3Roots San Diego Project
Environmental Impact Report

SCH No. 2018041065; Project No. 587128

Appendix R1

Preliminary Hydromodification Management Study

June 2019

Preliminary Hydromodification Management Study

3 ROOTS

Vesting Tentative Map
***PTS* # 587128**

City of San Diego, CA
February 4, 2019

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1. INTRODUCTION

This report summarizes hydromodification design for the 3 Roots project located in the City of San Diego, CA. The hydromodification calculations were performed utilizing continuous simulation analysis to size the storm water treatment and control facilities. Storm Water Management Model (SWMM) version 5.1 distributed by USEPA is the basis of both existing and proposed conditions modeling within this report. The biofiltration basin/hydromodificaiton tank sizing and link configuration with the specialized outlet configuration ensures compliance with the Hydromodification Management Plan (HMP) requirements from the San Diego Regional Water Quality Control Board (SDRWQCB).

2. PROJECT DESCRIPTION

The 3Roots San Diego Project is a proposed mixed-use community located in the City of San Diego. The site is approximately 413 acres in size and is located east of Camino Santa Fe, approximately halfway between Mira Mesa Boulevard and Miramar Road, and west of Carroll Canyon Rd and Parkdale Avenue. The Property was formerly operated as a sand and gravel mining site and is currently owned by Mesa Community Partners. The Proposed Project includes approximately 256 acres of open space (including approximately 181 acres of natural open space, landscaped slopes and 76 acres of parkland), a total of 1800 residential units, and a proposed 1.5-acre on-site Transit Center adjacent to the intersection of Camino Santa Fe and Carroll Canyon Road.

3. HYDROMODIFICATION MODELING OVERVIEW

3. 1 Model Description

PCSWMM is a proprietary software which utilizes the EPA's Stormwater Management Model (SWMM) as its computational engine, while providing added processing and analytical capabilities to streamline design. PCSWMM is essentially a user-friendly shell for SWMM that allows rapid development and analysis of SWMM models.

PCSWMM was employed for this study based on the ability to efficiently create, edit and compare models, perform detention routing with the same software, and moreover, due to the tendency for SWMM to produce results that have been found to more accurately represent San Diego area watersheds than the alternative San Diego Hydrology Model (SDHM).

SWMM is a semi-distributed hydrologic and hydraulic modeling software that simulates the rainfall-runoff response of a watershed based on linear-reservoir overland flow routing. This overland flow

routine accounts the connectedness of pervious, impervious and Low Impact Development (LID) BMPs to the drainage system. LID BMPs are represented with a module in SWMM that simulates the water balance through standard LID BMP components, accounting for soil percolation, evapotranspiration, underdrain outflow, various media layer storage and subgrade infiltration. These controls provide a wide range of customizability between the various associated parameters and the ability to route underdrain or overflow to other SWMM elements, like storages nodes and conduits to represent most any conceivable LID system.

The outflow from these LID controls, storage components or watersheds is translated into the hydraulic component of the model that utilizes energy and momentum principles to determine flow through conduits, orifices and other structures. The hydraulics may be computed based on either the kinematic or dynamic-wave equations. In this study the former was used because there was no need to take downstream hydraulic grade line effects into consideration.

3.2 Hydromodification Criteria

The San Diego Regional Water Quality Control Board (SDRWQCB) requires the exceedance duration of post-developed flow rates be maintained to within 10% of the pre-developed flow durations. This must occur for flow frequencies ranging from a fraction of the 2-year flow (Q2) to the 10-year flow (Q10). These flow frequency values may be calculated directly from SWMM statistics or estimated based on accepted USGS regression equations. These equations estimate flows based on a correlation with watershed area and the mean annual rainfall developed for the region. For this project the SWMM output was used because of the exceedingly small values calculated by regression equations, which were developed with data from significantly larger watersheds.

The fraction of the Q2 that must be controlled is dependent on the relative erodibility of the channel being discharged to, categorized as either High, Medium or Low susceptibility. By default it is assumed that all channels have a High susceptibility, and that therefore 0.1 of the Q2 must be controlled. A Geomorphic Assessment of Receiving Channels may be performed to indicate whether the channel erosion susceptibility can be categorized as Medium or Low, allowing control to 0.3 or 0.5 of the Q2, respectively.

The low-flow threshold used in the analysis for 3Roots project is the 0.5Q2 low-flow threshold, as determined as "low susceptibility" by the geomorphic channel assessment analysis performed for the downstream locations. Complete geomorphic assessment report will be submitted with next submittal.

3.3 Model Development

The inputs required for a SWMM model include rainfall, evapotranspiration rates, watershed characteristics and BMP configurations. The sources for some of these parameters are provided in Table 1 below.

Table 1: Hydrology Criteria

Rain Gage	'Kearny Mesa' – from Project Clean Water website
Evapotranspiration	Daily E-T Rates taken from Table G.1-1 in the City of San Diego BMP Design Manual based on location in Zone 6 of California irrigation Management Information System "Reference Evapotranspiration Zones"
Overland Flow Path Length	Based on available digital topographic data for pre-development conditions and proposed grading plan for post-project conditions.
Soils/Green-Ampt Parameters	Values for Hydrologic Soil Group 'D' taken from Table G.1-4 in the City of San Diego BMP Design Manual .

The drainage area to each point of compliance was delineated with the project boundary plus small fragments of adjacent land that drain through the site for both existing and proposed conditions. For the proposed model this drainage area has been broken up into the contributing drainage management (DMA) areas that drain to BMPs. See the Storm Water Quality Management Plan (SWQMP) for more information regarding the pollutant control strategy and DMAs.

The overland flow path lengths were drawn from a visual inspection of the watershed contours, extending from the upper ridge to the apparent flow path, perpendicular to the contours. The percent imperviousness was calculated based on the known coverages in the site plan to develop the same values used to calculate the Design Capture Volume provided in Attachment 1e of the SWQMP. An electronic copy of the model is provided in Attachment 2 of this report.

4. Modeling for Hydromodification Compliance

The pre-developed conditions for the site were modelled based on the existing topography and landcover with zero imperviousness. For the post-developed condition, the proposed site footprint was represented as an equivalent imperviousness and a short overland flow path length typical of urban drainage systems. The lined biofiltration basins were modelled by coupling the bioretention LID component to properly represent the media and underdrain, with the storage component to represent the basin surface storage. The parameters utilized for the biofiltration parameters were based on the published values in the City of San Diego Stormwater Standards. The basins outlet to two separate backbone storm drains or new proposed stormdrains that discharge to the adjacent Carroll Canyon Creek.

For the offsite Carroll Canyon West area, the western end of the offsite road area drains into the 800LF biofiltration median BMP with check dams every 100 feet. The eastern end of the offsite road area flows into two modular wetland units. Outflows from eastern modular wetland units and western biofiltration median then drain into an underground hydromodification tank. Both the biofiltration median BMP and the underground tank are modeled as a storage component in SWMM to represent the hydromodification units.

It was determined that this suite of BMPs would be sufficient to provide flow control with the storage depths and outlet size provided herein based on the SWMM modeling results. The Status Report SWMM output file for the existing condition is provided in Attachment 3 and the proposed condition is provided in Attachment 4.

4.1 Flow Frequency Analysis

The SWMM statistics calculator was used to determine the pre-developed and post developed flow rates for the 2, 5, and 10-year recurrence intervals. These are provided below with the resultant low flow threshold based on the geomorphic assessment. The SWMM output used to calculate these values is provided in Attachment 5.

A Geomorphic Assessment of Receiving Channels, often referred to as a SCCWRP analysis, was performed by Chang Consultants for the Points of Compliance along the north Canyon and Carroll Canyon creeks. It was determined that the channels had a low susceptibility to erosion meaning that a

0.5 factor could be used as to calculate the low flow threshold from the flow rate of the 2-year recurrence interval.

Table 2 – Pre-Developed and Post-Mitigated Flows for the POC 1 (BMP Basins 1, 2, 3 Combined)

Return Period	Pre-project - Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	3.096	1.744
2-year	6.193	3.488
5-year	8.128	4.674
10-year	11.657	5.764

Table 3 – Pre-Developed and Post-Mitigated Flows for the POC 6 (BMP Basin 6)

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	1.648	0.507
2-year	3.296	1.014
5-year	5.567	1.378
10-year	6.727	3.050

Table 4 – Pre-Developed and Post-Mitigated Flows for the POC 7 (BMP Basin 7)

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	1.472	0.512
2-year	2.944	1.025
5-year	4.011	2.327
10-year	5.513	2.972

Table 5 – Pre-Developed and Post-Mitigated Flows for the POC 8 (BMP Basin 8)

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	3.905	1.875
2-year	7.810	3.749
5-year	12.660	9.765
10-year	15.894	13.271

Table 6 – Pre-Developed and Post-Mitigated Flows for the POC 9 (BMP Basins 5, 9 Combined)

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	3.365	2.183
2-year	6.730	4.365
5-year	10.220	8.720
10-year	13.319	12.171

Table 7 – Pre-Developed and Post-Mitigated Flows for the POC 10

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.5xQ2	0.532	0.325
2-year	1.063	0.650
5-year	1.474	0.841
10-year	1.908	1.242

4.2 Biofiltration Basins

The basins are composed of above ground storage as well as biofiltration media. These components were represented as an LID control ("Bio-retention cell") in series with a storage node as simulated in SWMM. The module allows the user to represent the various stages of a biofiltration basin including ponding, media, and gravel storage above and below the underdrain. These layer depths were assigned per the design developed for pollutant control as shown in Table 8 and the parameter values were assigned with the standard values taken from Table G.1-7 in the BMP Design Manual (with some refinement). The underdrain is offset to allow for the dead storage needed to achieve partial-retention requirements. The drain coefficients are calculated based on media infiltration of 5 in/hr and basin layer depth and listed in Table 8. Drain coefficient calculation is based on C factor calculation equation in the BMP Design Manual (Page G-27).

$$C = c_g \left(\frac{605}{A_{LID}} \right) \left(\frac{\pi D^2}{8} \right) \sqrt{\frac{g}{6}}$$

where,

cg is the orifice discharge coefficient, typically 0.60-0.65 for thin walled plates and higher for thicker walls;
ALID is the cumulative footprint area (ft^2) of all LID controls;
D is the underdrain orifice diameter (in); and
g is the gravitational constant (32.2 ft/s^2).

Table 8 – Biofiltration Model Summary

Biofiltration BMP #	Surface Area (sf)	Layer Depth			Underdrain Orifice (in)	Drain Coefficient
		Ponding (in)	Soil (in)	Gravel Storage (in)		
1	7,792	6	18	21	4	0.67
2	7,677	6	18	21	3	0.38
3	9,428	6	18	21	4	0.56
5	12,590	6	18	21	4	0.42
6	57,745	6	18	21	4	0.09
7	18,214	6	18	21	4	0.29
8	56,705	6	18	21	4	0.09
9	28,525	6	18	40	4	0.18
Media and storage parameters taken from Table G.1-7 in BMP Design Manual, including media infiltration = 5 in/hr						

To control the flows with this configuration, except for underdrain orifices, a series of flow orifices were connected between the biofiltration basin storage node connected to the point of compliance. The orifice design is summarized in Table 9.

Table 9 – Biofiltration Orifice Design

Biofiltration BMP #	Low Flow Orifice		Mid Flow Orifice		High Flow Orifice		Overflow Weir	
	Dia. (in)	Offset (ft)	Dia. (in)	Offset (ft)	Dia. (in)	Offset (ft)	Dia. (ft)	Offset (ft)
1	2	0.5	-	-	-	-	2	5
2	4	0.5	-	-	-	-	2	3
3	4	0.5	6	2	-	-	2	3
5	4	0.5	2	2.5	4	3	2	3.5
6	2-2in	0.5	2-4in	2.1	2-4.8in	2.5	3	3.1
7	2-2in	0.5	3-4in	2	2-4.8in	2.5	3	2.8
8	2-4in	0.5	2-4 in	1.5	-	-	2	2.5
9	4	0.5	4 & 2	1.5 & 2.5	3-4in	3.5	2	4.9

4.3 Biofiltration Median

For the offsite Carroll Canyon Road extension to the west of the project, the roadway is proposed to be designed as an inverted section with a 16-feet wide center median. 800LF of the downstream end of the median will incorporate a biofiltration median BMP with check dams every 100 feet. The biofiltration median was represented as a storage node with ponding layer, soil layer, and gravel layer in SWMM for modeling purposes. The median BMP will work in conjunction with the proposed Modular Wetland systems and downstream storage vault for POC 10. The BMP layer sizes are provided below. Refer to Attachment 2 for more details.

Table 10 – Biofiltration Median Design

BMP #	Bottom Area for each 100 ft (sf)	Layer Depth		
		Ponding (in)	Soil (in)	Gravel Storage (in)
11 (Biofiltration Median)	700	6	18	12

4.4 Hydromodification Storage

One storage vault will be implemented in conjunction with the Modular Wetland systems and biofiltration median for the offsite Carroll Canyon Road to the west. The storage volume is provided below. Refer to Attachment 2 for the outlet control for the storage vault.

Table 11 – Hydromodification Storage Vault Design

Hydromod BMP #	Depth (ft)	Effective Area (sf)	Storage Volume (cf)
BMP #12	6	1800	10800

Storage Vaults	BMP #12	
ORIFICES & RISER	Size	Offset (ft)
	3 in Orifice	0
	2 in Orifice	2
	2 in Orifice	3
	2-ft Diameter Riser	5.2

4.5 Flow Duration Curves for Hydromodification Compliance

The pre and post developed flow duration exceedance curves were developed for the hourly flow data using an automatic partial duration series calculator in PCSWMM. These curves are graphed over the

flow ranges listed in Table 2-7 and are provided in Attachment 6. In all cases the duration of post developed flows are brought to well within that of the pre developed flows for half the two-year flow to the ten-year flow, indicating that the suite of BMPs will provide the flow attenuation required for compliance.

5.0 SUMMARY

The predeveloped conditions of the 3 Roots site were modelled in SWMM to determine a baseline of flow durations that would need to be controlled in the post-developed conditions. The proposed development was also modelled in SWMM with biofiltration basins with significant storage. Based on the SWMM model results for this study it is determined that the combination of LID BMPs, including eight biofiltration basins, one offsite biofiltration median, and one underground storage vault will be able to satisfy the hydromodification criteria. This study is intended to demonstrate that these controls as sized are capable of providing hydromodification compliance and a full outlet design will be performed during final engineering.

Attachments

1 – Hydromodification Management Exhibit

2 – SWMM Model w/ Subcatchment Schematics

3 – SWMM Output – Existing Condition

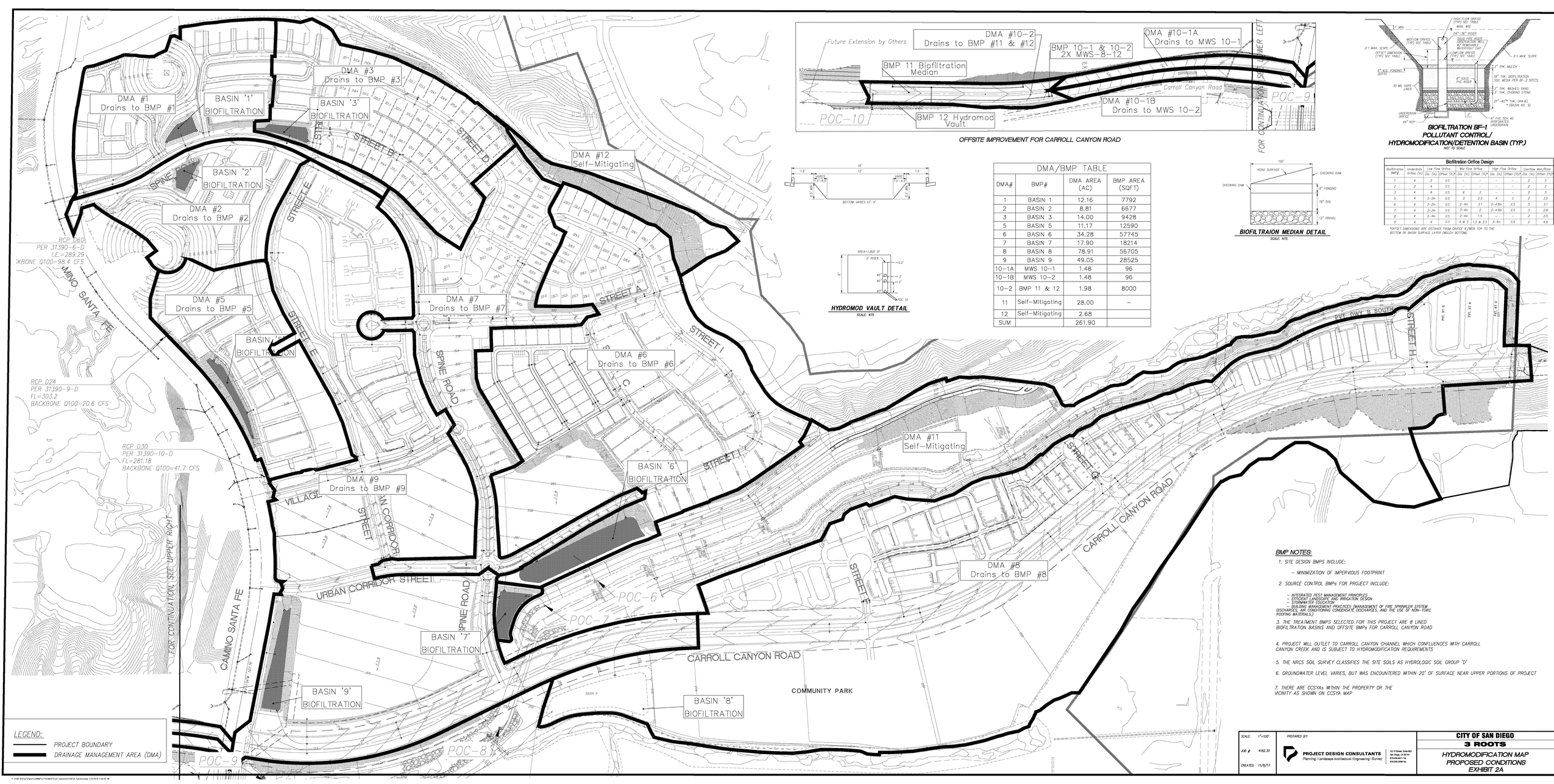
4 – SWMM Output – Proposed Conditions

5 – Flow Frequency Statistical Analysis results

6 – Flow Duration Curves

ATTACHMENT 1

Hydromodification Management Exhibit



OFFSITE IMPROVEMENT FOR CARROLL CANYON ROAD

BIOFILTRATION BF-1
POLLUTANT CONTROL/
HYDROMODIFICATION/DETENTION BASIN (TYP.)
NOT TO SCALE

HYDROMOD VAULT DETAIL
SCALE: NTS

DMA/BMP TABLE			
DMA#	BMP#	DMA AREA (AC)	BMP AREA (SQFT)
1	BASIN 1	12.16	7792
2	BASIN 2	8.81	6677
3	BASIN 3	14.00	9428
5	BASIN 5	11.17	12590
6	BASIN 6	34.28	57745
7	BASIN 7	17.90	18214
8	BASIN 8	78.91	56705
9	BASIN 9	49.05	28525
10-1A	MWS 10-1	1.48	96
10-1B	MWS 10-2	1.48	96
10-2	BMP 11 & 12	1.98	8000
11	Self-Mitigating	28.00	–
12	Self-Mitigating	2.68	
SUM		261.90	

