N/A	19,781
DP-3:	18,600	1,550	N/A	N/A	1,587
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☒ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.): **(See below)**

- DP-2 Total disturbed area = 96 acres x (0.2/12) = 1.6 ac-ft = 69,696 c.f. = WQv
- DP-2 filters the entirety of the 1.2" water quality storm event.
- DP-3 Storage within Bioretention Swale: Above grade = 0.5' x ((1,339 s.f. + 2,364)/2) = 925 c.f.; Underground = 1.5' x 1,339 x 0.33 = 662 c.f. Total storage = 1,587 c.f.

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4			
YES	**NO**		
☒	☐	Is this standard waived? If "Yes," please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☒	The project directs is a small facility with impervious cover of less than or equal to 1 acre.
		☐	The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☐	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:	

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10) (N/A)					
Design Point	**Receiving Water Body Name**	**Coldwater Fishery? (Y/N)**	**Total CPv Required (cu ft)**	**Total CPv Provided (cu ft)**	**Average Release Rate Modeled in the 1-yr storm (cfs)**
DP-1:					
DP-2:					
TOTALS:					

Note: The Channel Protection Volume Standard must be met in each waterbody ID.

☒ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).
☐ YES ☒ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.

☒ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

- Note: Impervious cover to the DP-2 (0 acres) and DP-3 (0.43 acres) facilities are less than 1 acre. Therefore CPv is waived. In addition, due to the irrigation use of the pond, the design model likely overestimates runoff flows and volumes during dryer than average periods for smaller storms.

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☐	☒	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☒ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☒	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☒	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☒	☐	Are the off-site areas shown on the subwatershed maps?	
☒	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☐	☐	Calculate the following:	
		☒	Area of disturbance within the sub-watershed (areas) 88.5 acres
		☒	Impervious cover (%) 0.5
☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☒	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
Subwatershed (Design Point)	**1.2" Peak Flow** (cfs) **		**1-yr Peak Flow** (cfs)		**10-yr Peak Flow** (cfs)		**100-yr Peak Flow** (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
DP-1:	0.17	0.14	6.66	5.85	21.03	18.60	50.57	44.72
DP-2:	1.27	0.31	51.94	16.17	165.44	54.18	398.58	193.63
TOTALS:	1.44	0.45	58.60	22.02	186.47	72.78	449.15	238.35

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	Stormwater Management Report by DiPrete Engineering
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	Stormwater Management Report by DiPrete Engineering
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Stormwater Management Report by DiPrete Engineering
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Stormwater Management Report by DiPrete Engineering

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v	WQ_v	CP_v (Y/N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
NA	DP-3	Bioretention Swale	NA	NA	0.043*	NA	N	NA	Yes		61 ft
116P	DP-2	Irrigation Pond	NA	NA	1.43**	NA	Y	NA	NA (non-infiltrating)		
* 0.43 Ac impervious/12 = 0.036 Ac-Ft											
** Irrigation pond to store entirety of WQ storm with only low flow outlet, and used on-site for irrigation											
		TOTALS:									

Table 5.3 Summary of Soils to Evaluate Each BMP									
DP #	**BMP ID**	**BMP Type** (e.g., bioretention, tree filter)	**Soils Analysis for Each BMP**						
			Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
		TOTALS:							

* For underground infiltration systems (UICs) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8			
YES	**NO**	**N/A**	
☐	☐	☒	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
☐	☐	☐	Are these activities already covered under an MSGP? If "No," please explain if you have applied for an MSGP or intend to do so?
☐	☐	☐	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, "Acceptable BMPs for Use at LUHPPLs." Please list BMPs:
☐	☐	☐	Additional BMPs, or additional pretreatment BMP's if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If "Yes," please identify.
☐	☒	☐	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☐	Qualified SESC Plan Preparer's Information and Certification
			☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☐	☒	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:

☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☐	☒	Designated snow stockpile locations?
☐	☒	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☐	☒	Asphalt-only based sealants?
☐	☒	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☐	☒	Regular sweeping? Please describe:
☐	☒	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
☐	☒	A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)			
YES	**NO**		
☒	☐		Existing and proposed drainage area delineations
☒	☐		Locations of all streams and drainage swales
☒	☐		Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐		Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☐	☒		Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☐	☒		Mapped seasonal high-water-table test pit locations
☐	☒		Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐		Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☐	☒		Mapped bedrock outcrops adjacent to any infiltration BMP
☐	☒		Soils were logged by a:
		☐	DEM-licensed Class IV soil evaluator Name:
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (units)**	**Existing Impervious (units)**	**Proposed Impervious (units)**
DP-1:	Mitchell's Lane	4.38	0.00	0.00
DP-2:	Maidford River/Wyatt Rd	84.12	0.23	0.43
TOTALS:		88.5	0.23	0.43

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☒	☐	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ▸ freshwater and coastal wetlands, including lakes and ponds ▸ coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☒	☐	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: ▸ Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ▸ Design water surface elevations (applicable storms); ▸ Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ▸ Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ▸ Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ▸ Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☐	☒	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☐	☒	Mapping of any OWM-approved remedial actions/systems (including ELURs)
☐	☒	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ▸ Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ▸ Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ▸ Cross sections of roadways, with edge details such as curbs and sidewalks; ▸ Location and dimensions of channel modifications, such as bridge or culvert crossings
☐	☒	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

1.0 Project Description

The purpose of this report is to specify a Storm Water Management System to be implemented for the Newport National Golf Club addition project located at 425 Mitchell's Lane in Middletown, RI.

The site is located on Assessors' Map 124 Lot 29 and is zoned as Open Space. The site is approximately 171 acres and exists todays as vast stretches of open field from previous farming activities, a variety of previously established pathways and stone walls, areas dominated by forested habitat, and several wetland features.

The proposed development will include a new nine-hole golf course expansion along with associated clubhouse, maintenance building and parking. Access would be provided by a proposed 24' wide gravel/clamshell driveway extending westward from Mitchell's Lane into the central interior of the property. The site will be serviced by private water and sewer services extended from an existing residential subdivision on Meadow Lane.

The stormwater quality will be improved by utilizing Best Management Practices (BMPs) as established by the RISDISM for the treatment of storm water runoff from the proposed development. BMPs will consist of a bioretention swale and irrigation pond. The system has been designed to meet the RIDEM Stormwater Design and Installations Standards Manual.

2.0 Site Conditions

2.1 EXISTING SITE CONDITIONS

The site is located on Assessors' Map 124 Lot 29 and is zoned as Open Space. The site is approximately 171 acres and exists todays as vast stretches of open field from previous farming activities, a variety of previously established pathways and stone walls, areas dominated by forested habitat, and several wetland features.

A vast wetland complex occupies the majority of the western region of the property. Additionally, a portion of the northern region of the site is occupied by a large swamp. Small areas of isolated shrub wetland and isolated forested wetland are located within the east-central portion of the site, and an emergent wetland area is situated in the southwestern portion of the subject property. All wetlands, including the isolated wetlands, have been assessed a 50-foot perimeter wetland buffer.

A watercourse known as the "Maidford River" runs from north to south for the length of the large wetland complex in the western region of the site. This river is classified as an intermittent stream less than 10 feet wide and has been assessed a 100-foot riverbank wetland buffer.

The existing site has been analyzed into (3) watersheds and (2) sperate design points. These analysis points are described in section 5.5.3. An area of high ground on the property, adjacent to Mitchell's Lane to the east, separates two of these watersheds. The small watershed east of this upland area slopes down from west to east toward Mitchell's Lane (Design Line 1) and stormwater flows offsite. West of this upland area, and occupying the north, central, and western portions of the subject property, a large watershed comprises a majority is the site. The topography slopes down from east to west and stormwater flows toward the large wetland complex and the Maidford River to the west (Design Line 2). In addition, the northern subcatchment (103) in the northern portion of the site, including clubhouse, maintenance building and parking area, discharges to a bioretention swale water quality practice. For the flow analysis, this subcatchment was conservatively discharged to directly join the irrigation pond outflow directly at the design point.

2.2 POST SITE CONDITIONS

The proposed drainage analysis uses stormwater management systems to control and treat runoff from the proposed development.

The primary goal of increasing water quality treatment is accomplished by providing water quality BMPs. Stormwater runoff mitigation is provided through the use of an irrigation basin. By reducing post development stormwater flow rate to a level no greater than the pre-development rate, the second goal of the proposed drainage system is achieved. Any potential impacts from the proposed development on the abutting properties and wetlands has been mitigated.

3.0: Water Quality

All stormwater is treated through an approved BMP before being discharged. This site has been designed to use a wet (irrigation) basin to treat stormwater before final discharge.

The clubhouse and maintenance yard impervious areas are treated by a proposed linear sand filter along the west edge of the proposed pervious parking area. The sand filter sizing spreadsheet on the following page demonstrates that the BMP provides sufficient water quality volume.

See Appendix A3.1 for the sample inlet calculations for a water quality storm event. In order to treat the entirety of the water quality volume based on 0.2" of runoff over the entire site, each inlet would be required to filter 462 c.f.:

0.2"/12 x (96 acres disturbed x 43,560 s.f.) = 69,696 c.f. / 151 inlets = 462 c.f. per inlet.

Based on the sample inlet calculation, the runoff volume for the water quality storm will only produce approximately 0.003 ac-ft (131 c.f.). Therefore, the entire volume filtered will be 19,781 c.f. < 69,696 c.f. Based on the amount of individual inlets for filtering at the source and the fact that the entirety of the water quality storm event will be treated without overflowing directly into the Detention Basin BMP, it is our opinion that water quality is fully treated for the proposed development and meets this standard.

4.0: Conveyance and Natural Channel Protection

4.1 Drainage Network Design Parameters:

A. PIPES

- All drainage pipes are HDPE or equivalent unless otherwise noted.
- Manning's coefficient = 0.011 for HDPE Pipe
- Diameters & lengths as specified
- The 25-year design storm is utilized for the drainage pipe design per Town of Middletown requirements to ensure that the drainage system contains and channels water to the BMP areas as shown on the plans. Note that the topography of the site includes natural collection areas, allowing water for greater storm events (100-year storm) to be detained at the individual inline drains for final discharge to the irrigation pond over time.
- The rational method has been used for the closed drainage system.

B. STRUCTURES

- Catch basins – Perma-Drain or equal (see site plans)
- Manholes – Perma-Drain or equal (see site plans)

5.0: Overbank Flood Protection & Downstream Analysis

5.1 Method of Analysis

USDA Soil Conservation Service Method as defined by Technical Release No. 20 (TR-20) determines Stormwater runoff rate and volume. Type III rainfall distribution is utilized. Time of concentration is determined using Technical Release No 55 (TR-55) methodology, through the computer program *HydroCAD ver. 10.0* by Applied Microcomputer Systems.

The drainage system has been designed to mitigate all stormwater flows for the 1 through 100-year storm events. The emergency outlets have been sized to handle the 100-year storm event.

5.2 Design Storm

Analysis of 1-year, 10-year, 25-year, and 100-year frequency storms are included. The following 24-hour rainfall intensities are obtained from the Rhode Island Stormwater Design and Installation Standards Manual,

Table 3-1 for Newport County:

1 year = 2.8 inches
10 year = 4.9 inches
25 year = 6.1 inches
100 year= 8.6 inches

5.3 Design Point Breakdown

The site is analyzed as 2 watershed areas. In the pre-development stage there are 3 subcatchments. In the post development stage there are 4 subcatchments. Each watershed will demonstrate zero increase of runoff due to the proposed development. A description of each watershed and associated subcatchments are summarized as follows:

Design Point #1: Mitchell's Lane

Watershed #1 flows to Design Point- 1 (DP-1). This watershed consists of the east portion of the site. The design point is the Mitchell's Lane roadway.

In pre-development conditions there is one sub-watershed to Design Point Pre-1 (11). Stormwater reaches DP-1 (21) via overland flow. Pre-1 is predominately grassed.

In post development conditions there is 1 sub-watershed:

Post-1 (101) is mainly grassed and runs overland to DP-1 (121).

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-1.

	Area (acres)	CN	Tc (min)
Pre-1	14.023	74	30.0

Post-1	9.771	74	17.0

Design Point #2: Combined Maidford / Wyatt Road Crossing

Watershed #2 flows to Design Point- 2 (DP-2). This watershed consists of the western portion of the site. The design point is Wyatt Road via overland flow and Maidford River.

In pre-development conditions there are two sub-watersheds to Design Point Pre-2 (12A and 12B). Stormwater reaches DP-2 (22) via overland flow. Pre-2 and Pre-3 are predominately grassed.

In post development conditions there are 3 sub-watersheds:

Post-02A (102A) is mainly grassed and runs uncontrolled overland to DP-2 (122).

Post-02B (102B) is mainly grassed and runs mainly through a closed drainage system through the Irrigation Pond (116P) to DP-2 (124).

Post-03 (103) contains the two proposed structures, grassed areas, and the pervious parking area. This subcatchment flows through the bioretention swale, however is conservatively modeled to flow uncontrolled directly to DP-2 (124).

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-2.

	Area (acres)	CN	Tc (min)
Pre-2	39.850	74	27.4
Pre-3	60.434	74	20.4
Post-2A	9.698	74	15.2
Post-2B	77.399	75	6.0
Post-3	12.030	74	17.4
Post-4	5.408	77	25.0

5.4 Q_p BMP Calculations

The section includes calculations for each Qp BMP for the site. Calculations include Rip Rap Aprons, Anti Seep Collars, and the Emergency Outlet Calculations.

The emergency outlets have been sized to safely pass the 100-year storm and beyond without erosion or overtopping the embankment. For this analysis, the detention pond was assumed to have all of the orifices clogged and only the emergency outlet functioning. Under normal conditions, no stormwater will flow over the emergency spillway and the basin will have a minimum of one foot of freeboard.

Basin	Q(cfs)	V (ft/s)	Top of Basin	Flood Elevation
Pond 116A	111.35	2.26	161.00	160.70

The velocity over the spillway is less than 3 ft/s thus no erosion will take place on the embankment or downstream. The basin maintains freeboard even with all orifices clogged and the 100-year storm flowing over the embankment. See attached HydroCAD.

Outlet Protection

A rip rap swale is proposed from the pond outlet to the level spreader along Wyatt Road. The rip rap aprons are designed to prevent scour at the storm water outlet and to minimize the potential for downstream erosion by reducing the velocity of concentrated storm water flows.

5.5 Overbank Flood Protection Conclusion

The table below presents a summary of the pre-development flows vs. the mitigated post-development flows. The table shows a decrease in the rate of runoff for all storms included in the analysis.

Pre-Development Flows vs. Post-Development Flows Mitigated

Subwatershed (design point)	1-yr Peak Flow		10-yr Peak Flow		25-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1 (Mitchell's Lane)	6.66	5.85	21.03	18.60	30.31	26.81	50.57	44.72
DP-2 (Maidford River/Wyatt Road)	51.94	16.17	165.44	54.18	238.67	82.99	398.58	193.63

All flows in cubic feet per second (cfs)

As shown in the tables above, no increase in stormwater runoff flow will occur following the proposed construction during the 1 through 100-year storm events.

6.0: Pollution Prevention

A Soil Erosion and Sediment Control Plan (SESC) for this development can be found under a separate document. See the Soil Erosion and Sediment Control Plan for the development prepared by DiPrete

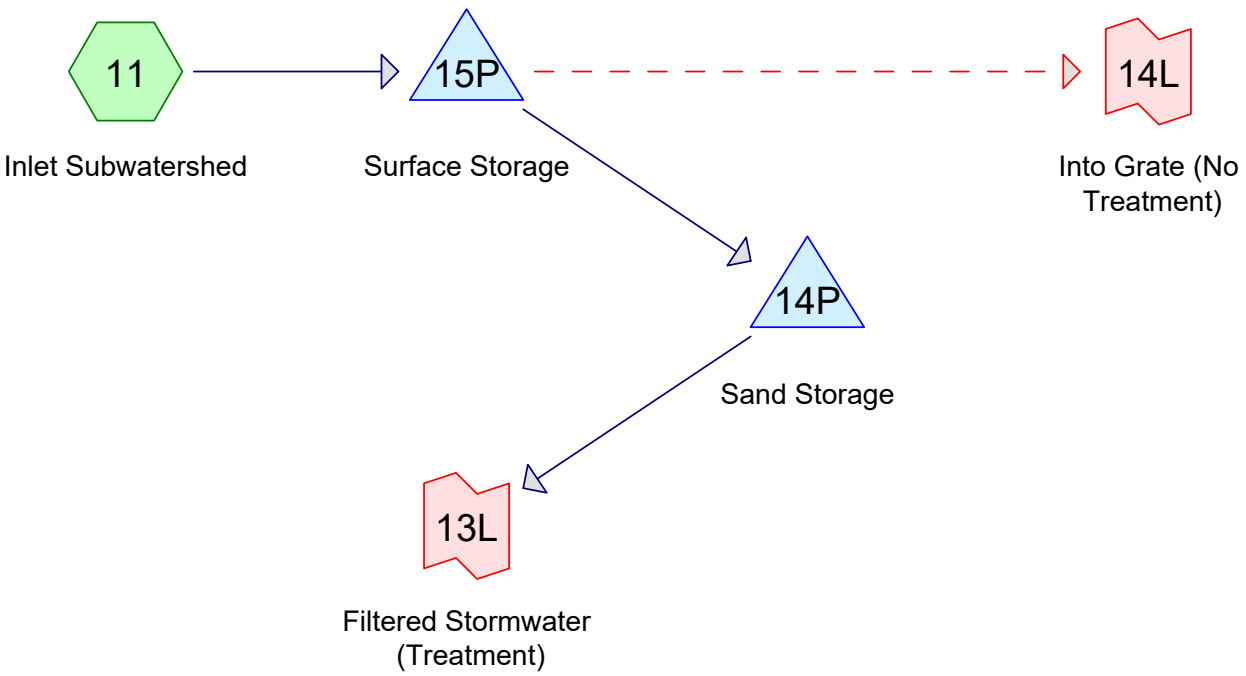
Engineering. The SESC contains information for construction pollution prevention. For post construction pollution prevention see the Operations and Maintenance (O&M) document prepared for this development by DiPrete Engineering.

7.0: Stormwater Management System Operation and Maintenance

See the O&M for this development prepared by DiPrete Engineering.

Appendix A

A3.1 Sample Inlet WQ BMP Calculations



Subcat Reach Pond Link

Routing Diagram for 2569-001-ALLS-PHCD-INHS-SampleInlet-R1
Prepared by DiPrete Engineering
HydroCAD® 10.00-22 s/n 01125 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment11: Inlet Subwatershed Runoff Area=0.636 ac 0.00% Impervious Runoff Depth=0.06"
Tc=6.0 min CN=74/0 Runoff=0.01 cfs 0.003 af

Pond 14P: Sand Storage Peak Elev=198.05' Storage=8 cf Inflow=0.01 cfs 0.003 af
Outflow=0.01 cfs 0.003 af

Pond 15P: Surface Storage Peak Elev=200.03' Storage=1 cf Inflow=0.01 cfs 0.003 af
Primary=0.01 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.003 af

Link 13L: Filtered Stormwater (Treatment) Inflow=0.01 cfs 0.003 af
Primary=0.01 cfs 0.003 af

Link 14L: Into Grate (No Treatment) Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 0.636 ac Runoff Volume = 0.003 af Average Runoff Depth = 0.06"
100.00% Pervious = 0.636 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 11: Inlet Subwatershed

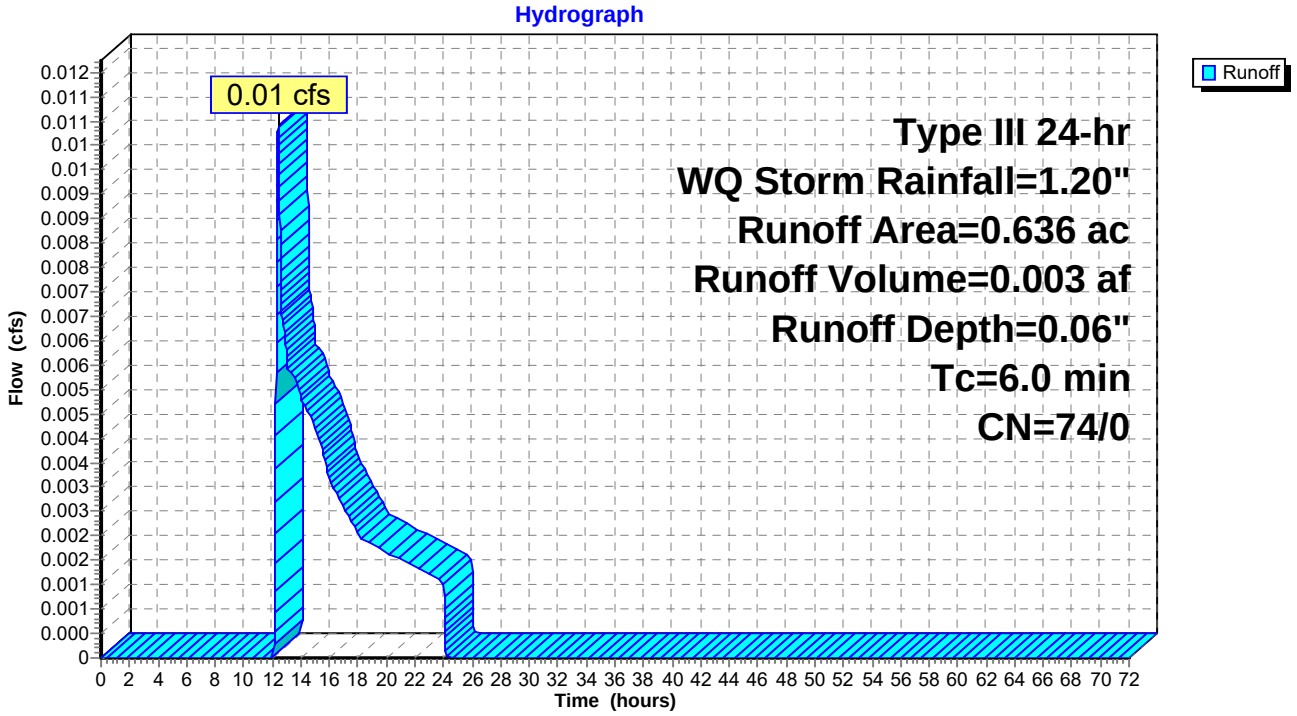
Runoff = 0.01 cfs @ 12.42 hrs, Volume= 0.003 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
0.636	74	>75% Grass cover, Good, HSG C
0.636	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, a-b**

Subcatchment 11: Inlet Subwatershed



Hydrograph for Subcatchment 11: Inlet Subwatershed

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.02	0.00	0.00	0.00
4.00	0.05	0.00	0.00	0.00
6.00	0.09	0.00	0.00	0.00
8.00	0.14	0.00	0.00	0.00
10.00	0.23	0.00	0.00	0.00
12.00	0.60	0.00	0.00	**0.00**
14.00	0.97	0.02	0.00	**0.01**
16.00	1.06	0.03	0.00	0.00
18.00	1.11	0.04	0.00	0.00
20.00	1.15	0.05	0.00	0.00
22.00	1.18	0.06	0.00	0.00
24.00	**1.20**	**0.06**	0.00	0.00
26.00	1.20	0.06	0.00	0.00
28.00	1.20	0.06	0.00	0.00
30.00	1.20	0.06	0.00	0.00
32.00	1.20	0.06	0.00	0.00
34.00	1.20	0.06	0.00	0.00
36.00	1.20	0.06	0.00	0.00
38.00	1.20	0.06	0.00	0.00
40.00	1.20	0.06	0.00	0.00
42.00	1.20	0.06	0.00	0.00
44.00	1.20	0.06	0.00	0.00
46.00	1.20	0.06	0.00	0.00
48.00	1.20	0.06	0.00	0.00
50.00	1.20	0.06	0.00	0.00
52.00	1.20	0.06	0.00	0.00
54.00	1.20	0.06	0.00	0.00
56.00	1.20	0.06	0.00	0.00
58.00	1.20	0.06	0.00	0.00
60.00	1.20	0.06	0.00	0.00
62.00	1.20	0.06	0.00	0.00
64.00	1.20	0.06	0.00	0.00
66.00	1.20	0.06	0.00	0.00
68.00	1.20	0.06	0.00	0.00
70.00	1.20	0.06	0.00	0.00
72.00	1.20	0.06	0.00	0.00

Summary for Pond 14P: Sand Storage

Inflow Area = 0.636 ac, 0.00% Impervious, Inflow Depth = 0.06" for WQ Storm event
Inflow = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 12.52 hrs, Volume= 0.003 af, Atten= 4%, Lag= 3.1 min
Primary = 0.01 cfs @ 12.52 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 198.05' @ 12.52 hrs Surf.Area= 24 sf Storage= 8 cf

Plug-Flow detention time= 39.4 min calculated for 0.003 af (94% of inflow)
Center-of-Mass det. time= 14.9 min (1,004.4 - 989.5)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	8 cf	**Custom Stage Data (Prismatic)** Listed below 24 cf Overall x 33.0% Voids
#2	196.00'	8 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 24 cf Overall x 33.0% Voids
		16 cf	Total Available Storage

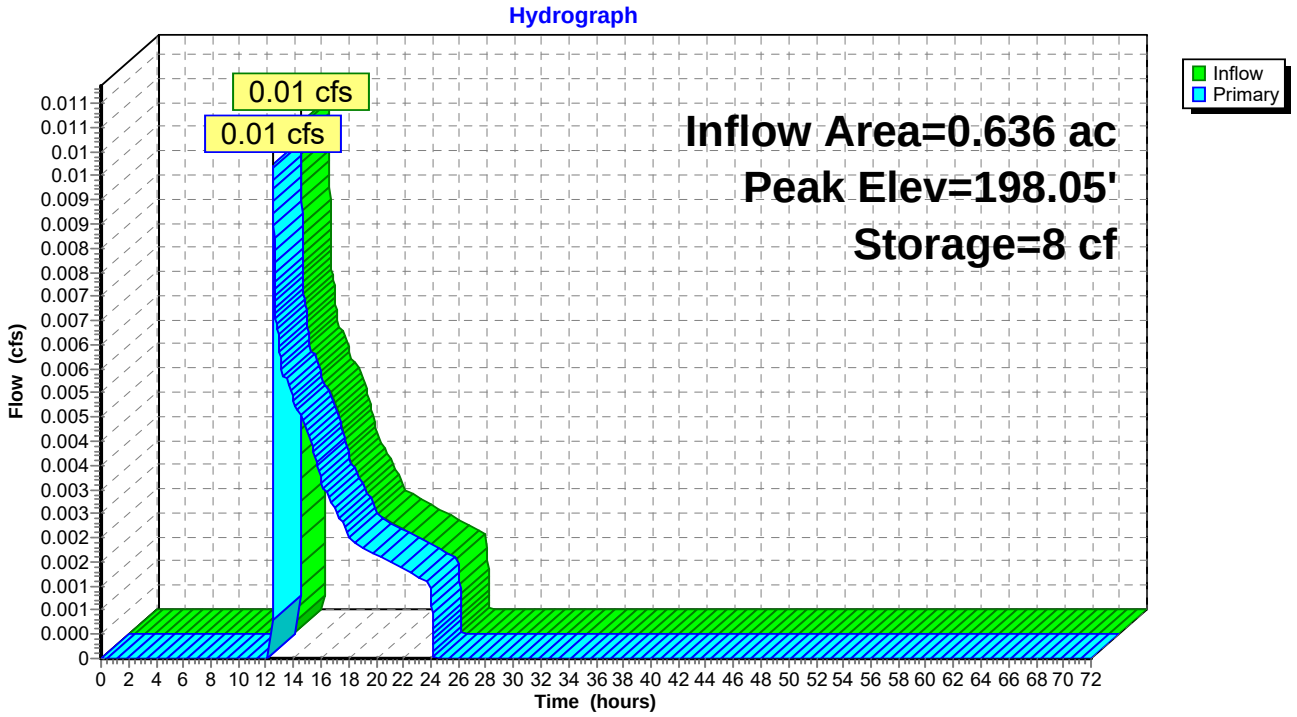
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	12	0	0
200.00	12	24	24

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	12	0	0
198.00	12	24	24

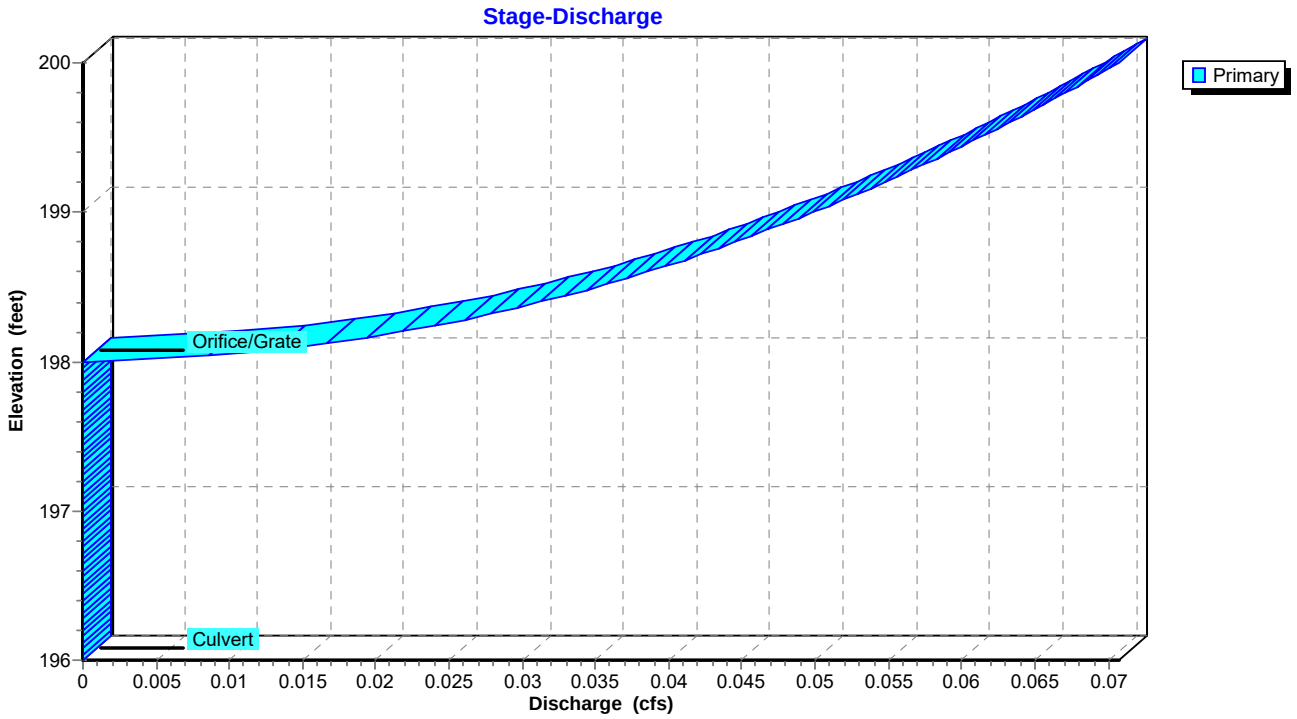
Device	Routing	Invert	Outlet Devices
#1	Device 2	198.00'	**1.00" W x 0.25" H Vert. Orifice/Grate X 6.00** C= 0.600
#2	Primary	196.00'	**15.00" Round Culvert** L= 150.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 196.00' / 193.00' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.01 cfs @ 12.52 hrs HW=198.05' TW=0.00' (Dynamic Tailwater)
↑**2=Culvert** (Passes 0.01 cfs of 9.51 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.98 fps)

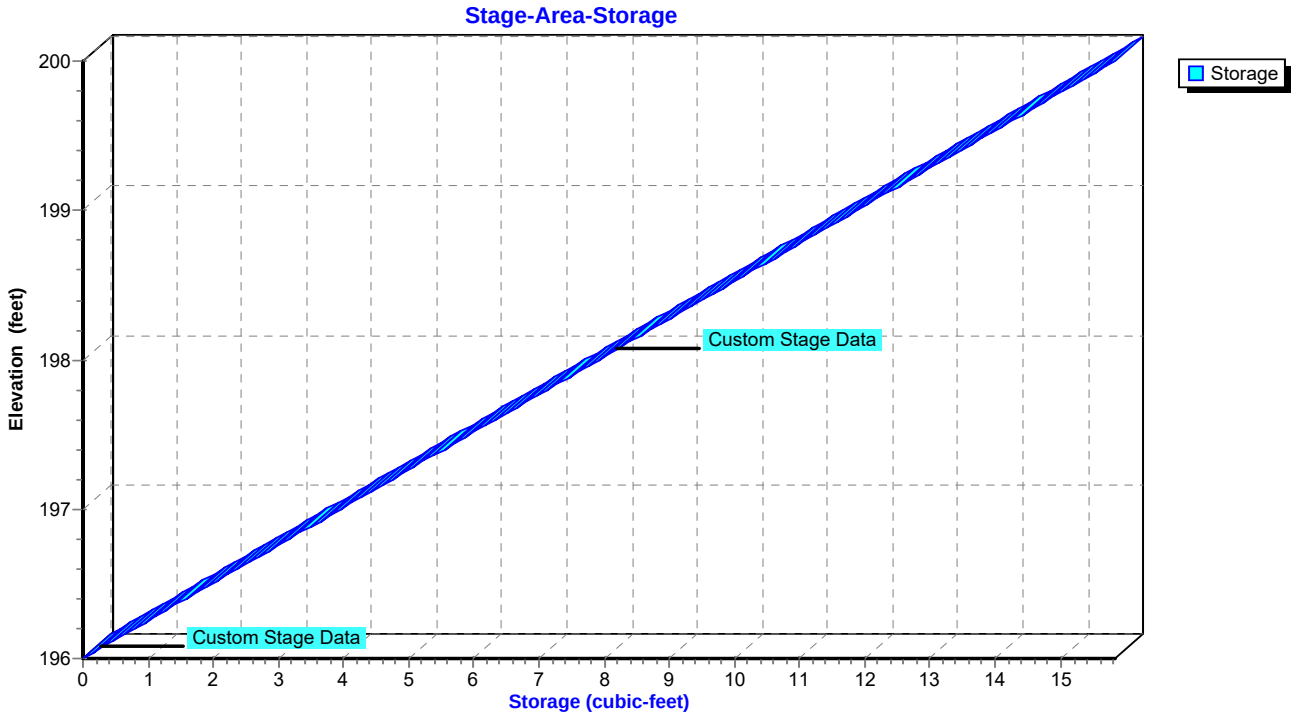
Pond 14P: Sand Storage



Pond 14P: Sand Storage



Pond 14P: Sand Storage



Hydrograph for Pond 14P: Sand Storage

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	196.00	0.00
2.00	0.00	0	196.00	0.00
4.00	0.00	0	196.00	0.00
6.00	0.00	0	196.00	0.00
8.00	0.00	0	196.00	0.00
10.00	0.00	0	196.00	0.00
12.00	**0.00**	**0**	**196.00**	**0.00**
14.00	**0.01**	**8**	**198.02**	**0.01**
16.00	0.00	8	198.02	0.00
18.00	0.00	8	198.01	0.00
20.00	0.00	8	198.01	0.00
22.00	0.00	8	198.01	0.00
24.00	0.00	8	198.01	0.00
26.00	0.00	8	198.00	0.00
28.00	0.00	8	198.00	0.00
30.00	0.00	8	198.00	0.00
32.00	0.00	8	198.00	0.00
34.00	0.00	8	198.00	0.00
36.00	0.00	8	198.00	0.00
38.00	0.00	8	198.00	0.00
40.00	0.00	8	198.00	0.00
42.00	0.00	8	198.00	0.00
44.00	0.00	8	198.00	0.00
46.00	0.00	8	198.00	0.00
48.00	0.00	8	198.00	0.00
50.00	0.00	8	198.00	0.00
52.00	0.00	8	198.00	0.00
54.00	0.00	8	198.00	0.00
56.00	0.00	8	198.00	0.00
58.00	0.00	8	198.00	0.00
60.00	0.00	8	198.00	0.00
62.00	0.00	8	198.00	0.00
64.00	0.00	8	198.00	0.00
66.00	0.00	8	198.00	0.00
68.00	0.00	8	198.00	0.00
70.00	0.00	8	198.00	0.00
72.00	0.00	8	198.00	0.00

Stage-Discharge for Pond 14P: Sand Storage

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
196.00	0.00	197.06	0.00	198.12	0.02	199.18	0.05
196.02	0.00	197.08	0.00	198.14	0.02	199.20	0.05
196.04	0.00	197.10	0.00	198.16	0.02	199.22	0.06
196.06	0.00	197.12	0.00	198.18	0.02	199.24	0.06
196.08	0.00	197.14	0.00	198.20	0.02	199.26	0.06
196.10	0.00	197.16	0.00	198.22	0.02	199.28	0.06
196.12	0.00	197.18	0.00	198.24	0.02	199.30	0.06
196.14	0.00	197.20	0.00	198.26	0.03	199.32	0.06
196.16	0.00	197.22	0.00	198.28	0.03	199.34	0.06
196.18	0.00	197.24	0.00	198.30	0.03	199.36	0.06
196.20	0.00	197.26	0.00	198.32	0.03	199.38	0.06
196.22	0.00	197.28	0.00	198.34	0.03	199.40	0.06
196.24	0.00	197.30	0.00	198.36	0.03	199.42	0.06
196.26	0.00	197.32	0.00	198.38	0.03	199.44	0.06
196.28	0.00	197.34	0.00	198.40	0.03	199.46	0.06
196.30	0.00	197.36	0.00	198.42	0.03	199.48	0.06
196.32	0.00	197.38	0.00	198.44	0.03	199.50	0.06
196.34	0.00	197.40	0.00	198.46	0.03	199.52	0.06
196.36	0.00	197.42	0.00	198.48	0.03	199.54	0.06
196.38	0.00	197.44	0.00	198.50	0.04	199.56	0.06
196.40	0.00	197.46	0.00	198.52	0.04	199.58	0.06
196.42	0.00	197.48	0.00	198.54	0.04	199.60	0.06
196.44	0.00	197.50	0.00	198.56	0.04	199.62	0.06
196.46	0.00	197.52	0.00	198.58	0.04	199.64	0.06
196.48	0.00	197.54	0.00	198.60	0.04	199.66	0.06
196.50	0.00	197.56	0.00	198.62	0.04	199.68	0.06
196.52	0.00	197.58	0.00	198.64	0.04	199.70	0.07
196.54	0.00	197.60	0.00	198.66	0.04	199.72	0.07
196.56	0.00	197.62	0.00	198.68	0.04	199.74	0.07
196.58	0.00	197.64	0.00	198.70	0.04	199.76	0.07
196.60	0.00	197.66	0.00	198.72	0.04	199.78	0.07
196.62	0.00	197.68	0.00	198.74	0.04	199.80	0.07
196.64	0.00	197.70	0.00	198.76	0.04	199.82	0.07
196.66	0.00	197.72	0.00	198.78	0.04	199.84	0.07
196.68	0.00	197.74	0.00	198.80	0.04	199.86	0.07
196.70	0.00	197.76	0.00	198.82	0.05	199.88	0.07
196.72	0.00	197.78	0.00	198.84	0.05	199.90	0.07
196.74	0.00	197.80	0.00	198.86	0.05	199.92	0.07
196.76	0.00	197.82	0.00	198.88	0.05	199.94	0.07
196.78	0.00	197.84	0.00	198.90	0.05	199.96	0.07
196.80	0.00	197.86	0.00	198.92	0.05	199.98	0.07
196.82	0.00	197.88	0.00	198.94	0.05	200.00	**0.07**
196.84	0.00	197.90	0.00	198.96	0.05		
196.86	0.00	197.92	0.00	198.98	0.05		
196.88	0.00	197.94	0.00	199.00	0.05		
196.90	0.00	197.96	0.00	199.02	0.05		
196.92	0.00	197.98	0.00	199.04	0.05		
196.94	0.00	198.00	0.00	199.06	0.05		
196.96	0.00	198.02	0.00	199.08	0.05		
196.98	0.00	198.04	0.01	199.10	0.05		
197.00	0.00	198.06	0.01	199.12	0.05		
197.02	0.00	198.08	0.01	199.14	0.05		
197.04	0.00	198.10	0.02	199.16	0.05		

Summary for Pond 15P: Surface Storage

Inflow Area = 0.636 ac, 0.00% Impervious, Inflow Depth = 0.06" for WQ Storm event
Inflow = 0.01 cfs @ 12.42 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af, Atten= 3%, Lag= 2.7 min
Primary = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 200.03' @ 12.46 hrs Surf.Area= 55 sf Storage= 1 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (989.5 - 989.1)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	34 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

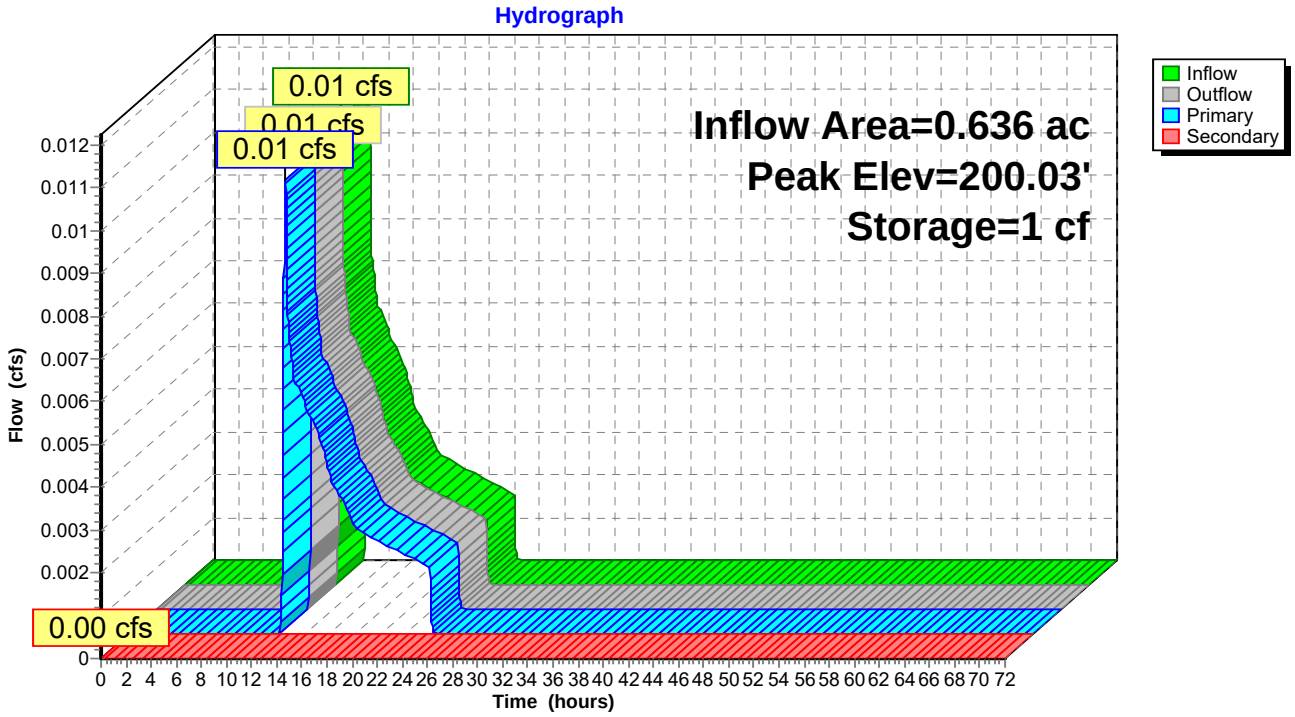
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	12	0	0
200.10	177	9	9
200.20	314	25	34

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	200.04'	**12.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

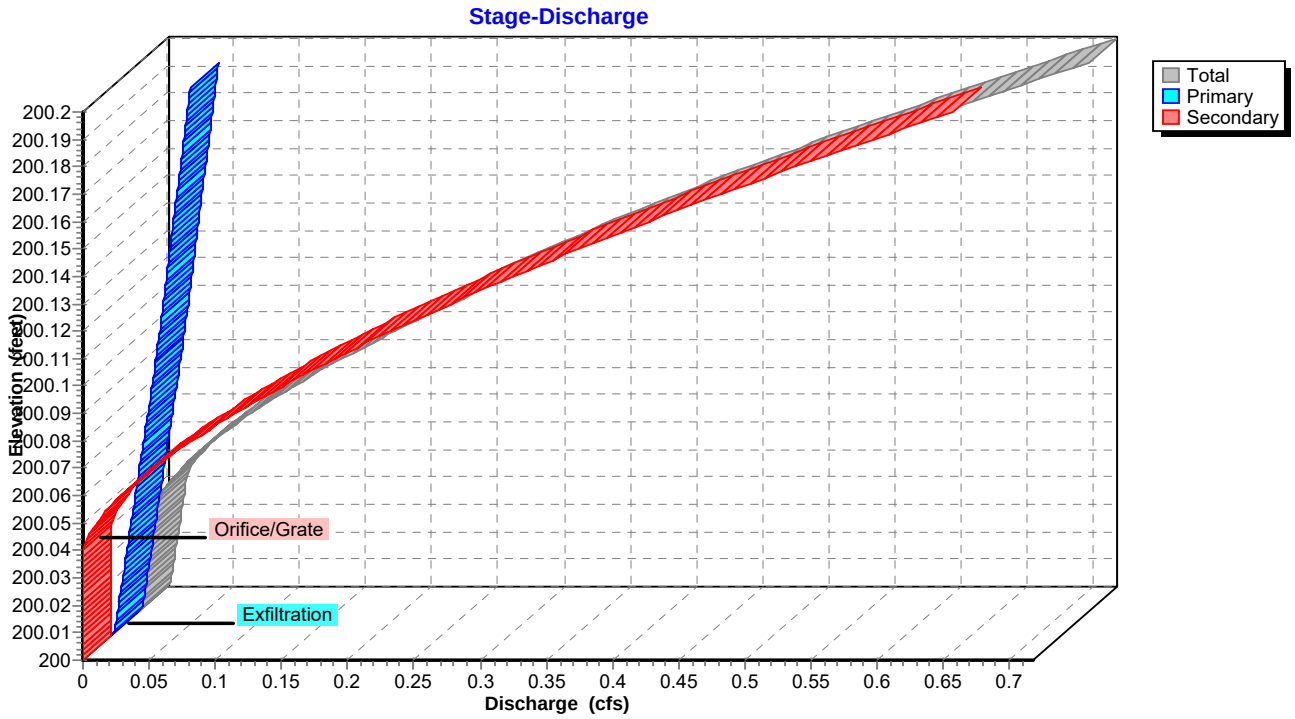
Primary OutFlow Max=0.01 cfs @ 12.46 hrs HW=200.03' TW=197.81' (Dynamic Tailwater)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Controls 0.00 cfs)

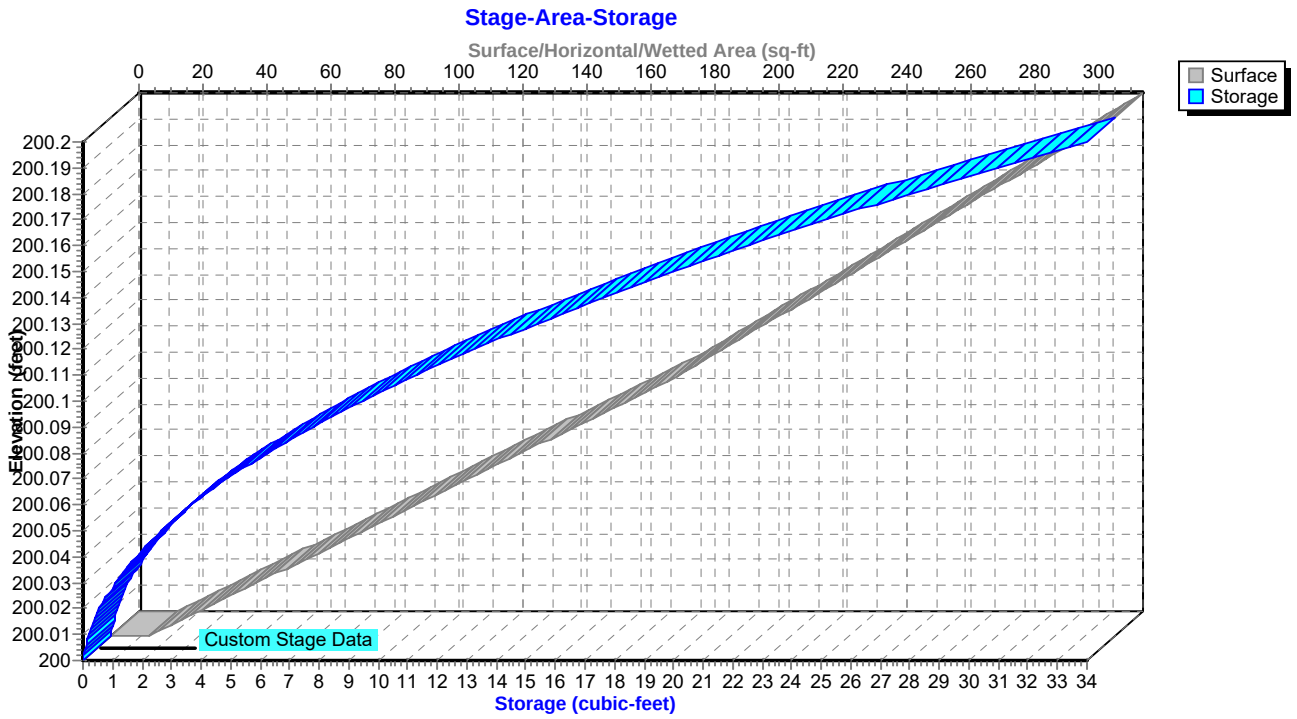
Pond 15P: Surface Storage



Pond 15P: Surface Storage



Pond 15P: Surface Storage



Hydrograph for Pond 15P: Surface Storage

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	200.00	0.00	0.00	**0.00**
2.00	0.00	0	200.00	0.00	0.00	0.00
4.00	0.00	0	200.00	0.00	0.00	0.00
6.00	0.00	0	200.00	0.00	0.00	0.00
8.00	0.00	0	200.00	0.00	0.00	0.00
10.00	0.00	0	200.00	0.00	0.00	0.00
12.00	**0.00**	**0**	**200.00**	**0.00**	**0.00**	0.00
14.00	**0.01**	**0**	**200.01**	**0.01**	**0.01**	0.00
16.00	0.00	0	200.00	0.00	0.00	0.00
18.00	0.00	0	200.00	0.00	0.00	0.00
20.00	0.00	0	200.00	0.00	0.00	0.00
22.00	0.00	0	200.00	0.00	0.00	0.00
24.00	0.00	0	200.00	0.00	0.00	0.00
26.00	0.00	0	200.00	0.00	0.00	0.00
28.00	0.00	0	200.00	0.00	0.00	0.00
30.00	0.00	0	200.00	0.00	0.00	0.00
32.00	0.00	0	200.00	0.00	0.00	0.00
34.00	0.00	0	200.00	0.00	0.00	0.00
36.00	0.00	0	200.00	0.00	0.00	0.00
38.00	0.00	0	200.00	0.00	0.00	0.00
40.00	0.00	0	200.00	0.00	0.00	0.00
42.00	0.00	0	200.00	0.00	0.00	0.00
44.00	0.00	0	200.00	0.00	0.00	0.00
46.00	0.00	0	200.00	0.00	0.00	0.00
48.00	0.00	0	200.00	0.00	0.00	0.00
50.00	0.00	0	200.00	0.00	0.00	0.00
52.00	0.00	0	200.00	0.00	0.00	0.00
54.00	0.00	0	200.00	0.00	0.00	0.00
56.00	0.00	0	200.00	0.00	0.00	0.00
58.00	0.00	0	200.00	0.00	0.00	0.00
60.00	0.00	0	200.00	0.00	0.00	0.00
62.00	0.00	0	200.00	0.00	0.00	0.00
64.00	0.00	0	200.00	0.00	0.00	0.00
66.00	0.00	0	200.00	0.00	0.00	0.00
68.00	0.00	0	200.00	0.00	0.00	0.00
70.00	0.00	0	200.00	0.00	0.00	0.00
72.00	0.00	0	200.00	0.00	0.00	0.00

Stage-Discharge for Pond 15P: Surface Storage

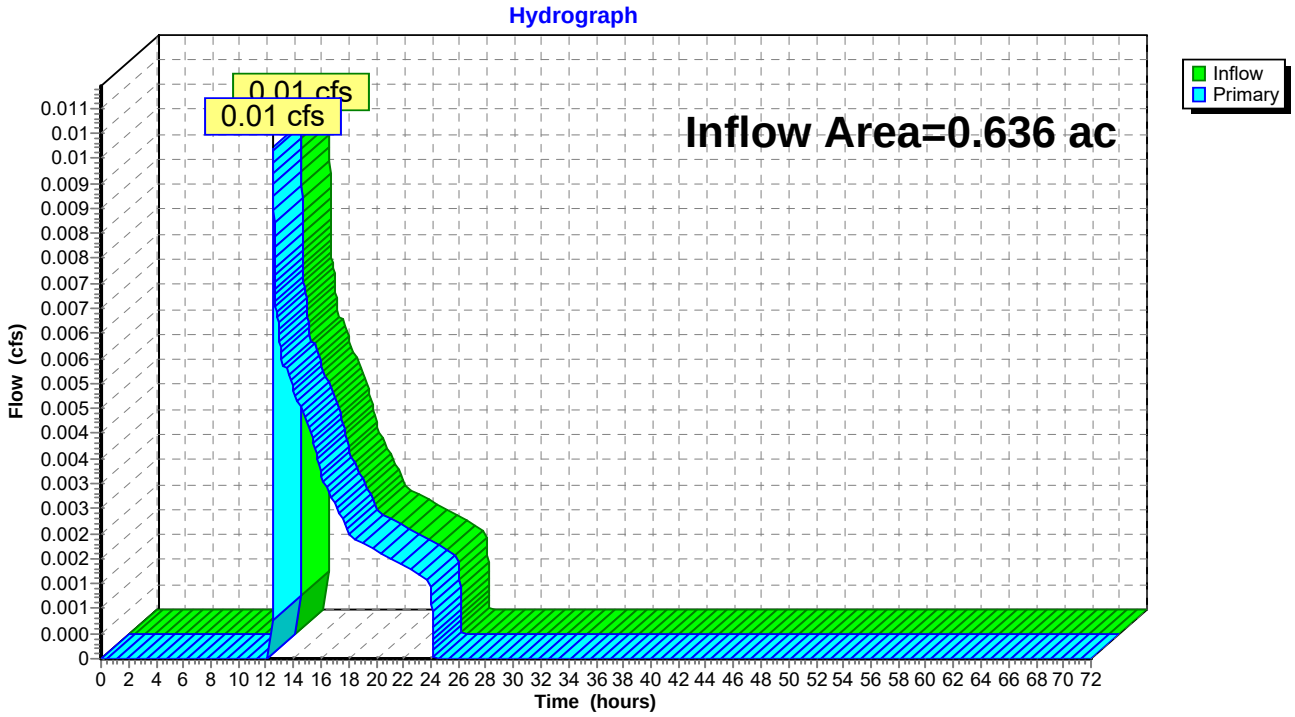
Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
200.00	0.00	0.00	0.00
200.01	0.01	0.01	0.00
200.02	0.01	0.01	0.00
200.03	0.01	0.01	0.00
200.04	0.01	0.01	0.00
200.05	0.03	0.02	0.01
200.06	0.05	0.02	0.03
200.07	0.08	0.02	0.05
200.08	0.11	0.03	0.08
200.09	0.15	0.03	0.11
200.10	0.18	0.03	0.15
200.11	0.23	0.04	0.19
200.12	0.27	0.04	0.23
200.13	0.32	0.04	0.28
200.14	0.37	0.04	0.32
200.15	0.42	0.05	0.37
200.16	0.48	0.05	0.43
200.17	0.53	0.05	0.48
200.18	0.59	0.05	0.54
200.19	0.65	0.06	0.60
200.20	**0.72**	**0.06**	**0.66**

Summary for Link 13L: Filtered Stormwater (Treatment)

Inflow Area = 0.636 ac, 0.00% Impervious, Inflow Depth = 0.06" for WQ Storm event
Inflow = 0.01 cfs @ 12.52 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.52 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 13L: Filtered Stormwater (Treatment)



Hydrograph for Link 13L: Filtered Stormwater (Treatment)

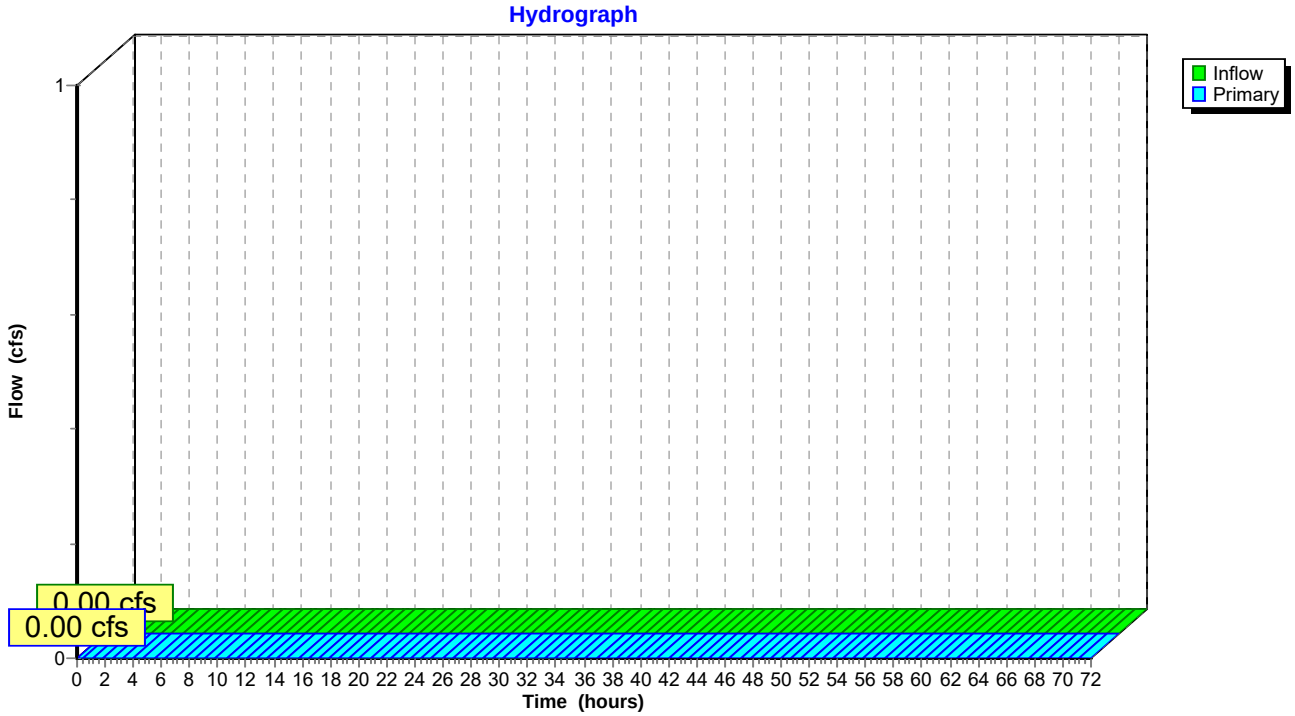
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
1.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00
12.00	**0.00**	0.00	**0.00**
13.00	**0.01**	0.00	**0.01**
14.00	0.01	0.00	0.01
15.00	0.00	0.00	0.00
16.00	0.00	0.00	0.00
17.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00
21.00	0.00	0.00	0.00
22.00	0.00	0.00	0.00
23.00	0.00	0.00	0.00
24.00	0.00	0.00	0.00
25.00	0.00	0.00	0.00
26.00	0.00	0.00	0.00
27.00	0.00	0.00	0.00
28.00	0.00	0.00	0.00
29.00	0.00	0.00	0.00
30.00	0.00	0.00	0.00
31.00	0.00	0.00	0.00
32.00	0.00	0.00	0.00
33.00	0.00	0.00	0.00
34.00	0.00	0.00	0.00
35.00	0.00	0.00	0.00
36.00	0.00	0.00	0.00
37.00	0.00	0.00	0.00
38.00	0.00	0.00	0.00
39.00	0.00	0.00	0.00
40.00	0.00	0.00	0.00
41.00	0.00	0.00	0.00
42.00	0.00	0.00	0.00
43.00	0.00	0.00	0.00
44.00	0.00	0.00	0.00
45.00	0.00	0.00	0.00
46.00	0.00	0.00	0.00
47.00	0.00	0.00	0.00
48.00	0.00	0.00	0.00
49.00	0.00	0.00	0.00
50.00	0.00	0.00	0.00
51.00	0.00	0.00	0.00
52.00	0.00	0.00	0.00
53.00	0.00	0.00	0.00
54.00	0.00	0.00	0.00
55.00	0.00	0.00	0.00
56.00	0.00	0.00	0.00
57.00	0.00	0.00	0.00
58.00	0.00	0.00	0.00
59.00	0.00	0.00	0.00
60.00	0.00	0.00	0.00
61.00	0.00	0.00	0.00
62.00	0.00	0.00	0.00
63.00	0.00	0.00	0.00
64.00	0.00	0.00	0.00
65.00	0.00	0.00	0.00
66.00	0.00	0.00	0.00
67.00	0.00	0.00	0.00
68.00	0.00	0.00	0.00
69.00	0.00	0.00	0.00
70.00	0.00	0.00	0.00
71.00	0.00	0.00	0.00
72.00	0.00	0.00	0.00

Summary for Link 14L: Into Grate (No Treatment)

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 14L: Into Grate (No Treatment)



Hydrograph for Link 14L: Into Grate (No Treatment)

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	**0.00**	**0.00**	**0.00**	53.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	54.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	55.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	56.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	57.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	58.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	59.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	60.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	61.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	62.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	63.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	64.00	0.00	0.00	0.00
12.00	0.00	0.00	0.00	65.00	0.00	0.00	0.00
13.00	0.00	0.00	0.00	66.00	0.00	0.00	0.00
14.00	0.00	0.00	0.00	67.00	0.00	0.00	0.00
15.00	0.00	0.00	0.00	68.00	0.00	0.00	0.00
16.00	0.00	0.00	0.00	69.00	0.00	0.00	0.00
17.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00	71.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00	72.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00				
21.00	0.00	0.00	0.00				
22.00	0.00	0.00	0.00				
23.00	0.00	0.00	0.00				
24.00	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				
27.00	0.00	0.00	0.00				
28.00	0.00	0.00	0.00				
29.00	0.00	0.00	0.00				
30.00	0.00	0.00	0.00				
31.00	0.00	0.00	0.00				
32.00	0.00	0.00	0.00				
33.00	0.00	0.00	0.00				
34.00	0.00	0.00	0.00				
35.00	0.00	0.00	0.00				
36.00	0.00	0.00	0.00				
37.00	0.00	0.00	0.00				
38.00	0.00	0.00	0.00				
39.00	0.00	0.00	0.00				
40.00	0.00	0.00	0.00				
41.00	0.00	0.00	0.00				
42.00	0.00	0.00	0.00				
43.00	0.00	0.00	0.00				
44.00	0.00	0.00	0.00				
45.00	0.00	0.00	0.00				
46.00	0.00	0.00	0.00				
47.00	0.00	0.00	0.00				
48.00	0.00	0.00	0.00				
49.00	0.00	0.00	0.00				
50.00	0.00	0.00	0.00				
51.00	0.00	0.00	0.00				
52.00	0.00	0.00	0.00				