BIOFILTRAION MEDIAN DETAIL
SCALE: NTS

Biofiltration Orifice Design

Biofiltration BMP #	Underdrain Orifice (in)	Low Flow Orifice		Mid Flow Orifice		High Flow Orifice		Overflow Weir/Riser	
		Dia. (in)	Offset (ft)*	Dia. (in)	Offset (ft)*	Dia. (in)	Offset (ft)*	Dia. (in)	Offset (ft)*
1	4	2	0.5	–	–	–	–	2	5
2	3	4	0.5	–	–	–	–	2	3
3	4	4	0.5	6	2	–	–	2	3
5	4	2-2in	0.5	2	2.5	4	3	2	3.5
6	4	2-2in	0.5	2-4in	2.1	2-4.8in	2.5	3	3.1
7	4	2-2in	0.5	2-4in	2	2-4.8in	2.5	3	2.8
8	4	2-4in	0.5	2-4in	1.5	–	–	2	2.5
9	4	4	0.5	4 & 2	1.5 & 2.5	2-4in	3.5	2	4.9

*OFFSET DIMENSIONS ARE DISTANCE FROM ORIFICE INVERT TOP TO THE BOTTOM OF BASIN SURFACE LAYER (MULCH BOTTOM)

BMP NOTES:

1. SITE DESIGN BMPS INCLUDE:
   - MINIMIZATION OF IMPERVIOUS FOOTPRINT
2. SOURCE CONTROL BMPs FOR PROJECT INCLUDE:
   - INTEGRATED PEST MANAGEMENT PRINCIPLES
   - EFFICIENT LANDSCAPE AND IRRIGATION DESIGN
   - STORMWATER EDUCATION
   - BUILDING MANAGEMENT PRACTICES (MANAGEMENT OF FIRE SPRINKLER SYSTEM DISCHARGES, AIR CONDITIONING CONDENSATE DISCHARGES, AND THE USE OF NON-TOXIC ROOFING MATERIALS.)
3. THE TREATMENT BMPS SELECTED FOR THIS PROJECT ARE B LINED BIOFILTRATION BASINS AND OFFSITE BMPs FOR CARROLL CANYON ROAD
4. PROJECT WILL OUTLET TO CARROLL CANYON CHANNEL WHICH CONFLUENCES WITH CARROLL CANYON CREEK AND IS SUBJECT TO HYDROMODIFICATION REQUIREMENTS
5. THE NRCS SOIL SURVEY CLASSIFIES THE SITE SOILS AS HYDROLOGIC SOIL GROUP 'D'
6. GROUNDWATER LEVEL VARIES, BUT WAS ENCOUNTERED WITHIN 20' OF SURFACE NEAR UPPER PORTIONS OF PROJECT
7. THERE ARE CCSYAs WITHIN THE PROPERTY OR THE VICINITY AS SHOWN ON CCSYA MAP

LEGEND:
- PROJECT BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)

SCALE: 1"=100'
JOB #: 4182.30
CREATED: 11/9/17

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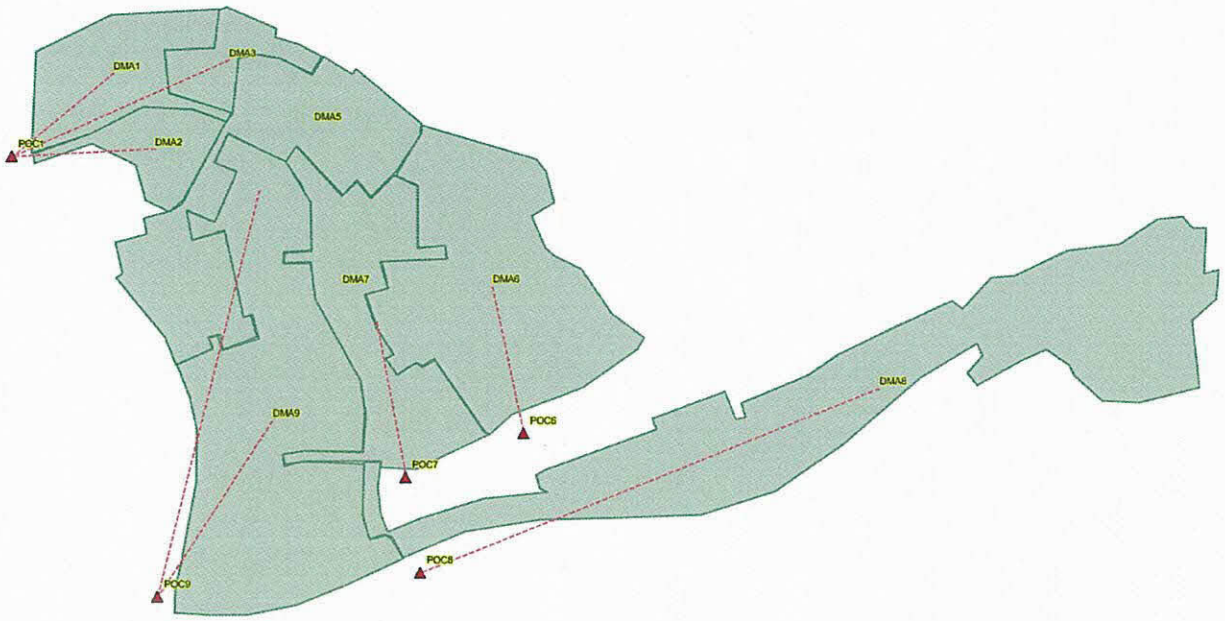
CITY OF SAN DIEGO
3 ROOTS
HYDROMODIFICATION MAP
PROPOSED CONDITIONS
EXHIBIT 2A

ATTACHMENT 2

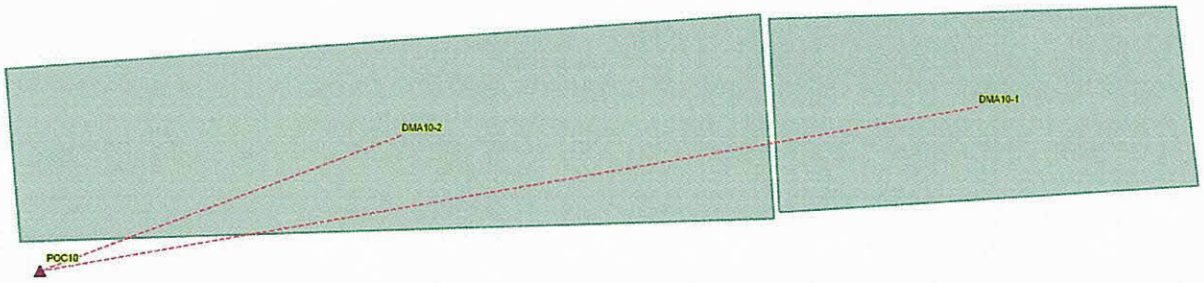
SWMM Model with

Sub-catchment Parameters and Schematic

Existing Conditions

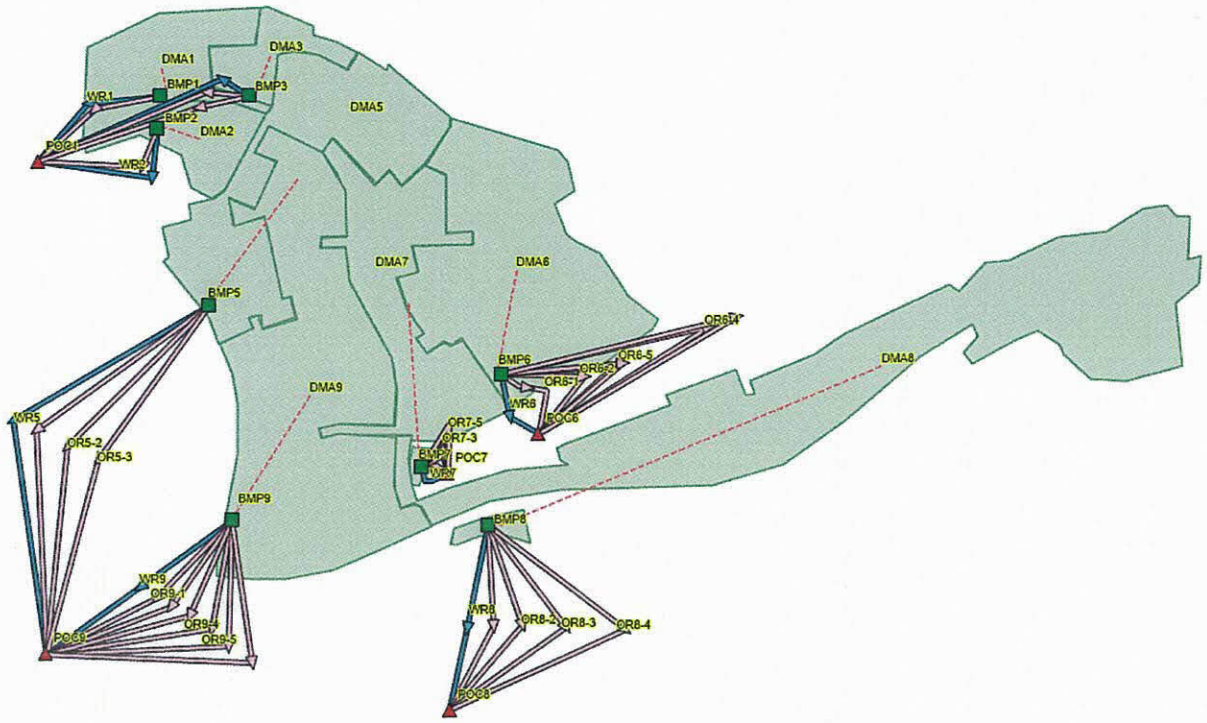


Name	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Length (ft)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)
DMA1	KearnyMesa	POC1	12.16	452	1171.88	2	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA2	KearnyMesa	POC1	8.81	330.827	1160.013	2	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA3	KearnyMesa	POC1	14	260.403	2341.909	2	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA5	KearnyMesa	POC9	11.17	804.758	604.611	0.5	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA6	KearnyMesa	POC6	34.28	809.712	1844.158	0.5	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA7	KearnyMesa	POC7	17.9	878.302	887.763	0.5	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA8	KearnyMesa	POC8	78.91	1935.06	1776.337	0.5	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33
DMA9	KearnyMesa	POC9	49.05	1074.292	1988.862	0.5	0	0.012	0.15	0.05	0.1	25	9	0.025	0.33

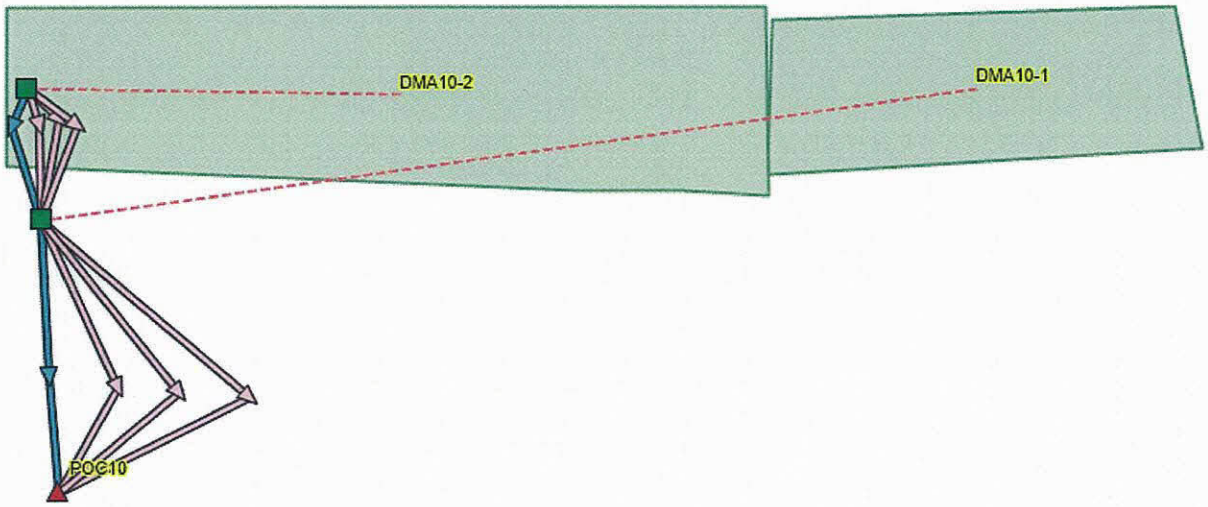


Name	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Length (ft)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)				Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)
DMA10-1	KearnyMesa	POC10	2.953	100	1286.327	3.2	0	0.012	0.15	0.05	0.1	25				9	0.025	0.33
DMA10-2	KearnyMesa	POC10	1.984	100	864.23	1.2	0	0.012	0.15	0.05	0.1	25				9	0.025	0.33

Proposed Conditions



Name	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Length (ft)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)
BMP1	KearnyMesa	ST1	0.18	62	126.465	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP2	KearnyMesa	ST2	0.18	60	130.68	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP3	KearnyMesa	ST3	0.22	50	191.664	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP5	KearnyMesa	ST5	0.29	64.39	196.186	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP6	KearnyMesa	ST6	1.33	90	643.72	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP7	KearnyMesa	ST7	0.42	85	215.238	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP8	KearnyMesa	ST8	1.3	110	514.8	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
BMP9	KearnyMesa	ST9	0.65	467.72	60.536	0.5	0	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA1	KearnyMesa	BMP1	11.98	452	1154.533	2	61	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA2	KearnyMesa	BMP2	8.63	344.157	1092.3	2	55	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA3	KearnyMesa	BMP3	13.78	260.403	2305.107	2	75	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA5	KearnyMesa	BMP5	10.88	804.758	538.913	0.5	73	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA6	KearnyMesa	BMP6	32.95	830.807	1727.6	0.5	75	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA7	KearnyMesa	BMP7	17.48	800.038	951.741	0.5	59	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA8	KearnyMesa	BMP8	77.61	1128.785	2934.983	0.5	38	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA9	KearnyMesa	BMP9	48.4	1074.743	1961.682	0.5	73	0.012	0.15	0.05	0.1	25	9	0.019	0.33



Name	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Length (ft)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)
DMA10-1	KearnyMesa	ST11	2.953	100	1286.327	3.2	71	0.012	0.15	0.05	0.1	25	9	0.019	0.33
DMA10-2	KearnyMesa	ST10	1.984	100	864.23	1.2	71	0.012	0.15	0.05	0.1	25	9	0.019	0.33

```
[TITLE]
4182.30-PRE

[OPTIONS]
;;Options            Value
;;------------------ ------------
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           09/08/1964
START_TIME           06:00:00
REPORT_START_DATE    09/08/1964
REPORT_START_TIME    06:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:10:00
DRY_STEP             01:00:00
ROUTING_STEP         60
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
MONTHLY      .060   .080   .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
KearnyMesa       INTENSITY 1:00   1.0    TIMESERIES KearnyMesa

[SUBCATCHMENTS]
;;                                                   Total    Pcnt.              Pcnt.    Curb     Snow
;;Name           Raingage         Outlet             Area     Imperv   Width     Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- --------- -------- -------- --------
DMA1             KearnyMesa       POC1               12.16    0        452       2        0
DMA2             KearnyMesa       POC1               8.81     0        330.827   2        0
DMA3             KearnyMesa       POC1               14       0        260.403   2        0
DMA5             KearnyMesa       POC9               11.17    0        804.758   0.5      0
DMA6             KearnyMesa       POC6               34.28    0        809.712   0.5      0
DMA7             KearnyMesa       POC7               17.9     0        878.302   0.5      0
DMA8             KearnyMesa       POC8               78.91    0        1935.06   0.5      0
DMA9             KearnyMesa       POC9               49.05    0        1074.292  0.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA1             0.012      0.15       0.05       0.1        25         OUTLET
DMA2             0.012      0.15       0.05       0.1        25         OUTLET
DMA3             0.012      0.15       0.05       0.1        25         OUTLET
DMA5             0.012      0.15       0.05       0.1        25         OUTLET
DMA6             0.012      0.15       0.05       0.1        25         OUTLET
DMA7             0.012      0.15       0.05       0.1        25         OUTLET
DMA8             0.012      0.15       0.05       0.1        25         OUTLET
DMA9             0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA1             9          0.025      0.33
DMA2             9          0.025      0.33
```

```
DMA3            9          0.025      0.33
DMA5            9          0.025      0.33
DMA6            9          0.025      0.33
DMA7            9          0.025      0.33
DMA8            9          0.025      0.33
DMA9            9          0.025      0.33

[LID_CONTROLS]
;;              Type/Layer Parameters
;;--------------- ---------- ----------
BIO-BASIN       BC
BIO-BASIN       SURFACE    6          0.0        0          0          5
BIO-BASIN       SOIL       15         0.67       .15        0.1        5          5          1.5
BIO-BASIN       STORAGE    18         0.4        0          0
BIO-BASIN       DRAIN      152        0.5        6          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
Drain to
;;--------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------
---------------- ----------------

[OUTFALLS]
;;              Invert     Outfall      Stage/Table      Tide
;;Name          Elev.      Type         Time Series      Gate Route To
;;--------------- ---------- ------------ ---------------- ---- ----------------
POC1            0          FREE                          NO
POC6            0          FREE                          NO
POC7            0          FREE                          NO
POC8            0          FREE                          NO
POC9            0          FREE                          NO
```

[TITLE]
4182.30-POST

[OPTIONS]
;;Options Value
;;------------------ ------------
FLOW_UNITS CFS
INFILTRATION GREEN_AMPT
FLOW_ROUTING KINWAVE
START_DATE 09/08/1964
START_TIME 06:00:00
REPORT_START_DATE 09/08/1964
REPORT_START_TIME 06:00:00
END_DATE 05/23/2008
END_TIME 22:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 01:00:00
WET_STEP 00:15:00
DRY_STEP 01:00:00
ROUTING_STEP 300
ALLOW_PONDING NO
INERTIAL_DAMPING PARTIAL
VARIABLE_STEP 0.75
LENGTHENING_STEP 0
MIN_SURFAREA 12.557
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS DEPTH
MIN_SLOPE 0
MAX_TRIALS 8
HEAD_TOLERANCE 0.005
SYS_FLOW_TOL 5
LAT_FLOW_TOL 5
MINIMUM_STEP 0.5
THREADS 4

[EVAPORATION]
;;Type Parameters
;;------------ ----------
MONTHLY .060 .080 .11 .15 .17 .19 .19 .18 .15 .11 .08 .06
DRY_ONLY NO

[RAINGAGES]
;; Rain Time Snow Data
;;Name Type Intrvl Catch Source
;;-------------- --------- ------ ------ ----------
KearnyMesa INTENSITY 1:00 1.0 TIMESERIES KearnyMesa