A4.1 Drainage Network Hydraulic Calculations

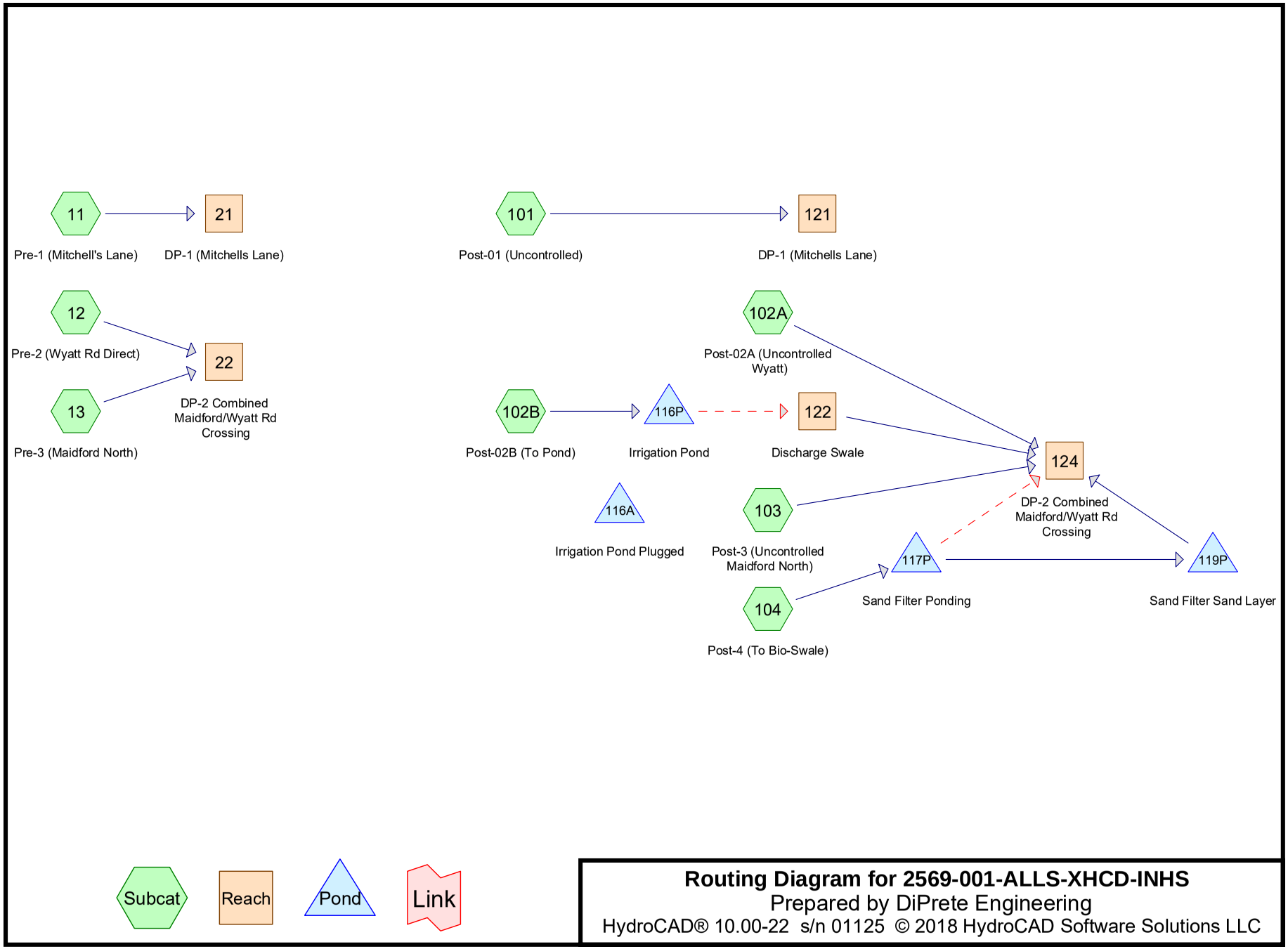
		DRAINAGE AREA				FLOW TIME (min)			RUNOFF (cfs)		PIPE DATA					FULL FLOW		DESIGN FLOW			COVER		RIM		INVERT	
From	To	Area (Ac.)	Runoff Coeff. C	Incr. CA	Sum CA	Overld. Time	Time In Pipe	T_c	Intensity (In/Hr)	Design Flow	Diam (In.)	Drop (Ft.)	Length (Ft.)	Slope (Ft./Ft.)	Manning Coeff.	Capacity (Cfs)	Velocity (Fps)	Depth (Ft.)	Q/Qf	Velocity (Fps.)	Upper (Ft.)	Lower (Ft.)	Upper	Lower	Upper	Lower
CB-1	CB-2	0.16	0.30	0.05	0.05	6.0	0.1	6.0	6.1	0.29	6	2.00	49.0	0.0408	0.011	1.34	6.82	0.18	0.2	4.50	1.8	1.8	175.00	173.00	172.50	170.50
CB-2	CB-3	0.06	0.30	0.02	0.02	6.0	0.3	6.0	6.1	0.40	6	1.00	78.0	0.0128	0.011	0.75	3.82	0.28	0.5	3.25	1.8	1.8	173.00	172.00	170.50	169.50
CB-4A	CB-4B	0.19	0.30	0.06	0.06	6.0	0.3	6.0	6.1	0.35	6	3.75	115.0	0.0326	0.011	1.197465	6.09864	0.2125	0.29189	4.452006	1.3	4.05	180.00	179.00	178.00	174.25
CB-4B	J-1	0.20	0.30	0.06	0.06	6.0	0.5	6.0	6.1	0.71	6	5.75	188.0	0.0306	0.011	1.159714	5.90638	0.3075	0.61541	5.256675	4.05	#######	179.00	-	174.25	168.50
CB-3	CB-4C	0.39	0.30	0.12	0.12	6.0	0.5	6.0	6.1	1.11	8	0.73	100.0	0.0073	0.011	1.22	3.50	0.55	0.9	3.57	1.6		172.00	172.00	169.50	168.77
CB-4C	CB-5	0.80	0.30	0.24	0.24	6.0	0.4	6.0	6.1	2.57	12	0.77	107.0	0.0072	0.011	3.57	4.55	0.69	0.7	4.27	2.0	2.8	172.00	172.00	168.77	168.00
CB-6A	J-2	0.44	0.30	0.13	0.13	6.0	0.6	6.0	6.1	0.81	8	0.50	107.0	0.0047	0.011	0.98	2.80	0.51	0.8	2.77	1.1	#######	176.00	-	174.00	173.50
CB-5	CB-6B	0.35	0.30	0.11	0.11	6.0	0.4	6.0	6.1	4.03	12	1.00	116.0	0.0086	0.011	3.91	4.98	0.93	1.0	5.28	2.8	3.8	172.00	172.00	168.00	167.00
CB-6B	CB-7	0.52	0.30	0.16	0.16	6.0	0.2	6.0	6.1	4.98	15	0.50	60.0	0.0083	0.011	6.97	5.68	0.84	0.7	5.34	3.6	1.1	172.00	169.00	167.00	166.50
CB-7	CB-8	0.22	0.30	0.07	0.07	6.0	0.5	6.0	6.1	5.39	15	1.00	160.0	0.0063	0.011	6.04	4.92	1.01	0.9	5.02	1.1	3.1	169.00	170.00	166.50	165.50
CB-8A	CB-8B	0.20	0.30	0.06	0.06	6.0	0.5	6.0	6.1	0.37	6	2.5	137.0	0.0182	0.011	0.90	4.56	0.25	0.4	3.65	-81.2	2.8	125.50	207.00	206.00	203.50
CB-8B	CB-8C	0.43	0.30	0.13	0.13	6.0	0.5	6.0	6.1	1.16	8	2.2	157.0	0.0140	0.011	1.69	4.84	0.44	0.7	4.50	-80.5	1.8	123.88	204.00	203.50	201.30
CB-8C	CB-8D	0.60	0.30	0.18	0.18	6.0	0.5	6.0	6.1	2.25	12	1	137.0	0.0073	0.011	3.60	4.58	0.62	0.6	4.12	1.5	1.5	204.00	203.00	201.30	200.30
CB-8E	J-3	0.24	0.30	0.07	0.07	7.0	0.2	7.0	6.1	0.44	6		56.4	0.0213	0.011	0.97	4.93	0.26	0.5	4.04	1.8	#######	203.00	-	200.50	199.30
CB-8D	CB-8F	0.39	0.30	0.12	0.12	6.0	0.5	6.0	6.1	3.41	12	2.3	175.8	0.0131	0.011	4.82	6.13	0.67	0.7	5.76	1.5	1.8	203.00	201.00	200.30	198.00
CB-8F	CB-8G	0.47	0.30	0.14	0.14	6.0	0.3	6.0	6.1	4.26	15	1	109.0	0.0092	0.011	7.31	5.96	0.74	0.6	5.24	1.6	1.6	201.00	200.00	198.00	197.00
CB-8G	J-4	0.53	0.30	0.16	0.16	6.0	0.6	6.0	6.1	5.24	15	8.24	327.0	0.0252	0.011	12.12	9.88	0.64	0.4	8.00	1.6	#######	200.00	-	197.00	188.76
CB-8I	J-5	0.66	0.30	0.20	0.20	6.0	0.4	6.0	6.1	1.21	8	3.25	141.7	0.0229	0.011	2.16	6.20	0.39	0.6	5.39	1.6	#######	194.00	-	191.50	188.25
CB-8H	J-4	0.76	0.30	0.23	0.23	6.0	0.4	6.0	6.1	1.39	8	1.74	125.0	0.0139	0.011	1.68	4.83	0.50	0.8	4.78	1.6	#######	193.00	-	190.50	188.76
CB-8J	J-6	0.61	0.30	0.18	0.18	6.0	0.0	6.0	6.1	1.12	6	0.55	6.0	0.0917	0.011	2.01	10.23	0.29	0.6	8.90	3.3	#######	190.00	-	186.00	185.45
J-6	J-7	0.00	0.00	0.00	0.00	6.0	0.2	6.0	6.1	8.96	15	2.45	98.0	0.0250	0.011	12.07	9.84	0.87	0.7	9.34	#######	#######	-	-	185.45	183.00
CB-8K	J-8	0.61	0.30	0.18	0.18	6.0	0.5	6.0	6.1	1.12	8	1.34	133.5	0.0100	0.011	1.43	4.10	0.48	0.8	3.98	1.6	#######	192.00	-	189.50	188.16
CB-8L	CB-8M	0.61	0.30	0.18	0.18	6.0	0.8	6.0	6.1	2.23	10	3.50	252.5	0.0139	0.011	3.05	5.59	0.57	0.7	5.25	4.2	1.7	194.00	188.00	188.80	185.30
CB-8M	J-7	0.77	0.30	0.23	0.23	6.0	0.4	6.0	6.1	3.64	15	2.30	164.4	0.0140	0.011	9.03	7.36	0.62	0.4	5.89	1.2	#######	188.00	-	185.30	183.00
CB-8N/J-7	J-9/CB-8F	0.45	0.30	0.14	0.14	6.0	0.3	6.0	6.1	5.59	18	5	196.3	0.0255	0.011	19.81	11.21	0.62	0.3	8.07	-5.7	#######	179.00	-	183.00	178.00
CB-8o1	CB-8o2	0.35	0.30	0.11	0.11	6.0	0.5	6.0	6.1	0.64	6	2.20	126.0	0.0175	0.011	0.88	4.46	0.35	0.7	4.24	2.3	2.0	207.50	205.00	204.50	202.30
CB-8o2	J-10	0.64	0.30	0.19	0.19	6.0	0.3	6.0	6.1	1.81	8	2.10	104.7	0.0201	0.011	2.02	5.79	0.54	0.9	5.91	1.8	#######	205.00	-	202.30	200.20
CB-8o3	J-10	0.18	0.30	0.06	0.06	6.0	0.1	6.0	6.1	0.34	6	1.30	39.0	0.0333	0.011	1.21	6.17	0.21	0.3	4.38	1.8	#######	204.00	-	201.50	200.20
J-10	CB-8o4	0.00	0.30	0.00	0.00	6.0	0.4	6.0	6.1	2.14	10	3.20	170.7	0.0187	0.011	3.55	6.50	0.51	0.6	5.79	#######	2.0	-	200.00	200.20	197.00
CB-8o4	CB-8o5	1.12	0.30	0.34	0.34	6.0	0.2	6.0	6.1	2.39	15	4.20	150.0	0.0280	0.011	12.77	10.41	0.40	0.2	6.56	-1.6	2.6	200.00	200.00	200.20	196.00
CB-8o5	CB-8o6	0.40	0.30	0.12	0.12	6.0	0.3	6.0	6.1	3.12	15	3	150.0	0.0200	0.011	10.80	8.80	0.52	0.3	6.33	2.6	1.6	200.00	196.00	196.00	193.00
CB-8o6	CB-8o7	0.36	0.30	0.11	0.11	6.0	0.1	6.0	6.1	3.78	15	0.5	43.7	0.0114	0.011	8.17	6.65	0.66	0.5	5.52	1.6	2.1	196.00	196.00	193.00	192.50
CB-8o8	J-11	0.12	0.30	0.04	0.04	6.0	0.1	6.0	6.1	0.22	6	1.73	41.9	0.0413	0.011	1.35	6.86	0.15	0.2	4.12	3.3	#######	198.00	-	194.00	192.27
CB-8o7	CB-8o9	0.18	0.30	0.05	0.05	6.0	0.2	6.0	6.1	4.32	18	0.5	66.5	0.0075	0.011	10.76	6.09	0.74	0.4	4.87	1.8	2.8	196.00	196.50	192.50	192.00
CB-8o9	CB-8o11	0.46	0.30	0.14	0.14	6.0	0.4	6.0	6.1	5.16	18	2	185.5	0.0108	0.011	12.89	7.29	0.74	0.4	5.84	2.8	3.8	196.50	195.50	192.00	190.00
CB-8o12	CB-8o11	0.11	0.30	0.03	0.03	6.0	0.7	6.0	6.1	0.19	6	1.00	126.0	0.0079	0.011	0.59	3.01	0.22	0.3	2.29	3.3	4.3	195.50	195.50	191.50	190.50
CB-8o13	CB-8o14	0.12	0.30	0.04	0.04	6.0	0.3	6.0	6.1	0.22	6	2	88.2	0.0227	0.011	1.00	5.09	0.18	0.2	3.36	1.8	1.8	203.00	201.00	200.50	198.50
CB-8o14	CB-8o17	0.72	0.30	0.22	0.22	6.0	0.5	6.0	6.1	1.54	8	3	167.2	0.0179	0.011	1.91	5.48	0.49	0.8	5.37	1.6	1.6	201.00	198.00	198.50	195.50
CB-8o17	CB-8o19	0.44	0.30	0.13	0.13	6.0	0.3	6.0	6.1	2.34	10	2	101.3	0.0197	0.011	3.64	6.67	0.53	0.6	6.07	1.5	2.0	198.00	196.50	195.50	193.50
CB-8o18	CB-8o19	0.25	0.30	0.08	0.08	6.0	0.5	6.0	6.1	0.46	6	2.5	141.4	0.0177	0.011	0.88	4.49	0.28	0.5	3.82	1.3	2.3	198.00	196.50	196.00	193.50
CB-8o20	CB-8o19	0.08	0.30	0.03	0.03	6.0	0.3	6.0	6.1	0.62	8	0.5	67.7	0.0074	0.011	1.23	3.52	0.37	0.5	2.95	2.6	2.1	197.50	196.50	194.00	193.50
CB-8o19	CB-8o11	0.30	0.30	0.09	0.09	6.0	0.2	6.0	6.1	3.97	10	3	112.6	0.0266	0.011	4.23	7.75	0.70	0.9	8.06	2.0	4.0	196.50	195.50	193.50	190.50
CB-8o11	CB-8o21	0.15	0.30	0.04	0.04	6.0	0.4	6.0	6.1	9.59	18	3.5	214.9	0.0163	0.011	15.84	8.97	0.92	0.6	7.98	3.3	1.8	195.50	190.50	190.50	187.00
CB-8o21	CB-8o22	1.21	0.30	0.36	0.36	6.0	0.2	6.0	6.1	11.80	18	7.5	158.4	0.0473	0.011	27.01	15.29	0.77	0.4	12.38	1.8	4.3	190.50	185.50	187.00	179.50

CB-8o23	CB-8o24	0.42	0.30	0.13	0.13	6.0	0.3	6.0	6.1	0.77	8	2	112.7	0.0177	0.011	1.90	5.45	0.33	0.4	4.36	2.1	2.6	191.50	190.00	188.50	186.50
CB-8o24	J-12	0.24	0.30	0.07	0.07	6.0	0.3	6.0	6.1	1.21	8	5.3	129.5	0.0409	0.011	2.89	8.28	0.33	0.4	6.62	2.6	#######	190.00	-	186.50	181.20
CB-8o25	J-12	0.21	0.30	0.06	0.06	6.0	1.6	6.0	6.1	0.39	8	1.3	267.8	0.0049	0.011	1.00	2.85	0.33	0.4	2.25	1.9	#######	185.25	-	182.50	181.20
J-12	CB-8o22	0.00	0.00	0.00	0.00	6.0	1.6	6.0	6.1	1.60	12	1.8	359.4	0.0050	0.011	2.98	3.79	0.57	0.5	3.26	#######	4.9	-	185.50	181.20	179.40
CB-8o22	J-9	0.86	0.30	0.26	0.26	6.0	0.2	6.0	6.1	14.98	24	1.4	126.7	0.0110	0.011	28.10	8.95	1.14	0.5	7.69	3.9	#######	185.50	-	179.40	178.00
CB-8P	J-9	0.35	0.30	0.10	0.10	6.0	0.0	6.0	6.1	0.64	6	0.5	5.0	0.1000	0.011	2.10	10.68	0.22	0.3	7.90	5.8	#######	185.00	-	178.50	178.00
J-9	CB-15	0.00	0.00	0.00	0.00	6.0	0.3	6.0	6.1	20.57	24	5	223.2	0.0224	0.011	40.02	12.74	1.12	0.5	10.83	#######	0.8	-	176.00	178.00	173.00
CB-16	CB-15	0.59	0.30	0.18	0.18	6.0	0.5	6.0	6.1	1.07	8	0.87	110.0	0.0079	0.011	1.27	3.64	0.51	0.8	3.64			177.50	176.00	174.50	173.63
CB-15	J-13	0.53	0.30	0.16	0.16	6.0	0.1	6.0	6.1	22.62	24	3.05	75.8	0.0403	0.011	53.64	17.07	1.02	0.4	13.83			176.00	-	173.00	169.95
CB-11	J-13	0.37	0.30	0.11	0.11	6.0	0.2	6.0	6.1	0.68	6	1.05	54.5	0.0193	0.011	0.92	4.69	0.35	0.7	4.45			173.00	-	171.00	169.95
CB-13	J-14	0.21	0.30	0.06	0.06	6.0	0.2	6.0	6.1	0.38	6		40.5	0.0133	0.011	0.77	3.90	0.27	0.5	3.28			170.00	-	167.50	166.96
J-13	J-14	0.00	0.30	0.00	0.00	6.0	0.1	6.0	6.1	23.30	24		74.8	0.0401	0.011	53.55	17.05	1.02	0.4	13.81				-	169.95	166.95
CB-18	CB-17	0.53	0.30	0.16	0.16	6.0	0.3	6.0	6.1	0.98	6	4	101.1	0.0396	0.011	1.32	6.72	0.35	0.7	6.38	1.8	3.8	175.00	173.00	172.50	168.50
CB-22	CB-17	0.49	0.30	0.15	0.15	6.0	0.2	6.0	6.1	0.89	8	1	64.0	0.0156	0.011	1.79	5.11	0.37	0.5	4.30	2.6	3.6	173.00	173.00	169.50	168.50
CB-17	CB-14	0.45	0.30	0.14	0.14	6.0	0.3	6.0	6.1	2.69	12	0.5	76.6	0.0065	0.011	3.40	4.33	0.73	0.8	4.24	3.3	3.8	173.00	173.00	168.50	168.00
CB-14	CB-14A	0.29	0.30	0.09	0.09	6.0	0.3	6.0	6.1	3.22	12	1	101.9	0.0098	0.011	4.17	5.31	0.72	0.8	5.15	3.8	1.8	173.00	170.00	168.00	167.00
CB-14A	J-14	0.45	0.30	0.13	0.13	6.0	0.1	6.0	6.1	4.04	12	0.5	46.4	0.0108	0.011	4.37	5.57	0.84	0.9	5.73	1.8	#######	170.00	-	167.00	166.50
J-14	CB-8	-	-	-	0.00	6.0	0.1	6.0	6.1	27.7	24	1	76.7	0.0130	0.011	30.53	9.72	1.64	0.9	166.50	#######	2.3	-	170.00	166.50	165.50
CB-8	CB-9	0.19	0.30	0.06	0.06	6.0	0.1	6.0	6.1	33.46	30	1.00	88.9	0.0112	0.011	51.41	10.47	1.60	0.7	9.53	1.8	2.8	170.00	170.00	165.50	164.50
CB-9	CB-10	0.20	0.30	0.06	0.06	6.0	0.3	6.0	6.1	33.81	30	1.00	148.1	0.0068	0.011	39.83	8.11	1.93	0.8	8.11	2.8	2.8	170.00	169.00	164.50	163.50
CB-10	J-15	0.44	0.30	0.13	0.13	6.0	0.2	6.0	6.1	34.61	30	2.50	148.0	0.0169	0.011	63.00	12.83	1.44	0.5	11.04	0.3	#######	169.00	-	166.00	163.50
CB-35	CB-34	0.38	0.30	0.11	0.11	6.0	0.3	6.0	6.1	0.69	8	0.40	58.0	0.0069	0.011	1.19	3.40	0.40	0.6	2.99	2.1	1.6	179.50	178.60	176.50	176.10
CB-34	CB-26A	1.35	0.30	0.41	0.41	6.0	0.3	6.0	6.1	3.17	12	0.60	89.2	0.0067	0.011	3.45	4.40	0.83	0.9	4.53	1.3	-1.2	178.60	175.50	176.10	175.50
CB-26A	CB-26B	0.68	0.30	0.20	0.20	6.0	0.1	6.0	6.1	4.41	12	2.00	77.5	0.0258	0.011	6.76	8.61	0.64	0.7	7.84	-1.2	-1.2	175.50	173.50	175.50	173.50
CB-33A	CB-33	0.16	0.30	0.05	0.05	6.0	0.5	6.0	6.1	0.29	6	0.50	78.0	0.0064	0.011	0.53	2.70	0.29	0.5	2.33	-0.7	-0.7	175.00	174.50	175.00	174.50
CB-33	CB-26B	0.07	0.30	0.02	0.02	6.0	0.7	6.0	6.1	0.42	6	1.00	125.4	0.0080	0.011	0.59	3.02	0.34	0.7	2.83	-0.7	-0.7	174.50	173.50	174.50	173.50
CB-20	CB-23	0.66	0.30	0.20	0.20	6.0	0.3	6.0	6.1	1.21	8	2.00	97.9	0.0204	0.011	2.04	5.85	0.40	0.6	5.15	-52.1	-50.3	125.25	125.08	176.50	174.50
CB-23	CB-26B	0.67	0.30	0.20	0.20	6.0	0.2	6.0	6.1	2.44	10	1.00	77.2	0.0130	0.011	2.95	5.40	0.63	0.8	5.35	-50.5	-1.0	125.08	173.50	174.50	173.50
CB-26B	CB-21	-	-	-	0.00	6.0	0.4	6.0	6.1	7.28	15	5.00	222.9	0.0224	0.011	11.43	9.32	0.78	0.6	8.39	-1.5	-1.5	173.50	168.50	173.50	168.50
CB-21	J-16	0.57	0.30	0.17	0.17	6.0	0.0	6.0	6.1	8.32	10	6.00	46.6	0.1288	0.011	9.29	17.04	0.68	0.9	17.38	-1.0	#######	168.50	-	168.50	162.50
J-16	J-17	0.00	0.30	0.00	0.00	6.0	0.1	6.0	6.1	42.93	30	2.50	93.2	0.0268	0.011	79.39	16.17	1.44	0.5	13.91	#######	#######	-	-	162.50	160.00
CB-32	CB-25	0.28	0.30	0.08	0.08	6.0	0.6	6.0	6.1	0.51	6		136.0	0.0118	0.011	0.72	3.66	0.34	0.7	3.44			170.00	172.00	168.50	166.90
CB-25	J-18	0.57	0.30	0.17	0.17	6.0	0.2	6.0	6.1	1.55	8	2.60	94.0	0.0277	0.011	2.38	6.80	0.43	0.7	6.19	1.6	#######	172.00	-	169.50	166.90
J-18	CB-24	0.00	0.30	0.00	0.00	6.0	0.1	6.0	6.1	1.55	8		75.0	0.0853	0.011	4.17	11.95	0.32	0.4	9.32			-	169.00	166.90	160.50
CB-24	J-17	0.28	0.30	0.08	0.08	6.0	0.0	6.0	6.1	2.06	8		10.0	0.0500	0.011	3.19	9.15	0.42	0.6	8.33			169.00	-	160.50	160.00
J-17	J-19	0.00	0.00	0.00	0.00	6.0	0.2	6.0	6.1	44.99	30		107.5	0.0093	0.011	46.75	9.52	2.16	1.0	10.00			-	-	160.00	159.00
CB-28	J-19	0.13	0.30	0.04	0.04	6.0	0.1	6.0	6.1	0.23	6		67.6	0.1183	0.011	2.28	11.62	0.12	0.1	5.93			169.50	-	167.00	159.00
J-19	CB-27	0.00	0.00	0.00	0.00	6.0	0.2	6.0	6.1	45.22	30		101.0	0.0099	0.011	48.23	9.83	2.10	0.9	10.22			-	166.00	159.00	158.00
CB-27	CB-29	0.28	0.30	1.00	1.00	6.0	0.2	6.0	6.1	51.32	30		121.8	0.0107	0.011	50.08	10.20	2.33	1.0	10.81			166.00	167.00	158.00	156.70
CB-29	J-20	0.53	0.30	0.16	0.16	6.0	0.0	6.0	6.1	52.29	30	0.2	18.0	0.0111	0.011	51.10	10.41	2.33	1.0	11.03	7.6	#######	167.00	-	156.70	156.50
CB-31	CB-30	0.19	0.30	0.06	0.06	6.0	0.5	6.0	6.1	0.34	6	0.5	75.0	0.0067	0.011	0.54	2.76	0.31	0.6	2.48	1.8	2.3	169.00	169.00	166.50	166.00
CB-30	J-20	0.12	0.30	0.04	0.04	6.0	0.2	6.0	6.1	0.56	6	9.5	101.8	0.0933	0.011	2.03	10.32	0.21	0.3	7.33	2.3	#######	169.00	-	166.00	156.50
J-20	FE-1	-	-	-	0.00	6.0	0.1	6.0	6.1	52.85	30	2.5	103.5	0.0242	0.011	75.34	15.35	1.68	0.7	14.43	#######	-2.7	-	154.00	156.50	154.00

CB-36	FE-2	0.30	0.09	0.09	0.30	0.09	6.0	0.1	6.1	6.0	6.5	6	0.54	6.1	6.0	56.9	0.1142	0.011	2.24	11.41	0.19	0.2	7.88	1.8	-0.7	163.00	154.00	160.50	154.00
CB-38	CB-39	0.37	0.30	0.11	0.11	0.30	6.0	0.5	6.1	6.0	1.00	6	0.68	6.1	94.4	0.0106	0.011	0.68	3.48	0.45	1.0	3.68	3.8	1.8	-0.7	165.00	162.00	160.50	159.50
CB-39	FE-3	0.06	0.30	0.02	0.02	0.30	6.0	0.0	6.1	6.0	5.50	6	0.79	6.1	33.3	0.1652	0.011	2.69	13.73	0.21	0.3	10.02	1.8	-0.7	-0.7	162.00	154.00	159.50	154.00
CB-40	CB-42	0.25	0.30	0.08	0.08	0.30	6.0	0.6	6.1	6.0	1	6	0.46	6.1	117.8	0.0085	0.011	0.61	3.11	0.35	0.7	2.96	1.3	1.3	1.3	161.00	160.00	159.00	158.00
CB-42	FE-4	0.21	0.30	0.06	0.06	0.30	6.0	0.1	6.1	6.0	4	6	0.84	6.1	46.0	0.0870	0.011	1.96	9.96	0.26	0.4	8.07	1.3	1.8	-0.7	160.00	154.00	158.00	154.00
CB-43	CB-44	0.26	0.30	0.08	0.08	0.30	6.0	0.8	6.1	6.0	1.00	6	0.47	6.1	132.4	0.0076	0.011	0.58	2.94	0.38	0.8	2.88	1.8	1.8	1.8	201.00	200.00	198.50	197.50
CB-44	CB-45	0.41	0.30	0.12	0.12	0.30	6.0	0.3	6.1	6.0	0.35	10	1.22	6.1	65.0	0.0054	0.011	1.90	3.48	0.53	0.6	3.17	1.5	1.8	1.8	200.00	200.00	197.50	197.15
CB-45	CB-46	0.57	0.30	0.17	0.17	0.30	6.0	0.3	6.1	6.0	0.38	12	2.26	6.1	70.0	0.0054	0.011	3.10	3.95	0.69	0.7	3.71	1.6	4.0	4.0	200.00	202.00	197.15	196.77
CB-46	CB-48	0.16	0.30	0.05	0.09	0.30	6.0	0.4	6.1	6.0	1.89	12	2.55	6.1	144.2	0.0131	0.011	4.82	6.14	0.57	0.5	5.22	4.0	3.9	3.9	202.00	200.00	196.77	194.88
CB-47	CB-48	0.17	0.30	0.05	0.05	0.30	6.0	0.4	6.1	6.0	0.31	6		6.1	88.0	0.0127	0.011	0.75	3.81	0.25	0.4	3.05				200.00	200.00	196.00	194.88
CB-48	J-21	0.53	0.30	0.16	0.16	0.30	6.0	0.1	6.1	6.0	3.84	12	0.82	40.3	0.0203	0.011	6.01	7.65	0.63	0.6	6.88	3.9	#######	200.00	-	194.88	194.06		
CB-49	CB-50	0.31	0.30	0.09	0.09	0.30	6.0	0.6	6.1	6.0	0.57	6	3	161.7	0.0186	0.011	0.90	4.60	0.31	0.6	4.14	1.8	-7.7	201.00	188.50	198.50	195.50		
CB-50	J-21	0.13	0.30	0.04	0.04	0.30	6.0	0.3	6.1	6.0	0.81	8	1.44	86.0	0.0167	0.011	1.85	5.29	0.34	0.4	4.29	-7.9	#######	188.50	-	195.50	194.06		
J-21	CB-51	0.00	0.00	0.00	0.00	0.00	6.0	0.1	6.1	6.0	4.65	12	2.49	80.0	0.0311	0.011	7.43	9.46	0.62	0.6	8.51	#######	2.7	-	195.50	194.06	191.57		
CB-51	CB-52	0.41	0.30	0.12	0.12	0.30	6.0	0.2	6.1	6.0	5.40	12	3.46	111.0	0.0312	0.011	7.43	9.47	0.69	0.7	8.90	2.7	3.2	195.50	192.50	191.57	188.11		
CB-52	CB-53	0.39	0.30	0.12	0.12	0.30	6.0	0.2	6.1	6.0	6.11	12	2.96	95.0	0.0312	0.011	7.43	9.46	0.76	0.8	9.37	3.2	4.1	192.50	190.50	188.11	185.15		
CB-53	CB-54	0.63	0.30	0.19	0.19	0.30	6.0	0.1	6.1	6.0	7.26	12	2.17	69.0	0.0314	0.011	7.47	9.51	0.88	1.0	9.98	4.1	2.8	190.50	187.00	185.15	182.98		
CB-54	CB-55	0.50	0.30	0.15	0.15	0.30	6.0	0.1	6.1	6.0	8.17	15	1.62	52.0	0.0312	0.011	13.47	10.98	0.76	0.6	9.77	2.6	3.1	187.00	185.88	182.98	181.36		
CB-55	CB-56	0.71	0.30	0.21	0.21	0.30	6.0	0.1	6.1	6.0	9.47	15	2.11	68.0	0.0310	0.011	13.45	10.96	0.84	0.7	10.30	3.1	3.1	185.88	183.75	181.36	179.25		
CB-56	CB-57	0.55	0.30	0.16	0.16	0.30	6.0	0.2	6.1	6.0	10.47	15	2.80	96.3	0.0291	0.011	13.02	10.61	0.93	0.8	10.40	3.1	1.6	183.75	179.50	179.25	176.45		
CB-57	CB-58	0.45	0.30	0.13	0.13	0.30	6.0	0.1	6.1	6.0	11.29	15	2.45	78.0	0.0314	0.011	13.53	11.03	0.95	0.8	10.92	1.6	2.1	179.50	177.50	176.45	174.00		
CB-58	CB-59	0.48	0.30	0.14	0.14	0.30	6.0	0.4	6.1	6.0	12.16	15	7.00	251.7	0.0278	0.011	12.73	10.37	1.08	1.0	10.79	2.1	1.6	177.50	170.00	174.00	167.00		
CB-59	CB-60	0.44	0.30	0.13	0.13	0.30	6.0	0.3	6.1	6.0	12.96	18	3.00	166.8	0.0180	0.011	16.65	9.42	1.07	0.8	9.14	1.3	0.8	170.00	166.50	167.00	164.00		
CB-60	CB-61	0.57	0.30	0.17	0.17	0.30	6.0	0.1	6.1	6.0	14.01	18	1.20	69.0	0.0174	0.011	16.37	9.26	1.17	0.9	9.26	0.8	0.5	166.50	165.00	164.00	162.80		
CB-61	J-22	0.08	0.30	0.02	0.02	0.30	6.0	0.1	6.1	6.0	14.16	18	0.80	44.8	0.0179	0.011	16.59	9.39	1.17	0.9	9.39	0.5	#######	165.00	-	162.80	162.00		
CB-65	J-23	0.18	0.30	0.05	0.05	0.30	6.0	0.3	6.1	6.0	0.33	6	1.23	73.4	0.0168	0.011	0.86	4.37	0.25	0.4	3.45	1.8	#######	207.00	-	204.50	203.27		
CB-63	CB-64	0.16	0.30	0.05	0.05	0.30	6.0	0.7	6.1	6.0	0.29	6	0.50	97.4	0.0051	0.011	0.48	2.42	0.31	0.6	2.15	2.3	2.3	207.50	207.00	204.50	204.00		
CB-64	J-23	0.18	0.30	0.05	0.05	0.30	6.0	0.3	6.1	6.0	0.61	6	0.73	68.4	0.0107	0.011	0.68	3.49	0.41	0.9	3.56	2.3	#######	207.00	-	204.00	203.27		
CB-83	J-25	0.39	0.30	0.12	0.12	0.30	6.0	0.3	6.1	6.0	6.88	15	1.50	117.0	0.0128	0.011	8.64	7.04	0.91	0.8	6.90	4.6	#######	198.00	-	192.00	190.50		
CB-82	CB-83	0.52	0.30	0.16	0.16	0.30	6.0	0.4	6.1	6.0	6.17	15	2.11	165.3	0.0128	0.011	8.63	7.03	0.84	0.7	6.61	4.4	4.6	200.00	198.00	194.11	192.00		
J-24	CB-82	0.00	0.30	0.00	0.00	0.30	6.0	0.1	6.1	6.0	5.22	15	0.74	57.7	0.0128	0.011	8.65	7.05	0.76	0.6	6.27	#######	4.4	-	200.00	194.85	194.11		
CB-81	J-24	0.20	0.30	0.06	0.06	0.30	6.0	0.1	6.1	6.0	0.37	6	2.65	36.8	0.0720	0.011	1.78	9.06	0.17	0.2	5.89	1.8	#######	200.00	-	197.50	194.85		
CB-74	J-24	0.21	0.30	0.06	0.06	0.30	6.0	0.4	6.1	6.0	4.86	15	1.15	128.0	0.0090	0.011	7.24	5.90	0.81	0.7	5.42	5.6	#######	203.00	-	196.00	194.85		
CB-79	CB-74	0.41	0.30	0.12	0.12	0.30	6.0	0.5	6.1	6.0	0.74	8	0.75	109.4	0.0069	0.011	1.18	3.39	0.41	0.6	3.05	3.4	6.1	201.00	203.00	196.75	196.00		
CB-78	CB-79	0.17	0.30	0.05	0.05	0.30	6.0	0.4	6.1	6.0	1.05	8	0.40	77.2	0.0052	0.011	1.03	2.94	0.62	1.0	3.12	4.0	3.4	202.00	201.00	197.15	196.75		
CB-77	CB-78	0.15	0.30	0.05	0.05	0.30	6.0	0.3	6.1	6.0	0.74	8	0.35	54.2	0.0065	0.011	1.15	3.29	0.42	0.6	2.99	3.6	4.0	202.00	202.00	197.50	197.15		
CB-76	CB-77	0.10	0.30	0.03	0.03	0.30	6.0	0.5	6.1	6.0	0.46	6	0.50	76.5	0.0065	0.011	0.54	2.73	0.39	0.9	2.76	2.3	3.8	201.00	202.00	198.00	197.50		
CB-75	CB-76	0.16	0.30	0.05	0.05	0.30	6.0	0.3	6.1	6.0	0.29	6	0.50	56.5	0.0088	0.011	0.62	3.18	0.26	0.5	2.61	1.8	2.3	201.00	201.00	198.50	198.00		
CB-80	CB-74	0.29	0.30	0.09	0.09	0.30	6.0	0.5	6.1	6.0	0.54	6	4.50	157.2	0.0286	0.011	1.12	5.71	0.27	0.5	4.74	1.8	6.3	203.00	203.00	200.50	196.00		
CB-73	CB-74	0.13	0.30	0.04	0.04	0.30	6.0	0.8	6.1	6.0	3.19	10	4.00	269.6	0.0148	0.011	3.15	5.78	0.77	1.0	6.13	2.0	6.0	203.00	203.00	200.00	196.00		
CB-72	CB-73	0.14	0.30	0.04	0.04	0.30	6.0	0.4	6.1	6.0	1.03	8	0.50	81.4	0.0061	0.011	1.12	3.21	0.55	0.9	3.30	2.1	2.1	203.50	203.00	200.50	200.00		
CB-71	CB-72	0.11	0.30	0.03	0.03	0.30	6.0	0.5	6.1	6.0	0.77	8	0.50	96.4	0.0052	0.011	1.03	2.95	0.46	0.7	2.80	1.6	2.1	203.50	203.50	201.00	200.50		
CB-70	CB-71	0.31	0.30	0.09	0.09	0.30	6.0	0.4	6.1	6.0	0.56	8	0.50	75.6	0.0066	0.011	1.16	3.33	0.36	0.5	2.76	1.6	1.6	204.00	203.50	201.50	201.00		
CB-69	CB-73	0.28	0.30	0.08	0.08	0.30	6.0	0.7	6.1	6.0	1.93	10	1.58	189.9	0.0083	0.011	2.36	4.33	0.63	0.8	4.24	2.4	2.0	205.00	203.00	201.58	200.00		
CB-68	CB-69	0.11	0.30	0.03	0.03	0.30	6.0	0.3	6.1	6.0	1.42	8	0.92	72.6	0.0127	0.011	1.61	4.61	0.53	0.9	4.70	2.6	2.6	206.00	205.00	202.50	201.58		
CB-67	CB-68	0.09	0.30	0.03	0.03	0.30	6.0	0.4	6.1	6.0	0.27	6	0.75	73.3	0.0102	0.011	0.67	3.42	0.25	0.4	2.73	1.6	2.8	205.50	206.00	203.25	202.50		
CB-66	CB-67	0.06	0.30	0.02	0.02	0.30	6.0	0.3	6.1	6.0	0.10	6	0.50	52.3	0.0096	0.011	0.65	3.30	0.15	0.2	1.98	1.1	1.6	205.50	205.50	203.75	203.25		
J-23	CB-68	0.00	0.30	0.00	0.00	0.30	6.0	0.1	6.1	6.0	0.95	8	0.77	46.5	0.0166	0.011	1.84	5.26	0.37	0.5	4.48	#######	2.6	-	206.00	203.27	202.50		
CB-84	CB-85	1.00	0.30	0.30	0.30	0.30	6.0	0.4	6.1	6.0	1.83	10	1.00	117.3	0.0085	0.011	2.39	4.38	0.59	0.8	4.21	1.5	2.5	198.00	198.00	194.50	194.50		
CB-85	CB-86	0.19	0.30	0.06	0.06	0.30	6.0	0.3	6.1	6.0	2.18	10	2.50	116.9	0.0214	0.011	3.79	6.94	0.49	0.6	6.04	2.5	2.0	198.00	195.00	194.50	192.00		
CB-86	CB-87	0.29	0.30	0.09	0.09	0.30	6.0	0.3	6.1	6.0	2.71	12	0.50	79.2	0.0063	0.011	3.35	4.26	0.74	0.8	4.17	1.8	2.3	195.00	195.00	192.00	191.50		