[SUBCATCHMENTS]
;;
;;Name Raingage Outlet Total Area Pcnt. Imperv Width Pcnt. Slope Curb Length Snow Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
BMP1 KearnyMesa ST1 0.18 0 62 0.5 0
BMP2 KearnyMesa ST2 0.18 0 60 0.5 0
BMP3 KearnyMesa ST3 0.22 0 50 0.5 0
BMP5 KearnyMesa ST5 0.29 0 64.39 0.5 0
BMP6 KearnyMesa ST6 1.33 0 90 0.5 0
BMP7 KearnyMesa ST7 0.42 0 85 0.5 0
BMP8 KearnyMesa ST8 1.3 0 110 0.5 0
BMP9 KearnyMesa ST9 0.65 0 467.72 0.5 0
DMA1 KearnyMesa BMP1 11.98 61 452 2 0
DMA2 KearnyMesa BMP2 8.63 55 344.157 2 0
DMA3 KearnyMesa BMP3 13.78 75 260.403 2 0
DMA5 KearnyMesa BMP5 10.88 73 804.758 0.5 0
DMA6 KearnyMesa BMP6 32.95 75 830.807 0.5 0
DMA7 KearnyMesa BMP7 17.48 59 800.038 0.5 0
DMA8 KearnyMesa BMP8 77.61 38 1128.785 0.5 0
DMA9 KearnyMesa BMP9 48.4 73 1074.743 0.5 0

[SUBAREAS]
;;Subcatchment N-Imperv N-Perv S-Imperv S-Perv PctZero RouteTo PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
BMP1 0.012 0.15 0.05 0.1 25 OUTLET
BMP2 0.012 0.15 0.05 0.1 25 OUTLET
BMP3 0.012 0.15 0.05 0.1 25 OUTLET
BMP5 0.012 0.15 0.05 0.1 25 OUTLET
BMP6 0.012 0.15 0.05 0.1 25 OUTLET
BMP7 0.012 0.15 0.05 0.1 25 OUTLET

```
BMP8             0.012      0.15       0.05       0.1        25         OUTLET
BMP9             0.012      0.15       0.05       0.1        25         OUTLET
DMA1             0.012      0.15       0.05       0.1        25         OUTLET
DMA2             0.012      0.15       0.05       0.1        25         OUTLET
DMA3             0.012      0.15       0.05       0.1        25         OUTLET
DMA5             0.012      0.15       0.05       0.1        25         OUTLET
DMA6             0.012      0.15       0.05       0.1        25         OUTLET
DMA7             0.012      0.15       0.05       0.1        25         OUTLET
DMA8             0.012      0.15       0.05       0.1        25         OUTLET
DMA9             0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
BMP1             9          0.019      0.33
BMP2             9          0.019      0.33
BMP3             9          0.019      0.33
BMP5             9          0.019      0.33
BMP6             9          0.019      0.33
BMP7             9          0.019      0.33
BMP8             9          0.019      0.33
BMP9             9          0.019      0.33
DMA1             9          0.019      0.33
DMA2             9          0.019      0.33
DMA3             9          0.019      0.33
DMA5             9          0.019      0.33
DMA6             9          0.019      0.33
DMA7             9          0.019      0.33
DMA8             9          0.019      0.33
DMA9             9          0.019      0.33

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
LID1             BC
LID1             SURFACE    6          0.0        0          0          5
LID1             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID1             STORAGE    21         0.67       0          0
LID1             DRAIN      0.67       0.5        3          6

LID10            BC
LID10            SURFACE    6          0.0        0          0          5
LID10            SOIL       18         0.4        0.2        0.1        5          5          1.5
LID10            STORAGE    18         0.67       0          0
LID10            DRAIN      0.705      0.5        3          6

LID2             BC
LID2             SURFACE    6          0.0        0          0          5
LID2             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID2             STORAGE    21         0.67       0          0
LID2             DRAIN      0.38       0.5        3          6

LID3             BC
LID3             SURFACE    6          0.0        0          0          5
LID3             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID3             STORAGE    21         0.67       0          0
LID3             DRAIN      0.556      0.5        3          6

LID5             BC
LID5             SURFACE    6          0.0        0          0          5
LID5             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID5             STORAGE    21         0.67       0          0
LID5             DRAIN      0.416      0.5        3          6

LID6             BC
LID6             SURFACE    6          0.0        0          0          5
LID6             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID6             STORAGE    21         0.67       0          0
LID6             DRAIN      0.091      0.5        3          6

LID7             BC
LID7             SURFACE    6          0.0        0.         0          5
LID7             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID7             STORAGE    21         0.67       0          0
LID7             DRAIN      0.288      0.5        3          6

LID8             BC
LID8             SURFACE    6          0.0        0          0          5
LID8             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID8             STORAGE    21         0.67       0          0
LID8             DRAIN      0.09       0.5        3          6
```

```
LID9            BC
LID9            SURFACE     6          0.0        0          0          5
LID9            SOIL        18         0.4        0.2        0.1        5          5          1.5
LID9            STORAGE     40         0.67       0          0
LID9            DRAIN       0.18       0.5        3          6
```

```
[LID_USAGE]
;;Subcatchment   LID Process      Number  Area        Width       InitSatur   FromImprv   ToPerv      Report File
Drain to
;;--------------- ---------------- ------- ----------- ----------- ----------- ----------- ----------- ------------
--------------- ----------------
BMP1            LID1             1       7840.79     0           0           0           0           *
POC1
BMP2            LID2             1       7840.79     0           0           0           0           *
POC1
BMP3            LID3             1       9583.2      0           0           0           0           *
POC1
BMP5            LID5             1       12632.4     0           0           0           0           *
POC9
BMP6            LID6             1       57934.8     0           0           0           0           *
POC6
BMP7            LID7             1       18295.2     0           0           0           0           *
POC7
BMP8            LID8             1       56628       0           0           0           0           *
POC8
BMP9            LID9             1       28314       0           0           0           0           *
POC9
```

```
[OUTFALLS]
;;              Invert     Outfall      Stage/Table      Tide
;;Name          Elev.      Type         Time Series      Gate Route To
;;--------------- ---------- ------------ ---------------- ---- ----------------
POC1            289.29     FREE                          NO
POC6            243        FREE                          NO
POC7            238        FREE                          NO
POC8            230        FREE                          NO
POC9            211.89     FREE                          NO
```

```
[STORAGE]
;;              Invert   Max.     Init.    Storage     Curve                    Ponded   Evap.
;;Name          Elev.    Depth    Depth    Curve       Params                   Area     Frac.
Infiltration parameters
;;--------------- -------- -------- -------- ----------- -------- -------- -------- -------- ---------
---------------
ST1             294.5    5.5      0        TABULAR     ST1                      0        0
ST2             294.5    5.5      0        TABULAR     ST2                      0        0
ST3             302.5    3.5      0        TABULAR     ST3                      0        0
ST5             290.5    5.5      0        TABULAR     ST5                      0        0
ST6             276.5    4.5      0        TABULAR     ST6                      0        0
ST7             260.5    3.5      0        TABULAR     ST7                      0        0
ST8             261.5    3.5      0        TABULAR     ST8                      0        0
ST9             246.5    5.5      0        TABULAR     ST9                      0        0
```

```
[ORIFICES]
;;              Inlet            Outlet           Orifice      Crest      Disch.     Flap Open/Close
;;Name          Node             Node             Type         Height     Coeff.     Gate Time
;;--------------- ---------------- ---------------- ------------ ---------- ---------- ---- ----------
OR1             ST3              POC1             SIDE         1.5        0.6        NO   0
OR1-1           ST1              POC1             SIDE         0          0.6        NO   0
OR2-1           ST2              POC1             SIDE         0          0.6        NO   0
OR3-1           ST3              POC1             SIDE         0          0.6        NO   0
OR5-1           ST5              POC9             SIDE         0          0.6        NO   0
OR5-2           ST5              POC9             SIDE         2          0.6        NO   0
OR5-3           ST5              POC9             SIDE         2.5        0.6        NO   0
OR6-1           ST6              POC6             BOTTOM       0          0.6        NO   0
OR6-2           ST6              POC6             SIDE         0          0.6        NO   0
OR6-3           ST6              POC6             SIDE         1.6        0.6        NO   0
OR6-4           ST6              POC6             SIDE         2          0.6        NO   0
OR6-5           ST6              POC6             SIDE         1.6        0.6        NO   0
OR6-6           ST6              POC6             SIDE         2          0.6        NO   0
OR7-1           ST7              POC7             SIDE         0          0.6        NO   0
OR7-2           ST7              POC7             SIDE         1.5        0.6        NO   0
OR7-3           ST7              POC7             SIDE         1.5        0.6        NO   0
OR7-4           ST7              POC7             SIDE         1.5        0.6        NO   0
OR7-5           ST7              POC7             SIDE         2          0.6        NO   0
OR7-6           ST7              POC7             SIDE         2          0.6        NO   0
OR7-7           ST7              POC7             SIDE         0          0.6        NO   0
OR8-1           ST8              POC8             SIDE         0          0.6        NO   0
OR8-2           ST8              POC8             SIDE         1          0.6        NO   0
OR8-3           ST8              POC8             SIDE         1          0.6        NO   0
```

```
OR8-4             ST8             POC8            SIDE        0          0.6        NO   0
OR9-1             ST9             POC9            SIDE        0          0.6        NO   0
OR9-2             ST9             POC9            SIDE        1          0.6        NO   0
OR9-3             ST9             POC9            SIDE        2          0.6        NO   0
OR9-4             ST9             POC9            SIDE        3          0.6        NO   0
OR9-5             ST9             POC9            SIDE        3          0.6        NO   0
OR9-6             ST9             POC9            SIDE        3          0.6        NO   0

[WEIRS]
;;                Inlet           Outlet          Weir        Crest      Disch.     Flap End      End
;;Name           Node            Node            Type        Height     Coeff.     Gate Con.     Coeff.
Surcharge  RoadWidth  RoadSurf
;;--------------- --------------- --------------- ----------- ---------- ---------- ---- -------- ---------
- ---------- ---------- ----------
WR1               ST1             POC1            TRANSVERSE  4.5        3          NO   0        0
YES
WR2               ST2             POC1            TRANSVERSE  2.5        3          NO   0        0
YES
WR3               ST3             POC1            TRANSVERSE  2.5        3          NO   0        0
YES
WR5               ST5             POC9            TRANSVERSE  3          3          NO   0        0
YES
WR6               ST6             POC6            TRANSVERSE  2.6        3          NO   0        0
YES
WR7               ST7             POC7            TRANSVERSE  2.3        3          NO   0        0
YES
WR8               ST8             POC8            TRANSVERSE  2          3          NO   0        0
YES
WR9               ST9             POC9            TRANSVERSE  4.4        3          NO   0        0
YES

[XSECTIONS]
;;Link           Shape        Geom1           Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ --------------- ---------- ---------- ---------- ----------
OR1               CIRCULAR     0.5             0          0          0
OR1-1             CIRCULAR     0.167           0          0          0
OR2-1             CIRCULAR     0.33            0          0          0
OR3-1             CIRCULAR     0.33            0          0          0
OR5-1             CIRCULAR     0.33            0          0          0
OR5-2             CIRCULAR     0.167           0          0          0
OR5-3             CIRCULAR     0.33            0          0          0
OR6-1             CIRCULAR     0.167           0          0          0
OR6-2             CIRCULAR     0.167           0          0          0
OR6-3             CIRCULAR     0.33            0          0          0
OR6-4             CIRCULAR     0.4             0          0          0
OR6-5             CIRCULAR     0.33            0          0          0
OR6-6             CIRCULAR     0.4             0          0          0
OR7-1             CIRCULAR     0.167           0          0          0
OR7-2             CIRCULAR     0.33            0          0          0
OR7-3             CIRCULAR     0.33            0          0          0
OR7-4             CIRCULAR     0.33            0          0          0
OR7-5             CIRCULAR     0.4             0          0          0
OR7-6             CIRCULAR     0.4             0          0          0
OR7-7             CIRCULAR     0.167           0          0          0
OR8-1             CIRCULAR     0.33            0          0          0
OR8-2             CIRCULAR     0.33            0          0          0
OR8-3             CIRCULAR     0.33            0          0          0
OR8-4             CIRCULAR     0.33            0          0          0
OR9-1             CIRCULAR     0.33            0          0          0
OR9-2             CIRCULAR     0.33            0          0          0
OR9-3             CIRCULAR     0.167           0          0          0
OR9-4             CIRCULAR     0.33            0          0          0
OR9-5             CIRCULAR     0.33            0          0          0
OR9-6             CIRCULAR     0.33            0          0          0
WR1               RECT_OPEN    1               6.28       0          0
WR2               RECT_OPEN    1               6.28       0          0
WR3               RECT_OPEN    1               6.28       0          0
WR5               RECT_OPEN    1               6.28       0          0
WR6               RECT_OPEN    1               9.42       0          0
WR7               RECT_OPEN    1               9.42       0          0
WR8               RECT_OPEN    1.2             6.28       0          0
WR9               RECT_OPEN    1.1             12.56      0          0

[CURVES]
;;Name           Type         X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;BASIN1 Storage above 6in ponding depth
ST1               Storage      0          8488
ST1                            5.5        16142

ST10              Storage      0          9000
```

```
ST10                    3.2         9000

ST2             Storage 0           8099
ST2                     5.5         12741

ST3             Storage 0           9725
ST3                     3.5         12000

ST5             Storage 0           13897
ST5                     5.5         28268

ST6             Storage 0           60247
ST6                     4.5         82766

ST7             Storage 0           19010
ST7                     3.5         24581

ST8             Storage 0           60302
ST8                     3.5         85483

ST9             Storage 0           29614
ST9                     1.5         32879
ST9                     5.5         41957

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
KearnyMesa       9/8/1964   6:00       0.01
KearnyMesa       9/24/1964  17:00      0.15
KearnyMesa       9/24/1964  18:00      0.15
KearnyMesa       10/15/1964 10:00      0.04
KearnyMesa       10/15/1964 11:00      0.01
KearnyMesa       10/15/1964 14:00      0.02
KearnyMesa       10/15/1964 18:00      0.01
KearnyMesa       11/9/1964  12:00      0.02
KearnyMesa       11/9/1964  13:00      0.07
KearnyMesa       11/9/1964  14:00      0.2
KearnyMesa       11/9/1964  15:00      0.01
KearnyMesa       11/9/1964  19:00      0.01
KearnyMesa       11/9/1964  23:00      0.03
KearnyMesa       11/10/1964 6:00       0.01
KearnyMesa       11/10/1964 9:00       0.01
KearnyMesa       11/10/1964 16:00      0.02
KearnyMesa       11/10/1964 17:00      0.33
KearnyMesa       11/10/1964 18:00      0.01
KearnyMesa       11/11/1964 22:00      0.01
KearnyMesa       11/12/1964 0:00       0.02
KearnyMesa       11/12/1964 2:00       0.01
KearnyMesa       11/12/1964 3:00       0.02
KearnyMesa       11/12/1964 4:00       0.01
KearnyMesa       11/12/1964 5:00       0.01
KearnyMesa       11/12/1964 6:00       0.03
KearnyMesa       11/12/1964 10:00      0.06
KearnyMesa       11/12/1964 22:00      0.1
KearnyMesa       11/12/1964 23:00      0.02
KearnyMesa       11/13/1964 0:00       0.01
KearnyMesa       11/14/1964 4:00       0.01
KearnyMesa       11/14/1964 9:00       0.01
KearnyMesa       11/14/1964 11:00      0.02
KearnyMesa       11/15/1964 20:00      0.01
KearnyMesa       11/16/1964 0:00       0.01
KearnyMesa       11/16/1964 2:00       0.04
KearnyMesa       11/16/1964 5:00       0.06
KearnyMesa       11/16/1964 8:00       0.01
KearnyMesa       11/16/1964 9:00       0.17
KearnyMesa       11/27/1964 3:00       0.01
KearnyMesa       11/27/1964 4:00       0.01
KearnyMesa       11/27/1964 5:00       0.02
KearnyMesa       11/27/1964 6:00       0.02
KearnyMesa       11/27/1964 8:00       0.01
KearnyMesa       11/27/1964 9:00       0.02
KearnyMesa       11/27/1964 10:00      0.01
KearnyMesa       12/18/1964 3:00       0.02
KearnyMesa       12/18/1964 9:00       0.01
KearnyMesa       12/18/1964 17:00      0.01
KearnyMesa       12/23/1964 6:00       0.01
KearnyMesa       12/23/1964 8:00       0.01
KearnyMesa       12/24/1964 8:00       0.01
KearnyMesa       12/24/1964 9:00       0.01
KearnyMesa       12/25/1964 5:00       0.01
KearnyMesa       12/25/1964 10:00      0.01
```

```
[TITLE]
4182.30POC10-PRE

[OPTIONS]
;;Options            Value
;;------------------ ------------
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           09/08/1964
START_TIME           06:00:00
REPORT_START_DATE    09/08/1964
REPORT_START_TIME    06:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:10:00
DRY_STEP             01:00:00
ROUTING_STEP         60
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
MONTHLY      .060   .080   .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
KearnyMesa       INTENSITY 1:00   1.0    TIMESERIES KearnyMesa

[SUBCATCHMENTS]
;;                                                    Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage          Outlet             Area      Imperv    Width   Slope     Length    Pack
;;-------------- ----------------- ----------------- --------- --------- ------- --------- --------- ---------
DMA10-1          KearnyMesa        POC10              2.953     0         100     3.2       0
DMA10-2          KearnyMesa        POC10              1.984     0         100     1.2       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA10-1          0.012      0.15       0.05       0.1        25         OUTLET
DMA10-2          0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA10-1          9          0.025      0.33
DMA10-2          9          0.025      0.33

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
BIO-BASIN        BC
BIO-BASIN        SURFACE    6          0.0        0          0          5
BIO-BASIN        SOIL       15         0.67       .15        0.1        5          5          1.5
BIO-BASIN        STORAGE    18         0.4        0          0
BIO-BASIN        DRAIN      152        0.5        6          6

[LID_USAGE]
```