CB-87	J-25	0.52	0.30	0.15	0.15	6.0	0.1	6.0	6.1	3.65	12	1.00	52.6	0.0190	0.011	5.81	7.39	0.62	0.6	6.65	2.3	#######	195.00	-	191.50	190.50
J-25	CB-88	0.00	0.30	0.00	0.00	6.0	0.1	6.0	6.1	10.53	15	2.50	83.9	0.0298	0.011	13.18	10.74	0.91	0.8	10.52	#######	3.6	-	193.00	190.50	188.00
CB-88	CB-89	0.48	0.30	0.14	0.14	6.0	0.2	6.0	6.1	11.41	15	4.37	150.6	0.0290	0.011	13.01	10.60	0.99	0.9	10.70	3.6	0.9	193.00	186.00	188.00	183.63
CB-89	CB-90	0.18	0.30	0.05	0.05	6.0	0.1	6.0	6.1	11.74	15	1.13	38.1	0.0297	0.011	13.15	10.71	1.01	0.9	10.93	0.9	1.1	186.00	185.00	183.63	182.50
CB-90	CB-91	0.48	0.30	0.14	0.14	6.0	0.2	6.0	6.1	12.61	15	3.20	110.0	0.0291	0.011	13.02	10.61	1.08	1.0	11.14	1.1	0.7	185.00	181.50	182.50	179.30
CB-91	CB-92	0.21	0.30	0.06	0.06	6.0	0.1	6.0	6.1	12.98	15	1.45	49.8	0.0291	0.011	13.03	10.62	1.12	1.0	11.25	0.7	0.7	181.50	180.00	179.30	177.85
CB-92	J-26	0.43	0.30	0.13	0.13	6.0	0.4	6.0	6.1	13.78	18	8.48	292.4	0.0290	0.011	21.14	11.96	0.96	0.7	10.89	0.5	#######	180.00	-	177.85	169.37
CB-93A	CB-93B	0.44	0.30	0.13	0.13	6.0	0.5	6.0	6.1	0.80	6	1.80	121.2	0.0149	0.011	0.81	4.12	0.44	1.0	4.36	1.8	1.1	177.00	174.50	174.50	172.70
CB-93B	CB-93C	0.78	0.30	0.23	0.23	6.0	0.4	6.0	6.1	2.22	10		157.6	0.0184	0.011	3.51	6.44	0.52	0.6	5.80	0.8	1.2	174.50	172.00	172.70	169.80
CB-93C	J-26	1.27	1.30	1.65	1.65	6.0	0.1	6.0	6.1	12.30	18		41.7	0.0103	0.011	12.61	7.13	1.31	1.0	7.49	0.5	#######	172.00	-	169.80	169.37
J-26	J-27	0.00	0.30	0.00	0.00	6.0	0.1	6.0	6.1	26.08	24	1.67	57.2	0.0292	0.011	45.68	14.54	1.18	0.6	12.65	#######	#######	-	-	169.37	167.70
J-27	CB-94	0.12	0.30	0.04	0.04	6.0	0.1	6.0	6.1	26.31	24	2.24	77.0	0.0291	0.011	45.60	14.52	1.18	0.6	12.63	#######	1.3	-	169.00	167.70	165.46
CB-94	J-28	0.22	0.30	0.07	0.07	6.0	0.1	6.0	6.1	26.70	24	1.96	70.0	0.0280	0.011	44.74	14.24	1.20	0.6	12.53	1.3	#######	169.00	-	165.46	163.50
CB-95	CB-96	1.78	0.30	0.53	0.53	6.0	0.5	6.0	6.1	3.25	8	13.74	281.3	0.0488	0.011	3.16	9.04	0.62	1.0	9.58	1.6	5.9	192.00	182.50	189.50	175.76
CB-96	CB-97	0.57	0.30	0.17	0.17	6.0	0.2	6.0	6.1	4.29	15	0.26	54.6	0.0048	0.011	5.27	4.29	0.94	0.8	4.21		3.1	182.50	180.00	175.76	175.50
CB-97	CB-98	0.57	0.30	0.17	0.17	6.0	0.3	6.0	6.1	5.33	15	2.30	134.2	0.0171	0.011	9.99	8.14	0.71	0.5	7.00	3.1	2.4	180.00	177.00	175.50	173.20
CB-98	CB-99	0.35	0.30	0.10	0.10	6.0	0.0	6.0	6.1	5.96	15	1.30	35.6	0.0365	0.011	14.59	11.89	0.62	0.4	9.51	1.1	0.9	177.00	175.50	174.50	173.20
CB-100	CB-99	0.45	0.30	0.13	0.13	6.0	0.4	6.0	6.1	0.82	8	1.00	100.2	0.0100	0.011	1.43	4.09	0.39	0.6	3.56	1.6	3.6	174.50	175.50	172.00	171.00
CB-99	CB-101	0.73	0.30	0.22	0.22	6.0	0.3	6.0	6.1	8.12	15	2.00	142.0	0.0141	0.011	9.06	7.38	1.01	0.9	7.53	3.1	1.1	175.50	171.50	171.00	169.00
CB-101	CB-102	0.59	0.30	0.18	0.18	6.0	0.1	6.0	6.1	9.20	15	2.00	79.0	0.0253	0.011	12.15	9.90	0.88	0.8	9.50	1.1	1.1	171.50	169.50	169.00	167.00
CB-102	CB-103	0.32	0.30	0.09	0.09	6.0	0.2	6.0	6.1	9.78	15	2.50	103.0	0.0243	0.011	11.89	9.69	0.95	0.8	9.60	1.1	1.1	169.50	167.00	167.00	164.50
CB-103	J-28	1.31	0.30	0.39	0.39	6.0	0.1	6.0	6.1	12.18	18	1.00	67.2	0.0149	0.011	15.14	8.57	1.11	0.8	8.40	0.8	#######	167.00	-	164.50	163.50
J-28	J-29	0.14	0.30	0.04	0.04	6.0	0.1	6.0	6.1	39.15	30	0.63	49.6	0.0127	0.011	54.63	11.13	1.69	0.7	10.46	#######	#######	-	-	163.50	162.87
J-29	J-22	0.06	0.30	0.02	0.02	6.0	0.1	6.0	6.1	39.25	30	0.87	70.0	0.0124	0.011	54.04	11.01	1.71	0.7	10.35	#######	#######	-	-	162.87	162.00
J-22	FE-5	0.06	0.30	0.02	0.02	6.0	0.0	6.0	6.1	53.51	30	8.00	78.0	0.1026	0.011	155.24	31.63	1.15	0.3	24.35	#######	-2.7	-	154.00	162.00	154.00
CB-105	CB-106	6.77	0.30	2.03	2.03	21.5	0.1	21.5	6.1	12.39	24	0.50	60.1	0.0083	0.011	24.39	7.76	1.10	0.5	6.52	0.3	0.8	158.00	158.00	155.50	155.00
CB-106	CB-107	1.83	0.30	0.55	0.55	6.0	0.3	6.0	6.1	15.74	24	1.00	126.8	0.0079	0.011	23.74	7.56	1.29	0.7	6.88	0.8	0.8	158.00	157.00	155.00	154.00
CB-108	CB-109	9.66	0.30	2.90	2.90	16.9	0.1	16.9	6.1	17.68	24	0.50	50.5	0.0099	0.011	26.60	8.47	1.29	0.7	7.71	0.3	0.8	158.50	158.50	156.00	155.50
CB-110	CB-109	0.82	0.30	0.25	0.25	10.9	0.2	10.9	6.1	1.50	8	1.50	72.8	0.0206	0.011	2.05	5.87	0.46	0.7	5.58	1.6	2.1	159.50	158.50	157.00	155.50
CB-109	CB-111	0.33	0.30	0.10	0.10	6.0	0.1	6.0	6.1	19.78	24	0.50	62.6	0.0080	0.011	23.89	7.61	1.51	0.8	7.53	0.8	0.8	158.50	158.00	155.50	155.00
CB-111	CB-112	3.02	0.30	0.91	0.91	6.0	0.2	6.0	6.1	25.31	30	0.50	76.9	0.0065	0.011	39.09	7.96	1.58	0.6	7.25	0.3	0.8	158.00	158.00	155.00	154.50
CB-112	CB-107	0.11	0.30	0.03	0.03	6.0	0.3	6.0	6.1	25.51	30	0.50	115.5	0.0043	0.011	31.89	6.50	1.83	0.8	6.37	-32.0	1.3	125.25	158.00	154.50	154.00

A5.3 HydroCAD Node Diagram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Pre-1 (Mitchell's Lane)
DP-1 (Mitchells Lane)
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DP-1 (Mitchells Lane)
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DP-2 Combined Maidford/Wyatt Rd Crossing
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Post-02B (To Pond)
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Post-4 (To Bio-Swale)
Subcat
Reach
Pond
Link
Routing Diagram for 2569-001-ALLS-XHCD-INHS
Prepared by DiPrete Engineering
HydroCAD® 10.00-22 s/n 01125 © 2018 HydroCAD Software Solutions LLC

A5.3.1 HydroCAD 1.2" (WQ) Storm Analysis

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: Post-01 (Uncontrolled) Runoff Area=9.771 ac 0.00% Impervious Runoff Depth=0.06"
Flow Length=488' Tc=17.0 min CN=74/0 Runoff=0.14 cfs 0.050 af

Subcatchment 102A: Post-02A (Uncontrolled Runoff Area=9.698 ac 0.00% Impervious Runoff Depth=0.06"
Flow Length=667' Tc=15.2 min CN=74/0 Runoff=0.14 cfs 0.050 af

Subcatchment 102B: Post-02B (To Pond) Runoff Area=77.399 ac 5.85% Impervious Runoff Depth=0.12"
Tc=6.0 min CN=74/98 Runoff=4.85 cfs 0.747 af

Subcatchment 103: Post-3 (Uncontrolled Runoff Area=12.030 ac 0.00% Impervious Runoff Depth=0.06"
Flow Length=739' Tc=17.4 min CN=74/0 Runoff=0.17 cfs 0.062 af

Subcatchment 104: Post-4 (To Bio-Swale) Runoff Area=5.408 ac 10.50% Impervious Runoff Depth=0.16"
Flow Length=919' Tc=25.0 min CN=74/98 Runoff=0.39 cfs 0.072 af

Reach 121: DP-1 (Mitchells Lane) Inflow=0.14 cfs 0.050 af
Outflow=0.14 cfs 0.050 af

Reach 122: Discharge Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=168.0' S=0.0089 '/' Capacity=191.80 cfs Outflow=0.00 cfs 0.000 af

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=0.86 cfs 0.168 af
Outflow=0.86 cfs 0.168 af

Pond 116A: Irrigation Pond Plugged Peak Elev=156.50' Storage=1,829,368 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 116P: Irrigation Pond Peak Elev=156.67' Storage=1,859,184 cf Inflow=4.85 cfs 0.747 af
Primary=0.09 cfs 0.305 af Secondary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.305 af

Pond 117P: Sand Filter Ponding Peak Elev=0.09' Storage=125 cf Inflow=0.39 cfs 0.072 af
Primary=0.29 cfs 0.072 af Secondary=0.00 cfs 0.000 af Outflow=0.29 cfs 0.072 af

Pond 119P: Sand Filter Sand Layer Peak Elev=0.03' Storage=663 cf Inflow=0.29 cfs 0.072 af
Outflow=0.55 cfs 0.056 af

Total Runoff Area = 114.306 ac Runoff Volume = 0.980 af Average Runoff Depth = 0.10"
95.54% Pervious = 109.207 ac 4.46% Impervious = 5.099 ac

Summary for Subcatchment 101: Post-01 (Uncontrolled)

Runoff = 0.14 cfs @ 12.59 hrs, Volume= 0.050 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2" Storm Rainfall=1.20"

Area (ac)	CN	Description
9.771	74	>75% Grass cover, Good, HSG C
9.771	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0090	0.13		**Sheet Flow, 1A - 1B** Grass: Short n= 0.150 P2= 3.30"
3.7	388	0.0119	1.76		**Shallow Concentrated Flow, 1B - 1C** Unpaved Kv= 16.1 fps
17.0	488	Total			

Summary for Subcatchment 102A: Post-02A (Uncontrolled Wyatt)

Runoff = 0.14 cfs @ 12.56 hrs, Volume= 0.050 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2" Storm Rainfall=1.20"

Area (ac)	CN	Description
8.893	74	>75% Grass cover, Good, HSG C
0.805	70	Woods, Good, HSG C
9.698	74	Weighted Average
9.698	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0210	0.18		**Sheet Flow, 2A - 2B** Grass: Short n= 0.150 P2= 3.30"
5.7	567	0.0106	1.66		**Shallow Concentrated Flow, 2B - 2C** Unpaved Kv= 16.1 fps
15.2	667	Total			

Summary for Subcatchment 102B: Post-02B (To Pond)

Runoff = 4.85 cfs @ 12.09 hrs, Volume= 0.747 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2" Storm Rainfall=1.20"

Area (ac)	CN	Description
70.440	74	>75% Grass cover, Good, HSG C
2.428	70	Woods, Good, HSG C
4.531	98	Water Surface, HSG C
77.399	75	Weighted Average
72.868	74	94.15% Pervious Area
4.531	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 103: Post-3 (Uncontrolled Maidford North)

Runoff = 0.17 cfs @ 12.60 hrs, Volume= 0.062 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2" Storm Rainfall=1.20"

Area (ac)	CN	Description
11.703	74	>75% Grass cover, Good, HSG C
0.327	70	Woods, Good, HSG C
12.030	74	Weighted Average
12.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0220	0.12		**Sheet Flow, 3A 3B** Grass: Dense n= 0.240 P2= 3.30"
3.9	639	0.0282	2.70		**Shallow Concentrated Flow, 3B-3C** Unpaved Kv= 16.1 fps
17.4	739	Total			

Summary for Subcatchment 104: Post-4 (To Bio-Swale)

Runoff = 0.39 cfs @ 12.35 hrs, Volume= 0.072 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2" Storm Rainfall=1.20"

	Area (ac)	CN	Description
	4.840	74	>75% Grass cover, Good, HSG C
*	0.568	98	Impervious
	5.408	77	Weighted Average
	4.840	74	89.50% Pervious Area
	0.568	98	10.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0090	0.09		**Sheet Flow, 4A-4B** Grass: Dense n= 0.240 P2= 3.30"
5.7	819	0.0225	2.42		**Shallow Concentrated Flow, 4B-4C** Unpaved Kv= 16.1 fps
25.0	919	Total			

Summary for Reach 121: DP-1 (Mitchells Lane)

Inflow Area = 9.771 ac, 0.00% Impervious, Inflow Depth = 0.06" for 1.2" Storm event
Inflow = 0.14 cfs @ 12.59 hrs, Volume= 0.050 af
Outflow = 0.14 cfs @ 12.59 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 122: Discharge Swale

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.50' Flow Area= 31.3 sf, Capacity= 191.80 cfs

5.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 168.0' Slope= 0.0089 '/'
Inlet Invert= 155.50', Outlet Invert= 154.00'

‡

Summary for Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 27.136 ac, 2.09% Impervious, Inflow Depth = 0.07" for 1.2" Storm event
Inflow = 0.86 cfs @ 12.60 hrs, Volume= 0.168 af
Outflow = 0.86 cfs @ 12.60 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 116A: Irrigation Pond Plugged

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.50' @ 0.00 hrs Surf.Area= 180,129 sf Storage= 1,829,368 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 116P: Irrigation Pond

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 0.12" for 1.2" Storm event
Inflow = 4.85 cfs @ 12.09 hrs, Volume= 0.747 af
Outflow = 0.09 cfs @ 24.10 hrs, Volume= 0.305 af, Atten= 98%, Lag= 720.7 min
Primary = 0.09 cfs @ 24.10 hrs, Volume= 0.305 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.67' @ 24.10 hrs Surf.Area= 181,267 sf Storage= 1,859,184 cf (29,815 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,488.6 min (2,374.4 - 885.9)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Device 4	156.50'	**8.00" Vert. Orifice/Grate** C= 0.600
#2	Device 4	157.50'	**12.00" Vert. Orifice/Grate X 3.00** C= 0.600
#3	Device 4	160.00'	**24.00" x 48.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	156.00'	**24.00" Round Culvert** L= 91.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 156.00' / 155.50' S= 0.0055 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#5	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.09 cfs @ 24.10 hrs HW=156.67' (Free Discharge)
└─**4=Culvert** (Passes 0.09 cfs of 2.41 cfs potential flow)
  ├─**1=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.38 fps)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' TW=155.50' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 117P: Sand Filter Ponding

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 0.16" for 1.2" Storm event
Inflow = 0.39 cfs @ 12.35 hrs, Volume= 0.072 af
Outflow = 0.29 cfs @ 12.62 hrs, Volume= 0.072 af, Atten= 26%, Lag= 16.4 min
Primary = 0.29 cfs @ 12.62 hrs, Volume= 0.072 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.09' @ 12.62 hrs Surf.Area= 1,521 sf Storage= 125 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.9 min (873.5 - 871.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,374 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,340	0	0
1.00	3,408	2,374	2,374

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	0.75'	**335.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.29 cfs @ 12.62 hrs HW=0.09' TW=0.02' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 119P: Sand Filter Sand Layer

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 0.16" for 1.2" Storm event
Inflow = 0.29 cfs @ 12.62 hrs, Volume= 0.072 af
Outflow = 0.55 cfs @ 12.60 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Primary = 0.55 cfs @ 12.60 hrs, Volume= 0.056 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.03' @ 12.60 hrs Surf.Area= 1,340 sf Storage= 663 cf

Plug-Flow detention time= 152.6 min calculated for 0.056 af (79% of inflow)
Center-of-Mass det. time= 59.7 min (933.2 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.50'	663 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 2,010 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-1.50	1,340	0	0
0.00	1,340	2,010	2,010

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.40'	**4.00" Vert. Orifice/Grate X 7.00** C= 0.600

Primary OutFlow Max=0.55 cfs @ 12.60 hrs HW=0.03' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.55 cfs @ 0.90 fps)

A5.3.2 HydroCAD 1-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 11: Pre-1 (Mitchell's Lane) Runoff Area=14.023 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=684' Tc=30.0 min CN=74 Runoff=6.66 cfs 0.916 af

Subcatchment 12: Pre-2 (Wyatt Rd Direct) Runoff Area=39.850 ac 0.57% Impervious Runoff Depth=0.78"
Flow Length=1,091' Tc=27.4 min CN=74 Runoff=19.66 cfs 2.603 af

Subcatchment 13: Pre-3 (Maidford North) Runoff Area=60.434 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=1,186' Tc=20.4 min CN=74 Runoff=33.67 cfs 3.948 af

Subcatchment 101: Post-01 (Uncontrolled) Runoff Area=9.771 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=488' Tc=17.0 min CN=74 Runoff=5.85 cfs 0.638 af

Subcatchment 102A: Post-02A (Uncontrolled Runoff Area=9.698 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=667' Tc=15.2 min CN=74 Runoff=6.03 cfs 0.634 af

Subcatchment 102B: Post-02B (To Pond) Runoff Area=77.399 ac 5.85% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=75 Runoff=69.18 cfs 5.370 af

Subcatchment 103: Post-3 (Uncontrolled Runoff Area=12.030 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=739' Tc=17.4 min CN=74 Runoff=7.14 cfs 0.786 af

Subcatchment 104: Post-4 (To Bio-Swale) Runoff Area=5.408 ac 10.50% Impervious Runoff Depth=0.93"
Flow Length=919' Tc=25.0 min CN=77 Runoff=3.44 cfs 0.421 af

Reach 21: DP-1 (Mitchells Lane) Inflow=6.66 cfs 0.916 af
Outflow=6.66 cfs 0.916 af

Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=51.94 cfs 6.552 af
Outflow=51.94 cfs 6.552 af

Reach 121: DP-1 (Mitchells Lane) Inflow=5.85 cfs 0.638 af
Outflow=5.85 cfs 0.638 af

Reach 122: Discharge Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=168.0' S=0.0089 '/' Capacity=191.80 cfs Outflow=0.00 cfs 0.000 af

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=15.67 cfs 1.826 af
Outflow=15.67 cfs 1.826 af

Pond 116A: Irrigation Pond Plugged Peak Elev=156.50' Storage=1,829,368 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 116P: Irrigation Pond Peak Elev=157.49' Storage=2,010,300 cf Inflow=69.18 cfs 5.370 af
Primary=1.36 cfs 4.140 af Secondary=0.00 cfs 0.000 af Outflow=1.36 cfs 4.140 af

Pond 117P: Sand Filter Ponding Peak Elev=0.78' Storage=1,661 cf Inflow=3.44 cfs 0.421 af
Primary=0.56 cfs 0.302 af Secondary=3.43 cfs 0.119 af Outflow=3.99 cfs 0.421 af

Pond 119P: Sand Filter Sand Layer Peak Elev=0.05' Storage=663 cf Inflow=0.56 cfs 0.302 af
Outflow=0.67 cfs 0.287 af

Total Runoff Area = 228.613 ac Runoff Volume = 15.317 af Average Runoff Depth = 0.80"
97.67% Pervious = 223.288 ac 2.33% Impervious = 5.325 ac

Summary for Subcatchment 11: Pre-1 (Mitchell's Lane)

Runoff = 6.66 cfs @ 12.47 hrs, Volume= 0.916 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
13.679	74	>75% Grass cover, Good, HSG C
0.344	70	Woods, Good, HSG C
14.023	74	Weighted Average
14.023	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0140	0.07		**Sheet Flow, 1a-1b** Woods: Light underbrush n= 0.400 P2= 3.30"
5.6	584	0.0116	1.73		**Shallow Concentrated Flow, 1b-1c** Unpaved Kv= 16.1 fps
30.0	684	Total			

Summary for Subcatchment 12: Pre-2 (Wyatt Rd Direct)

Runoff = 19.66 cfs @ 12.43 hrs, Volume= 2.603 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (ac)	CN	Description
	36.580	74	>75% Grass cover, Good, HSG C
	3.044	70	Woods, Good, HSG C
*	0.226	98	Impervious
	39.850	74	Weighted Average
	39.624	74	99.43% Pervious Area
	0.226	98	0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0070	0.08		**Sheet Flow, 2a-2b** Grass: Dense n= 0.240 P2= 3.30"
6.0	991	0.0290	2.74		**Shallow Concentrated Flow, 2b-2c** Unpaved Kv= 16.1 fps
27.4	1,091	Total			

Summary for Subcatchment 13: Pre-3 (Maidford North)

Runoff = 33.67 cfs @ 12.32 hrs, Volume= 3.948 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
54.365	74	>75% Grass cover, Good, HSG C
6.069	70	Woods, Good, HSG C
60.434	74	Weighted Average
60.434	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0230	0.13		**Sheet Flow, 3a-3b** Grass: Dense n= 0.240 P2= 3.30"
7.1	1,086	0.0250	2.55		**Shallow Concentrated Flow, 3b-3c** Unpaved Kv= 16.1 fps
20.4	1,186	Total			

Summary for Subcatchment 101: Post-01 (Uncontrolled)

Runoff = 5.85 cfs @ 12.26 hrs, Volume= 0.638 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
9.771	74	>75% Grass cover, Good, HSG C
9.771	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0090	0.13		**Sheet Flow, 1A - 1B** Grass: Short n= 0.150 P2= 3.30"
3.7	388	0.0119	1.76		**Shallow Concentrated Flow, 1B - 1C** Unpaved Kv= 16.1 fps
17.0	488	Total			

Summary for Subcatchment 102A: Post-02A (Uncontrolled Wyatt)

Runoff = 6.03 cfs @ 12.23 hrs, Volume= 0.634 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
8.893	74	>75% Grass cover, Good, HSG C
0.805	70	Woods, Good, HSG C
9.698	74	Weighted Average
9.698	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0210	0.18		**Sheet Flow, 2A - 2B** Grass: Short n= 0.150 P2= 3.30"
5.7	567	0.0106	1.66		**Shallow Concentrated Flow, 2B - 2C** Unpaved Kv= 16.1 fps
15.2	667	Total			

Summary for Subcatchment 102B: Post-02B (To Pond)

Runoff = 69.18 cfs @ 12.10 hrs, Volume= 5.370 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
70.440	74	>75% Grass cover, Good, HSG C
2.428	70	Woods, Good, HSG C
4.531	98	Water Surface, HSG C
77.399	75	Weighted Average
72.868	74	94.15% Pervious Area
4.531	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 103: Post-3 (Uncontrolled Maidford North)

Runoff = 7.14 cfs @ 12.27 hrs, Volume= 0.786 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
11.703	74	>75% Grass cover, Good, HSG C
0.327	70	Woods, Good, HSG C
12.030	74	Weighted Average
12.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0220	0.12		**Sheet Flow, 3A 3B** Grass: Dense n= 0.240 P2= 3.30"
3.9	639	0.0282	2.70		**Shallow Concentrated Flow, 3B-3C** Unpaved Kv= 16.1 fps
17.4	739	Total			

Summary for Subcatchment 104: Post-4 (To Bio-Swale)

Runoff = 3.44 cfs @ 12.38 hrs, Volume= 0.421 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (ac)	CN	Description
4.840	74	>75% Grass cover, Good, HSG C
* 0.568	98	Impervious
5.408	77	Weighted Average
4.840	74	89.50% Pervious Area
0.568	98	10.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0090	0.09		**Sheet Flow, 4A-4B** Grass: Dense n= 0.240 P2= 3.30"
5.7	819	0.0225	2.42		**Shallow Concentrated Flow, 4B-4C** Unpaved Kv= 16.1 fps
25.0	919	Total			

Summary for Reach 21: DP-1 (Mitchells Lane)

Inflow Area = 14.023 ac, 0.00% Impervious, Inflow Depth = 0.78" for 1-Year event
Inflow = 6.66 cfs @ 12.47 hrs, Volume= 0.916 af
Outflow = 6.66 cfs @ 12.47 hrs, Volume= 0.916 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 100.284 ac, 0.23% Impervious, Inflow Depth = 0.78" for 1-Year event
Inflow = 51.94 cfs @ 12.35 hrs, Volume= 6.552 af
Outflow = 51.94 cfs @ 12.35 hrs, Volume= 6.552 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 121: DP-1 (Mitchells Lane)

Inflow Area = 9.771 ac, 0.00% Impervious, Inflow Depth = 0.78" for 1-Year event
Inflow = 5.85 cfs @ 12.26 hrs, Volume= 0.638 af
Outflow = 5.85 cfs @ 12.26 hrs, Volume= 0.638 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 122: Discharge Swale

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.50' Flow Area= 31.3 sf, Capacity= 191.80 cfs

5.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 168.0' Slope= 0.0089 '/'
Inlet Invert= 155.50', Outlet Invert= 154.00'

‡

Summary for Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 27.136 ac, 2.09% Impervious, Inflow Depth = 0.81" for 1-Year event
Inflow = 15.67 cfs @ 12.33 hrs, Volume= 1.826 af
Outflow = 15.67 cfs @ 12.33 hrs, Volume= 1.826 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 116A: Irrigation Pond Plugged

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.50' @ 0.00 hrs Surf.Area= 180,129 sf Storage= 1,829,368 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 116P: Irrigation Pond

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 0.83" for 1-Year event
Inflow = 69.18 cfs @ 12.10 hrs, Volume= 5.370 af
Outflow = 1.36 cfs @ 22.79 hrs, Volume= 4.140 af, Atten= 98%, Lag= 641.4 min
Primary = 1.36 cfs @ 22.79 hrs, Volume= 4.140 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 157.49' @ 22.79 hrs Surf.Area= 186,934 sf Storage= 2,010,300 cf (180,931 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,229.6 min (2,097.0 - 867.4)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Device 4	156.50'	**8.00" Vert. Orifice/Grate** C= 0.600
#2	Device 4	157.50'	**12.00" Vert. Orifice/Grate X 3.00** C= 0.600
#3	Device 4	160.00'	**24.00" x 48.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	156.00'	**24.00" Round Culvert** L= 91.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 156.00' / 155.50' S= 0.0055 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#5	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.36 cfs @ 22.79 hrs HW=157.49' (Free Discharge)
└**4=Culvert** (Passes 1.36 cfs of 9.92 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 1.36 cfs @ 3.89 fps)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' TW=155.50' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 117P: Sand Filter Ponding

Inflow Area =	5.408 ac,	10.50% Impervious,	Inflow Depth =	0.93" for 1-Year event
Inflow =	3.44 cfs @	12.38 hrs,	Volume=	0.421 af
Outflow =	3.99 cfs @	12.36 hrs,	Volume=	0.421 af, Atten= 0%, Lag= 0.0 min
Primary =	0.56 cfs @	12.35 hrs,	Volume=	0.302 af
Secondary =	3.43 cfs @	12.36 hrs,	Volume=	0.119 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.78' @ 12.35 hrs Surf.Area= 2,944 sf Storage= 1,661 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 19.9 min (897.8 - 877.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,374 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,340	0	0
1.00	3,408	2,374	2,374

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	0.75'	**335.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.56 cfs @ 12.35 hrs HW=0.78' TW=0.02' (Dynamic Tailwater)
└**1=Exfiltration** (Exfiltration Controls 0.56 cfs)

Secondary OutFlow Max=3.29 cfs @ 12.36 hrs HW=0.77' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 3.29 cfs @ 0.39 fps)

Summary for Pond 119P: Sand Filter Sand Layer

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 0.67" for 1-Year event
Inflow = 0.56 cfs @ 12.35 hrs, Volume= 0.302 af
Outflow = 0.67 cfs @ 12.40 hrs, Volume= 0.287 af, Atten= 0%, Lag= 3.0 min
Primary = 0.67 cfs @ 12.40 hrs, Volume= 0.287 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.05' @ 12.40 hrs Surf.Area= 1,340 sf Storage= 663 cf

Plug-Flow detention time= 37.0 min calculated for 0.287 af (95% of inflow)
Center-of-Mass det. time= 13.1 min (966.4 - 953.3)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.50'	663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,010 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-1.50	1,340	0	0
0.00	1,340	2,010	2,010

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.40'	**4.00" Vert. Orifice/Grate X 7.00** C= 0.600

Primary OutFlow Max=0.67 cfs @ 12.40 hrs HW=0.05' TW=0.00' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 0.67 cfs @ 1.09 fps)

A5.3.3 HydroCAD 10-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 11: Pre-1 (Mitchell's Lane) Runoff Area=14.023 ac 0.00% Impervious Runoff Depth=2.28"
Flow Length=684' Tc=30.0 min CN=74 Runoff=21.03 cfs 2.670 af

Subcatchment 12: Pre-2 (Wyatt Rd Direct) Runoff Area=39.850 ac 0.57% Impervious Runoff Depth=2.28"
Flow Length=1,091' Tc=27.4 min CN=74 Runoff=62.26 cfs 7.587 af

Subcatchment 13: Pre-3 (Maidford North) Runoff Area=60.434 ac 0.00% Impervious Runoff Depth=2.28"
Flow Length=1,186' Tc=20.4 min CN=74 Runoff=106.93 cfs 11.506 af

Subcatchment 101: Post-01 (Uncontrolled) Runoff Area=9.771 ac 0.00% Impervious Runoff Depth=2.28"
Flow Length=488' Tc=17.0 min CN=74 Runoff=18.60 cfs 1.860 af

Subcatchment 102A: Post-02A (Uncontrolled Runoff Area=9.698 ac 0.00% Impervious Runoff Depth=2.28"
Flow Length=667' Tc=15.2 min CN=74 Runoff=19.33 cfs 1.846 af

Subcatchment 102B: Post-02B (To Pond) Runoff Area=77.399 ac 5.85% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=75 Runoff=210.17 cfs 15.276 af

Subcatchment 103: Post-3 (Uncontrolled Runoff Area=12.030 ac 0.00% Impervious Runoff Depth=2.28"
Flow Length=739' Tc=17.4 min CN=74 Runoff=22.71 cfs 2.290 af

Subcatchment 104: Post-4 (To Bio-Swale) Runoff Area=5.408 ac 10.50% Impervious Runoff Depth=2.54"
Flow Length=919' Tc=25.0 min CN=77 Runoff=9.83 cfs 1.144 af

Reach 21: DP-1 (Mitchells Lane) Inflow=21.03 cfs 2.670 af
Outflow=21.03 cfs 2.670 af

Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=165.44 cfs 19.094 af
Outflow=165.44 cfs 19.094 af

Reach 121: DP-1 (Mitchells Lane) Inflow=18.60 cfs 1.860 af
Outflow=18.60 cfs 1.860 af