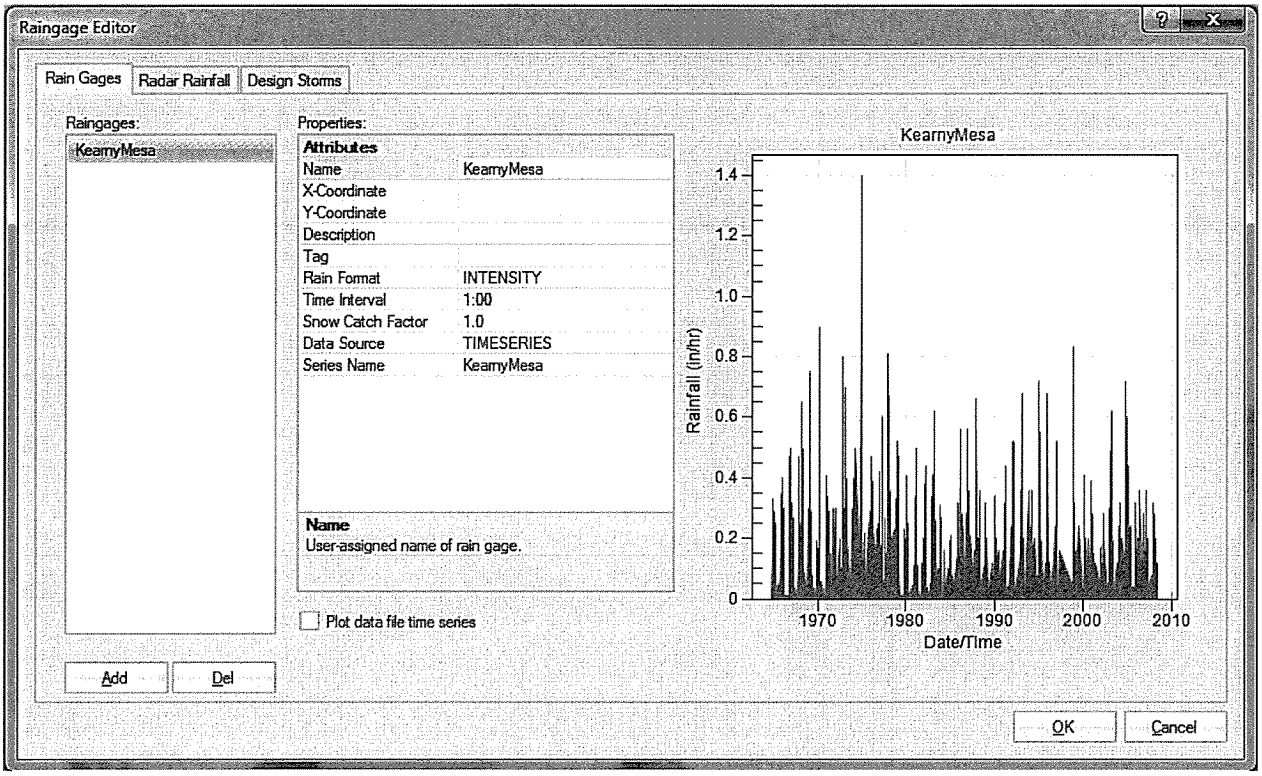
```
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
Drain to
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------
-------------- ----------------

[OUTFALLS]
;;               Invert     Outfall      Stage/Table      Tide
;;Name           Elev.      Type         Time Series      Gate Route To
;;-------------- ---------- ------------ ---------------- ---- ----------------
POC10            0          FREE                          NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
KearnyMesa       9/8/1964   6:00       0.01
KearnyMesa       9/24/1964  17:00      0.15
KearnyMesa       9/24/1964  18:00      0.15
KearnyMesa       10/15/1964 10:00      0.04
KearnyMesa       10/15/1964 11:00      0.01
KearnyMesa       10/15/1964 14:00      0.02
KearnyMesa       10/15/1964 18:00      0.01
KearnyMesa       11/9/1964  12:00      0.02
KearnyMesa       11/9/1964  13:00      0.07
KearnyMesa       11/9/1964  14:00      0.2
KearnyMesa       11/9/1964  15:00      0.01
KearnyMesa       11/9/1964  19:00      0.01
KearnyMesa       11/9/1964  23:00      0.03
KearnyMesa       11/10/1964 6:00       0.01
KearnyMesa       11/10/1964 9:00       0.01
KearnyMesa       11/10/1964 16:00      0.02
KearnyMesa       11/10/1964 17:00      0.33
KearnyMesa       11/10/1964 18:00      0.01
KearnyMesa       11/11/1964 22:00      0.01
KearnyMesa       11/12/1964 0:00       0.02
KearnyMesa       11/12/1964 2:00       0.01
KearnyMesa       11/12/1964 3:00       0.02
KearnyMesa       11/12/1964 4:00       0.01
KearnyMesa       11/12/1964 5:00       0.01
KearnyMesa       11/12/1964 6:00       0.03
KearnyMesa       11/12/1964 10:00      0.06
KearnyMesa       11/12/1964 22:00      0.1
KearnyMesa       11/12/1964 23:00      0.02
KearnyMesa       11/13/1964 0:00       0.01
KearnyMesa       11/14/1964 4:00       0.01
KearnyMesa       11/14/1964 9:00       0.01
KearnyMesa       11/14/1964 11:00      0.02
KearnyMesa       11/15/1964 20:00      0.01
KearnyMesa       11/16/1964 0:00       0.01
KearnyMesa       11/16/1964 2:00       0.04
KearnyMesa       11/16/1964 5:00       0.06
KearnyMesa       11/16/1964 8:00       0.01
KearnyMesa       11/16/1964 9:00       0.17
KearnyMesa       11/27/1964 3:00       0.01
KearnyMesa       11/27/1964 4:00       0.01
KearnyMesa       11/27/1964 5:00       0.02
KearnyMesa       11/27/1964 6:00       0.02
KearnyMesa       11/27/1964 8:00       0.01
KearnyMesa       11/27/1964 9:00       0.02
KearnyMesa       11/27/1964 10:00      0.01
KearnyMesa       12/18/1964 3:00       0.02
KearnyMesa       12/18/1964 9:00       0.01
KearnyMesa       12/18/1964 17:00      0.01
KearnyMesa       12/23/1964 6:00       0.01
KearnyMesa       12/23/1964 8:00       0.01
KearnyMesa       12/24/1964 8:00       0.01
KearnyMesa       12/24/1964 9:00       0.01
KearnyMesa       12/25/1964 5:00       0.01
KearnyMesa       12/25/1964 10:00      0.01
KearnyMesa       12/27/1964 6:00       0.02
KearnyMesa       12/27/1964 7:00       0.04
KearnyMesa       12/27/1964 8:00       0.03
KearnyMesa       12/27/1964 9:00       0.03
KearnyMesa       12/27/1964 10:00      0.02
KearnyMesa       12/27/1964 11:00      0.12
KearnyMesa       12/27/1964 12:00      0.06
KearnyMesa       12/27/1964 13:00      0.15
KearnyMesa       12/27/1964 14:00      0.06
KearnyMesa       12/27/1964 15:00      0.29
KearnyMesa       12/27/1964 18:00      0.1
KearnyMesa       12/27/1964 20:00      0.1
KearnyMesa       12/27/1964 21:00      0.02
```

```
[TITLE]
4182.30POC10-POST

[OPTIONS]
;;Options            Value
;;------------------ ------------
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           09/08/1964
START_TIME           06:00:00
REPORT_START_DATE    09/08/1964
REPORT_START_TIME    06:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             01:00:00
ROUTING_STEP         300
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
MONTHLY       .060   .080   .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY      NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
KearnyMesa       INTENSITY 1:00   1.0    TIMESERIES KearnyMesa

[SUBCATCHMENTS]
;;                                                   Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage         Outlet             Area      Imperv   Width    Slope     Length    Pack
;;-------------- ---------------- ---------------- --------- -------- -------- --------- --------- ---------
DMA10-1          KearnyMesa       ST11               2.953     71       100      3.2       0
DMA10-2          KearnyMesa       ST10               1.984     71       100      1.2       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA10-1          0.012      0.15       0.05       0.1        25         OUTLET
DMA10-2          0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA10-1          9          0.019      0.33
DMA10-2          9          0.019      0.33

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
LID1             BC
LID1             SURFACE    6          0.0        0          0          5
LID1             SOIL       18         0.4        0.2        0.1        5          5          1.5
LID1             STORAGE    21         0.67       0          0
LID1             DRAIN      0.67       0.5        3          6

LID10            BC
LID10            SURFACE    6          0.0        0          0          5
```

```
LID10           SOIL        21          0.4         0.2         0.1         5           5           1.5
LID10           STORAGE     18          0.67        0           0
LID10           DRAIN       0.4852      0.5         3           6

LID10-Media     BC
LID10-Media     SURFACE     3           0.0         0           0           5
LID10-Media     SOIL        18          0.4         0.2         0.1         5           5           1.5
LID10-Media     STORAGE     21          0.67        0           0
LID10-Media     DRAIN       0.0862      0.5         3           6

LID11           BC
LID11           SURFACE     6           0.0         0           0           5
LID11           SOIL        18          0.4         0.2         0.1         5           5           1.5
LID11           STORAGE     21          0.67        0           0
LID11           DRAIN       0.1638      0.5         3           6

LID2            BC
LID2            SURFACE     6           0.0         0           0           5
LID2            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID2            STORAGE     21          0.67        0           0
LID2            DRAIN       0.38        0.5         3           6

LID3            BC
LID3            SURFACE     6           0.0         0           0           5
LID3            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID3            STORAGE     21          0.67        0           0
LID3            DRAIN       0.556       0.5         3           6

LID5            BC
LID5            SURFACE     6           0.0         0           0           5
LID5            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID5            STORAGE     21          0.67        0           0
LID5            DRAIN       0.416       0.5         3           6

LID6            BC
LID6            SURFACE     6           0.0         0           0           5
LID6            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID6            STORAGE     21          0.67        0           0
LID6            DRAIN       0.091       0.5         3           6

LID7            BC
LID7            SURFACE     6           0.0         0.          0           5
LID7            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID7            STORAGE     21          0.67        0           0
LID7            DRAIN       0.288       0.5         3           6

LID8            BC
LID8            SURFACE     6           0.0         0           0           5
LID8            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID8            STORAGE     21          0.67        0           0
LID8            DRAIN       0.09        0.5         3           6

LID9            BC
LID9            SURFACE     6           0.0         0           0           5
LID9            SOIL        18          0.4         0.2         0.1         5           5           1.5
LID9            STORAGE     40          0.67        0           0
LID9            DRAIN       0.18        0.5         3           6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area        Width       InitSatur   FromImprv   ToPerv      Report File
Drain to
;;--------------- ---------------- ------- ----------- ----------- ----------- ----------- ----------- ------------
--------------- ----------------

[OUTFALLS]
;;              Invert     Outfall      Stage/Table      Tide
;;Name          Elev.      Type         Time Series      Gate Route To
;;--------------- ---------- ------------ ---------------- ---- ----------------
POC10           0          FREE                          NO

[STORAGE]
;;              Invert   Max.     Init.    Storage    Curve                    Ponded   Evap.
;;Name          Elev.    Depth    Depth    Curve      Params                   Area     Frac.
Infiltration parameters
;;--------------- -------- -------- -------- ---------- -------- -------- -------- -------- ---------
---------------
ST10            0        3        0        TABULAR    Curve4                   0        0
ST11            0        6        0        TABULAR    ST11                     0        0

[ORIFICES]
;;              Inlet            Outlet           Orifice     Crest       Disch.      Flap Open/Close
```

```
;;Name           Node           Node           Type         Height     Coeff.     Gate Time
;;-------------- -------------- -------------- ------------ ---------- ---------- ---- ----------
OR1              ST11           POC10          SIDE         0          0.6        NO   0
OR2              ST10           ST11           SIDE         0          0.6        NO   0
OR3              ST10           ST11           SIDE         1.6        0.6        NO   0
OR4              ST10           ST11           SIDE         1          0.6        NO   0
OR8              ST11           POC10          SIDE         2          0.6        NO   0
OR9              ST11           POC10          SIDE         3          0.6        NO   0

[WEIRS]
;;               Inlet          Outlet         Weir         Crest      Disch.     Flap End      End
;;Name          Node           Node           Type         Height     Coeff.     Gate Con.     Coeff.
Surcharge  RoadWidth  RoadSurf
;;-------------- -------------- -------------- ------------ ---------- ---------- ---- -------- ---------
- ---------- ---------- ----------
W1               ST10           ST11           TRANSVERSE   2.5        3          NO   0        0
YES
W2               ST11           POC10          TRANSVERSE   5.2        3          NO   0        0
YES

[XSECTIONS]
;;Link           Shape        Geom1          Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ -------------- ---------- ---------- ---------- ----------
OR1              CIRCULAR     0.25           0          0          0
OR2              CIRCULAR     0.167          0          0          0
OR3              CIRCULAR     0.167          0          0          0
OR4              CIRCULAR     0.167          0          0          0
OR8              CIRCULAR     0.167          0          0          0
OR9              CIRCULAR     0.167          0          0          0
W1               RECT_OPEN    6.28           1          0          0
W2               RECT_OPEN    6.28           1          0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Curve1           Storage    0          10000
Curve1                      2          10000
Curve1                      2.01       3400
Curve1                      3.49       3400
Curve1                      3.5        13600
Curve1                      4          15200

Curve2           Storage    0          7040
Curve2                      2          7040
Curve2                      2.01       3520
Curve2                      3.49       3520
Curve2                      3.5        8000
Curve2                      4          17611

Curve2-Adj       Storage    0          11000
Curve2-Adj                  2          11000
Curve2-Adj                  2.01       2560
Curve2-Adj                  3.49       2560
Curve2-Adj                  3.5        8000
Curve2-Adj                  4          12800

Curve3           Storage    0          3200
Curve3                      4          3200
Curve3                      4.01       1280
Curve3                      5.49       1280
Curve3                      5.5        4000
Curve3                      6          6400

Curve4           Storage    0          3200
Curve4                      1          3200
Curve4                      1.01       1600
Curve4                      2.49       1600
Curve4                      2.5        5600
Curve4                      3          8000

;BASIN1 Storage above 6in ponding depth
ST1              Storage    0          8488
ST1                         5.5        16142

ST10             Storage    0          5000
ST10                        4          6700

ST10New          Storage    0          5120
ST10New                     2          5120
ST10New                     2.01       2560
ST10New                     3.49       2560
```

```
ST10New                 3.5         12800
ST10New                 4           12800

ST11            Storage 0           1800
ST11                    6           1800

ST12            Storage 0           2650
ST12                    4           5000

ST2             Storage 0           8099
ST2                     5.5         12741

ST3             Storage 0           9725
ST3                     3.5         12000

ST5             Storage 0           13897
ST5                     5.5         28268

ST6             Storage 0           60247
ST6                     4.5         82766

ST7             Storage 0           19010
ST7                     3.5         24581

ST8             Storage 0           60302
ST8                     3.5         85483

ST9             Storage 0           29614
ST9                     1.5         32879
ST9                     5.5         41957

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
KearnyMesa       9/8/1964   6:00       0.01
KearnyMesa       9/24/1964  17:00      0.15
KearnyMesa       9/24/1964  18:00      0.15
KearnyMesa       10/15/1964 10:00      0.04
KearnyMesa       10/15/1964 11:00      0.01
KearnyMesa       10/15/1964 14:00      0.02
KearnyMesa       10/15/1964 18:00      0.01
KearnyMesa       11/9/1964  12:00      0.02
KearnyMesa       11/9/1964  13:00      0.07
KearnyMesa       11/9/1964  14:00      0.2
KearnyMesa       11/9/1964  15:00      0.01
KearnyMesa       11/9/1964  19:00      0.01
KearnyMesa       11/9/1964  23:00      0.03
KearnyMesa       11/10/1964 6:00       0.01
KearnyMesa       11/10/1964 9:00       0.01
KearnyMesa       11/10/1964 16:00      0.02
KearnyMesa       11/10/1964 17:00      0.33
KearnyMesa       11/10/1964 18:00      0.01
KearnyMesa       11/11/1964 22:00      0.01
KearnyMesa       11/12/1964 0:00       0.02
KearnyMesa       11/12/1964 2:00       0.01
KearnyMesa       11/12/1964 3:00       0.02
KearnyMesa       11/12/1964 4:00       0.01
KearnyMesa       11/12/1964 5:00       0.01
KearnyMesa       11/12/1964 6:00       0.03
KearnyMesa       11/12/1964 10:00      0.06
KearnyMesa       11/12/1964 22:00      0.1
KearnyMesa       11/12/1964 23:00      0.02
KearnyMesa       11/13/1964 0:00       0.01
KearnyMesa       11/14/1964 4:00       0.01
KearnyMesa       11/14/1964 9:00       0.01
KearnyMesa       11/14/1964 11:00      0.02
KearnyMesa       11/15/1964 20:00      0.01
KearnyMesa       11/16/1964 0:00       0.01
KearnyMesa       11/16/1964 2:00       0.04
KearnyMesa       11/16/1964 5:00       0.06
KearnyMesa       11/16/1964 8:00       0.01
KearnyMesa       11/16/1964 9:00       0.17
KearnyMesa       11/27/1964 3:00       0.01
KearnyMesa       11/27/1964 4:00       0.01
KearnyMesa       11/27/1964 5:00       0.02
KearnyMesa       11/27/1964 6:00       0.02
KearnyMesa       11/27/1964 8:00       0.01
KearnyMesa       11/27/1964 9:00       0.02
KearnyMesa       11/27/1964 10:00      0.01
KearnyMesa       12/18/1964 3:00       0.02
KearnyMesa       12/18/1964 9:00       0.01
```


Raingage Editor
Rain Gages
Radar Rainfall
Design Storms
Raingages:
KearnyMesa
Properties:
Attributes
Name KearnyMesa
X-Coordinate
Y-Coordinate
Description
Tag
Rain Format INTENSITY
Time Interval 1:00
Snow Catch Factor 1.0
Data Source TIMESERIES
Series Name KearnyMesa
Name
User-assigned name of rain gage.
Plot data file time series
Add
Del
KearnyMesa
Rainfall (in/hr)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
1970
1980
1990
2000
2010
Date/Time
OK
Cancel

SWMM Model Flow Coefficient Calculation

BMP1

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	8488	ft^2
Bioretention Surface Area	A_S, A_G	7792	ft^2
	A_S, A_G	0.1789	ac
Flow Rate (per unit area)	q	4.410	in/hr
Effective Ponding Depth	PD_{eff}	**6.27**	in
Flow Coefficient	C	**0.6725**	--

SWMM Model Flow Coefficient Calculation

BMP2

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	3	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.450	cfs
Ponding Depth Surface Area	A_{PD}	8099	ft^2
Bioretention Surface Area	A_S, A_G	7677	ft^2
	A_S, A_G	0.1762	ac
Flow Rate (per unit area)	q	2.532	in/hr
Effective Ponding Depth	PD_{eff}	**6.16**	in
Flow Coefficient	C	**0.3839**	--

SWMM Model Flow Coefficient Calculation

BMP3

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	9642	ft^2
Bioretention Surface Area	A_S, A_G	9428	ft^2
	A_S, A_G	0.2164	ac
Flow Rate (per unit area)	q	3.645	in/hr
Effective Ponding Depth	PD_{eff}	**6.07**	in
Flow Coefficient	C	**0.5558**	--

SWMM Model Flow Coefficient Calculation

BMP5

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	13897	ft^2
Bioretention Surface Area	A_S, A_G	12590	ft^2
	A_S, A_G	0.2890	ac
Flow Rate (per unit area)	q	2.729	in/hr
Effective Ponding Depth	PD_{eff}	**6.31**	in
Flow Coefficient	C	**0.4162**	--

SWMM Model Flow Coefficient Calculation

BMP6

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	60265	ft^2
Bioretention Surface Area	A_S, A_G	57745	ft^2
	A_S, A_G	1.3256	ac
Flow Rate (per unit area)	q	0.595	in/hr
Effective Ponding Depth	PD_{eff}	**6.13**	in
Flow Coefficient	C	**0.0907**	--

SWMM Model Flow Coefficient Calculation

BMP7

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	19010	ft^2
Bioretention Surface Area	A_S, A_G	18214	ft^2
	A_S, A_G	0.4181	ac
Flow Rate (per unit area)	q	1.887	in/hr
Effective Ponding Depth	PD_{eff}	**6.13**	in
Flow Coefficient	C	**0.2877**	--

SWMM Model Flow Coefficient Calculation

BMP8

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	21	in
TOTAL		3.8	ft
		45	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.795	cfs
Ponding Depth Surface Area	A_{PD}	60302	ft^2
Bioretention Surface Area	A_S, A_G	56705	ft^2
	A_S, A_G	1.3018	ac
Flow Rate (per unit area)	q	0.606	in/hr
Effective Ponding Depth	PD_{eff}	**6.19**	in
Flow Coefficient	C	**0.0924**	--

SWMM Model Flow Coefficient Calculation

BMP9

PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	40	in
TOTAL		5.3	ft
		64	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	4	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.955	cfs
Ponding Depth Surface Area	A_{PD}	29613	ft^2
Bioretention Surface Area	A_S, A_G	28525	ft^2
	A_S, A_G	0.6548	ac
Flow Rate (per unit area)	q	1.446	in/hr
Effective Ponding Depth	PD_{eff}	**6.11**	in
Flow Coefficient	C	**0.1837**	--

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PROJECT 3 RIDGES
SUBJECT BMP BASIN 1
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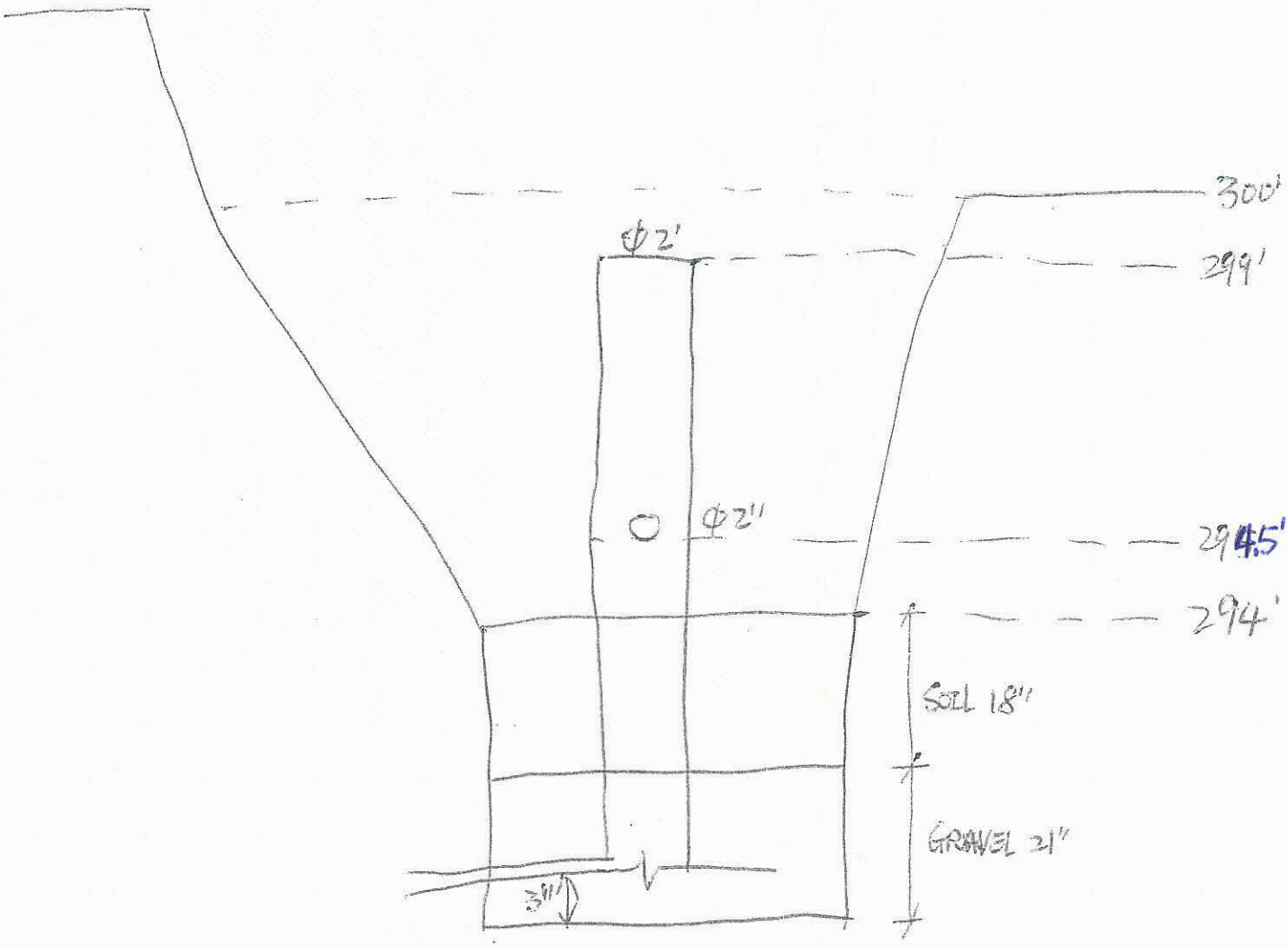
DRAWN BY : S. LI DATE :
CHECKED BY : DATE :



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PROJECT _____

SUBJECT BASIN 2

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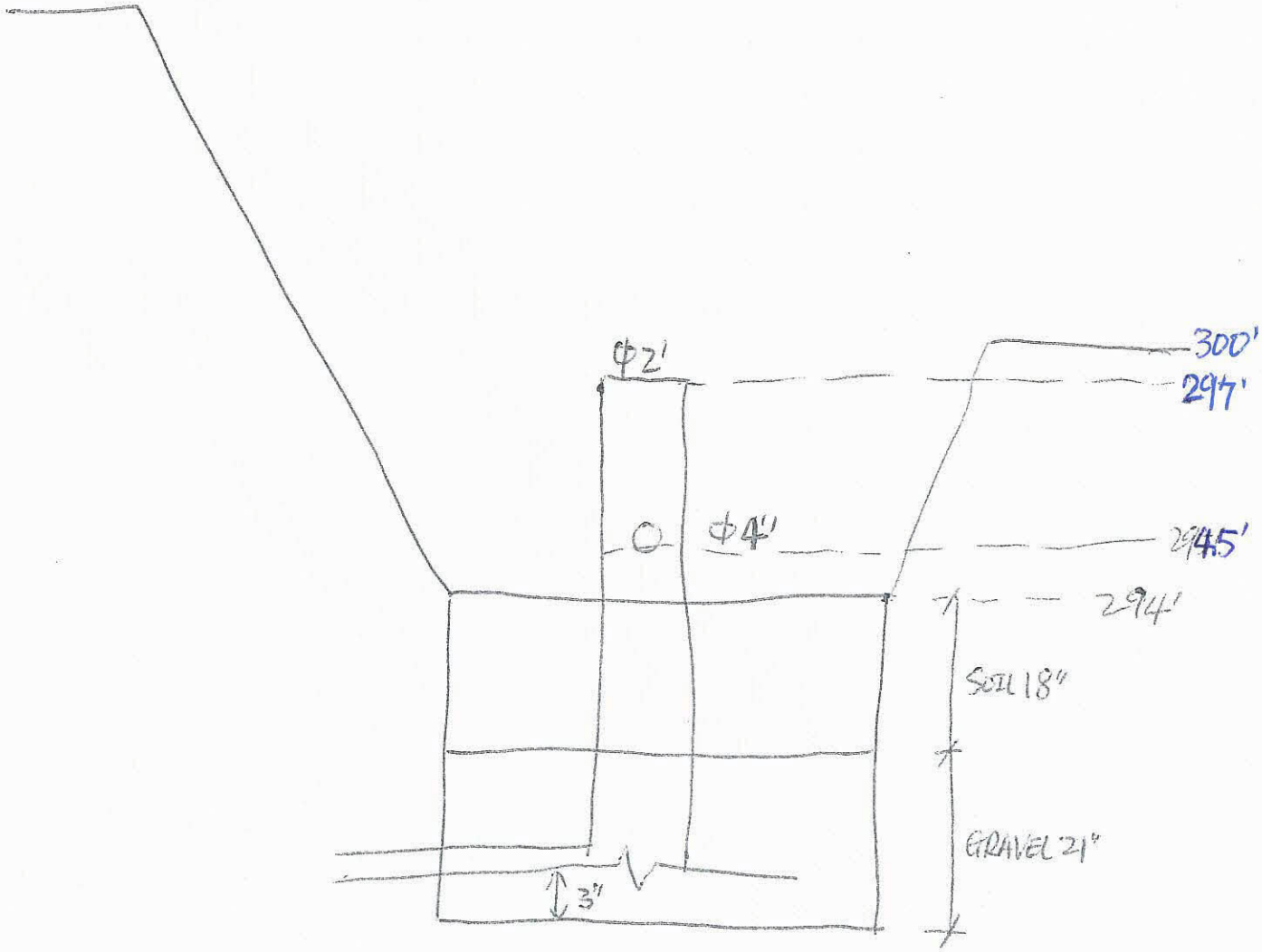

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SUBJECT BMP BASIN 3

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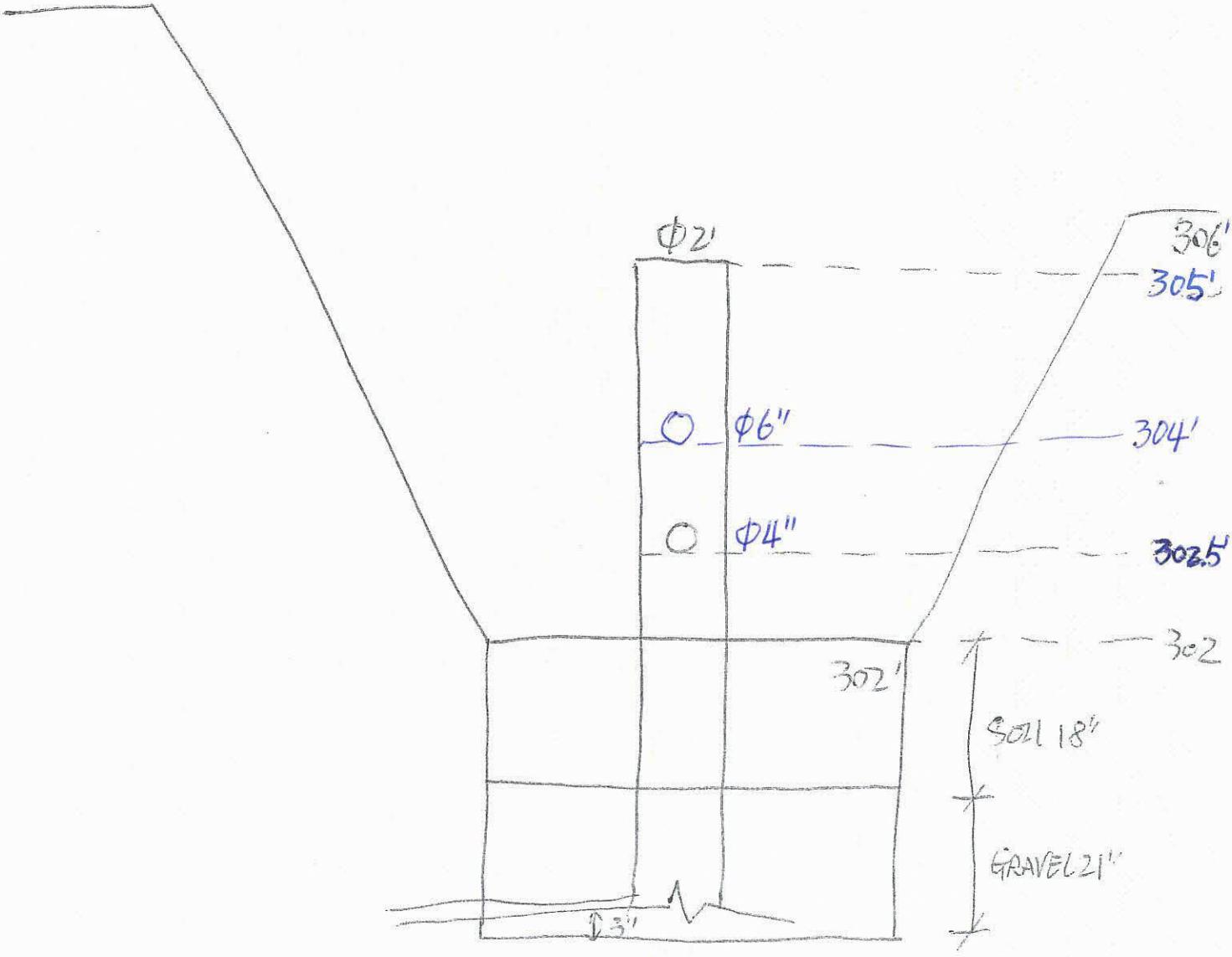

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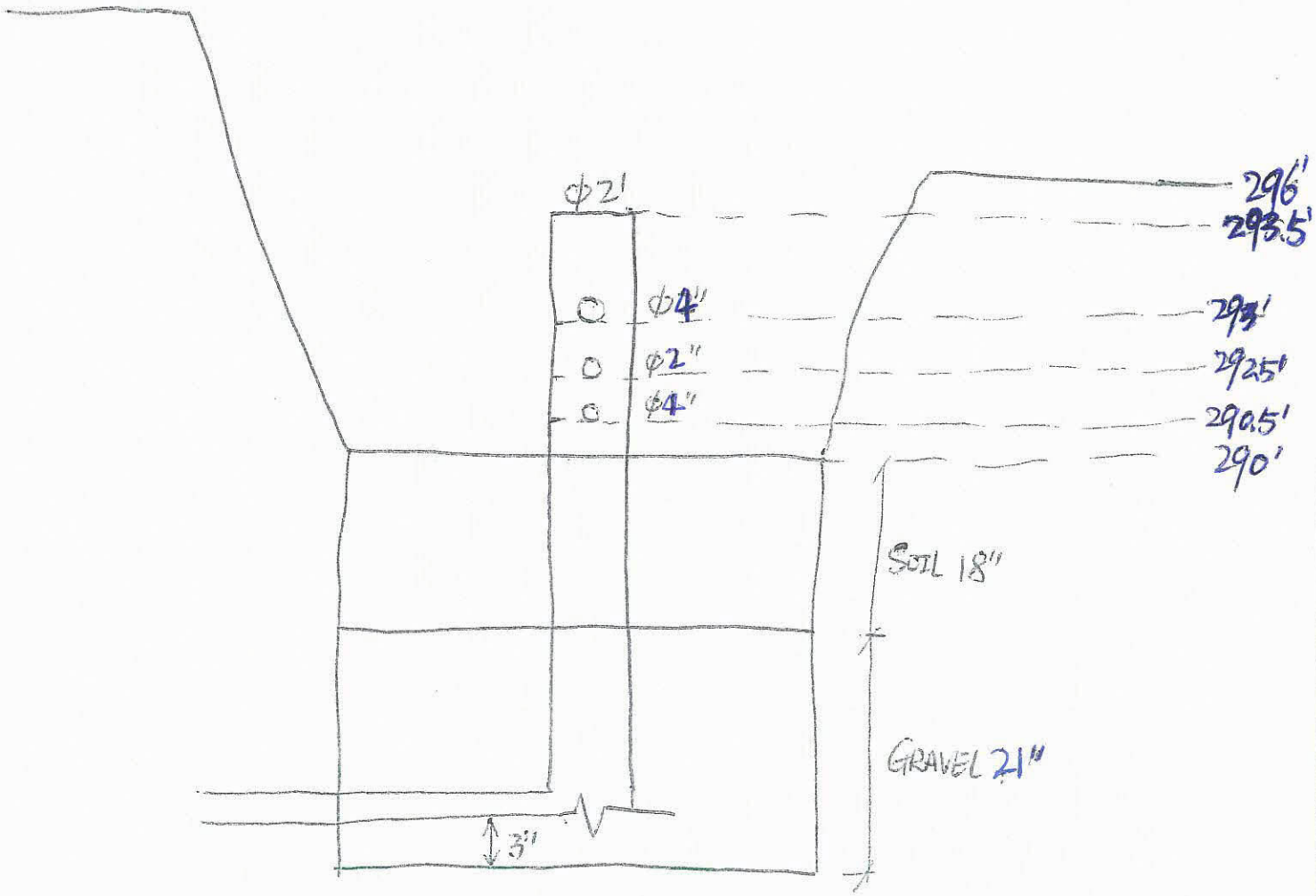

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SUBJECT BMP BASIN 6

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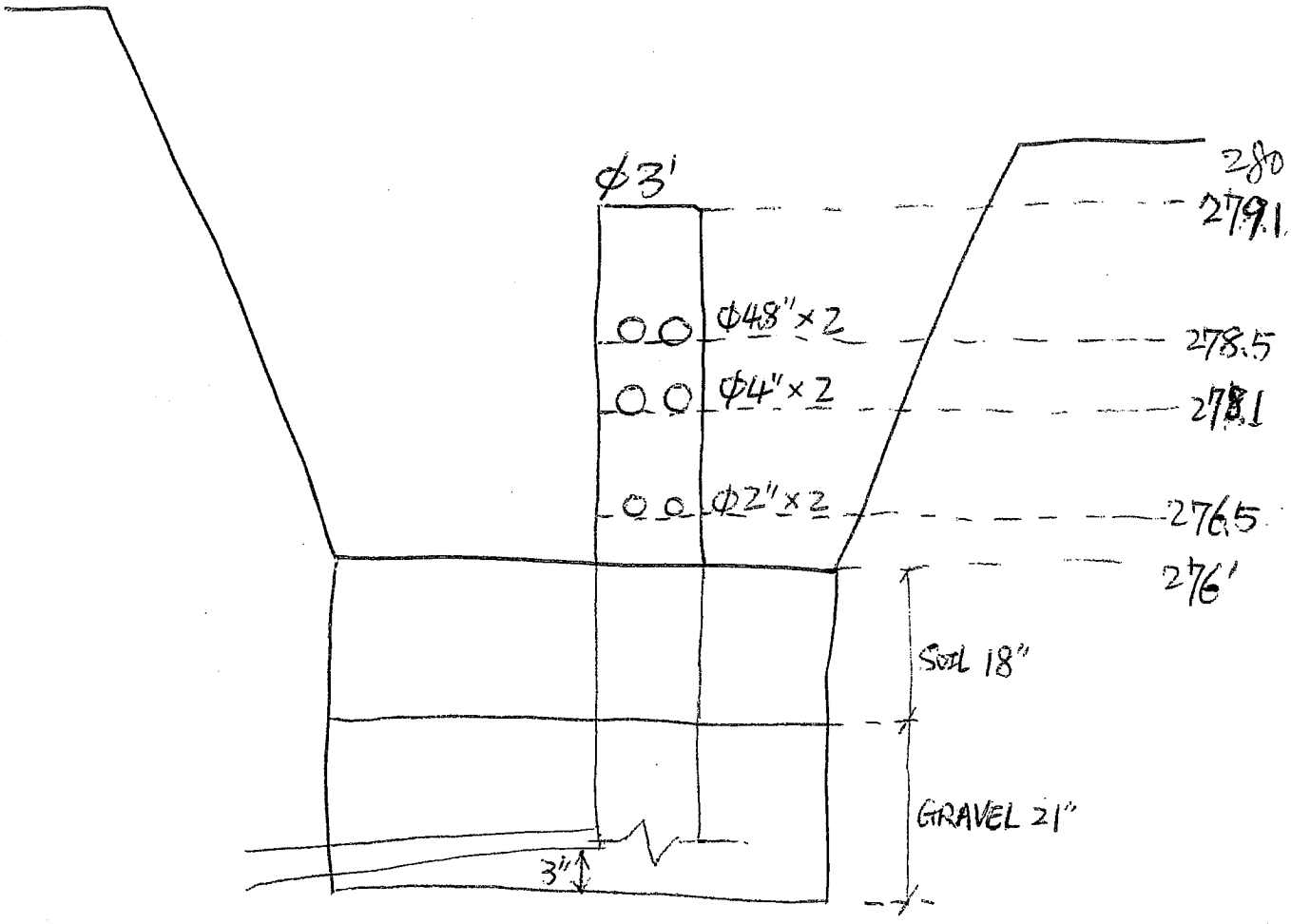