Reach 122: Discharge Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=168.0' S=0.0089 '/' Capacity=191.80 cfs Outflow=0.00 cfs 0.000 af

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=50.57 cfs 5.266 af
Outflow=50.57 cfs 5.266 af

Pond 116A: Irrigation Pond Plugged Peak Elev=156.50' Storage=1,829,368 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 116P: Irrigation Pond Peak Elev=158.64' Storage=2,229,974 cf Inflow=210.17 cfs 15.276 af
Primary=11.31 cfs 13.680 af Secondary=0.00 cfs 0.000 af Outflow=11.31 cfs 13.680 af

Pond 117P: Sand Filter Ponding Peak Elev=0.80' Storage=1,734 cf Inflow=9.83 cfs 1.144 af
Primary=0.57 cfs 0.508 af Secondary=9.32 cfs 0.636 af Outflow=9.89 cfs 1.144 af

Pond 119P: Sand Filter Sand Layer Peak Elev=0.07' Storage=663 cf Inflow=0.57 cfs 0.508 af
Outflow=0.80 cfs 0.493 af

Total Runoff Area = 228.613 ac Runoff Volume = 44.182 af Average Runoff Depth = 2.32"
97.67% Pervious = 223.288 ac 2.33% Impervious = 5.325 ac

Summary for Subcatchment 11: Pre-1 (Mitchell's Lane)

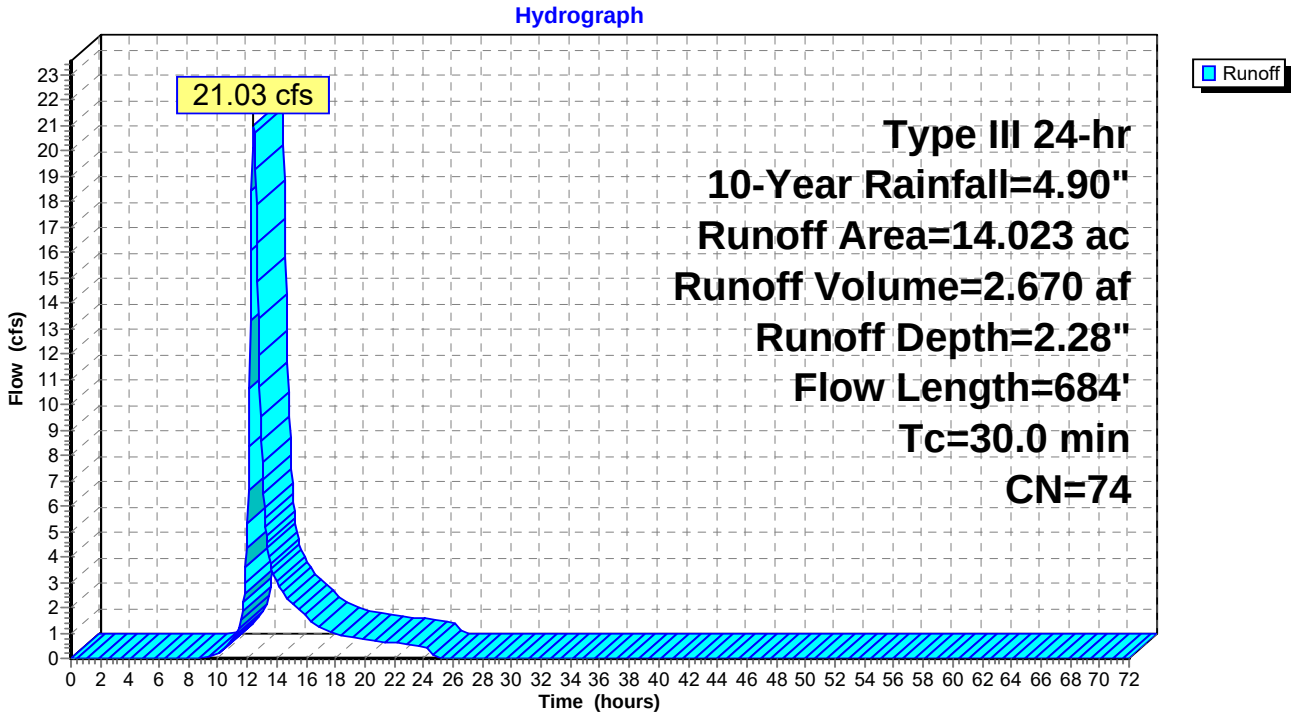
Runoff = 21.03 cfs @ 12.43 hrs, Volume= 2.670 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
13.679	74	>75% Grass cover, Good, HSG C
0.344	70	Woods, Good, HSG C
14.023	74	Weighted Average
14.023	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0140	0.07		**Sheet Flow, 1a-1b** Woods: Light underbrush n= 0.400 P2= 3.30"
5.6	584	0.0116	1.73		**Shallow Concentrated Flow, 1b-1c** Unpaved Kv= 16.1 fps
30.0	684	Total			

Subcatchment 11: Pre-1 (Mitchell's Lane)



Summary for Subcatchment 12: Pre-2 (Wyatt Rd Direct)

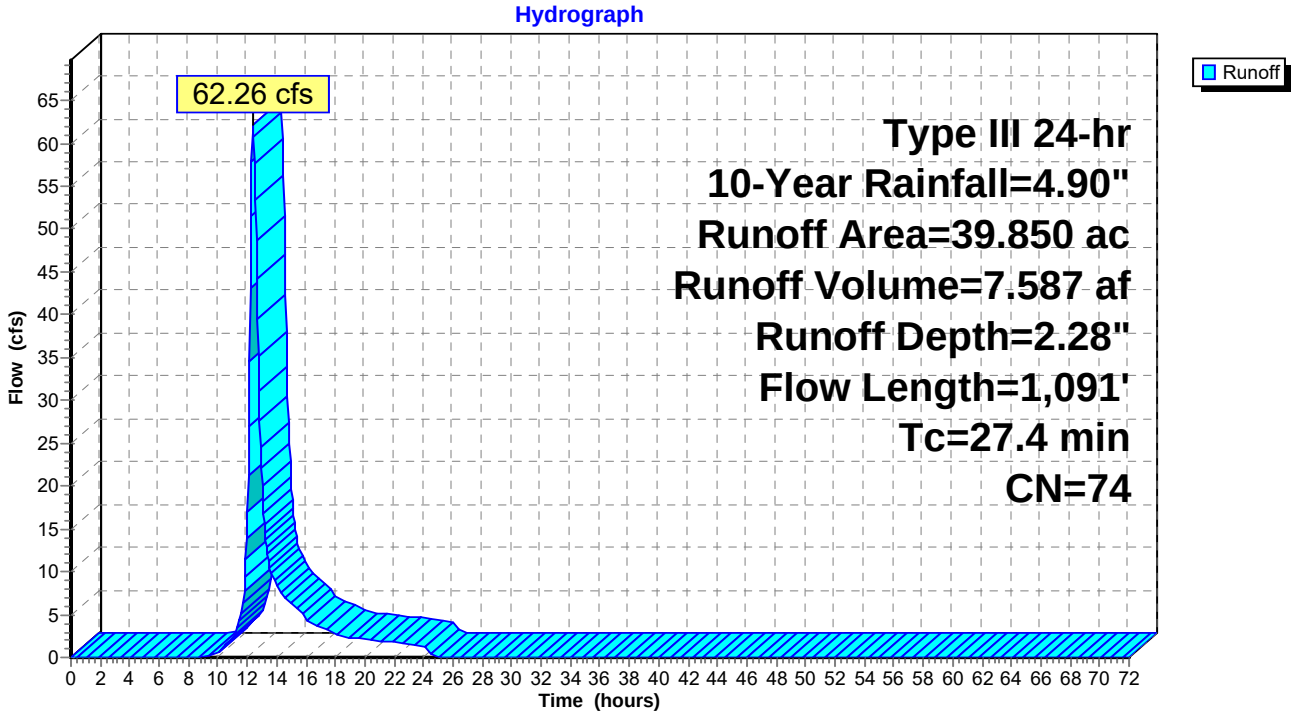
Runoff = 62.26 cfs @ 12.39 hrs, Volume= 7.587 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (ac)	CN	Description
	36.580	74	>75% Grass cover, Good, HSG C
	3.044	70	Woods, Good, HSG C
*	0.226	98	Impervious
	39.850	74	Weighted Average
	39.624	74	99.43% Pervious Area
	0.226	98	0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0070	0.08		**Sheet Flow, 2a-2b** Grass: Dense n= 0.240 P2= 3.30"
6.0	991	0.0290	2.74		**Shallow Concentrated Flow, 2b-2c** Unpaved Kv= 16.1 fps
27.4	1,091	Total			

Subcatchment 12: Pre-2 (Wyatt Rd Direct)



Summary for Subcatchment 13: Pre-3 (Maidford North)

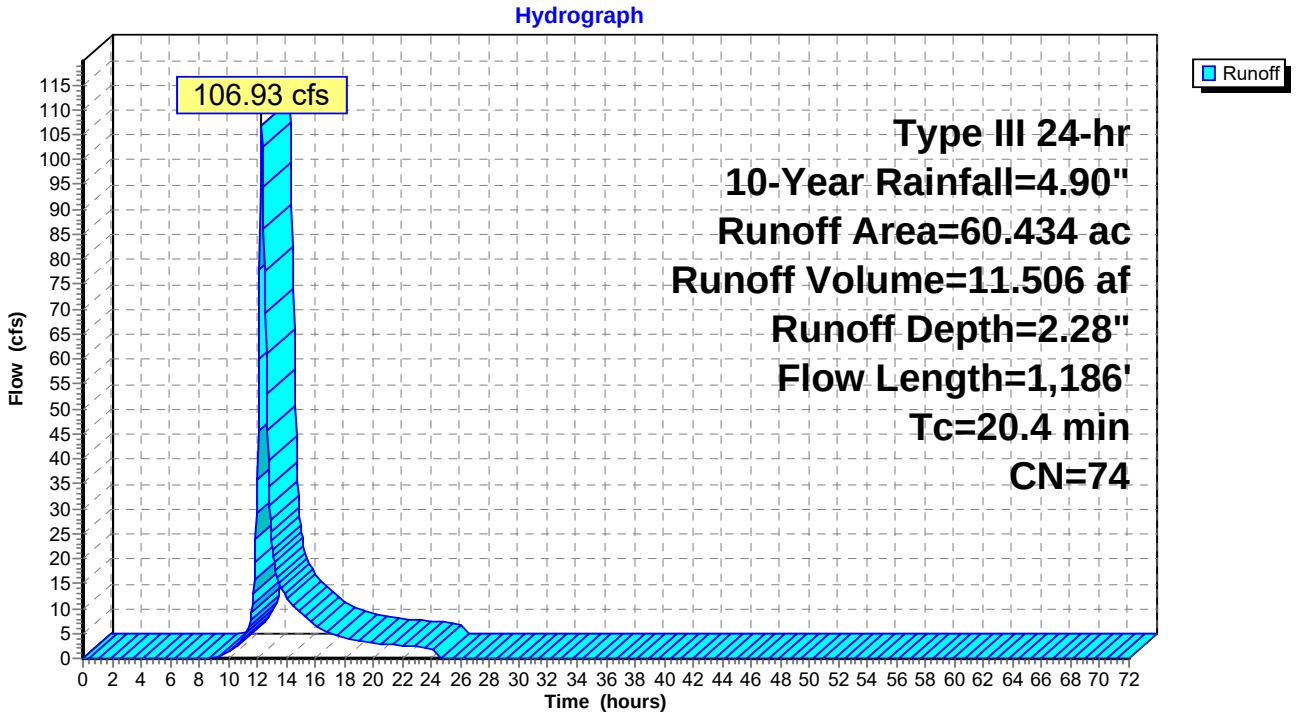
Runoff = 106.93 cfs @ 12.29 hrs, Volume= 11.506 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
54.365	74	>75% Grass cover, Good, HSG C
6.069	70	Woods, Good, HSG C
60.434	74	Weighted Average
60.434	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0230	0.13		**Sheet Flow, 3a-3b** Grass: Dense n= 0.240 P2= 3.30"
7.1	1,086	0.0250	2.55		**Shallow Concentrated Flow, 3b-3c** Unpaved Kv= 16.1 fps
20.4	1,186	Total			

Subcatchment 13: Pre-3 (Maidford North)



Summary for Subcatchment 101: Post-01 (Uncontrolled)

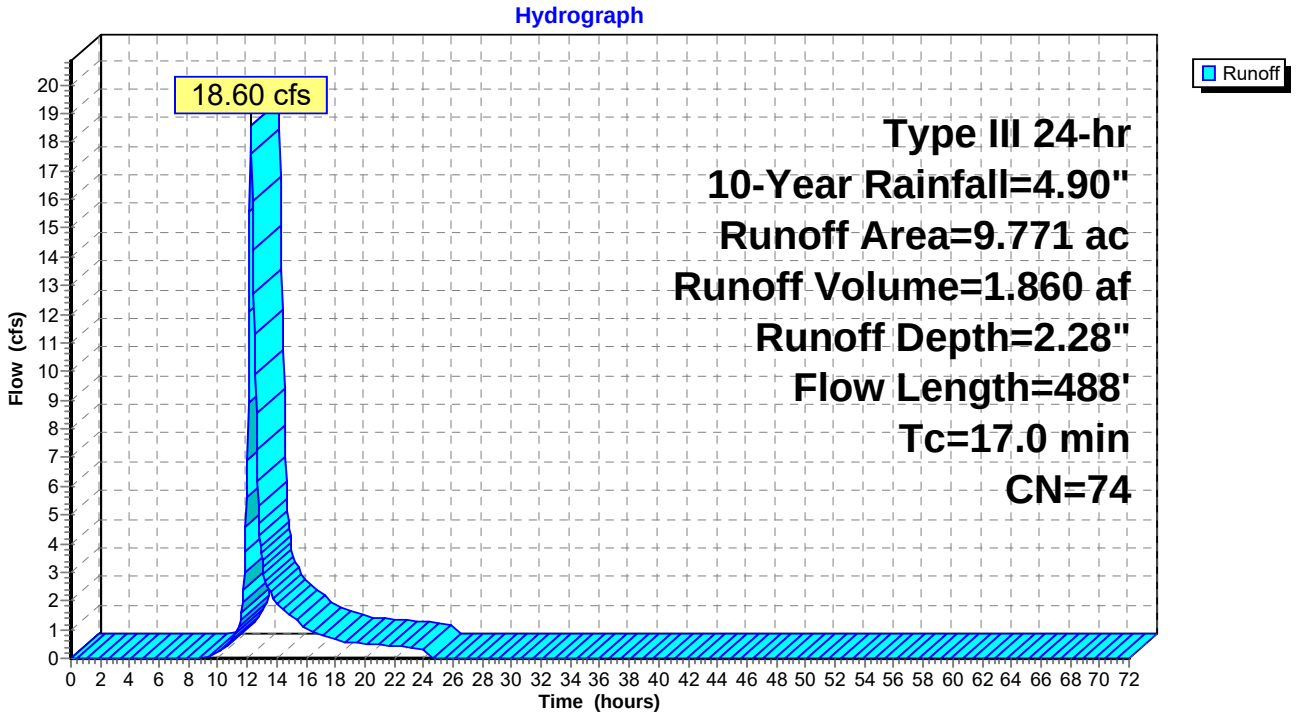
Runoff = 18.60 cfs @ 12.24 hrs, Volume= 1.860 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
9.771	74	>75% Grass cover, Good, HSG C
9.771	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0090	0.13		**Sheet Flow, 1A - 1B** Grass: Short n= 0.150 P2= 3.30"
3.7	388	0.0119	1.76		**Shallow Concentrated Flow, 1B - 1C** Unpaved Kv= 16.1 fps
17.0	488	Total			

Subcatchment 101: Post-01 (Uncontrolled)



Summary for Subcatchment 102A: Post-02A (Uncontrolled Wyatt)

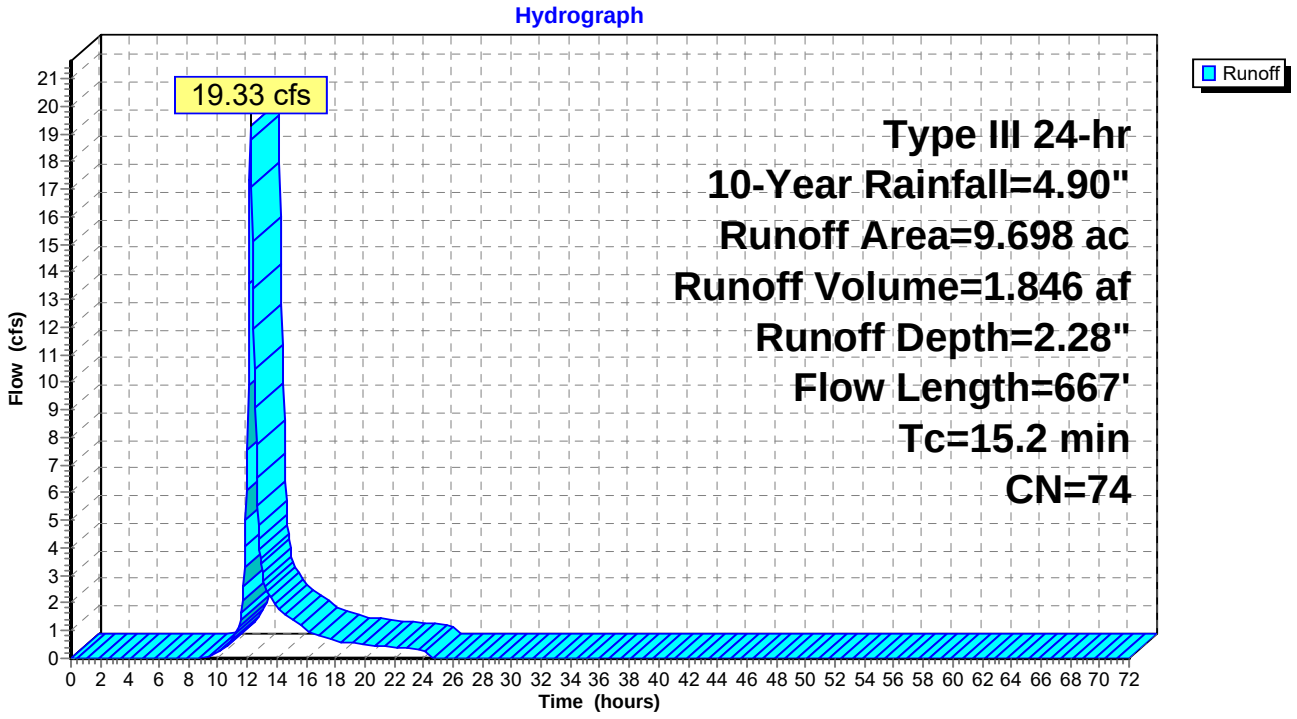
Runoff = 19.33 cfs @ 12.22 hrs, Volume= 1.846 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
8.893	74	>75% Grass cover, Good, HSG C
0.805	70	Woods, Good, HSG C
9.698	74	Weighted Average
9.698	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0210	0.18		**Sheet Flow, 2A - 2B** Grass: Short n= 0.150 P2= 3.30"
5.7	567	0.0106	1.66		**Shallow Concentrated Flow, 2B - 2C** Unpaved Kv= 16.1 fps
15.2	667	Total			

Subcatchment 102A: Post-02A (Uncontrolled Wyatt)



Summary for Subcatchment 102B: Post-02B (To Pond)

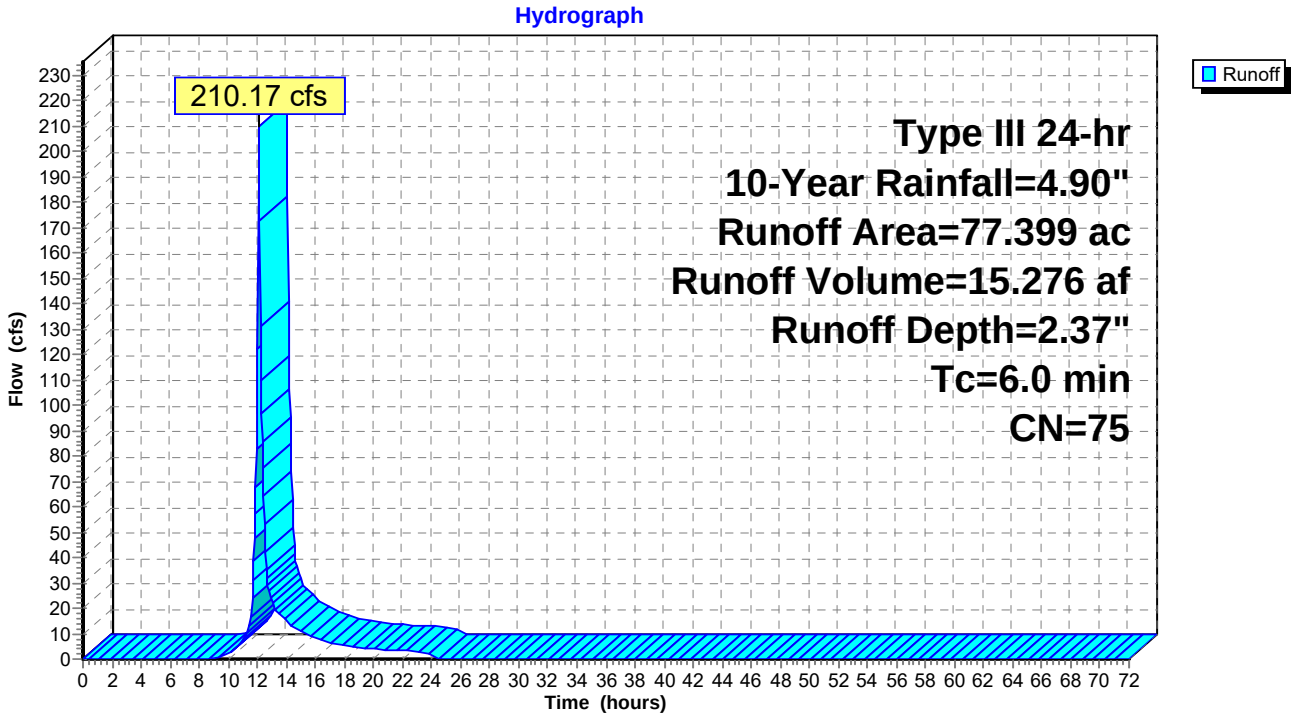
Runoff = 210.17 cfs @ 12.09 hrs, Volume= 15.276 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
70.440	74	>75% Grass cover, Good, HSG C
2.428	70	Woods, Good, HSG C
4.531	98	Water Surface, HSG C
77.399	75	Weighted Average
72.868	74	94.15% Pervious Area
4.531	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 102B: Post-02B (To Pond)



Summary for Subcatchment 103: Post-3 (Uncontrolled Maidford North)

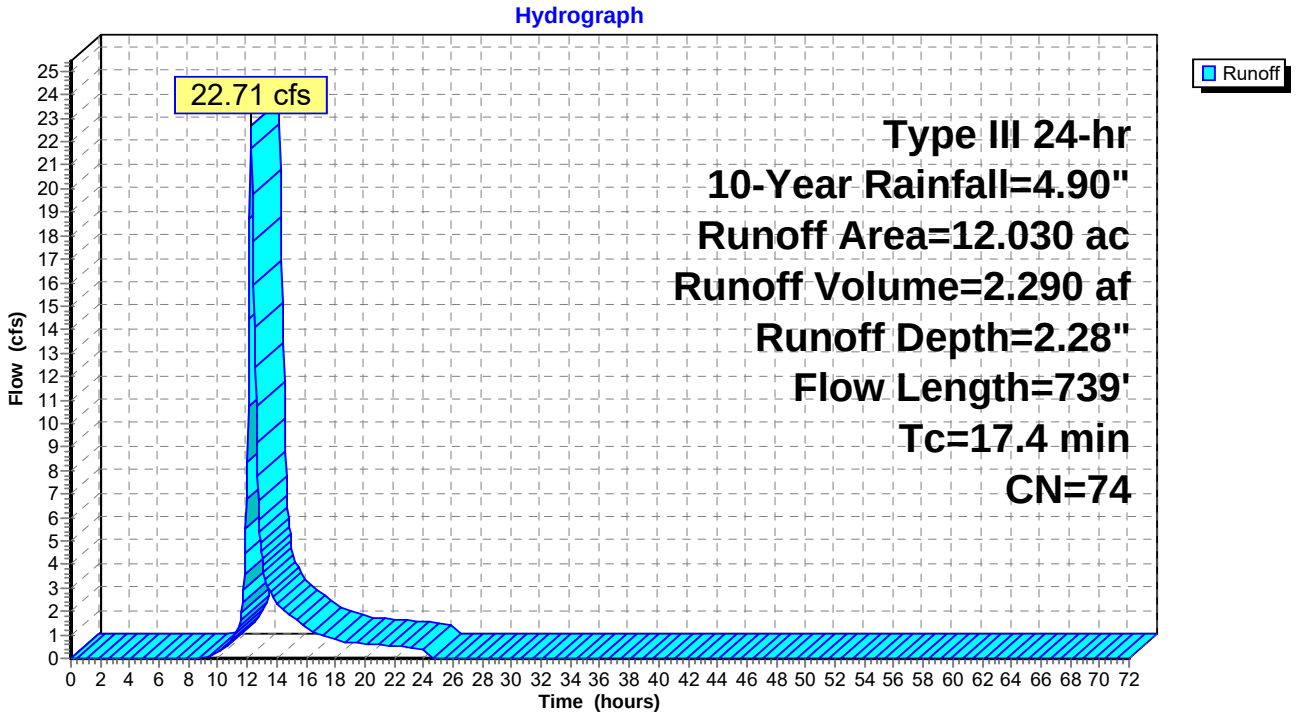
Runoff = 22.71 cfs @ 12.25 hrs, Volume= 2.290 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (ac)	CN	Description
11.703	74	>75% Grass cover, Good, HSG C
0.327	70	Woods, Good, HSG C
12.030	74	Weighted Average
12.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0220	0.12		**Sheet Flow, 3A 3B** Grass: Dense n= 0.240 P2= 3.30"
3.9	639	0.0282	2.70		**Shallow Concentrated Flow, 3B-3C** Unpaved Kv= 16.1 fps
17.4	739	Total			

Subcatchment 103: Post-3 (Uncontrolled Maidford North)



Summary for Subcatchment 104: Post-4 (To Bio-Swale)

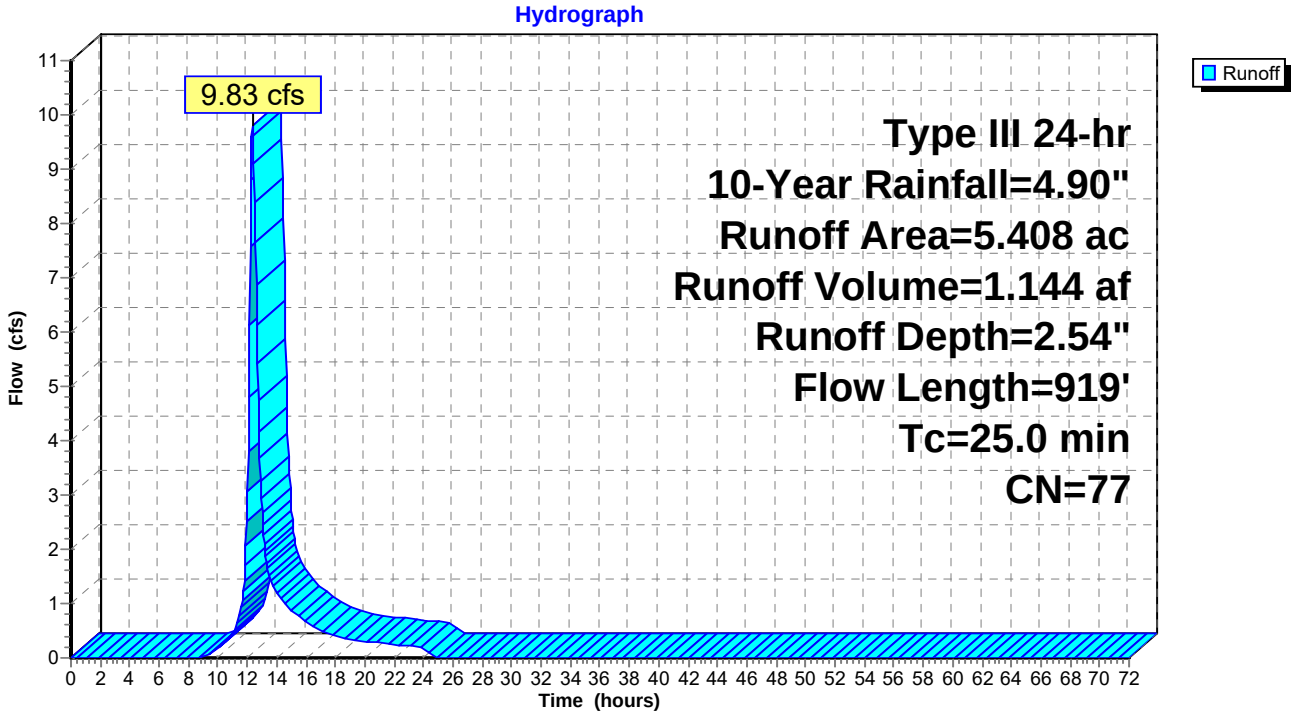
Runoff = 9.83 cfs @ 12.35 hrs, Volume= 1.144 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (ac)	CN	Description
	4.840	74	>75% Grass cover, Good, HSG C
*	0.568	98	Impervious
	5.408	77	Weighted Average
	4.840	74	89.50% Pervious Area
	0.568	98	10.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0090	0.09		**Sheet Flow, 4A-4B** Grass: Dense n= 0.240 P2= 3.30"
5.7	819	0.0225	2.42		**Shallow Concentrated Flow, 4B-4C** Unpaved Kv= 16.1 fps
25.0	919	Total			

Subcatchment 104: Post-4 (To Bio-Swale)

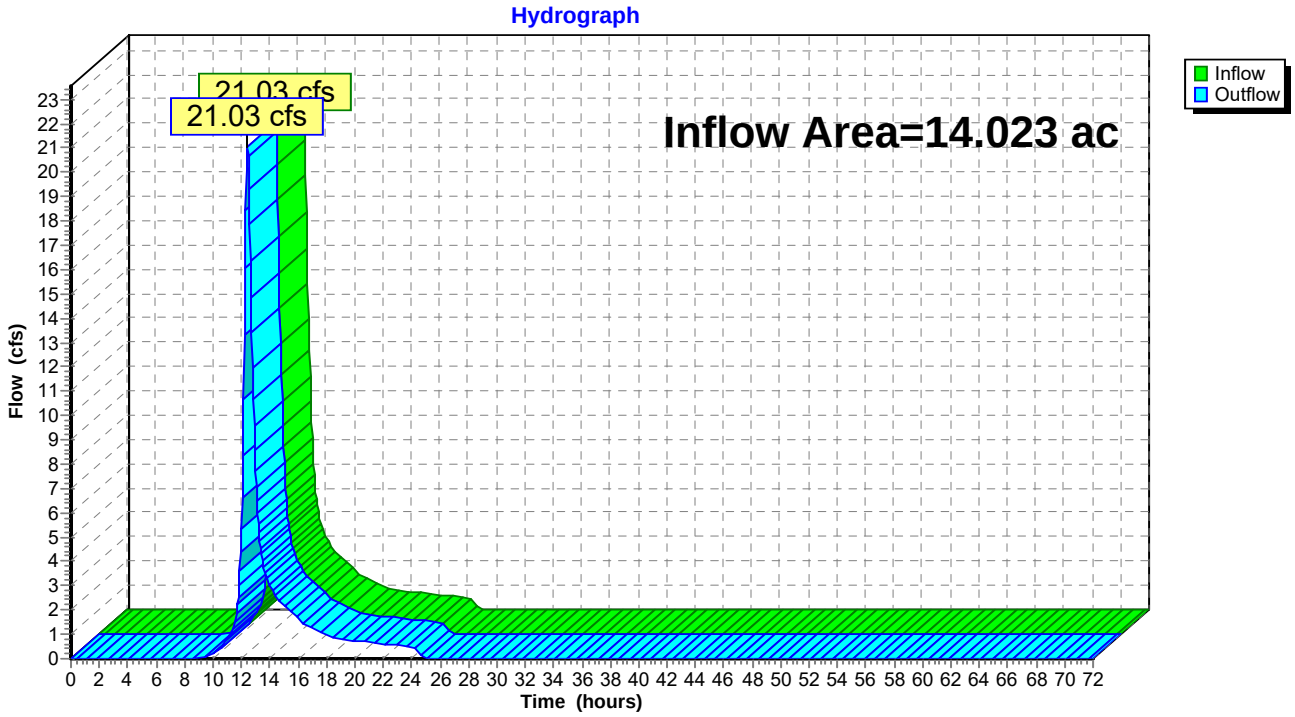


Summary for Reach 21: DP-1 (Mitchells Lane)

Inflow Area = 14.023 ac, 0.00% Impervious, Inflow Depth = 2.28" for 10-Year event
Inflow = 21.03 cfs @ 12.43 hrs, Volume= 2.670 af
Outflow = 21.03 cfs @ 12.43 hrs, Volume= 2.670 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 21: DP-1 (Mitchells Lane)

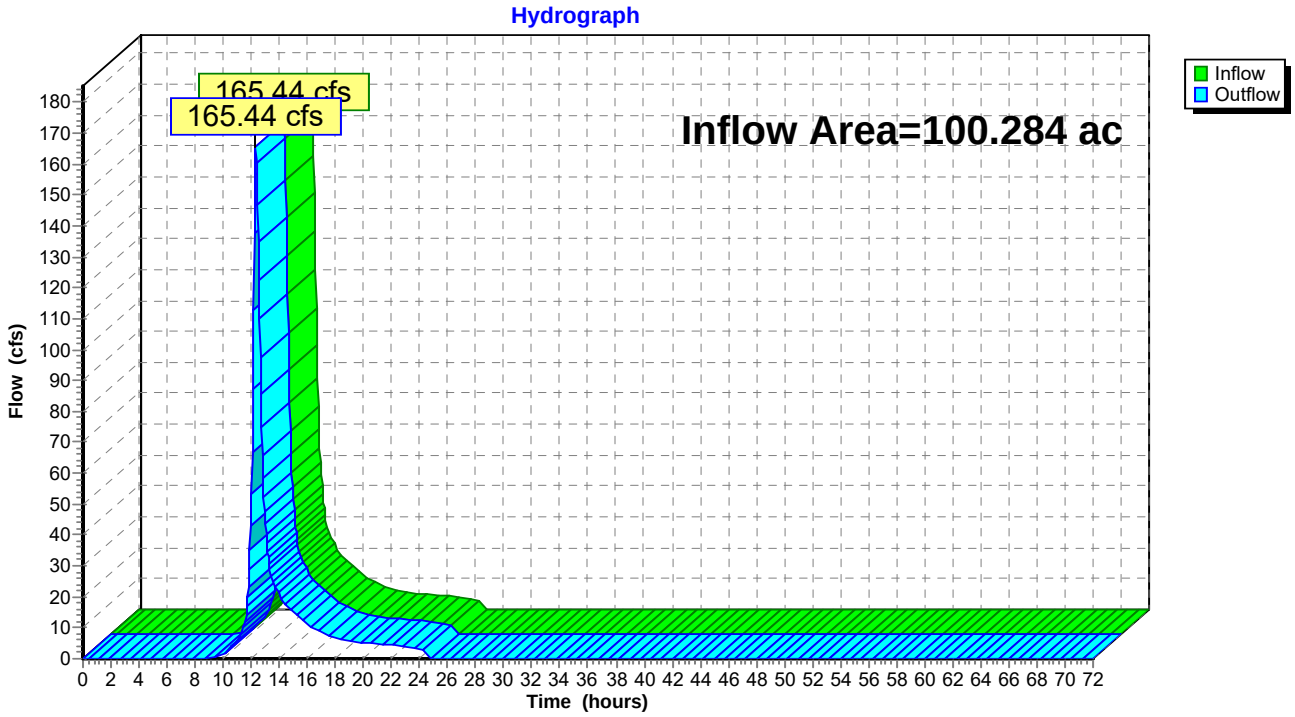


Summary for Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 100.284 ac, 0.23% Impervious, Inflow Depth = 2.28" for 10-Year event
Inflow = 165.44 cfs @ 12.32 hrs, Volume= 19.094 af
Outflow = 165.44 cfs @ 12.32 hrs, Volume= 19.094 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing

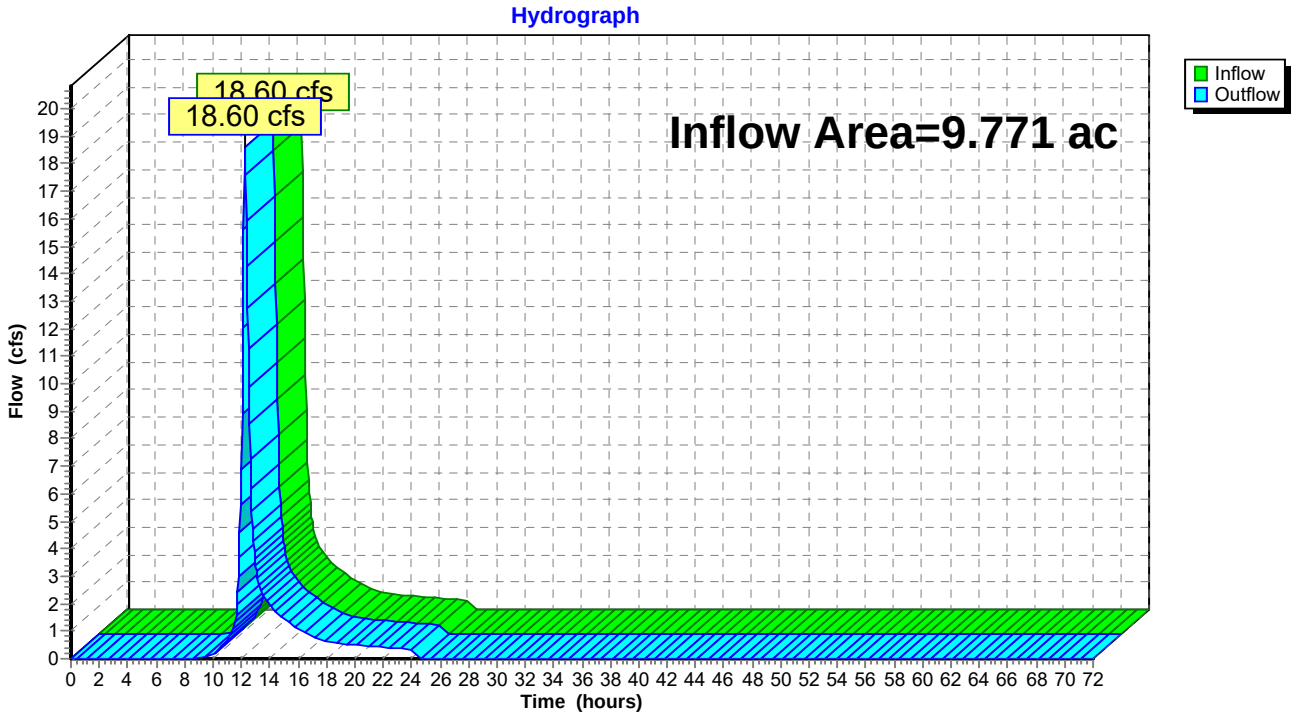


Summary for Reach 121: DP-1 (Mitchells Lane)

Inflow Area = 9.771 ac, 0.00% Impervious, Inflow Depth = 2.28" for 10-Year event
Inflow = 18.60 cfs @ 12.24 hrs, Volume= 1.860 af
Outflow = 18.60 cfs @ 12.24 hrs, Volume= 1.860 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 121: DP-1 (Mitchells Lane)



Summary for Reach 122: Discharge Swale

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

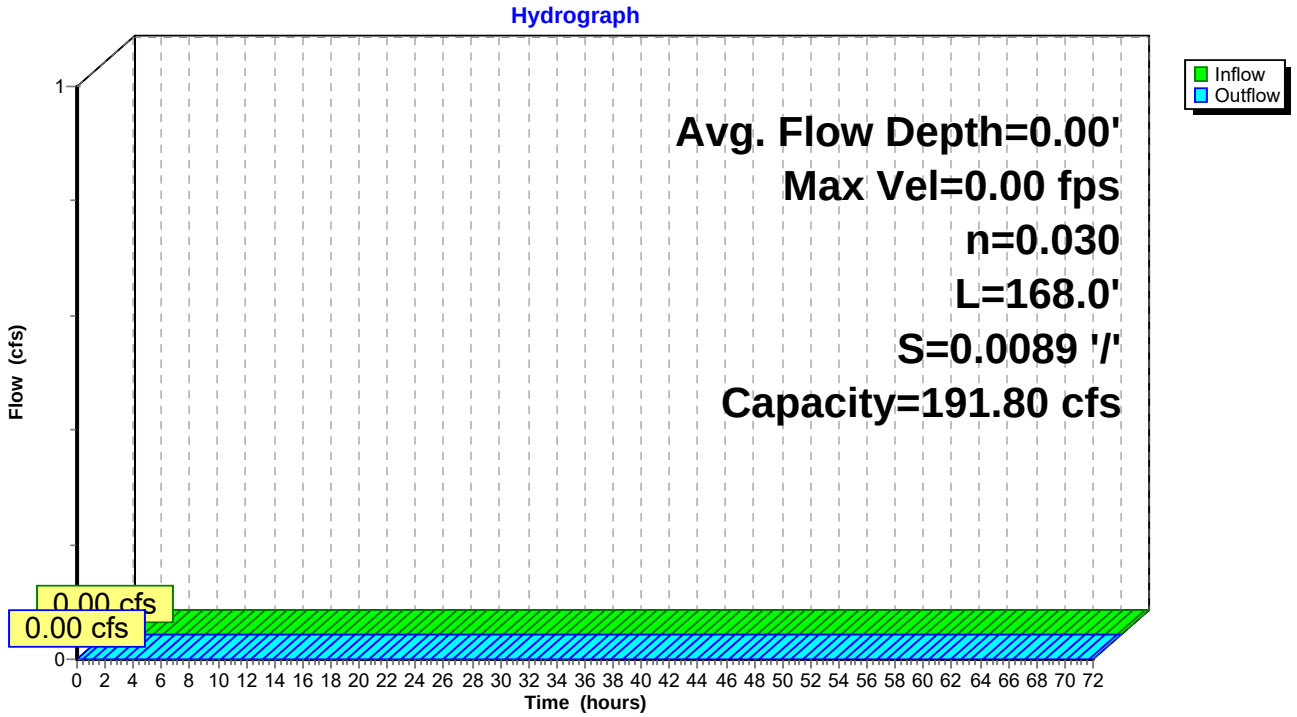
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.50' Flow Area= 31.3 sf, Capacity= 191.80 cfs

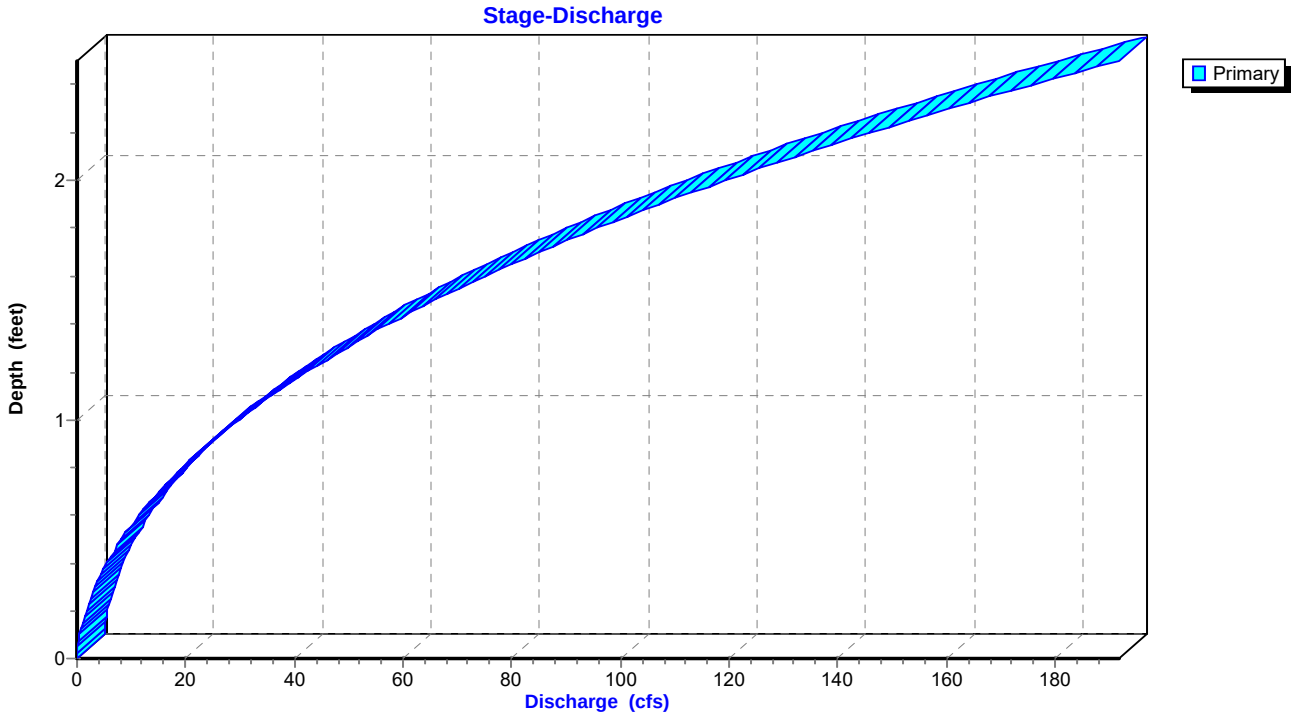
5.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 168.0' Slope= 0.0089 '/'
Inlet Invert= 155.50', Outlet Invert= 154.00'

‡

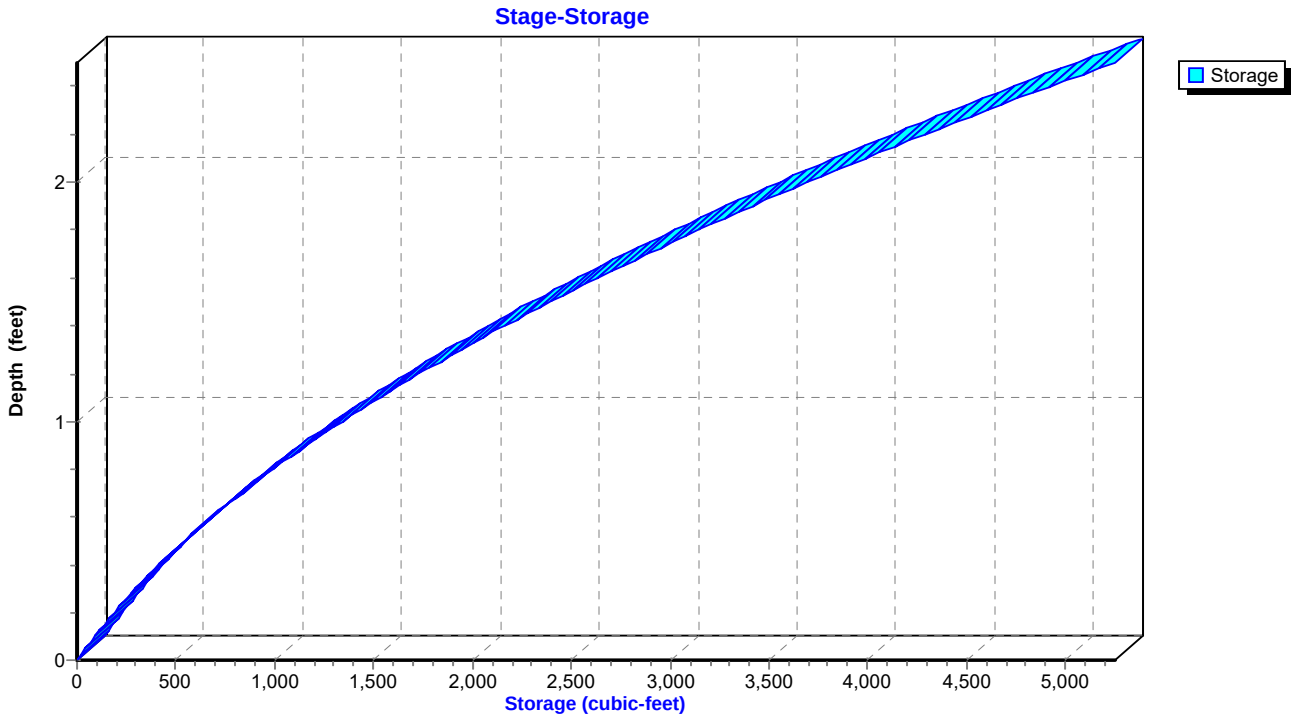
Reach 122: Discharge Swale



Reach 122: Discharge Swale



Reach 122: Discharge Swale



Stage-Discharge for Reach 122: Discharge Swale

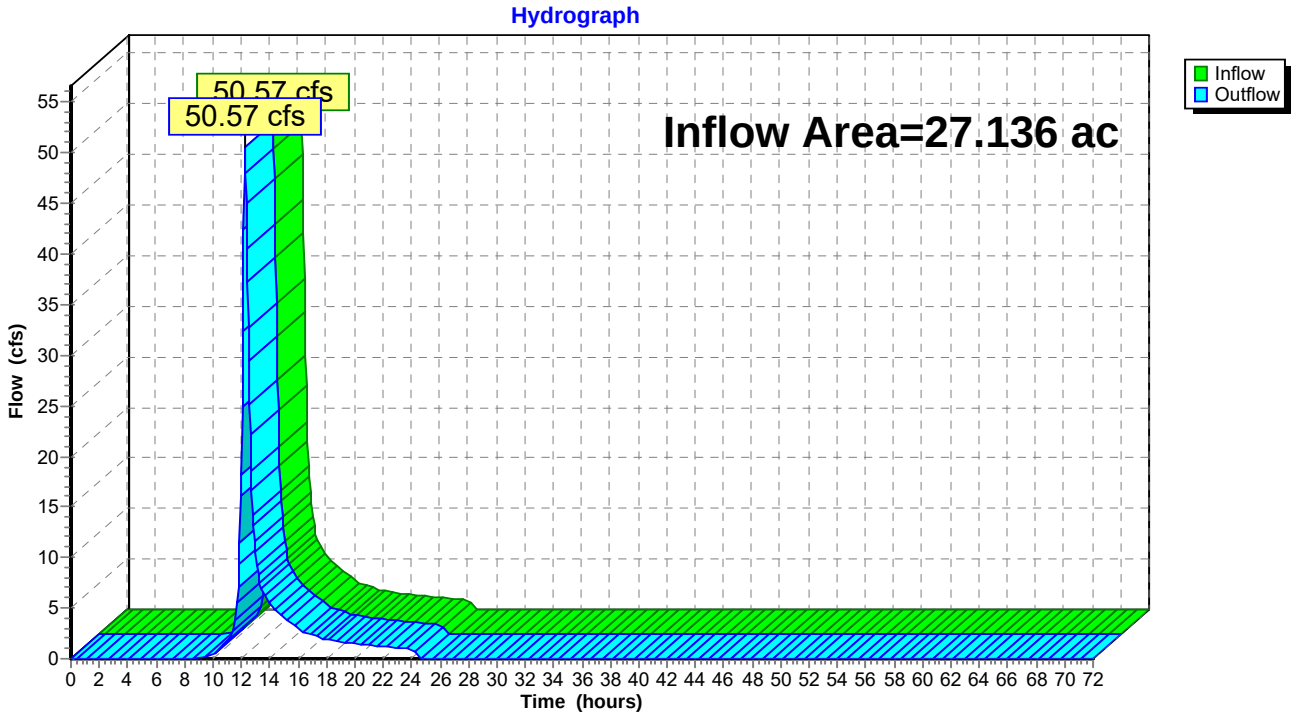
Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
155.50	0.00	0.00
155.52	0.32	0.04
155.54	0.53	0.12
155.56	0.70	0.22
155.58	0.84	0.36
155.60	0.97	0.51
155.62	1.08	0.70
155.64	1.19	0.91
155.66	1.30	1.14
155.68	1.39	1.39
155.70	1.49	1.66
155.72	1.57	1.96
155.74	1.66	2.28
155.76	1.74	2.61
155.78	1.81	2.97
155.80	1.89	3.35
155.82	1.96	3.75
155.84	2.03	4.16
155.86	2.10	4.60
155.88	2.17	5.06
155.90	2.23	5.54
155.92	2.30	6.04
155.94	2.36	6.56
155.96	2.42	7.10
155.98	2.48	7.66
156.00	2.53	8.23
156.02	2.59	8.84
156.04	2.64	9.46
156.06	2.70	10.10
156.08	2.75	10.76
156.10	2.80	11.44
156.12	2.86	12.15
156.14	2.91	12.88
156.16	2.96	13.63
156.18	3.01	14.39
156.20	3.05	15.18
156.22	3.10	16.00
156.24	3.15	16.83
156.26	3.20	17.69
156.28	3.24	18.56
156.30	3.29	19.46
156.32	3.33	20.38
156.34	3.38	21.33
156.36	3.42	22.30
156.38	3.46	23.28
156.40	3.51	24.29
156.42	3.55	25.33
156.44	3.59	26.39
156.46	3.63	27.47
156.48	3.67	28.57
156.50	3.71	29.70
156.52	3.75	30.86
156.54	3.79	32.03
156.56	3.83	33.23
156.58	3.87	34.45
156.60	3.91	35.70
156.62	3.95	36.97
156.64	3.99	38.27
156.66	4.02	39.59
156.68	4.06	40.94
156.70	4.10	42.31
156.72	4.14	43.71
156.74	4.17	45.13
156.76	4.21	46.58
156.78	4.25	48.05
156.80	4.28	49.54
156.82	4.32	51.07
156.84	4.35	52.62
156.86	4.39	54.20
156.88	4.42	55.80
156.90	4.46	57.42
156.92	4.49	59.08
156.94	4.53	60.77
156.96	4.56	62.47
156.98	4.60	64.21
157.00	4.63	65.97
157.02	4.66	67.76
157.04	4.70	69.58
157.06	4.73	71.43
157.08	4.76	73.30
157.10	4.80	75.19
157.12	4.83	77.12
157.14	4.86	79.08
157.16	4.89	81.07
157.18	4.93	83.08
157.20	4.96	85.12
157.22	4.99	87.19
157.24	5.02	89.29
157.26	5.05	91.42
157.28	5.08	93.58
157.30	5.12	95.76
157.32	5.15	97.98
157.34	5.18	100.23
157.36	5.21	102.50
157.38	5.24	104.80
157.40	5.27	107.14
157.42	5.30	109.50
157.44	5.33	111.90
157.46	5.36	114.33
157.48	5.39	116.78
157.50	5.42	119.26
157.52	5.45	121.79
157.54	5.48	124.34
157.56	5.51	126.92
157.58	5.54	129.52
157.60	5.57	132.16
157.62	5.60	134.84
157.64	5.63	137.55
157.66	5.66	140.28
157.68	5.69	143.05
157.70	5.72	145.85
157.72	5.74	148.68
157.74	5.77	151.55
157.76	5.80	154.45
157.78	5.83	157.38
157.80	5.86	160.34
157.82	5.89	163.34
157.84	5.91	166.37
157.86	5.94	169.43
157.88	5.97	172.52
157.90	6.00	175.65
157.92	6.03	178.81
157.94	6.05	182.01
157.96	6.08	185.24
157.98	6.11	188.50
158.00	**6.14**	**191.80**

Summary for Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 27.136 ac, 2.09% Impervious, Inflow Depth = 2.33" for 10-Year event
Inflow = 50.57 cfs @ 12.25 hrs, Volume= 5.266 af
Outflow = 50.57 cfs @ 12.25 hrs, Volume= 5.266 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing



Summary for Pond 116A: Irrigation Pond Plugged

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.50' @ 0.00 hrs Surf.Area= 180,129 sf Storage= 1,829,368 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

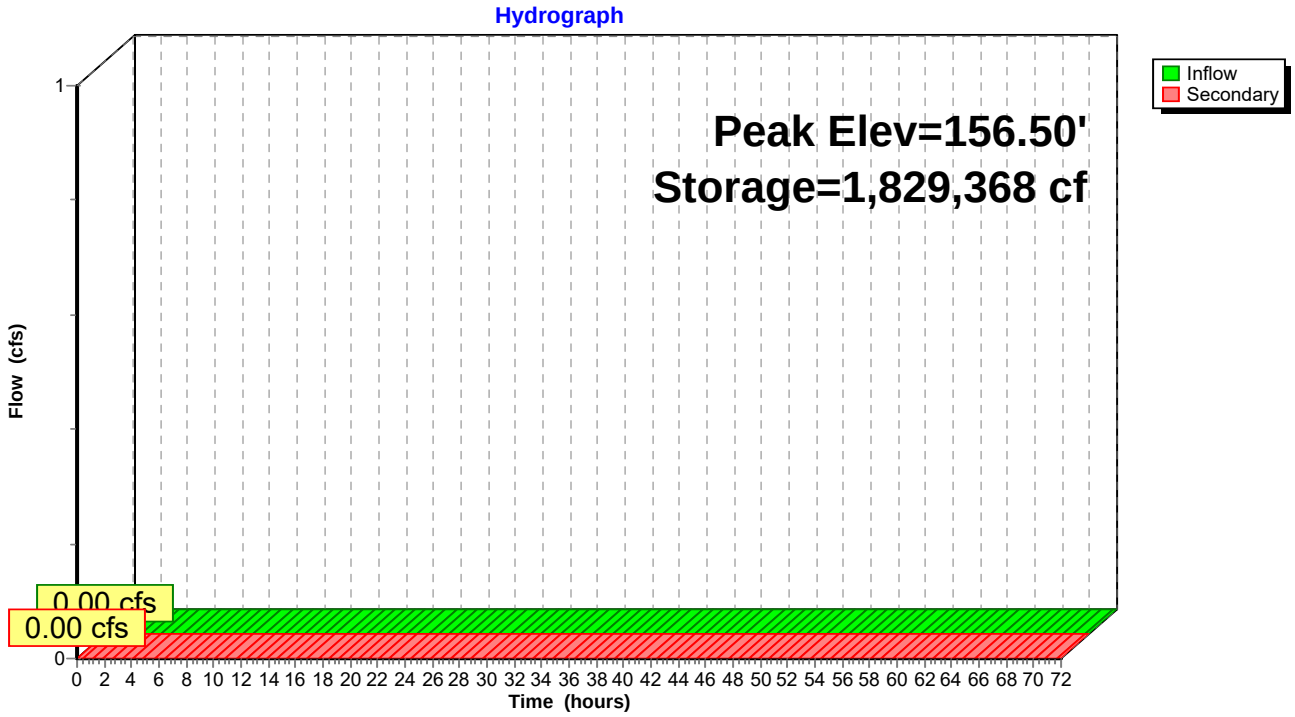
Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

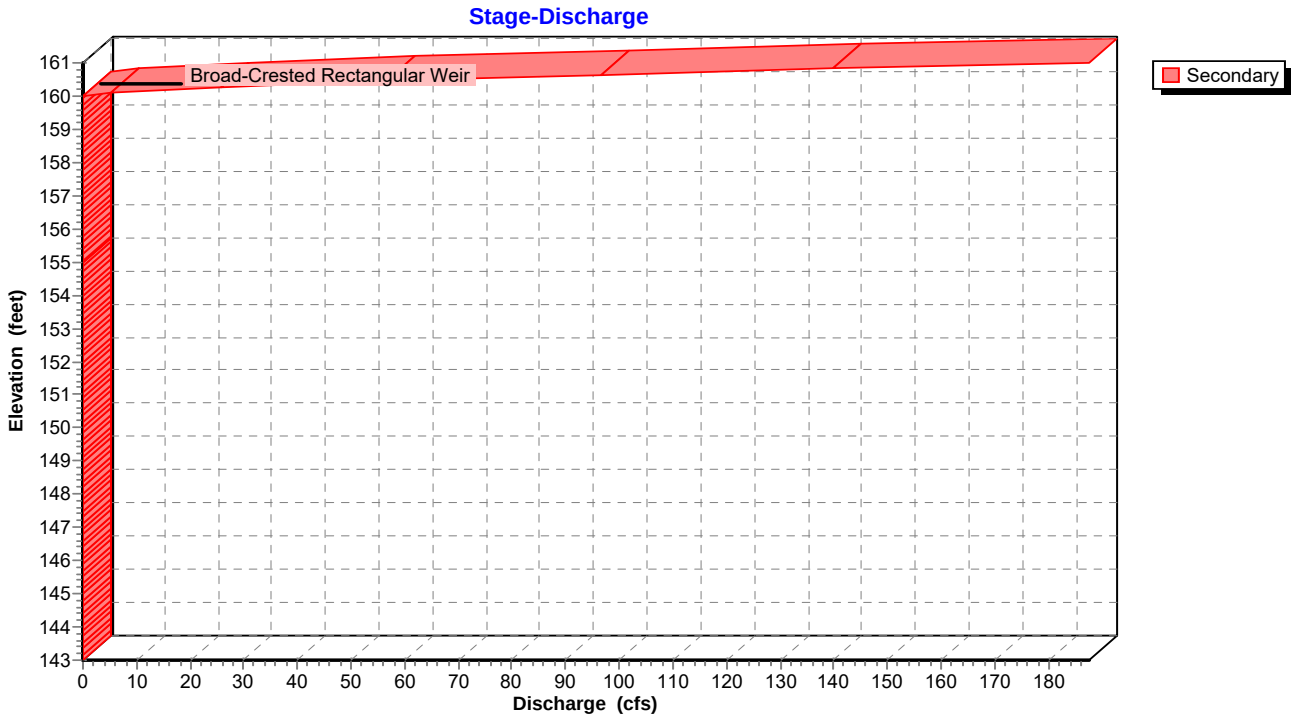
Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

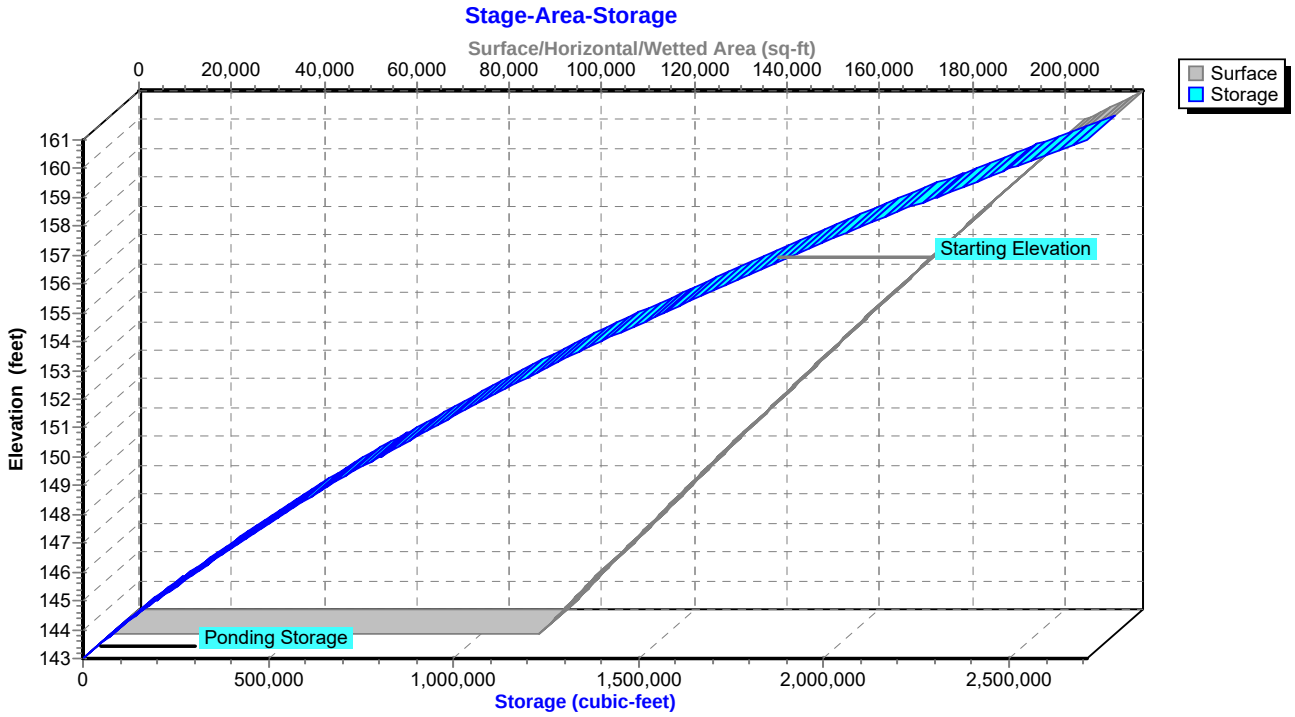
Pond 116A: Irrigation Pond Plugged



Pond 116A: Irrigation Pond Plugged



Pond 116A: Irrigation Pond Plugged



Stage-Discharge for Pond 116A: Irrigation Pond Plugged

Elevation (feet)	Secondary (cfs)	Elevation (feet)	Secondary (cfs)
143.00	0.00	153.60	0.00
143.20	0.00	153.80	0.00
143.40	0.00	154.00	0.00
143.60	0.00	154.20	0.00
143.80	0.00	154.40	0.00
144.00	0.00	154.60	0.00
144.20	0.00	154.80	0.00
144.40	0.00	155.00	0.00
144.60	0.00	155.20	0.00
144.80	0.00	155.40	0.00
145.00	0.00	155.60	0.00
145.20	0.00	155.80	0.00
145.40	0.00	156.00	0.00
145.60	0.00	156.20	0.00
145.80	0.00	156.40	0.00
146.00	0.00	156.60	0.00
146.20	0.00	156.80	0.00
146.40	0.00	157.00	0.00
146.60	0.00	157.20	0.00
146.80	0.00	157.40	0.00
147.00	0.00	157.60	0.00
147.20	0.00	157.80	0.00
147.40	0.00	158.00	0.00
147.60	0.00	158.20	0.00
147.80	0.00	158.40	0.00
148.00	0.00	158.60	0.00
148.20	0.00	158.80	0.00
148.40	0.00	159.00	0.00
148.60	0.00	159.20	0.00
148.80	0.00	159.40	0.00
149.00	0.00	159.60	0.00
149.20	0.00	159.80	0.00
149.40	0.00	160.00	0.00
149.60	0.00	160.20	15.21
149.80	0.00	160.40	44.98
150.00	0.00	160.60	87.84
150.20	0.00	160.80	134.74
150.40	0.00	161.00	**187.60**
150.60	0.00		
150.80	0.00		
151.00	0.00		
151.20	0.00		
151.40	0.00		
151.60	0.00		
151.80	0.00		
152.00	0.00		
152.20	0.00		
152.40	0.00		
152.60	0.00		
152.80	0.00		
153.00	0.00		
153.20	0.00		
153.40	0.00		

Summary for Pond 116P: Irrigation Pond

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 2.37" for 10-Year event
Inflow = 210.17 cfs @ 12.09 hrs, Volume= 15.276 af
Outflow = 11.31 cfs @ 14.98 hrs, Volume= 13.680 af, Atten= 95%, Lag= 173.0 min
Primary = 11.31 cfs @ 14.98 hrs, Volume= 13.680 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 158.64' @ 14.98 hrs Surf.Area= 194,877 sf Storage= 2,229,974 cf (400,606 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 712.9 min (1,548.8 - 835.9)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