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PROJECT _____

SUBJECT BMP BASIN 7

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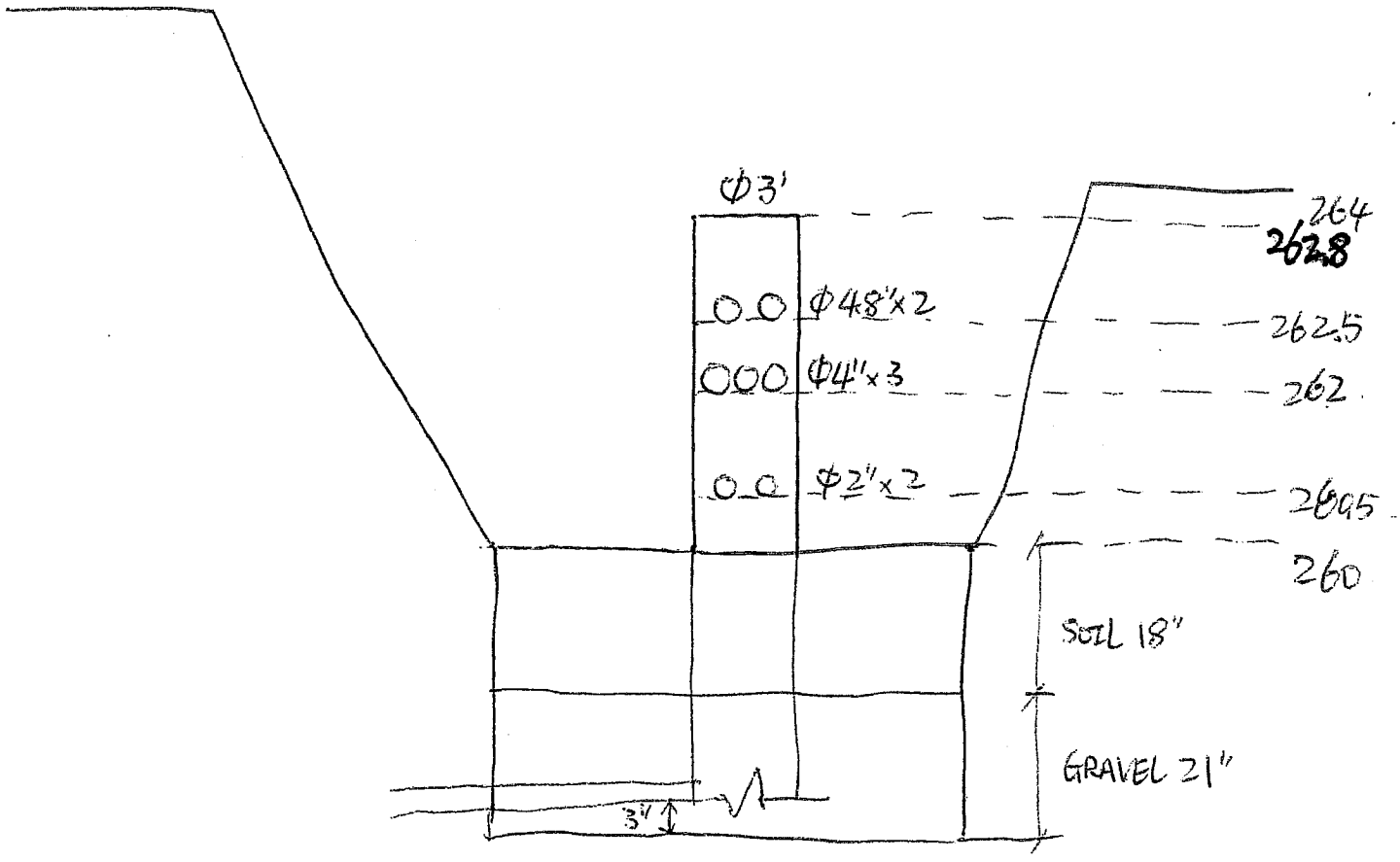

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PROJECT _____

SUBJECT BMP BASIN 8

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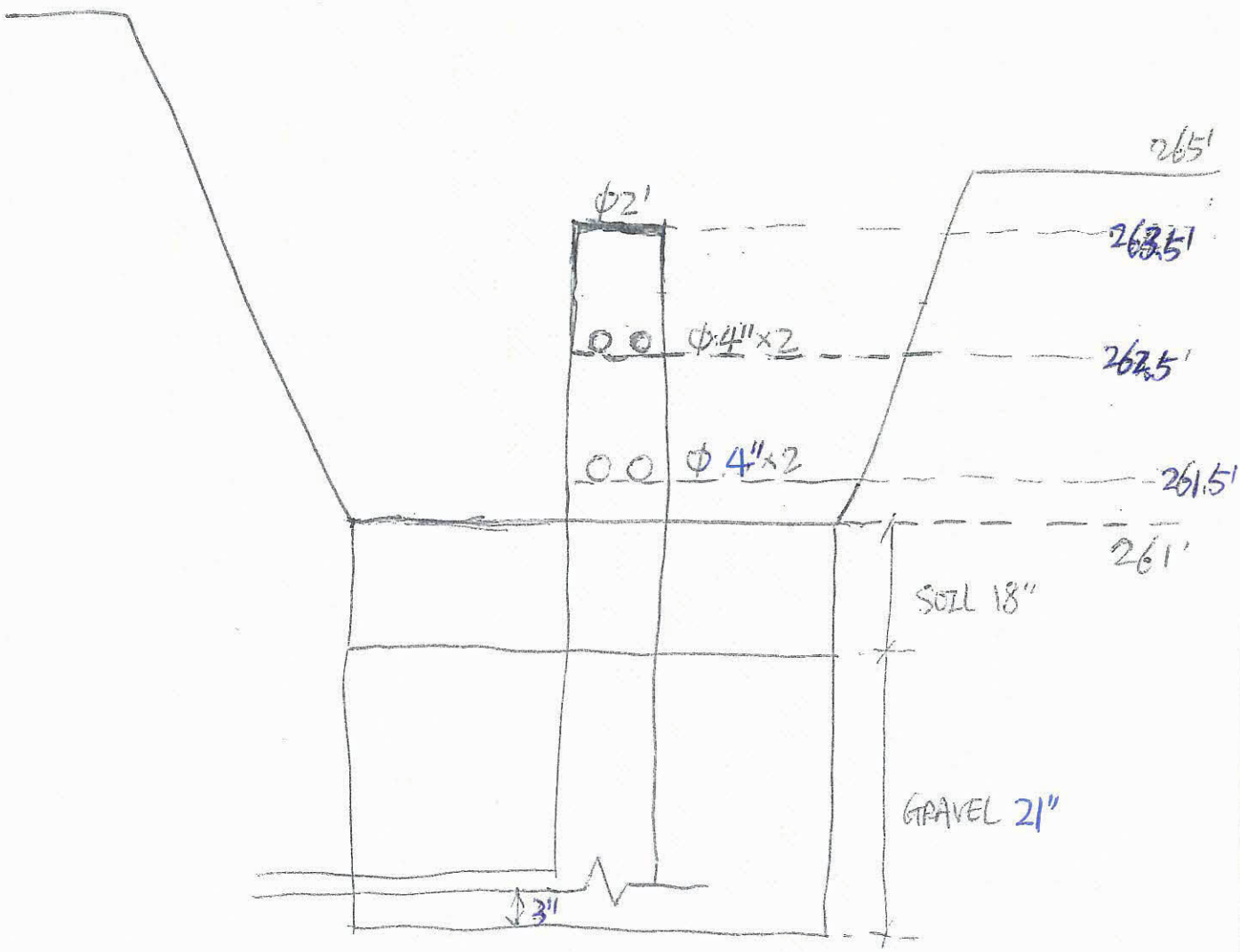

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PROJECT _____
SUBJECT BMP BASIN 9
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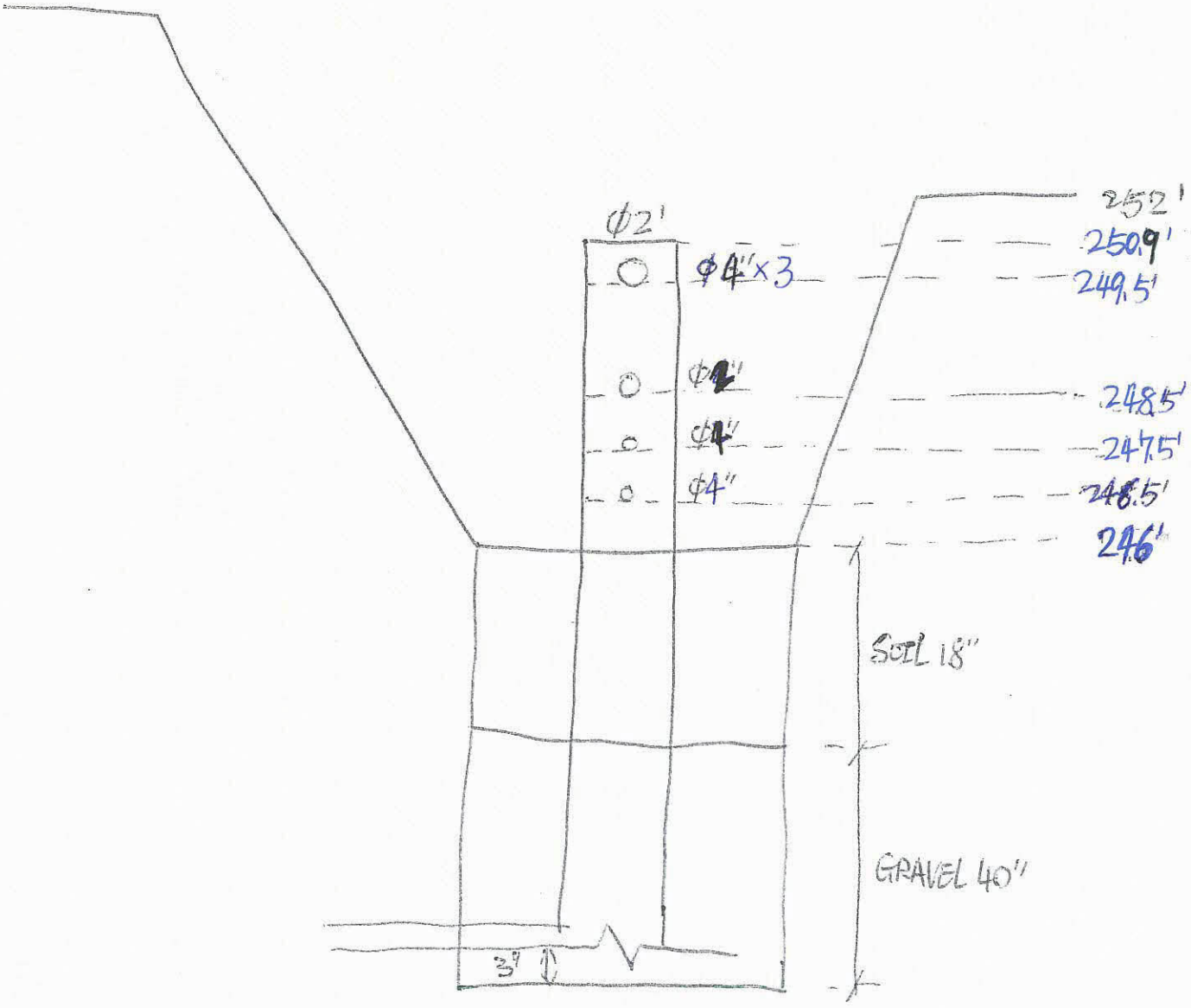
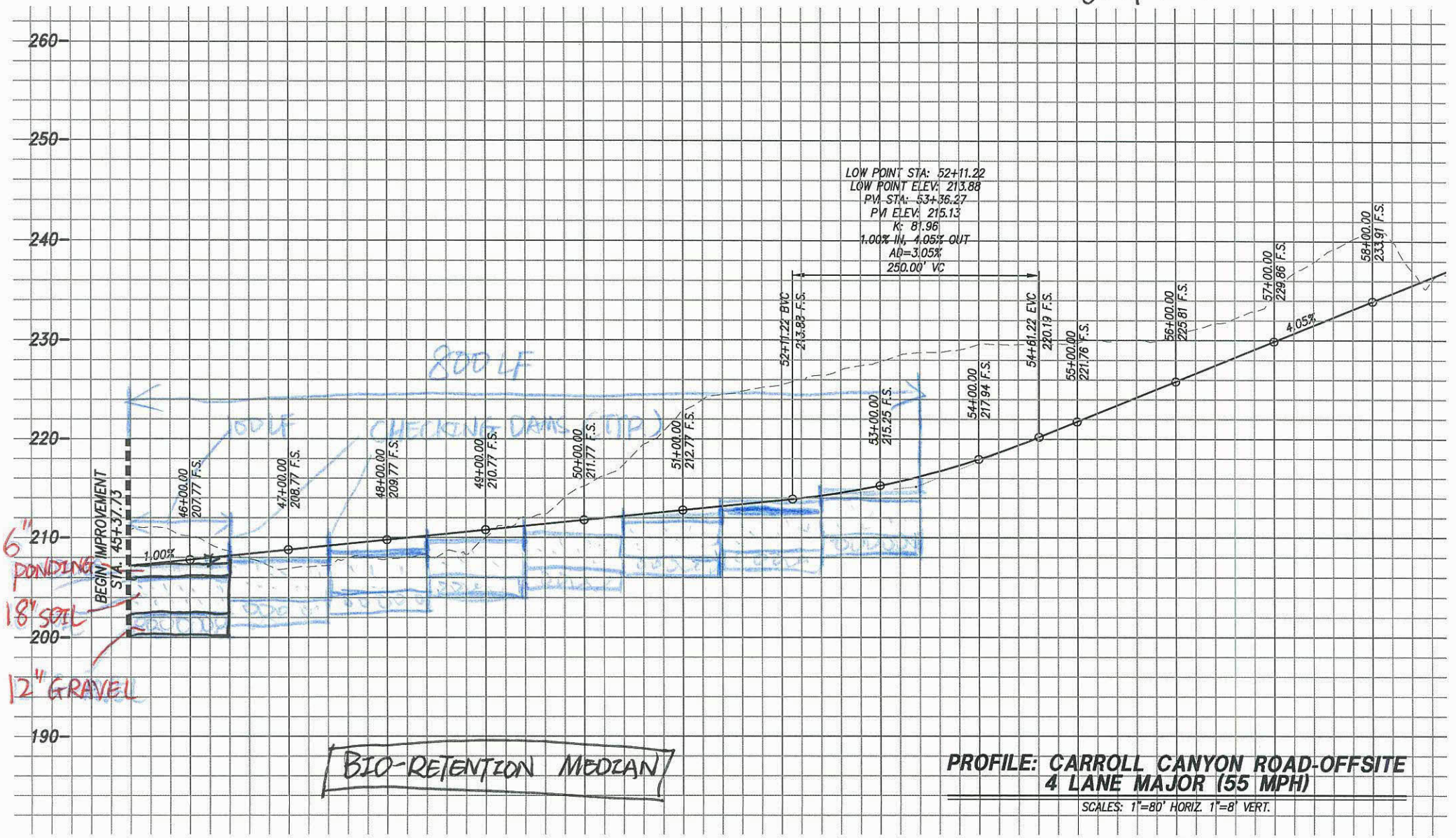
CHECKED BY : _____ DATE : _____



3 ROOTS

BMP #11



PROFILE: CARROLL CANYON ROAD-OFFSITE
4 LANE MAJOR (55 MPH)

SCALES: 1"=80' HORIZ. 1"=8' VERT.

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PROJECT 3 ROOTS
SUBJECT BMP #11 BIOFILTRATION MEDIAN
PAGE : _____ OF _____ JOB NO. :
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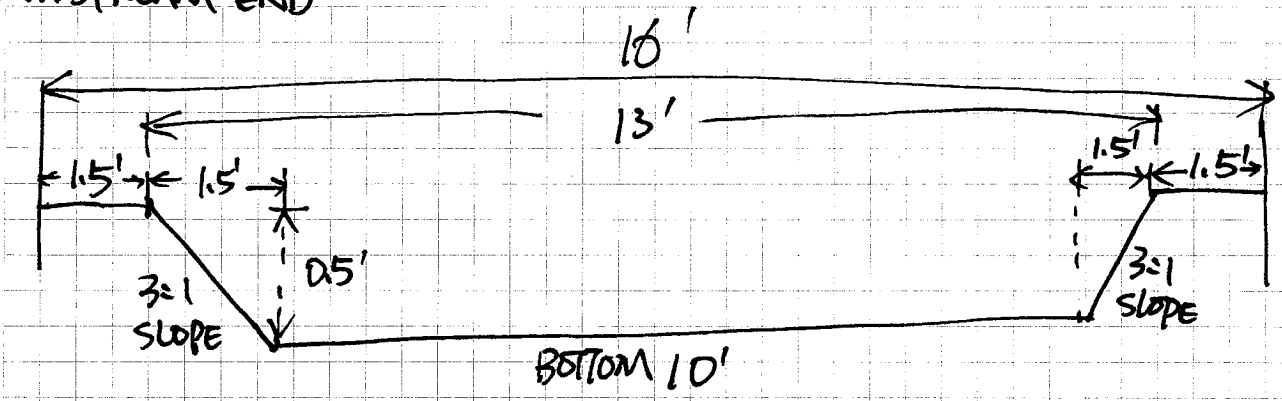
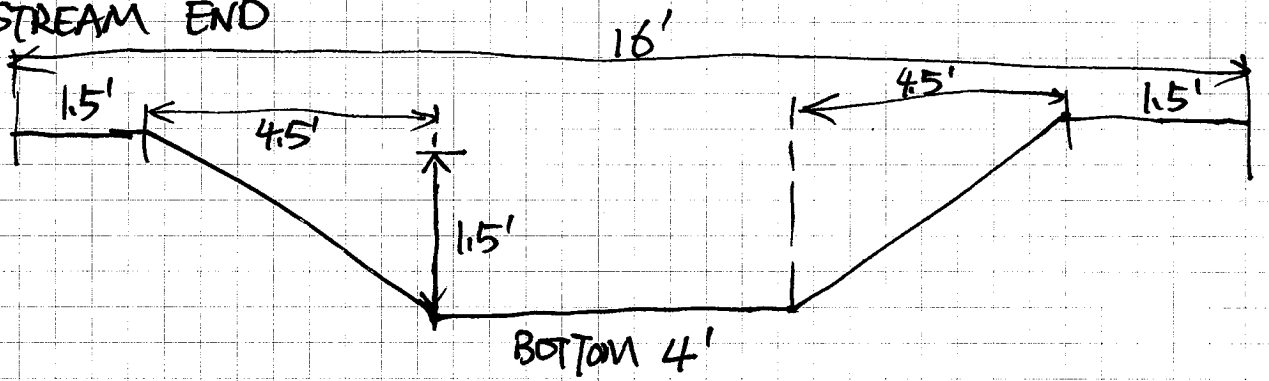
CHECKED BY : _____ DATE : _____

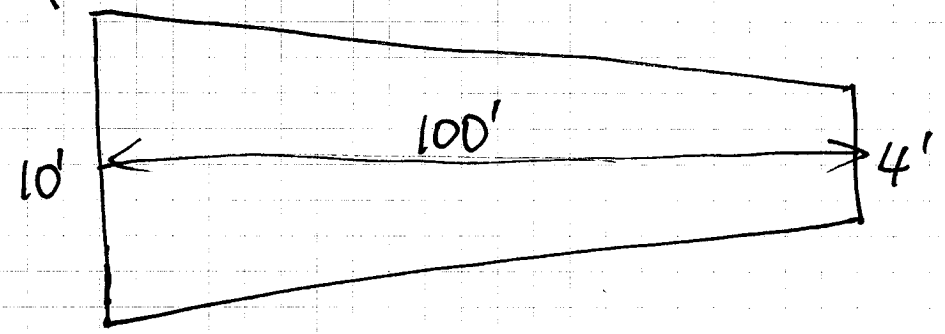
DOWNSTREAM END



UPSTREAM END

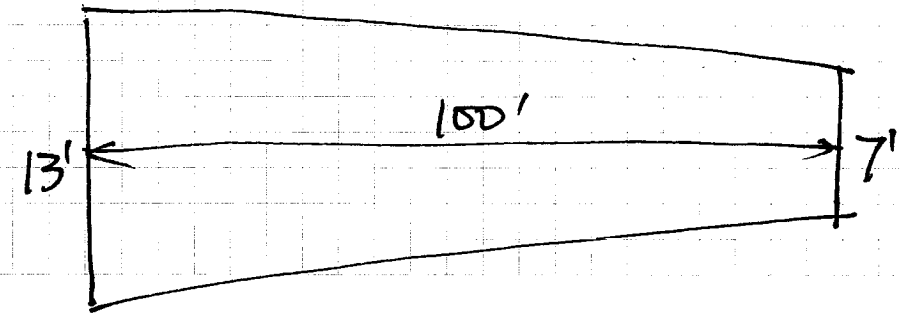


BOTTOM



$A = \frac{1}{2}(10+4) \times 100 = 700$ sqft

TOP



$A = \frac{1}{2}(13+7) \times 100 = 1000$ sqft

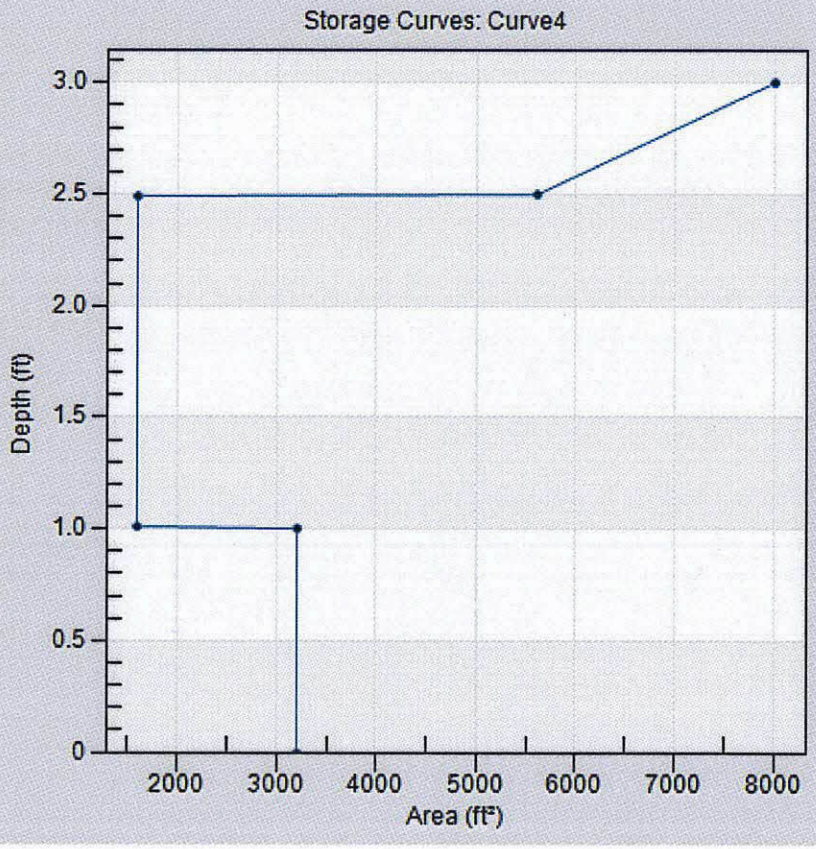
Name:

BioretentionMedian

Description:

Data:

	Depth (ft)	Area (ft²)
1	0	3200
2	1	3200
3	1.01	1600
4	2.49	1600
5	2.5	5600
6	3	8000
7		
8		
9		
10		
11		
12		



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PROJECT 3ROOTS
SUBJECT BMP #12 STORAGE VAULT

PAGE : _____ OF _____ JOB NO. : _____
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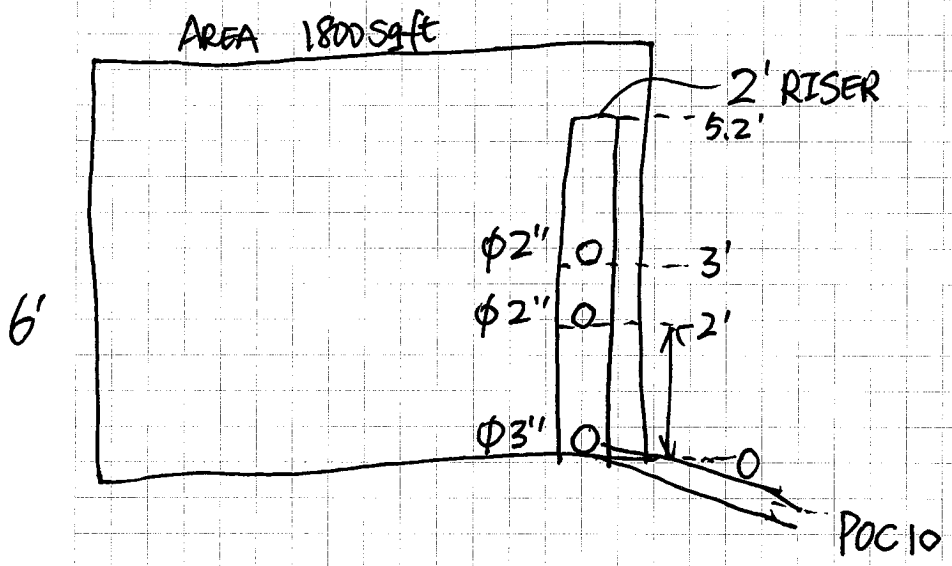
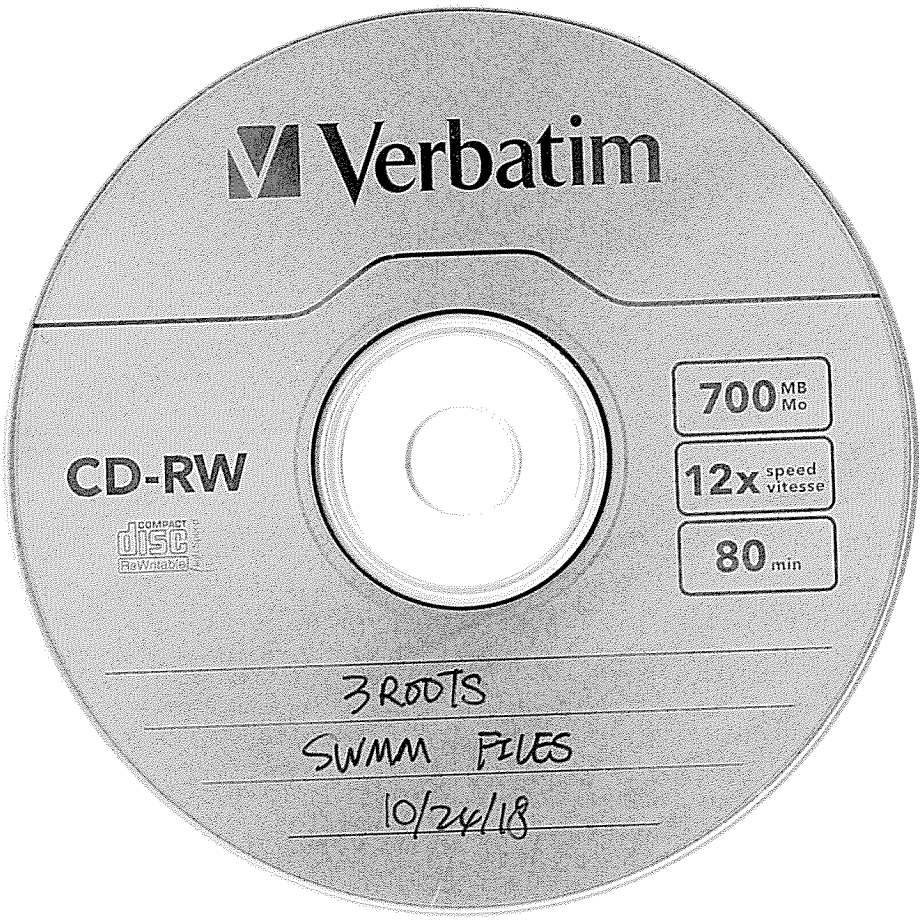



Verbatim
CD-RW
COMPACT disc ReWritable
700 MB Mo
12x speed vitesse
80 min
3 ROOTS
SWMM FILES
10/24/18

Attachment 3

SWMM Output – Existing Conditions

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

4182.30-PRE
****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 8
Number of nodes 5
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
KearnyMesa	KearnyMesa	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
DMA1	12.16	452.00	0.00	2.0000	KearnyMesa	POC1
DMA2	8.81	330.83	0.00	2.0000	KearnyMesa	POC1
DMA3	14.00	260.40	0.00	2.0000	KearnyMesa	POC1
DMA5	11.17	804.76	0.00	0.5000	KearnyMesa	POC9
DMA6	34.28	809.71	0.00	0.5000	KearnyMesa	POC6
DMA7	17.90	878.30	0.00	0.5000	KearnyMesa	POC7
DMA8	78.91	1935.06	0.00	0.5000	KearnyMesa	POC8
DMA9	49.05	1074.29	0.00	0.5000	KearnyMesa	POC9

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
POC1	OUTFALL	0.00	0.00	0.0	
POC6	OUTFALL	0.00	0.00	0.0	
POC7	OUTFALL	0.00	0.00	0.0	
POC8	OUTFALL	0.00	0.00	0.0	
POC9	OUTFALL	0.00	0.00	0.0	

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date 09/08/1964 06:00:00
Ending Date 05/23/2008 22:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:10:00
Dry Time Step 01:00:00

********** Volume Depth

Runoff Quantity Continuity	acre-feet	inches
Total Precipitation	9223.173	489.120
Evaporation Loss	342.245	18.150
Infiltration Loss	7805.505	413.939
Surface Runoff	1113.813	59.067
Final Storage	0.000	0.000
Continuity Error (%)	-0.416	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1113.813	362.953
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1113.813	362.953
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA1	489.12	0.00	16.87	400.94	73.25	24.18	7.84	0.150
DMA2	489.12	0.00	16.79	401.71	72.57	17.36	5.69	0.148
DMA3	489.12	0.00	17.81	411.29	62.08	23.60	6.95	0.127
DMA5	489.12	0.00	16.78	402.39	71.88	21.80	7.14	0.147
DMA6	489.12	0.00	18.61	416.77	55.79	51.93	13.50	0.114
DMA7	489.12	0.00	17.28	407.13	66.72	32.43	10.06	0.136
DMA8	489.12	0.00	18.53	416.61	56.05	120.10	31.51	0.115
DMA9	489.12	0.00	18.51	418.95	53.70	71.52	18.74	0.110

Analysis begun on: Tue Oct 23 14:06:36 2018
Analysis ended on: Tue Oct 23 14:06:44 2018
Total elapsed time: 00:00:08

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

4182.30POC10-PRE

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 2
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
KearnyMesa	KearnyMesa	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
DMA10-1	2.95	100.00	0.00	3.2000	KearnyMesa	POC10
DMA10-2	1.98	100.00	0.00	1.2000	KearnyMesa	POC10

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
POC10	OUTFALL	0.00	0.00	0.0	

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date 09/08/1964 06:00:00
Ending Date 05/23/2008 22:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:10:00
Dry Time Step 01:00:00

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	201.232	489.120
Evaporation Loss	6.880	16.723
Infiltration Loss	164.934	400.894
Surface Runoff	30.313	73.679
Final Storage	0.000	0.000
Continuity Error (%)	-0.445	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	30.313	9.878
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	30.313	9.878
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA10-1	489.12	0.00	16.64	400.72	73.93	5.93	1.99	0.151
DMA10-2	489.12	0.00	16.84	401.15	73.30	3.95	1.29	0.150

Analysis begun on: Tue Oct 23 14:45:17 2018
Analysis ended on: Tue Oct 23 14:45:22 2018
Total elapsed time: 00:00:05

Attachment 4

SWMM Output – Proposed Conditions

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

4182.30-POST

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 16
Number of nodes 13
Number of links 38
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
KearnyMesa	KearnyMesa	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
BMP1	0.18	62.00	0.00	0.5000	KearnyMesa	ST1
BMP2	0.18	60.00	0.00	0.5000	KearnyMesa	ST2
BMP3	0.22	50.00	0.00	0.5000	KearnyMesa	ST3
BMP5	0.29	64.39	0.00	0.5000	KearnyMesa	ST5
BMP6	1.33	90.00	0.00	0.5000	KearnyMesa	ST6
BMP7	0.42	85.00	0.00	0.5000	KearnyMesa	ST7
BMP8	1.30	110.00	0.00	0.5000	KearnyMesa	ST8
BMP9	0.65	467.72	0.00	0.5000	KearnyMesa	ST9
DMA1	11.98	452.00	61.00	2.0000	KearnyMesa	BMP1
DMA2	8.63	344.16	55.00	2.0000	KearnyMesa	BMP2
DMA3	13.78	260.40	75.00	2.0000	KearnyMesa	BMP3
DMA5	10.88	804.76	73.00	0.5000	KearnyMesa	BMP5
DMA6	32.95	830.81	75.00	0.5000	KearnyMesa	BMP6
DMA7	17.48	800.04	59.00	0.5000	KearnyMesa	BMP7
DMA8	77.61	1128.79	38.00	0.5000	KearnyMesa	BMP8
DMA9	48.40	1074.74	73.00	0.5000	KearnyMesa	BMP9

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated
BMP1	LID1	1	7840.79	0.00	100.00	0.00
BMP2	LID2	1	7840.79	0.00	100.00	0.00
BMP3	LID3	1	9583.20	0.00	100.00	0.00
BMP5	LID5	1	12632.40	0.00	100.00	0.00
BMP6	LID6	1	57934.80	0.00	100.00	0.00
BMP7	LID7	1	18295.20	0.00	100.00	0.00
BMP8	LID8	1	56628.00	0.00	100.00	0.00
BMP9	LID9	1	28314.00	0.00	100.00	0.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
POC1	OUTFALL	289.29	0.00	0.0	
POC6	OUTFALL	243.00	0.00	0.0	
POC7	OUTFALL	238.00	0.00	0.0	
POC8	OUTFALL	230.00	0.00	0.0	
POC9	OUTFALL	211.89	0.00	0.0	
ST1	STORAGE	294.50	5.50	0.0	
ST2	STORAGE	294.50	5.50	0.0	
ST3	STORAGE	302.50	3.50	0.0	
ST5	STORAGE	290.50	5.50	0.0	
ST6	STORAGE	276.50	4.50	0.0	

ST7	STORAGE	260.50	3.50	0.0
ST8	STORAGE	261.50	3.50	0.0
ST9	STORAGE	246.50	5.50	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
OR1	ST3	POC1	ORIFICE			
OR1-1	ST1	POC1	ORIFICE			
OR2-1	ST2	POC1	ORIFICE			
OR3-1	ST3	POC1	ORIFICE			
OR5-1	ST5	POC9	ORIFICE			
OR5-2	ST5	POC9	ORIFICE			
OR5-3	ST5	POC9	ORIFICE			
OR6-1	ST6	POC6	ORIFICE			
OR6-2	ST6	POC6	ORIFICE			
OR6-3	ST6	POC6	ORIFICE			
OR6-4	ST6	POC6	ORIFICE			
OR6-5	ST6	POC6	ORIFICE			
OR6-6	ST6	POC6	ORIFICE			
OR7-1	ST7	POC7	ORIFICE			
OR7-2	ST7	POC7	ORIFICE			
OR7-3	ST7	POC7	ORIFICE			
OR7-4	ST7	POC7	ORIFICE			
OR7-5	ST7	POC7	ORIFICE			
OR7-6	ST7	POC7	ORIFICE			
OR7-7	ST7	POC7	ORIFICE			
OR8-1	ST8	POC8	ORIFICE			
OR8-2	ST8	POC8	ORIFICE			
OR8-3	ST8	POC8	ORIFICE			
OR8-4	ST8	POC8	ORIFICE			
OR9-1	ST9	POC9	ORIFICE			
OR9-2	ST9	POC9	ORIFICE			
OR9-3	ST9	POC9	ORIFICE			
OR9-4	ST9	POC9	ORIFICE			
OR9-5	ST9	POC9	ORIFICE			
OR9-6	ST9	POC9	ORIFICE			
WR1	ST1	POC1	WEIR			
WR2	ST2	POC1	WEIR			
WR3	ST3	POC1	WEIR			
WR5	ST5	POC9	WEIR			
WR6	ST6	POC6	WEIR			
WR7	ST7	POC7	WEIR			
WR8	ST8	POC8	WEIR			
WR9	ST9	POC9	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... KINWAVE
Starting Date 09/08/1964 06:00:00
Ending Date 05/23/2008 22:00:00

Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:15:00
Dry Time Step 01:00:00
Routing Time Step ..... 300.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Initial LID Storage	0.685	0.036
Total Precipitation	9223.173	489.120
Evaporation Loss	1462.560	77.562
Infiltration Loss	2970.248	157.517
Surface Runoff	1109.922	58.861
LID Drainage	3705.451	196.506
Final Storage	3.566	0.189
Continuity Error (%)	-0.302	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	4815.341	1569.151
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	4813.979	1568.707
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.028	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	299.00 sec
Average Time Step	:	300.00 sec
Maximum Time Step	:	300.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
BMP1	489.12	19000.41	786.14	0.00	18696.78	91.38	14.59	0.959
BMP2	489.12	12839.82	759.93	0.00	12563.37	61.40	9.69	0.943
BMP3	489.12	20195.14	775.04	0.00	19902.36	118.89	17.06	0.962
BMP5	489.12	12103.37	755.11	0.00	11831.85	93.17	13.18	0.940
BMP6	489.12	7892.39	716.56	0.00	7661.04	276.67	32.64	0.914
BMP7	489.12	11429.80	744.84	0.00	11168.79	127.37	18.21	0.937
BMP8	489.12	11483.05	733.37	0.00	11233.97	396.55	46.69	0.938
BMP9	489.12	23162.51	775.48	0.00	22867.18	403.60	55.03	0.967
DMA1	489.12	0.00	60.61	145.56	285.49	92.87	15.09	0.584
DMA2	489.12	0.00	56.20	167.68	267.81	62.76	10.56	0.548
DMA3	489.12	0.00	74.45	93.96	322.43	120.64	17.74	0.659
DMA5	489.12	0.00	69.64	99.43	322.62	95.31	14.49	0.660
DMA6	489.12	0.00	77.02	94.85	318.58	285.03	40.70	0.651
DMA7	489.12	0.00	61.02	155.40	274.64	130.35	20.40	0.561
DMA8	489.12	0.00	49.90	247.97	192.35	405.35	54.30	0.393
DMA9	489.12	0.00	76.20	103.07	311.07	408.82	57.84	0.636