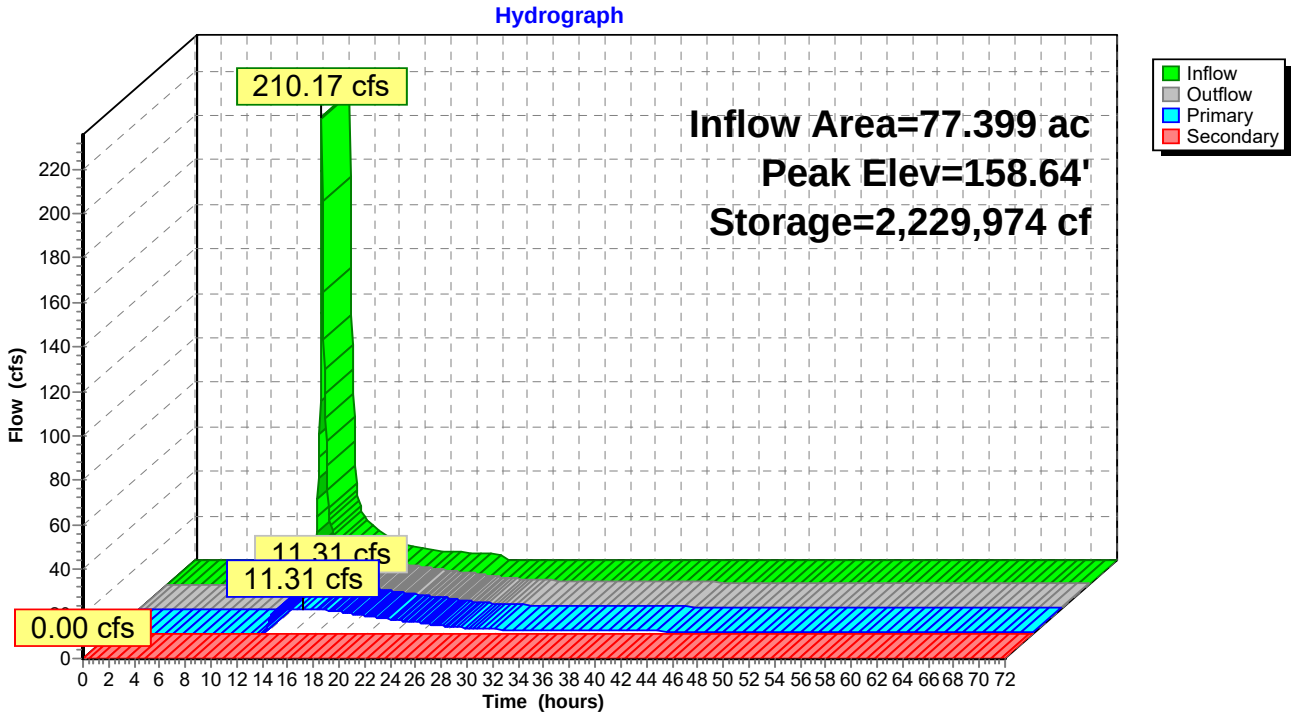
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Device 4	156.50'	**8.00" Vert. Orifice/Grate** C= 0.600
#2	Device 4	157.50'	**12.00" Vert. Orifice/Grate X 3.00** C= 0.600
#3	Device 4	160.00'	**24.00" x 48.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	156.00'	**24.00" Round Culvert** L= 91.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 156.00' / 155.50' S= 0.0055 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#5	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

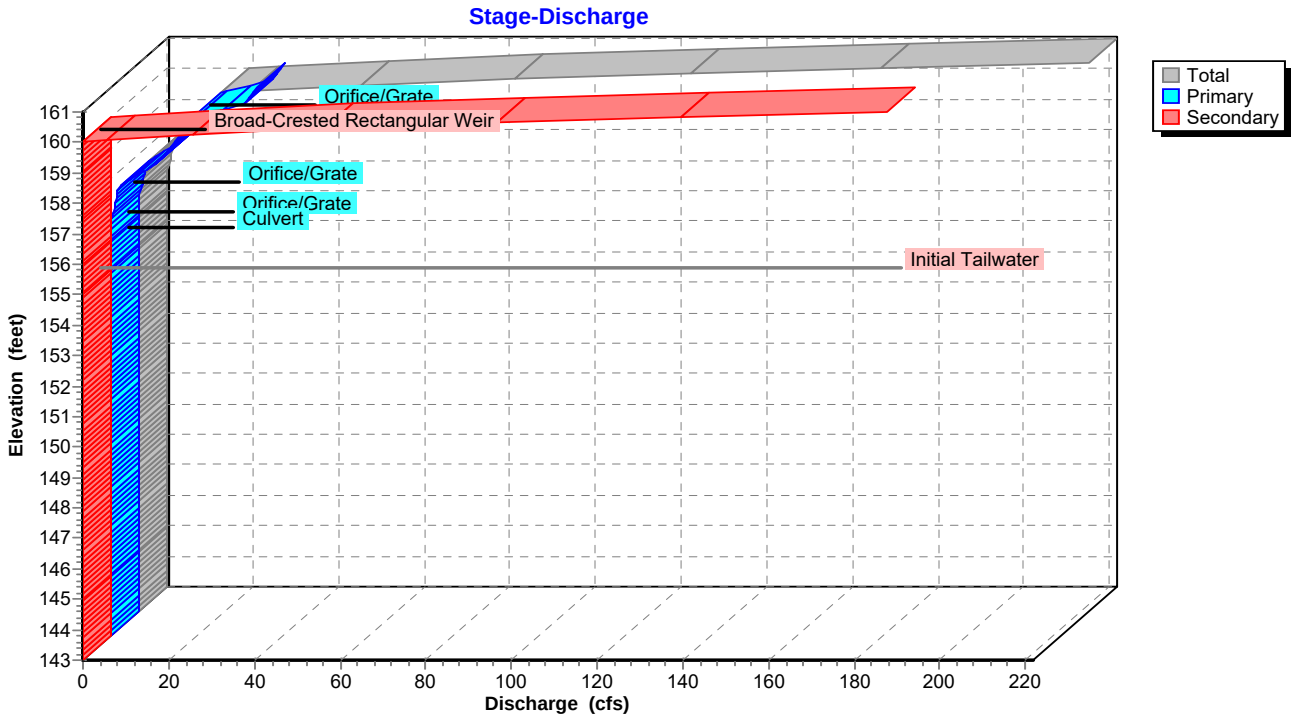
Primary OutFlow Max=11.31 cfs @ 14.98 hrs HW=158.64' (Free Discharge)
└**4=Culvert** (Passes 11.31 cfs of 19.96 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 2.26 cfs @ 6.47 fps)
  ├**2=Orifice/Grate** (Orifice Controls 9.05 cfs @ 3.84 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' TW=155.50' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

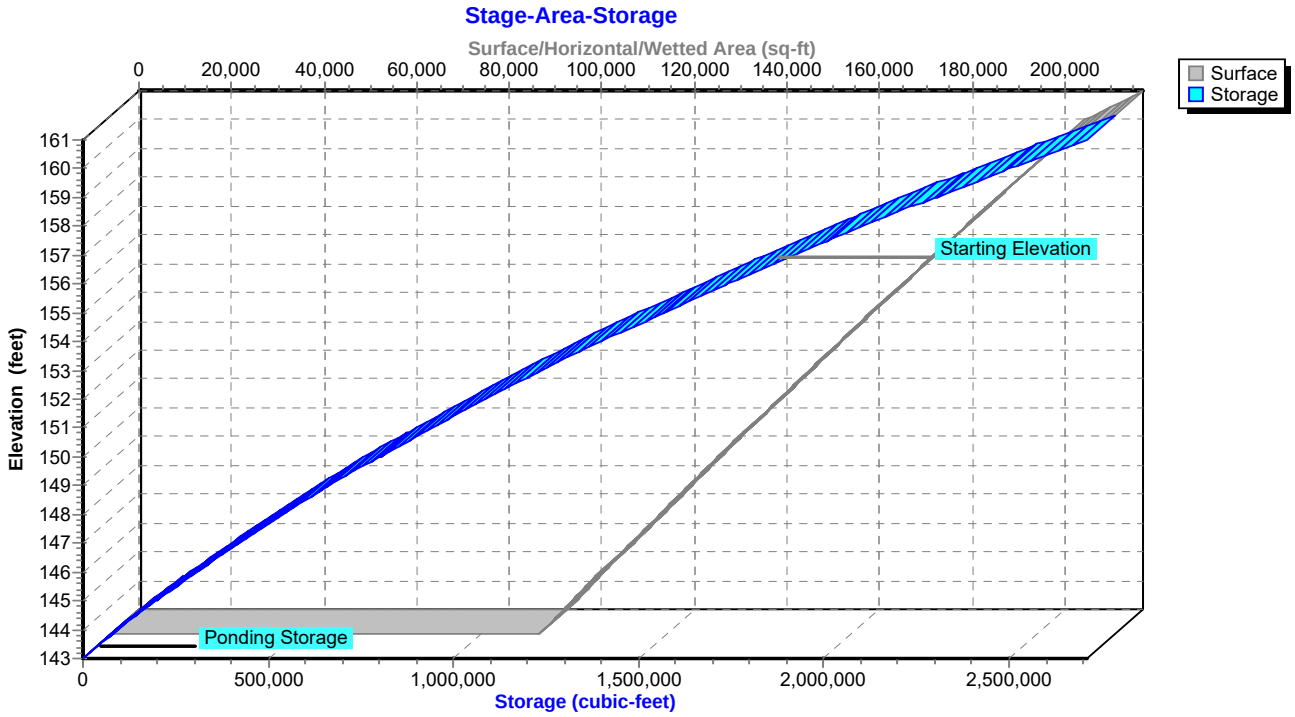
Pond 116P: Irrigation Pond



Pond 116P: Irrigation Pond



Pond 116P: Irrigation Pond



Stage-Discharge for Pond 116P: Irrigation Pond

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
143.00	0.00	0.00	0.00
143.20	0.00	0.00	0.00
143.40	0.00	0.00	0.00
143.60	0.00	0.00	0.00
143.80	0.00	0.00	0.00
144.00	0.00	0.00	0.00
144.20	0.00	0.00	0.00
144.40	0.00	0.00	0.00
144.60	0.00	0.00	0.00
144.80	0.00	0.00	0.00
145.00	0.00	0.00	0.00
145.20	0.00	0.00	0.00
145.40	0.00	0.00	0.00
145.60	0.00	0.00	0.00
145.80	0.00	0.00	0.00
146.00	0.00	0.00	0.00
146.20	0.00	0.00	0.00
146.40	0.00	0.00	0.00
146.60	0.00	0.00	0.00
146.80	0.00	0.00	0.00
147.00	0.00	0.00	0.00
147.20	0.00	0.00	0.00
147.40	0.00	0.00	0.00
147.60	0.00	0.00	0.00
147.80	0.00	0.00	0.00
148.00	0.00	0.00	0.00
148.20	0.00	0.00	0.00
148.40	0.00	0.00	0.00
148.60	0.00	0.00	0.00
148.80	0.00	0.00	0.00
149.00	0.00	0.00	0.00
149.20	0.00	0.00	0.00
149.40	0.00	0.00	0.00
149.60	0.00	0.00	0.00
149.80	0.00	0.00	0.00
150.00	0.00	0.00	0.00
150.20	0.00	0.00	0.00
150.40	0.00	0.00	0.00
150.60	0.00	0.00	0.00
150.80	0.00	0.00	0.00
151.00	0.00	0.00	0.00
151.20	0.00	0.00	0.00
151.40	0.00	0.00	0.00
151.60	0.00	0.00	0.00
151.80	0.00	0.00	0.00
152.00	0.00	0.00	0.00
152.20	0.00	0.00	0.00
152.40	0.00	0.00	0.00
152.60	0.00	0.00	0.00
152.80	0.00	0.00	0.00
153.00	0.00	0.00	0.00
153.20	0.00	0.00	0.00
153.40	0.00	0.00	0.00
153.60	0.00	0.00	0.00
153.80	0.00	0.00	0.00
154.00	0.00	0.00	0.00
154.20	0.00	0.00	0.00
154.40	0.00	0.00	0.00
154.60	0.00	0.00	0.00
154.80	0.00	0.00	0.00
155.00	0.00	0.00	0.00
155.20	0.00	0.00	0.00
155.40	0.00	0.00	0.00
155.60	0.00	0.00	0.00
155.80	0.00	0.00	0.00
156.00	0.00	0.00	0.00
156.20	0.00	0.00	0.00
156.40	0.00	0.00	0.00
156.60	0.04	0.04	0.00
156.80	0.28	0.28	0.00
157.00	0.68	0.68	0.00
157.20	1.02	1.02	0.00
157.40	1.27	1.27	0.00
157.60	1.60	1.60	0.00
157.80	2.76	2.76	0.00
158.00	4.65	4.65	0.00
158.20	6.98	6.98	0.00
158.40	9.32	9.32	0.00
158.60	11.02	11.02	0.00
158.80	12.50	12.50	0.00
159.00	13.82	13.82	0.00
159.20	15.01	15.01	0.00
159.40	16.12	16.12	0.00
159.60	17.15	17.15	0.00
159.80	18.12	18.12	0.00
160.00	19.04	19.04	0.00
160.20	38.64	23.42	15.21
160.40	75.66	30.68	44.98
160.60	119.94	32.10	87.84
160.80	167.86	33.12	134.74
161.00	**221.71**	**34.11**	**187.60**

Summary for Pond 117P: Sand Filter Ponding

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 2.54" for 10-Year event
Inflow = 9.83 cfs @ 12.35 hrs, Volume= 1.144 af
Outflow = 9.89 cfs @ 12.35 hrs, Volume= 1.144 af, Atten= 0%, Lag= 0.1 min
Primary = 0.57 cfs @ 12.35 hrs, Volume= 0.508 af
Secondary = 9.32 cfs @ 12.35 hrs, Volume= 0.636 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.80' @ 12.35 hrs Surf.Area= 2,994 sf Storage= 1,734 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.0 min (863.3 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,374 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

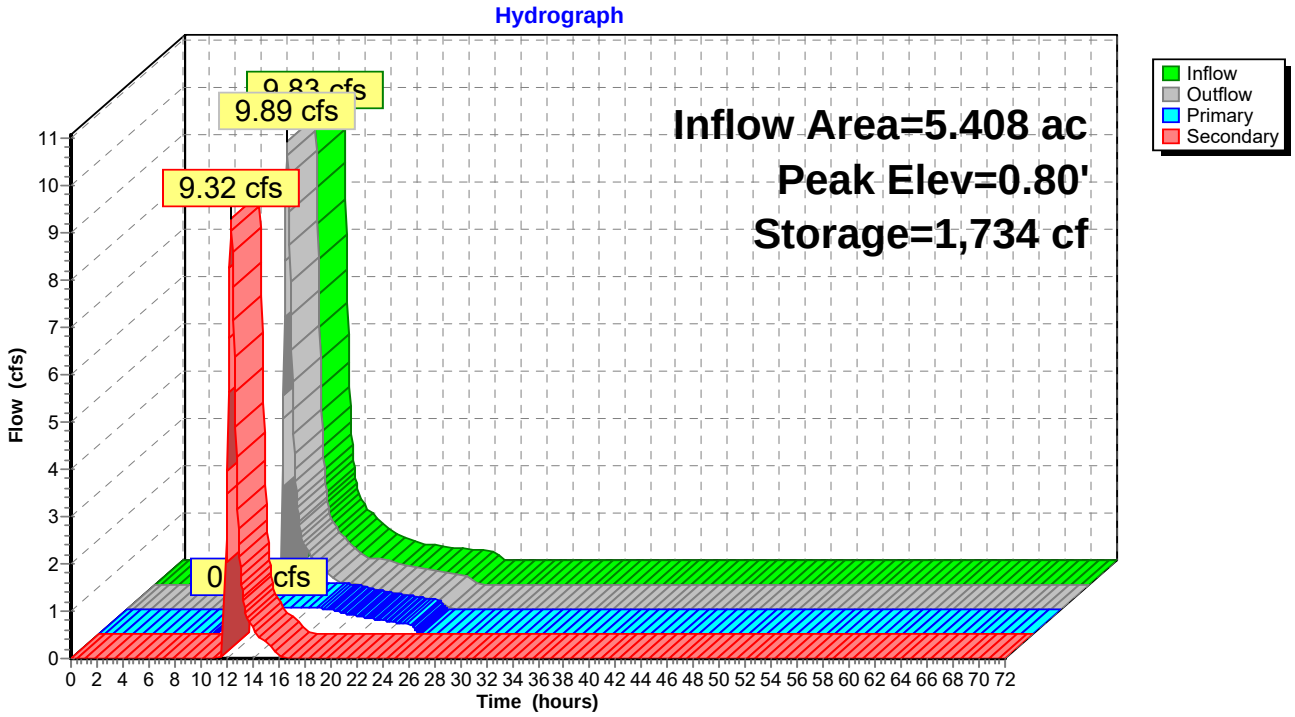
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,340	0	0
1.00	3,408	2,374	2,374

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	0.75'	**335.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

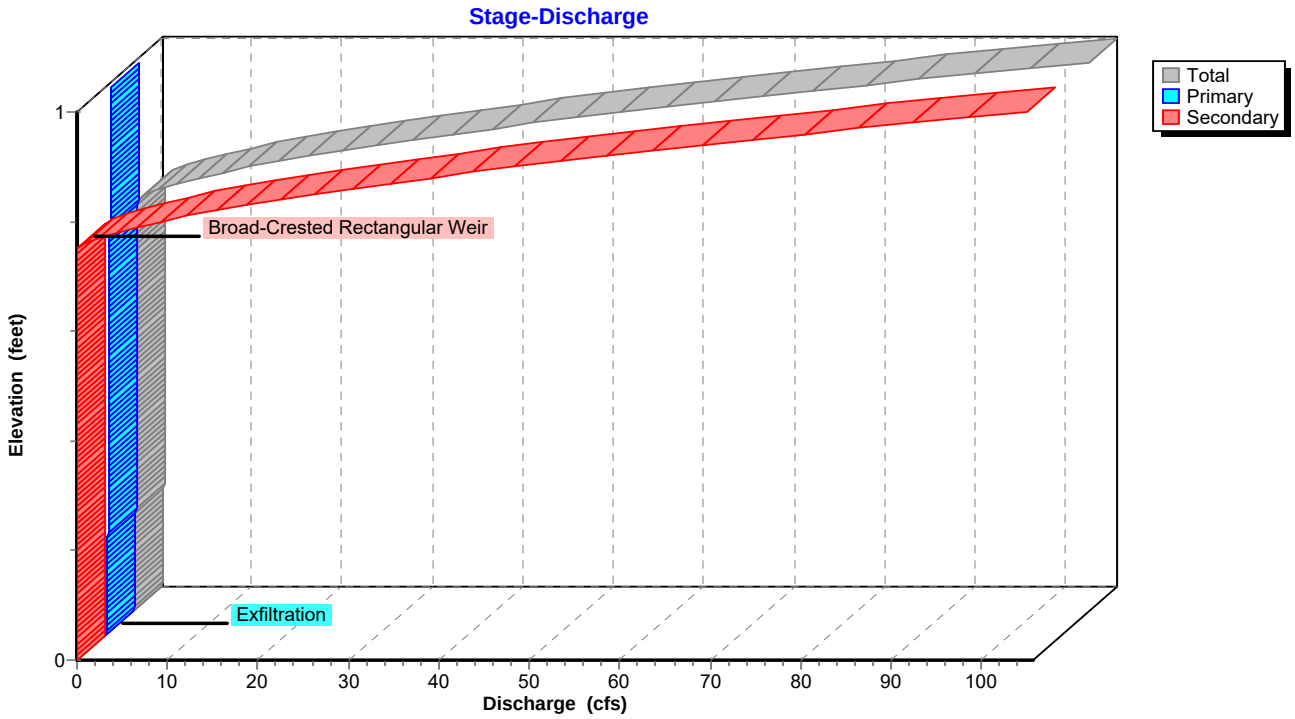
Primary OutFlow Max=0.57 cfs @ 12.35 hrs HW=0.80' TW=0.07' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.57 cfs)

Secondary OutFlow Max=9.29 cfs @ 12.35 hrs HW=0.80' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 9.29 cfs @ 0.56 fps)

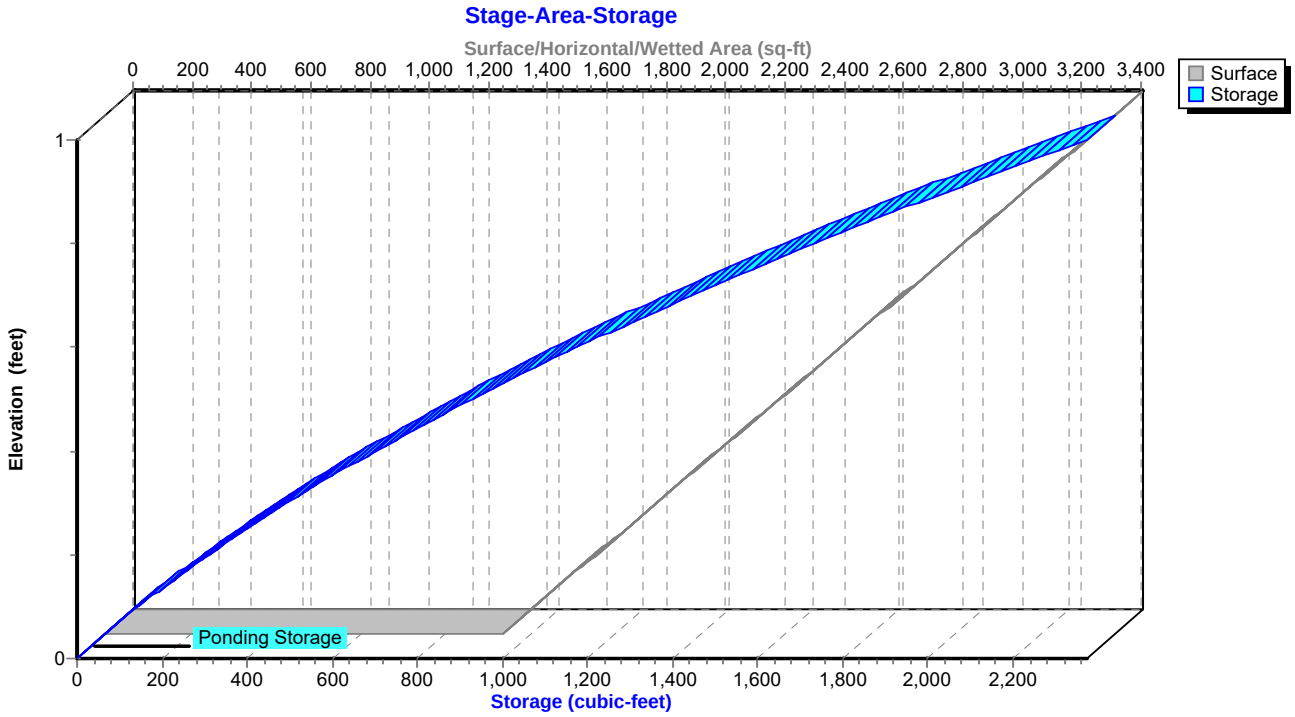
Pond 117P: Sand Filter Ponding



Pond 117P: Sand Filter Ponding



Pond 117P: Sand Filter Ponding



Stage-Discharge for Pond 117P: Sand Filter Ponding

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.00	0.00
0.01	0.26	0.26	0.00
0.02	0.26	0.26	0.00
0.03	0.27	0.27	0.00
0.04	0.27	0.27	0.00
0.05	0.28	0.28	0.00
0.06	0.28	0.28	0.00
0.07	0.28	0.28	0.00
0.08	0.29	0.29	0.00
0.09	0.29	0.29	0.00
0.10	0.30	0.30	0.00
0.11	0.30	0.30	0.00
0.12	0.30	0.30	0.00
0.13	0.31	0.31	0.00
0.14	0.31	0.31	0.00
0.15	0.32	0.32	0.00
0.16	0.32	0.32	0.00
0.17	0.32	0.32	0.00
0.18	0.33	0.33	0.00
0.19	0.33	0.33	0.00
0.20	0.34	0.34	0.00
0.21	0.34	0.34	0.00
0.22	0.34	0.34	0.00
0.23	0.35	0.35	0.00
0.24	0.35	0.35	0.00
0.25	0.36	0.36	0.00
0.26	0.36	0.36	0.00
0.27	0.36	0.36	0.00
0.28	0.37	0.37	0.00
0.29	0.37	0.37	0.00
0.30	0.38	0.38	0.00
0.31	0.38	0.38	0.00
0.32	0.38	0.38	0.00
0.33	0.39	0.39	0.00
0.34	0.39	0.39	0.00
0.35	0.40	0.40	0.00
0.36	0.40	0.40	0.00
0.37	0.40	0.40	0.00
0.38	0.41	0.41	0.00
0.39	0.41	0.41	0.00
0.40	0.41	0.41	0.00
0.41	0.42	0.42	0.00
0.42	0.42	0.42	0.00
0.43	0.43	0.43	0.00
0.44	0.43	0.43	0.00
0.45	0.43	0.43	0.00
0.46	0.44	0.44	0.00
0.47	0.44	0.44	0.00
0.48	0.45	0.45	0.00
0.49	0.45	0.45	0.00
0.50	0.45	0.45	0.00
0.51	0.46	0.46	0.00
0.52	0.46	0.46	0.00
0.53	0.47	0.47	0.00
0.54	0.47	0.47	0.00
0.55	0.47	0.47	0.00
0.56	0.48	0.48	0.00
0.57	0.48	0.48	0.00
0.58	0.49	0.49	0.00
0.59	0.49	0.49	0.00
0.60	0.49	0.49	0.00
0.61	0.50	0.50	0.00
0.62	0.50	0.50	0.00
0.63	0.51	0.51	0.00
0.64	0.51	0.51	0.00
0.65	0.51	0.51	0.00
0.66	0.52	0.52	0.00
0.67	0.52	0.52	0.00
0.68	0.53	0.53	0.00
0.69	0.53	0.53	0.00
0.70	0.53	0.53	0.00
0.71	0.54	0.54	0.00
0.72	0.54	0.54	0.00
0.73	0.55	0.55	0.00
0.74	0.55	0.55	0.00
0.75	0.55	0.55	0.00
0.76	1.39	0.56	0.83
0.77	2.92	0.56	2.36
0.78	4.90	0.57	4.33
0.79	7.24	0.57	6.67
0.80	9.90	0.57	9.33
0.81	12.84	0.58	12.26
0.82	16.03	0.58	15.45
0.83	19.46	0.59	18.87
0.84	23.11	0.59	22.52
0.85	26.97	0.59	26.38
0.86	31.03	0.60	30.43
0.87	35.28	0.60	34.67
0.88	39.70	0.60	39.10
0.89	44.30	0.61	43.70
0.90	49.07	0.61	48.46
0.91	54.00	0.62	53.39
0.92	59.09	0.62	58.47
0.93	64.33	0.62	63.70
0.94	69.71	0.63	69.08
0.95	75.24	0.63	74.61
0.96	81.02	0.64	80.39
0.97	86.96	0.64	86.32
0.98	93.04	0.64	92.40
0.99	99.28	0.65	98.63
1.00	**105.65**	**0.65**	**105.00**

Summary for Pond 119P: Sand Filter Sand Layer

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 1.13" for 10-Year event
Inflow = 0.57 cfs @ 12.35 hrs, Volume= 0.508 af
Outflow = 0.80 cfs @ 12.35 hrs, Volume= 0.493 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.35 hrs, Volume= 0.493 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.07' @ 12.35 hrs Surf.Area= 1,340 sf Storage= 663 cf

Plug-Flow detention time= 26.1 min calculated for 0.493 af (97% of inflow)
Center-of-Mass det. time= 12.1 min (995.8 - 983.7)

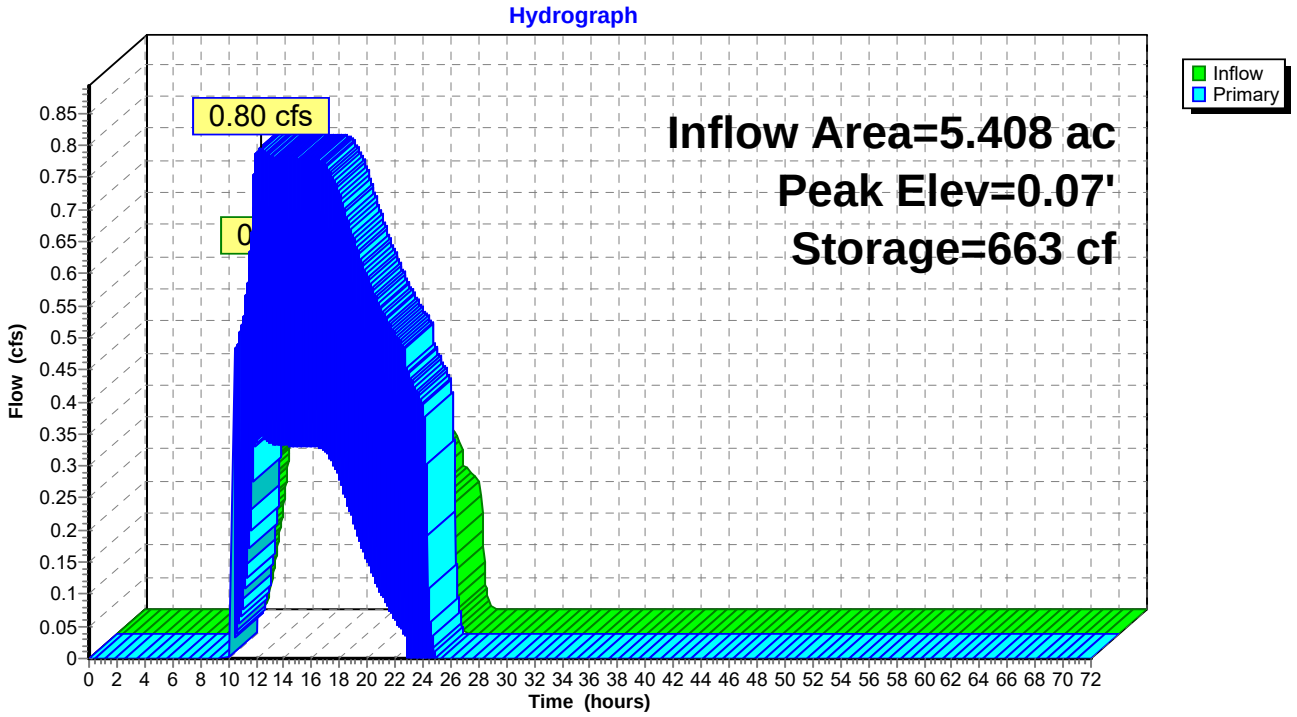
Volume	Invert	Avail.Storage	Storage Description
#1	-1.50'	663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,010 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-1.50	1,340	0	0
0.00	1,340	2,010	2,010

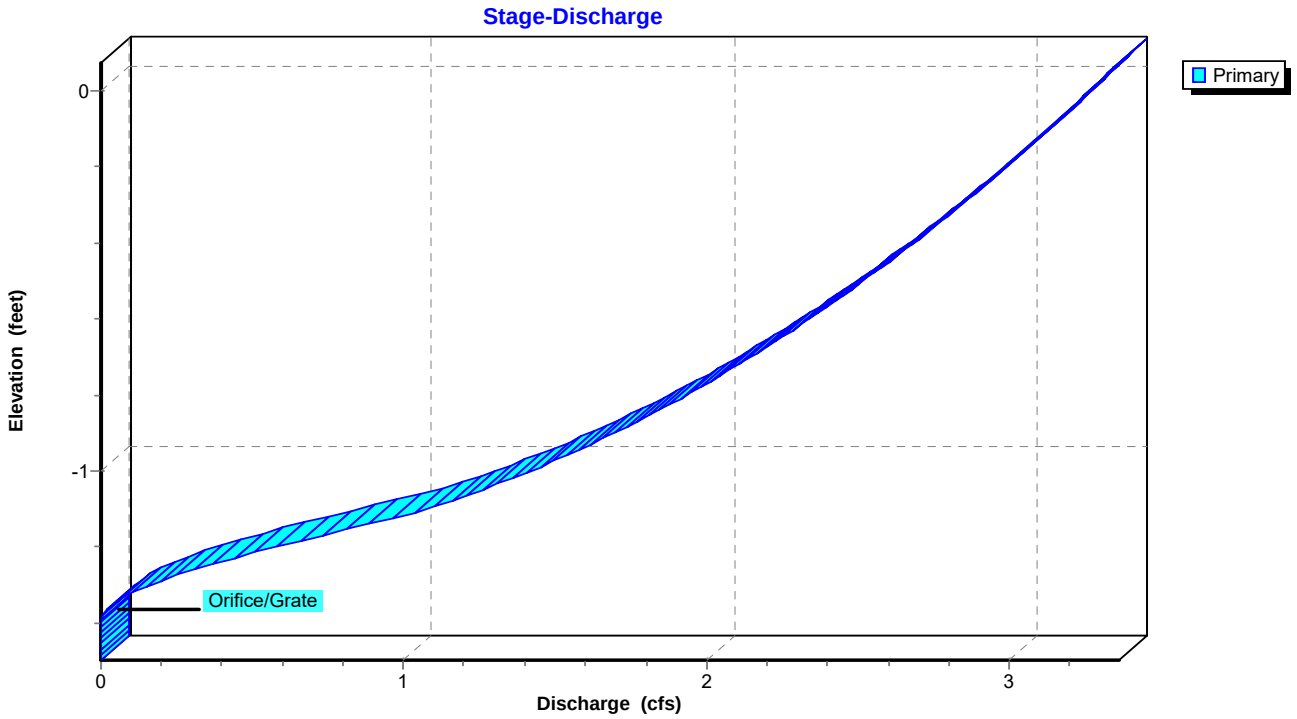
Device	Routing	Invert	Outlet Devices
#1	Primary	-1.40'	**4.00" Vert. Orifice/Grate X 7.00** C= 0.600

Primary OutFlow Max=0.80 cfs @ 12.35 hrs HW=0.07' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 0.80 cfs @ 1.31 fps)

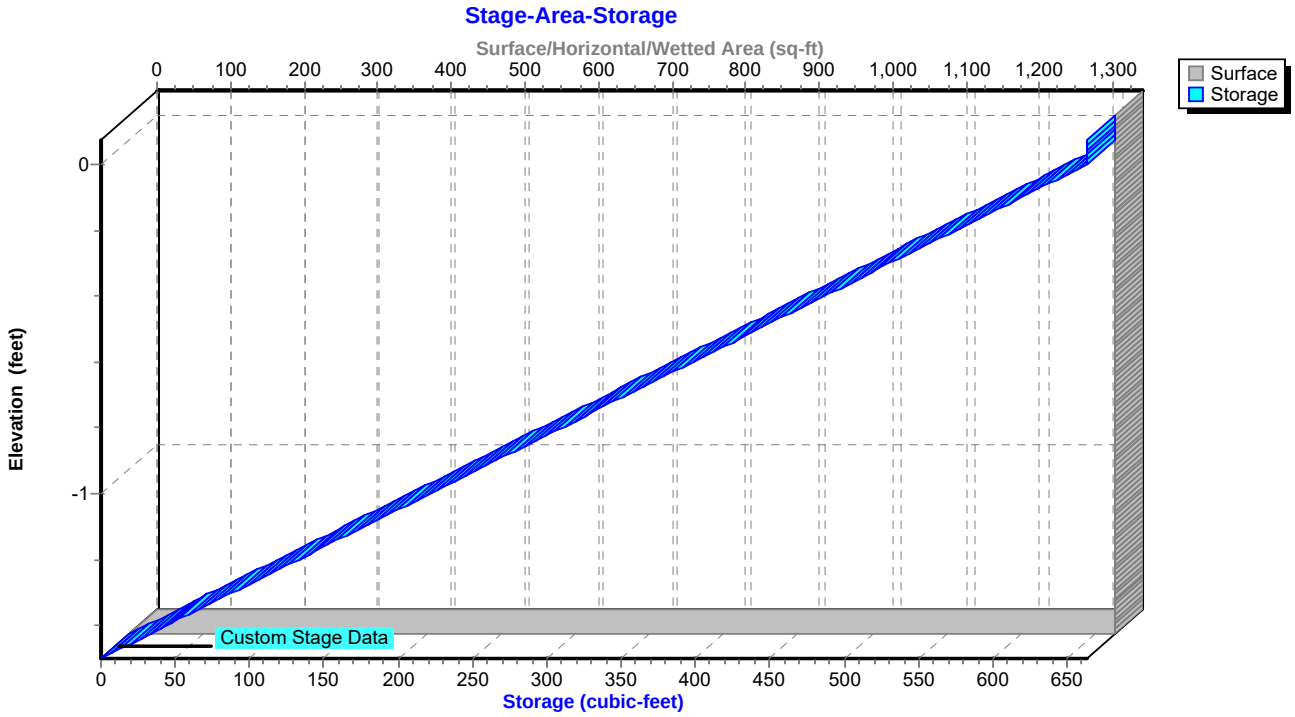
Pond 119P: Sand Filter Sand Layer



Pond 119P: Sand Filter Sand Layer



Pond 119P: Sand Filter Sand Layer



Stage-Discharge for Pond 119P: Sand Filter Sand Layer

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
-1.50	0.00	-0.97	1.51	-0.44	2.62
-1.49	0.00	-0.96	1.54	-0.43	2.64
-1.48	0.00	-0.95	1.57	-0.42	2.65
-1.47	0.00	-0.94	1.59	-0.41	2.67
-1.46	0.00	-0.93	1.62	-0.40	2.69
-1.45	0.00	-0.92	1.65	-0.39	2.70
-1.44	0.00	-0.91	1.67	-0.38	2.72
-1.43	0.00	-0.90	1.70	-0.37	2.73
-1.42	0.00	-0.89	1.72	-0.36	2.75
-1.41	0.00	-0.88	1.75	-0.35	2.76
-1.40	0.00	-0.87	1.77	-0.34	2.78
-1.39	0.00	-0.86	1.80	-0.33	2.80
-1.38	0.01	-0.85	1.82	-0.32	2.81
-1.37	0.02	-0.84	1.84	-0.31	2.83
-1.36	0.03	-0.83	1.87	-0.30	2.84
-1.35	0.04	-0.82	1.89	-0.29	2.86
-1.34	0.06	-0.81	1.91	-0.28	2.87
-1.33	0.08	-0.80	1.94	-0.27	2.89
-1.32	0.11	-0.79	1.96	-0.26	2.90
-1.31	0.14	-0.78	1.98	-0.25	2.92
-1.30	0.17	-0.77	2.00	-0.24	2.93
-1.29	0.20	-0.76	2.02	-0.23	2.95
-1.28	0.23	-0.75	2.04	-0.22	2.96
-1.27	0.27	-0.74	2.07	-0.21	2.98
-1.26	0.31	-0.73	2.09	-0.20	2.99
-1.25	0.35	-0.72	2.11	-0.19	3.00
-1.24	0.39	-0.71	2.13	-0.18	3.02
-1.23	0.44	-0.70	2.15	-0.17	3.03
-1.22	0.49	-0.69	2.17	-0.16	3.05
-1.21	0.53	-0.68	2.19	-0.15	3.06
-1.20	0.58	-0.67	2.21	-0.14	3.08
-1.19	0.63	-0.66	2.23	-0.13	3.09
-1.18	0.68	-0.65	2.25	-0.12	3.10
-1.17	0.73	-0.64	2.27	-0.11	3.12
-1.16	0.79	-0.63	2.28	-0.10	3.13
-1.15	0.84	-0.62	2.30	-0.09	3.15
-1.14	0.89	-0.61	2.32	-0.08	3.16
-1.13	0.94	-0.60	2.34	-0.07	3.17
-1.12	0.99	-0.59	2.36	-0.06	3.19
-1.11	1.03	-0.58	2.38	-0.05	3.20
-1.10	1.08	-0.57	2.40	-0.04	3.21
-1.09	1.12	-0.56	2.41	-0.03	3.23
-1.08	1.16	-0.55	2.43	-0.02	3.24
-1.07	1.19	-0.54	2.45	-0.01	3.25
-1.06	1.22	-0.53	2.47	0.00	3.27
-1.05	1.26	-0.52	2.48	0.01	3.28
-1.04	1.29	-0.51	2.50	0.02	3.29
-1.03	1.33	-0.50	2.52	0.03	3.31
-1.02	1.36	-0.49	2.54	0.04	3.32
-1.01	1.39	-0.48	2.55	0.05	3.33
-1.00	1.42	-0.47	2.57	0.06	3.34
-0.99	1.45	-0.46	2.59	0.07	**3.36**
-0.98	1.48	-0.45	2.60		

A5.3.4 HydroCAD 25-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 11: Pre-1 (Mitchell's Lane) Runoff Area=14.023 ac 0.00% Impervious Runoff Depth=3.27"
Flow Length=684' Tc=30.0 min CN=74 Runoff=30.31 cfs 3.820 af

Subcatchment 12: Pre-2 (Wyatt Rd Direct) Runoff Area=39.850 ac 0.57% Impervious Runoff Depth=3.27"
Flow Length=1,091' Tc=27.4 min CN=74 Runoff=89.72 cfs 10.856 af

Subcatchment 13: Pre-3 (Maidford North) Runoff Area=60.434 ac 0.00% Impervious Runoff Depth=3.27"
Flow Length=1,186' Tc=20.4 min CN=74 Runoff=154.15 cfs 16.464 af

Subcatchment 101: Post-01 (Uncontrolled) Runoff Area=9.771 ac 0.00% Impervious Runoff Depth=3.27"
Flow Length=488' Tc=17.0 min CN=74 Runoff=26.81 cfs 2.662 af

Subcatchment 102A: Post-02A (Uncontrolled Runoff Area=9.698 ac 0.00% Impervious Runoff Depth=3.27"
Flow Length=667' Tc=15.2 min CN=74 Runoff=27.87 cfs 2.642 af

Subcatchment 102B: Post-02B (To Pond) Runoff Area=77.399 ac 5.85% Impervious Runoff Depth=3.37"
Tc=6.0 min CN=75 Runoff=299.61 cfs 21.720 af

Subcatchment 103: Post-3 (Uncontrolled Runoff Area=12.030 ac 0.00% Impervious Runoff Depth=3.27"
Flow Length=739' Tc=17.4 min CN=74 Runoff=32.74 cfs 3.277 af

Subcatchment 104: Post-4 (To Bio-Swale) Runoff Area=5.408 ac 10.50% Impervious Runoff Depth=3.57"
Flow Length=919' Tc=25.0 min CN=77 Runoff=13.84 cfs 1.607 af

Reach 21: DP-1 (Mitchells Lane) Inflow=30.31 cfs 3.820 af
Outflow=30.31 cfs 3.820 af

Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=238.67 cfs 27.320 af
Outflow=238.67 cfs 27.320 af

Reach 121: DP-1 (Mitchells Lane) Inflow=26.81 cfs 2.662 af
Outflow=26.81 cfs 2.662 af

Reach 122: Discharge Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=168.0' S=0.0089 '/' Capacity=191.80 cfs Outflow=0.00 cfs 0.000 af

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=72.01 cfs 7.511 af
Outflow=72.01 cfs 7.511 af

Pond 116A: Irrigation Pond Plugged Peak Elev=156.50' Storage=1,829,368 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 116P: Irrigation Pond Peak Elev=159.48' Storage=2,396,866 cf Inflow=299.61 cfs 21.720 af
Primary=16.54 cfs 20.029 af Secondary=0.00 cfs 0.000 af Outflow=16.54 cfs 20.029 af

Pond 117P: Sand Filter Ponding Peak Elev=0.81' Storage=1,774 cf Inflow=13.84 cfs 1.607 af
Primary=0.58 cfs 0.597 af Secondary=13.26 cfs 1.010 af Outflow=13.84 cfs 1.607 af

Pond 119P: Sand Filter Sand Layer Peak Elev=0.07' Storage=663 cf Inflow=0.58 cfs 0.597 af
Outflow=0.76 cfs 0.582 af

Total Runoff Area = 228.613 ac Runoff Volume = 63.049 af Average Runoff Depth = 3.31"
97.67% Pervious = 223.288 ac 2.33% Impervious = 5.325 ac

Summary for Subcatchment 11: Pre-1 (Mitchell's Lane)

Runoff = 30.31 cfs @ 12.42 hrs, Volume= 3.820 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
13.679	74	>75% Grass cover, Good, HSG C
0.344	70	Woods, Good, HSG C
14.023	74	Weighted Average
14.023	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0140	0.07		**Sheet Flow, 1a-1b** Woods: Light underbrush n= 0.400 P2= 3.30"
5.6	584	0.0116	1.73		**Shallow Concentrated Flow, 1b-1c** Unpaved Kv= 16.1 fps
30.0	684	Total			

Summary for Subcatchment 12: Pre-2 (Wyatt Rd Direct)

Runoff = 89.72 cfs @ 12.39 hrs, Volume= 10.856 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

	Area (ac)	CN	Description
	36.580	74	>75% Grass cover, Good, HSG C
	3.044	70	Woods, Good, HSG C
*	0.226	98	Impervious
	39.850	74	Weighted Average
	39.624	74	99.43% Pervious Area
	0.226	98	0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0070	0.08		**Sheet Flow, 2a-2b** Grass: Dense n= 0.240 P2= 3.30"
6.0	991	0.0290	2.74		**Shallow Concentrated Flow, 2b-2c** Unpaved Kv= 16.1 fps
27.4	1,091	Total			

Summary for Subcatchment 13: Pre-3 (Maidford North)

Runoff = 154.15 cfs @ 12.29 hrs, Volume= 16.464 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
54.365	74	>75% Grass cover, Good, HSG C
6.069	70	Woods, Good, HSG C
60.434	74	Weighted Average
60.434	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0230	0.13		**Sheet Flow, 3a-3b** Grass: Dense n= 0.240 P2= 3.30"
7.1	1,086	0.0250	2.55		**Shallow Concentrated Flow, 3b-3c** Unpaved Kv= 16.1 fps
20.4	1,186	Total			

Summary for Subcatchment 101: Post-01 (Uncontrolled)

Runoff = 26.81 cfs @ 12.24 hrs, Volume= 2.662 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
9.771	74	>75% Grass cover, Good, HSG C
9.771	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0090	0.13		**Sheet Flow, 1A - 1B** Grass: Short n= 0.150 P2= 3.30"
3.7	388	0.0119	1.76		**Shallow Concentrated Flow, 1B - 1C** Unpaved Kv= 16.1 fps
17.0	488	Total			

Summary for Subcatchment 102A: Post-02A (Uncontrolled Wyatt)

Runoff = 27.87 cfs @ 12.21 hrs, Volume= 2.642 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
8.893	74	>75% Grass cover, Good, HSG C
0.805	70	Woods, Good, HSG C
9.698	74	Weighted Average
9.698	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0210	0.18		**Sheet Flow, 2A - 2B** Grass: Short n= 0.150 P2= 3.30"
5.7	567	0.0106	1.66		**Shallow Concentrated Flow, 2B - 2C** Unpaved Kv= 16.1 fps
15.2	667	Total			

Summary for Subcatchment 102B: Post-02B (To Pond)

Runoff = 299.61 cfs @ 12.09 hrs, Volume= 21.720 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
70.440	74	>75% Grass cover, Good, HSG C
2.428	70	Woods, Good, HSG C
4.531	98	Water Surface, HSG C
77.399	75	Weighted Average
72.868	74	94.15% Pervious Area
4.531	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 103: Post-3 (Uncontrolled Maidford North)

Runoff = 32.74 cfs @ 12.24 hrs, Volume= 3.277 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
11.703	74	>75% Grass cover, Good, HSG C
0.327	70	Woods, Good, HSG C
12.030	74	Weighted Average
12.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0220	0.12		**Sheet Flow, 3A 3B** Grass: Dense n= 0.240 P2= 3.30"
3.9	639	0.0282	2.70		**Shallow Concentrated Flow, 3B-3C** Unpaved Kv= 16.1 fps
17.4	739	Total			

Summary for Subcatchment 104: Post-4 (To Bio-Swale)

Runoff = 13.84 cfs @ 12.35 hrs, Volume= 1.607 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
4.840	74	>75% Grass cover, Good, HSG C
* 0.568	98	Impervious
5.408	77	Weighted Average
4.840	74	89.50% Pervious Area
0.568	98	10.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0090	0.09		**Sheet Flow, 4A-4B** Grass: Dense n= 0.240 P2= 3.30"
5.7	819	0.0225	2.42		**Shallow Concentrated Flow, 4B-4C** Unpaved Kv= 16.1 fps
25.0	919	Total			

Summary for Reach 21: DP-1 (Mitchells Lane)

Inflow Area = 14.023 ac, 0.00% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 30.31 cfs @ 12.42 hrs, Volume= 3.820 af
Outflow = 30.31 cfs @ 12.42 hrs, Volume= 3.820 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 100.284 ac, 0.23% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 238.67 cfs @ 12.32 hrs, Volume= 27.320 af
Outflow = 238.67 cfs @ 12.32 hrs, Volume= 27.320 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 121: DP-1 (Mitchells Lane)

Inflow Area = 9.771 ac, 0.00% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 26.81 cfs @ 12.24 hrs, Volume= 2.662 af
Outflow = 26.81 cfs @ 12.24 hrs, Volume= 2.662 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 122: Discharge Swale

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.50' Flow Area= 31.3 sf, Capacity= 191.80 cfs

5.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 168.0' Slope= 0.0089 '/'
Inlet Invert= 155.50', Outlet Invert= 154.00'

‡

Summary for Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 27.136 ac, 2.09% Impervious, Inflow Depth = 3.32" for 25-Year event
Inflow = 72.01 cfs @ 12.24 hrs, Volume= 7.511 af
Outflow = 72.01 cfs @ 12.24 hrs, Volume= 7.511 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 116A: Irrigation Pond Plugged

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.50' @ 0.00 hrs Surf.Area= 180,129 sf Storage= 1,829,368 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 116P: Irrigation Pond

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 3.37" for 25-Year event
Inflow = 299.61 cfs @ 12.09 hrs, Volume= 21.720 af
Outflow = 16.54 cfs @ 14.65 hrs, Volume= 20.029 af, Atten= 94%, Lag= 153.5 min
Primary = 16.54 cfs @ 14.65 hrs, Volume= 20.029 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 159.48' @ 14.65 hrs Surf.Area= 200,768 sf Storage= 2,396,866 cf (567,498 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 622.5 min (1,448.1 - 825.7)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Device 4	156.50'	**8.00" Vert. Orifice/Grate** C= 0.600
#2	Device 4	157.50'	**12.00" Vert. Orifice/Grate X 3.00** C= 0.600
#3	Device 4	160.00'	**24.00" x 48.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	156.00'	**24.00" Round Culvert** L= 91.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 156.00' / 155.50' S= 0.0055 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#5	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=16.54 cfs @ 14.65 hrs HW=159.48' (Free Discharge)
└**4=Culvert** (Passes 16.54 cfs of 25.66 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 2.73 cfs @ 7.83 fps)
  ├**2=Orifice/Grate** (Orifice Controls 13.80 cfs @ 5.86 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' TW=155.50' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 117P: Sand Filter Ponding

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 3.57" for 25-Year event
Inflow = 13.84 cfs @ 12.35 hrs, Volume= 1.607 af
Outflow = 13.84 cfs @ 12.35 hrs, Volume= 1.607 af, Atten= 0%, Lag= 0.2 min
Primary = 0.58 cfs @ 12.35 hrs, Volume= 0.597 af
Secondary = 13.26 cfs @ 12.35 hrs, Volume= 1.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.81' @ 12.35 hrs Surf.Area= 3,022 sf Storage= 1,774 cf

Plug-Flow detention time= 14.1 min calculated for 1.606 af (100% of inflow)
Center-of-Mass det. time= 14.1 min (852.6 - 838.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,374 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,340	0	0
1.00	3,408	2,374	2,374

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	0.75'	**335.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.58 cfs @ 12.35 hrs HW=0.81' TW=0.02' (Dynamic Tailwater)
└**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Secondary OutFlow Max=13.26 cfs @ 12.35 hrs HW=0.81' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 13.26 cfs @ 0.63 fps)

Summary for Pond 119P: Sand Filter Sand Layer

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 1.33" for 25-Year event
Inflow = 0.58 cfs @ 12.35 hrs, Volume= 0.597 af
Outflow = 0.76 cfs @ 12.30 hrs, Volume= 0.582 af, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.30 hrs, Volume= 0.582 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.07' @ 12.30 hrs Surf.Area= 1,340 sf Storage= 663 cf

Plug-Flow detention time= 23.8 min calculated for 0.582 af (97% of inflow)
Center-of-Mass det. time= 11.8 min (1,001.7 - 990.0)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.50'	663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,010 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-1.50	1,340	0	0
0.00	1,340	2,010	2,010

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.40'	**4.00" Vert. Orifice/Grate X 7.00** C= 0.600

Primary OutFlow Max=0.76 cfs @ 12.30 hrs HW=0.07' TW=0.00' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 0.76 cfs @ 1.25 fps)

A5.3.5 HydroCAD 100-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 11: Pre-1 (Mitchell's Lane) Runoff Area=14.023 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=684' Tc=30.0 min CN=74 Runoff=50.57 cfs 6.387 af

Subcatchment 12: Pre-2 (Wyatt Rd Direct) Runoff Area=39.850 ac 0.57% Impervious Runoff Depth=5.47"
Flow Length=1,091' Tc=27.4 min CN=74 Runoff=149.69 cfs 18.150 af

Subcatchment 13: Pre-3 (Maidford North) Runoff Area=60.434 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=1,186' Tc=20.4 min CN=74 Runoff=257.22 cfs 27.526 af

Subcatchment 101: Post-01 (Uncontrolled) Runoff Area=9.771 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=488' Tc=17.0 min CN=74 Runoff=44.72 cfs 4.450 af

Subcatchment 102A: Post-02A (Uncontrolled Runoff Area=9.698 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=667' Tc=15.2 min CN=74 Runoff=46.49 cfs 4.417 af

Subcatchment 102B: Post-02B (To Pond) Runoff Area=77.399 ac 5.85% Impervious Runoff Depth=5.59"
Tc=6.0 min CN=75 Runoff=493.00 cfs 36.030 af

Subcatchment 103: Post-3 (Uncontrolled Runoff Area=12.030 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=739' Tc=17.4 min CN=74 Runoff=54.61 cfs 5.479 af

Subcatchment 104: Post-4 (To Bio-Swale) Runoff Area=5.408 ac 10.50% Impervious Runoff Depth=5.83"
Flow Length=919' Tc=25.0 min CN=77 Runoff=22.43 cfs 2.626 af

Reach 21: DP-1 (Mitchells Lane) Inflow=50.57 cfs 6.387 af
Outflow=50.57 cfs 6.387 af

Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=398.58 cfs 45.676 af
Outflow=398.58 cfs 45.676 af

Reach 121: DP-1 (Mitchells Lane) Inflow=44.72 cfs 4.450 af
Outflow=44.72 cfs 4.450 af

Reach 122: Discharge Swale Avg. Flow Depth=1.66' Max Vel=4.89 fps Inflow=81.28 cfs 6.529 af
n=0.030 L=168.0' S=0.0089 '/' Capacity=191.80 cfs Outflow=81.29 cfs 6.529 af

Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing Inflow=161.70 cfs 19.038 af
Outflow=161.70 cfs 19.038 af

Pond 116A: Irrigation Pond Plugged Peak Elev=156.50' Storage=1,829,368 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 116P: Irrigation Pond Peak Elev=160.57' Storage=2,621,311 cf Inflow=493.00 cfs 36.030 af
Primary=31.96 cfs 27.702 af Secondary=81.28 cfs 6.529 af Outflow=113.24 cfs 34.231 af

Pond 117P: Sand Filter Ponding Peak Elev=0.84' Storage=1,850 cf Inflow=22.43 cfs 2.626 af
Primary=0.59 cfs 0.735 af Secondary=21.85 cfs 1.892 af Outflow=22.44 cfs 2.627 af

Pond 119P: Sand Filter Sand Layer Peak Elev=0.07' Storage=663 cf Inflow=0.59 cfs 0.735 af
Outflow=0.77 cfs 0.720 af

Total Runoff Area = 228.613 ac Runoff Volume = 105.067 af Average Runoff Depth = 5.52"
97.67% Pervious = 223.288 ac 2.33% Impervious = 5.325 ac

Summary for Subcatchment 11: Pre-1 (Mitchell's Lane)

Runoff = 50.57 cfs @ 12.41 hrs, Volume= 6.387 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
13.679	74	>75% Grass cover, Good, HSG C
0.344	70	Woods, Good, HSG C
14.023	74	Weighted Average
14.023	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0140	0.07		**Sheet Flow, 1a-1b** Woods: Light underbrush n= 0.400 P2= 3.30"
5.6	584	0.0116	1.73		**Shallow Concentrated Flow, 1b-1c** Unpaved Kv= 16.1 fps
30.0	684	Total			

Summary for Subcatchment 12: Pre-2 (Wyatt Rd Direct)

Runoff = 149.69 cfs @ 12.38 hrs, Volume= 18.150 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (ac)	CN	Description
	36.580	74	>75% Grass cover, Good, HSG C
	3.044	70	Woods, Good, HSG C
*	0.226	98	Impervious
	39.850	74	Weighted Average
	39.624	74	99.43% Pervious Area
	0.226	98	0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0070	0.08		**Sheet Flow, 2a-2b** Grass: Dense n= 0.240 P2= 3.30"
6.0	991	0.0290	2.74		**Shallow Concentrated Flow, 2b-2c** Unpaved Kv= 16.1 fps
27.4	1,091	Total			

Summary for Subcatchment 13: Pre-3 (Maidford North)

Runoff = 257.22 cfs @ 12.28 hrs, Volume= 27.526 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
54.365	74	>75% Grass cover, Good, HSG C
6.069	70	Woods, Good, HSG C
60.434	74	Weighted Average
60.434	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0230	0.13		**Sheet Flow, 3a-3b** Grass: Dense n= 0.240 P2= 3.30"
7.1	1,086	0.0250	2.55		**Shallow Concentrated Flow, 3b-3c** Unpaved Kv= 16.1 fps
20.4	1,186	Total			

Summary for Subcatchment 101: Post-01 (Uncontrolled)

Runoff = 44.72 cfs @ 12.23 hrs, Volume= 4.450 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
9.771	74	>75% Grass cover, Good, HSG C
9.771	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0090	0.13		**Sheet Flow, 1A - 1B** Grass: Short n= 0.150 P2= 3.30"
3.7	388	0.0119	1.76		**Shallow Concentrated Flow, 1B - 1C** Unpaved Kv= 16.1 fps
17.0	488	Total			

Summary for Subcatchment 102A: Post-02A (Uncontrolled Wyatt)

Runoff = 46.49 cfs @ 12.21 hrs, Volume= 4.417 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
8.893	74	>75% Grass cover, Good, HSG C
0.805	70	Woods, Good, HSG C
9.698	74	Weighted Average
9.698	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0210	0.18		**Sheet Flow, 2A - 2B** Grass: Short n= 0.150 P2= 3.30"
5.7	567	0.0106	1.66		**Shallow Concentrated Flow, 2B - 2C** Unpaved Kv= 16.1 fps
15.2	667	Total			

Summary for Subcatchment 102B: Post-02B (To Pond)

Runoff = 493.00 cfs @ 12.09 hrs, Volume= 36.030 af, Depth= 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
70.440	74	>75% Grass cover, Good, HSG C
2.428	70	Woods, Good, HSG C
4.531	98	Water Surface, HSG C
77.399	75	Weighted Average
72.868	74	94.15% Pervious Area
4.531	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 103: Post-3 (Uncontrolled Maidford North)

Runoff = 54.61 cfs @ 12.24 hrs, Volume= 5.479 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
11.703	74	>75% Grass cover, Good, HSG C
0.327	70	Woods, Good, HSG C
12.030	74	Weighted Average
12.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0220	0.12		**Sheet Flow, 3A 3B** Grass: Dense n= 0.240 P2= 3.30"
3.9	639	0.0282	2.70		**Shallow Concentrated Flow, 3B-3C** Unpaved Kv= 16.1 fps
17.4	739	Total			

Summary for Subcatchment 104: Post-4 (To Bio-Swale)

Runoff = 22.43 cfs @ 12.34 hrs, Volume= 2.626 af, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
4.840	74	>75% Grass cover, Good, HSG C
* 0.568	98	Impervious
5.408	77	Weighted Average
4.840	74	89.50% Pervious Area
0.568	98	10.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0090	0.09		**Sheet Flow, 4A-4B** Grass: Dense n= 0.240 P2= 3.30"
5.7	819	0.0225	2.42		**Shallow Concentrated Flow, 4B-4C** Unpaved Kv= 16.1 fps
25.0	919	Total			

Summary for Reach 21: DP-1 (Mitchells Lane)

Inflow Area = 14.023 ac, 0.00% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 50.57 cfs @ 12.41 hrs, Volume= 6.387 af
Outflow = 50.57 cfs @ 12.41 hrs, Volume= 6.387 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 22: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 100.284 ac, 0.23% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 398.58 cfs @ 12.31 hrs, Volume= 45.676 af
Outflow = 398.58 cfs @ 12.31 hrs, Volume= 45.676 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 121: DP-1 (Mitchells Lane)

Inflow Area = 9.771 ac, 0.00% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 44.72 cfs @ 12.23 hrs, Volume= 4.450 af
Outflow = 44.72 cfs @ 12.23 hrs, Volume= 4.450 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 122: Discharge Swale

Inflow = 81.28 cfs @ 12.50 hrs, Volume= 6.529 af
Outflow = 81.29 cfs @ 12.51 hrs, Volume= 6.529 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.89 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.36 fps, Avg. Travel Time= 1.2 min

Peak Storage= 2,789 cf @ 12.51 hrs
Average Depth at Peak Storage= 1.66'
Bank-Full Depth= 2.50' Flow Area= 31.3 sf, Capacity= 191.80 cfs

5.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 168.0' Slope= 0.0089 '/'
Inlet Invert= 155.50', Outlet Invert= 154.00'

‡

Summary for Reach 124: DP-2 Combined Maidford/Wyatt Rd Crossing

Inflow Area = 27.136 ac, 2.09% Impervious, Inflow Depth = 8.42" for 100-Year event
Inflow = 161.70 cfs @ 12.42 hrs, Volume= 19.038 af
Outflow = 161.70 cfs @ 12.42 hrs, Volume= 19.038 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 116A: Irrigation Pond Plugged

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 156.50' @ 0.00 hrs Surf.Area= 180,129 sf Storage= 1,829,368 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 116P: Irrigation Pond

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 5.59" for 100-Year event
Inflow = 493.00 cfs @ 12.09 hrs, Volume= 36.030 af
Outflow = 113.24 cfs @ 12.50 hrs, Volume= 34.231 af, Atten= 77%, Lag= 24.8 min
Primary = 31.96 cfs @ 12.50 hrs, Volume= 27.702 af
Secondary = 81.28 cfs @ 12.50 hrs, Volume= 6.529 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 160.57' @ 12.50 hrs Surf.Area= 211,546 sf Storage= 2,621,311 cf (791,943 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 463.0 min (1,274.2 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Device 4	156.50'	**8.00" Vert. Orifice/Grate** C= 0.600
#2	Device 4	157.50'	**12.00" Vert. Orifice/Grate X 3.00** C= 0.600
#3	Device 4	160.00'	**24.00" x 48.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	156.00'	**24.00" Round Culvert** L= 91.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 156.00' / 155.50' S= 0.0055 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#5	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=31.96 cfs @ 12.50 hrs HW=160.57' (Free Discharge)
└**4=Culvert** (Barrel Controls 31.96 cfs @ 10.17 fps)
  ├**1=Orifice/Grate** (Passes < 3.25 cfs potential flow)
  ├**2=Orifice/Grate** (Passes < 18.19 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 16.97 cfs potential flow)

Secondary OutFlow Max=81.06 cfs @ 12.50 hrs HW=160.57' TW=157.16' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Weir Controls 81.06 cfs @ 2.02 fps)

Summary for Pond 117P: Sand Filter Ponding

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 5.83" for 100-Year event
Inflow = 22.43 cfs @ 12.34 hrs, Volume= 2.626 af
Outflow = 22.44 cfs @ 12.34 hrs, Volume= 2.627 af, Atten= 0%, Lag= 0.1 min
Primary = 0.59 cfs @ 12.34 hrs, Volume= 0.735 af
Secondary = 21.85 cfs @ 12.34 hrs, Volume= 1.892 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.84' @ 12.34 hrs Surf.Area= 3,073 sf Storage= 1,850 cf

Plug-Flow detention time= 12.0 min calculated for 2.625 af (100% of inflow)
Center-of-Mass det. time= 12.1 min (836.6 - 824.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,374 cf	**Ponding Storage (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,340	0	0
1.00	3,408	2,374	2,374

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	0.75'	**335.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.59 cfs @ 12.34 hrs HW=0.84' TW=0.03' (Dynamic Tailwater)
└**1=Exfiltration** (Exfiltration Controls 0.59 cfs)

Secondary OutFlow Max=21.79 cfs @ 12.34 hrs HW=0.84' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 21.79 cfs @ 0.74 fps)

Summary for Pond 119P: Sand Filter Sand Layer

Inflow Area = 5.408 ac, 10.50% Impervious, Inflow Depth = 1.63" for 100-Year event
Inflow = 0.59 cfs @ 12.34 hrs, Volume= 0.735 af
Outflow = 0.77 cfs @ 12.30 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min
Primary = 0.77 cfs @ 12.30 hrs, Volume= 0.720 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 0.07' @ 12.30 hrs Surf.Area= 1,340 sf Storage= 663 cf

Plug-Flow detention time= 21.9 min calculated for 0.720 af (98% of inflow)
Center-of-Mass det. time= 11.7 min (1,003.8 - 992.1)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.50'	663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,010 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-1.50	1,340	0	0
0.00	1,340	2,010	2,010

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.40'	**4.00" Vert. Orifice/Grate X 7.00** C= 0.600

Primary OutFlow Max=0.77 cfs @ 12.30 hrs HW=0.07' TW=0.00' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 0.77 cfs @ 1.26 fps)

A5.3.6 HydroCAD 100-Year Storm Plugged Analysis

Summary for Pond 116A: Irrigation Pond Plugged

Inflow Area = 77.399 ac, 5.85% Impervious, Inflow Depth = 5.59" for 100-Year event
Inflow = 493.00 cfs @ 12.09 hrs, Volume= 36.030 af
Outflow = 111.35 cfs @ 12.51 hrs, Volume= 20.585 af, Atten= 77%, Lag= 25.1 min
Secondary = 111.35 cfs @ 12.51 hrs, Volume= 20.585 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 156.50' Surf.Area= 180,129 sf Storage= 1,829,368 cf
Peak Elev= 160.70' @ 12.51 hrs Surf.Area= 213,171 sf Storage= 2,649,096 cf (819,728 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 128.1 min (939.4 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,712,810 cf	**Ponding Storage (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	92,624	0	0
145.00	104,865	197,489	197,489
150.00	136,571	603,590	801,079
155.00	169,774	765,863	1,566,942
159.00	197,386	734,320	2,301,262
160.00	204,429	200,908	2,502,169
161.00	216,853	210,641	2,712,810

Device	Routing	Invert	Outlet Devices
#1	Secondary	160.00'	**70.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Secondary OutFlow Max=110.99 cfs @ 12.51 hrs HW=160.70' TW=157.43' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 110.99 cfs @ 2.26 fps)

Watershed Maps

DiPrete Engineering
Two Stafford Court Cranston, RI 02920
tel 401-943-1000 fax 401-464-6046 www.diprete-eng.com
Boston • Providence • Newport

No.	Date	Description	By:
1	6-10-2020	Watershed Map Updates	S.D.M.
0	8-24-2018	Watershed Maps	J.A.R.

Drawn By: J.A.R. Design By: K.J.D.

Pre-Watershed Map

Newport National West Course

Assessor's Plat 124, Lot 29
Middletown, Rhode Island

Applicant
Mr. John Pereira c/o Combined Properties, Inc.
300 Commercial Street
Malden, MA 02148

DE Job No: 2569-001

SHEET 1 OF 2

Legend

- Woods - A Soils
- Woods - B Soils
- Woods - C Soils
- Grass - A Soils
- Grass - B Soils
- Grass - C Soils
- Gravel - A Soils
- Gravel - B Soils
- Gravel - C Soils
- Impervious

Legend

- Tc Line (With Elevations)
- Subcat Area
- Soil Boundary
- Subcatchment
- Drainage Pond/Bio Retention/ Infiltrating Swale
- Design Point
- Reach
- Wetland Line
- 50' Perimeter Wetland
- Stream

DiPrete Engineering

Two Stafford Court Cranston, RI 02920
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No.	Date	Description	By:
0	8-24-2018	Watershed Maps	J.A.R.

Design By: K.J.D.
Drawn By: J.A.R.

Post-Watershed Map

Newport National West Course

Assessor's Plat 124, Lot 29
Middletown, Rhode Island

Applicant
Mr. John Pereira c/o Combined Properties, Inc.
300 Commercial Street
Malden, MA 02148

SHEET 2 OF 2

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