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BMP1	LID1	19489.53	786.17	0.00	3353.18	15344.30	1.80	8.11	-0.00
BMP2	LID2	13328.94	759.96	0.00	1850.85	10713.00	1.80	7.18	-0.00
BMP3	LID3	20684.26	775.07	0.00	3738.14	16164.94	1.80	8.14	-0.00
BMP5	LID5	12592.49	755.14	0.00	1165.53	10666.75	1.80	7.09	-0.00
BMP6	LID6	8381.51	716.58	0.00	1115.90	6545.42	1.80	5.39	0.00
BMP7	LID7	11918.92	744.86	0.00	1514.24	9654.95	1.80	6.79	-0.00
BMP8	LID8	11972.17	733.40	0.00	3513.14	7721.24	1.80	6.19	-0.00
BMP9	LID9	23651.63	775.51	0.00	6977.27	15890.75	1.80	9.85	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min	Reported Max Depth Feet
POC1	OUTFALL	0.00	0.00	289.29	0	00:00	0.00
POC6	OUTFALL	0.00	0.00	243.00	0	00:00	0.00
POC7	OUTFALL	0.00	0.00	238.00	0	00:00	0.00
POC8	OUTFALL	0.00	0.00	230.00	0	00:00	0.00
POC9	OUTFALL	0.00	0.00	211.89	0	00:00	0.00
ST1	STORAGE	0.02	5.03	299.53	1999	13:30	4.95
ST2	STORAGE	0.00	2.96	297.46	1999	13:20	2.91
ST3	STORAGE	0.01	3.17	305.67	3739	03:25	3.11
ST5	STORAGE	0.00	3.32	293.82	1999	14:20	3.29
ST6	STORAGE	0.01	3.00	279.50	818	04:45	2.99
ST7	STORAGE	0.01	2.80	263.30	1999	13:25	2.70
ST8	STORAGE	0.01	3.35	264.85	1999	14:30	3.24
ST9	STORAGE	0.03	5.27	251.77	1999	13:25	5.12

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC1	OUTFALL	2.03	26.40	1999	13:25	224	272	0.000
POC6	OUTFALL	0.79	10.32	818	04:45	236	277	0.000
POC7	OUTFALL	0.79	13.44	1999	13:25	110	127	0.000
POC8	OUTFALL	0.76	31.11	1999	14:30	273	396	0.000
POC9	OUTFALL	1.71	37.23	1999	13:30	364	497	0.000
ST1	STORAGE	14.18	14.18	3739	03:20	16.4	16.4	0.112
ST2	STORAGE	9.48	9.48	3739	03:20	9.05	9.05	0.245
ST3	STORAGE	16.63	16.63	3739	03:20	22.3	22.3	0.207
ST5	STORAGE	12.81	12.81	3739	03:20	9.18	9.18	0.227
ST6	STORAGE	32.32	32.32	3739	03:20	40.3	40.3	0.064
ST7	STORAGE	17.84	17.84	3739	03:20	17.3	17.3	0.141
ST8	STORAGE	46.25	46.25	3739	03:20	124	124	0.119
ST9	STORAGE	54.56	54.56	3739	03:20	123	123	0.112

****

Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
ST1	0.160	0	0	0	60.264	89	1999 13:30	7.40
ST2	0.022	0	0	0	27.755	48	1999 13:20	6.66
ST3	0.055	0	0	0	34.130	90	3739 03:25	12.21
ST5	0.040	0	0	0	60.548	52	1999 14:20	4.55
ST6	0.864	0	0	0	203.428	63	818 04:40	9.53
ST7	0.122	0	0	0	59.549	78	1999 13:25	12.65
ST8	0.790	0	0	0	242.378	95	1999 14:25	30.35
ST9	0.804	0	0	0	187.233	95	1999 13:25	34.57

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC1	6.29	0.42	26.40	271.589
POC6	9.81	0.27	10.32	276.645
POC7	5.43	0.23	13.44	127.348
POC8	11.14	0.34	31.11	396.403
POC9	11.55	0.42	37.23	496.606
System	8.84	1.68	98.56	1568.591

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
OR1	ORIFICE	1.13	3739 03:25			0.00
OR1-1	ORIFICE	0.23	1999 13:30			0.00
OR2-1	ORIFICE	0.69	1999 13:20			0.00
OR3-1	ORIFICE	0.71	3739 03:25			0.00
OR5-1	ORIFICE	0.73	1999 14:20			0.00
OR5-2	ORIFICE	0.12	1999 14:20			0.00
OR5-3	ORIFICE	0.33	1999 14:20			0.00
OR6-1	ORIFICE	0.18	818 04:45			
OR6-2	ORIFICE	0.18	818 04:45			0.00
OR6-3	ORIFICE	0.46	818 04:45			0.00
OR6-4	ORIFICE	0.54	818 04:45			0.00
OR6-5	ORIFICE	0.46	818 04:45			0.00
OR6-6	ORIFICE	0.54	818 04:45			0.00
OR7-1	ORIFICE	0.17	1999 13:25			0.00
OR7-2	ORIFICE	0.44	1999 13:25			0.00
OR7-3	ORIFICE	0.44	1999 13:25			0.00
OR7-4	ORIFICE	0.44	1999 13:25			0.00
OR7-5	ORIFICE	0.47	1999 13:25			0.00
OR7-6	ORIFICE	0.47	1999 13:25			0.00
OR7-7	ORIFICE	0.17	1999 13:25			0.00
OR8-1	ORIFICE	0.73	1999 14:30			0.00
OR8-2	ORIFICE	0.61	1999 14:30			0.00

OR8-3	ORIFICE	0.61	1999	14:30	0.00
OR8-4	ORIFICE	0.73	1999	14:30	0.00
OR9-1	ORIFICE	0.93	1999	13:25	0.00
OR9-2	ORIFICE	0.83	1999	13:25	0.00
OR9-3	ORIFICE	0.19	1999	13:25	0.00
OR9-4	ORIFICE	0.60	1999	13:25	0.00
OR9-5	ORIFICE	0.60	1999	13:25	0.00
OR9-6	ORIFICE	0.60	1999	13:25	0.00
WR1	WEIR	7.17	1999	13:30	0.00
WR2	WEIR	5.97	1999	13:20	0.00
WR3	WEIR	10.37	3739	03:25	0.00
WR5	WEIR	3.37	1999	14:20	0.00
WR6	WEIR	7.16	818	04:45	0.00
WR7	WEIR	10.05	1999	13:25	0.00
WR8	WEIR	27.66	1999	14:30	0.00
WR9	WEIR	30.82	1999	13:25	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Oct 23 14:07:11 2018
Analysis ended on: Tue Oct 23 14:07:52 2018
Total elapsed time: 00:00:41

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

4182.30POC10-POST

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 2
Number of nodes 3
Number of links 8
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
KearnyMesa	KearnyMesa	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
DMA10-1	2.95	100.00	71.00	3.2000	KearnyMesa	ST11
DMA10-2	1.98	100.00	71.00	1.2000	KearnyMesa	ST10

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
POC10	OUTFALL	0.00	0.00	0.0	
ST10	STORAGE	0.00	3.00	0.0	
ST11	STORAGE	0.00	6.00	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
OR1	ST11	POC10	ORIFICE			
OR2	ST10	ST11	ORIFICE			
OR3	ST10	ST11	ORIFICE			
OR4	ST10	ST11	ORIFICE			
OR8	ST11	POC10	ORIFICE			
OR9	ST11	POC10	ORIFICE			
W1	ST10	ST11	WEIR			
W2	ST11	POC10	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES

```
  RDII ..................... NO
  Snowmelt ................. NO
  Groundwater .............. NO
  Flow Routing ............. YES
  Ponding Allowed .......... NO
  Water Quality ............ NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ 09/08/1964 06:00:00
Ending Date .............. 05/23/2008 22:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 300.00 sec
```

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	201.232	489.120
Evaporation Loss	27.879	67.763
Infiltration Loss	43.958	106.845
Surface Runoff	130.565	317.354
Final Storage	0.019	0.045
Continuity Error (%)	-0.590	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	130.563	42.546
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	130.195	42.426
Flooding Loss	0.048	0.016
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.032	0.011
Continuity Error (%)	0.219	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	299.00 sec
Average Time Step	:	300.00 sec
Maximum Time Step	:	300.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA10-1	489.12	0.00	67.67	106.46	317.89	25.49	3.93	0.650
DMA10-2	489.12	0.00	67.91	107.42	316.55	17.05	2.63	0.647

Node Depth Summary

	Average	Maximum	Maximum	Time of Max	Reported

Node	Type	Depth Feet	Depth Feet	HGL Feet	Occurrence days	hr:min	Max Depth Feet
POC10	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
ST10	STORAGE	0.01	2.97	2.97	1999	13:15	2.95
ST11	STORAGE	0.02	6.00	6.00	1999	13:20	6.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC10	OUTFALL	0.00	3.11	1999	13:20	0	42.4	0.000
ST10	STORAGE	2.63	2.63	3739	03:05	17.1	17.1	0.159
ST11	STORAGE	3.93	4.73	3739	03:05	25.5	42.5	0.156

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days	hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Volume 1000 ft3
ST11	1.17	0.77	1999	13:05	0.016	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days	hr:min	Maximum Outflow CFS
ST10	0.040	0	0	0	8.835	98	1999	13:10	1.43
ST11	0.035	0	0	0	10.800	100	1999	12:25	3.11

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC10	8.22	0.05	3.11	42.423
System	8.22	0.05	3.11	42.423

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
OR1	ORIFICE	0.57	1999	13:20			0.00
OR2	ORIFICE	0.18	1999	13:15			0.00
OR3	ORIFICE	0.12	1999	13:15			0.00
OR4	ORIFICE	0.15	1999	13:15			0.00
OR8	ORIFICE	0.21	1999	13:20			0.00
OR9	ORIFICE	0.18	1999	13:20			0.00
W1	WEIR	0.98	1999	13:15			0.00
W2	WEIR	2.15	1999	13:20			0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Oct 23 14:45:13 2018
Analysis ended on: Tue Oct 23 14:45:19 2018
Total elapsed time: 00:00:06

Attachment 5

Flow Frequency Statistical Analysis

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	9	20.387	0.39	45
2	12/4/1974	7	17.89	0.78	22.5
3	12/5/1966	50	12.651	1.17	15
4	1/14/1969	10	12.124	1.56	11.25
5	11/13/1972	24	11.283	1.95	9
6	5/8/1977	18	11.164	2.33	7.5
7	1/25/1995	22	9.008	2.72	6.43
8	3/1/1983	71	8.878	3.11	5.63
9	1/5/1979	12	8.128	3.5	5
10	2/21/2005	53	7.787	3.89	4.5
11	1/28/1980	29	7.14	4.28	4.09
12	11/13/1998	5	6.982	4.67	3.75
13	1/4/1995	11	6.959	5.06	3.46
14	11/22/1965	33	6.935	5.45	3.21
15	2/13/1973	7	6.747	5.84	3
16	1/2/1977	15	6.745	6.23	2.81
17	2/24/2003	10	6.694	6.61	2.65
18	3/17/1979	10	6.647	7	2.5
19	1/16/1978	11	6.61	7.39	2.37
20	1/14/1978	20	6.333	7.78	2.25
21	1/7/1974	25	6.296	8.17	2.14
22	2/28/1981	29	6.255	8.56	2.05
23	2/8/1976	48	6.143	8.95	1.96
24	3/2/1992	11	5.782	9.34	1.88
25	2/6/1976	33	5.712	9.73	1.8
26	1/4/1978	5	5.696	10.12	1.73
27	1/27/1983	17	5.554	10.51	1.67
28	1/10/1978	6	5.513	10.89	1.61
29	2/11/2003	10	5.467	11.28	1.55
30	3/20/1983	9	5.459	11.67	1.5
31	3/17/1982	29	5.453	12.06	1.45
32	2/14/1995	14	5.389	12.45	1.41
33	1/18/1993	12	5.368	12.84	1.36
34	1/31/1979	16	5.353	13.23	1.32
35	1/20/1982	21	5.318	13.62	1.29
36	11/5/1987	10	5.265	14.01	1.25
37	4/13/2003	11	5.234	14.4	1.22
38	2/21/2000	34	5.203	14.79	1.18
39	2/12/1978	31	5.041	15.18	1.15
40	2/8/1993	11	4.943	15.56	1.13
41	1/9/2005	54	4.891	15.95	1.1
42	2/16/1980	46	4.826	16.34	1.07
43	1/15/1993	34	4.822	16.73	1.05
44	11/21/1967	33	4.761	17.12	1.02
45	2/6/1969	6	4.721	17.51	1

10-year Q:	11.657	cfs
5-year Q:	8.128	cfs
2-year Q:	6.193	cfs
Lower Flow Threshold:	50%	
0.5xQ2 :	3.096	cfs

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC6 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	13	13.49	0.43	45
2	12/5/1966	52	10.597	0.86	22.5
3	12/4/1974	8	8.646	1.29	15
4	5/8/1977	20	7.036	1.72	11.25
5	1/14/1969	10	6.48	2.16	9
6	1/14/1978	25	6.098	2.59	7.5
7	1/5/1979	14	6.092	3.02	6.43
8	2/21/2005	54	5.87	3.45	5.63
9	1/28/1980	30	5.567	3.88	5
10	11/22/1965	36	5.294	4.31	4.5
11	1/4/1995	14	5.199	4.74	4.09
12	11/13/1972	25	5.134	5.17	3.75
13	3/1/1983	70	5.118	5.6	3.46
14	1/25/1995	25	5.089	6.03	3.21
15	2/8/1976	51	4.869	6.47	3
16	1/4/1974	92	4.47	6.9	2.81
17	1/2/1977	18	4.262	7.33	2.65
18	2/28/1978	66	4.098	7.76	2.5
19	1/16/1978	14	3.916	8.19	2.37
20	1/27/1983	50	3.528	8.62	2.25
21	2/28/1981	38	3.392	9.05	2.14
22	3/2/1992	13	3.346	9.48	2.05
23	3/17/1979	12	3.256	9.91	1.96
24	1/9/2005	56	3.25	10.34	1.88
25	3/17/1982	42	3.187	10.78	1.8
26	2/13/1973	9	3.131	11.21	1.73
27	11/13/1998	6	3.098	11.64	1.67
28	2/24/2003	10	3.095	12.07	1.61
29	2/16/1980	49	3.074	12.5	1.55
30	1/15/1993	79	3.007	12.93	1.5
31	1/31/1979	18	2.95	13.36	1.45
32	1/24/1969	58	2.938	13.79	1.41
33	12/19/1970	67	2.896	14.22	1.36
34	3/4/2005	10	2.881	14.66	1.32
35	2/6/1976	33	2.782	15.09	1.29
36	1/26/1997	15	2.773	15.52	1.25
37	2/12/1978	31	2.746	15.95	1.22
38	2/8/1993	12	2.672	16.38	1.18
39	1/20/1982	14	2.663	16.81	1.15
40	2/11/2003	12	2.539	17.24	1.13
41	12/16/1987	18	2.519	17.67	1.1
42	2/14/1995	14	2.501	18.1	1.07
43	3/11/1995	24	2.499	18.53	1.05
44	2/21/2000	36	2.497	18.97	1.02
45	1/4/1978	6	2.482	19.4	1

10-year Q: 6.727 cfs
5-year Q: 5.567 cfs
2-year Q: 3.296 cfs

Lower Flow Threshold: 50%

0.5xQ2 : 1.648 cfs

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC7 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	8	10	0.42	45
2	12/4/1974	6	8.14	0.84	22.5
3	12/5/1966	50	6.43	1.26	15
4	1/14/1969	8	5.677	1.68	11.25
5	5/8/1977	18	5.382	2.1	9
6	11/13/1972	23	4.864	2.52	7.5
7	3/1/1983	70	4.254	2.94	6.43
8	1/25/1995	22	4.163	3.36	5.63
9	1/5/1979	11	4.011	3.78	5
10	2/21/2005	14	3.891	4.2	4.5
11	1/28/1980	28	3.608	4.62	4.09
12	1/14/1978	21	3.459	5.04	3.75
13	11/22/1965	32	3.439	5.46	3.46
14	1/4/1995	10	3.419	5.88	3.21
15	1/16/1978	11	3.335	6.3	3
16	1/2/1977	15	3.269	6.72	2.81
17	2/8/1976	48	3.118	7.14	2.65
18	11/13/1998	5	3.088	7.56	2.5
19	3/17/1979	9	3.037	7.98	2.37
20	2/13/1973	6	3.027	8.4	2.25
21	1/7/1974	25	3.015	8.82	2.14
22	2/24/2003	8	3.002	9.24	2.05
23	2/28/1981	28	2.898	9.66	1.96
24	1/27/1983	16	2.708	10.08	1.88
25	3/2/1992	11	2.652	10.5	1.8
26	2/6/1976	33	2.602	10.92	1.73
27	3/17/1982	29	2.507	11.34	1.67
28	1/31/1979	15	2.505	11.76	1.61
29	1/4/1978	5	2.503	12.18	1.55
30	2/11/2003	10	2.456	12.61	1.5
31	1/20/1982	13	2.447	13.03	1.45
32	3/20/1983	9	2.443	13.45	1.41
33	1/10/1978	6	2.43	13.87	1.36
34	2/14/1995	13	2.417	14.29	1.32
35	1/9/2005	53	2.396	14.71	1.29
36	2/12/1978	31	2.376	15.13	1.25
37	1/18/1993	12	2.371	15.55	1.22
38	2/21/2000	33	2.361	15.97	1.18
39	1/15/1993	34	2.352	16.39	1.15
40	2/16/1980	45	2.351	16.81	1.13
41	11/5/1987	10	2.322	17.23	1.1
42	2/8/1993	11	2.293	17.65	1.07
43	11/21/1967	15	2.211	18.07	1.05
44	12/19/1970	64	2.161	18.49	1.02
45	1/24/1969	56	2.127	18.91	1

10-year Q:	5.513	cfs
5-year Q:	4.011	cfs
2-year Q:	2.944	cfs
Lower Flow Threshold:	50%	
0.5xQ2 :	1.472	cfs

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC8 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	13	31.5	0.4	45
2	12/5/1966	53	24.662	0.8	22.5
3	12/4/1974	8	20.553	1.2	15
4	5/8/1977	20	16.562	1.61	11.25
5	1/14/1969	11	15.36	2.01	9
6	1/5/1979	14	14.246	2.41	7.5
7	2/21/2005	55	13.723	2.81	6.43
8	1/28/1980	31	13.009	3.21	5.63
9	1/14/1978	22	12.66	3.61	5
10	11/22/1965	36	12.346	4.02	4.5
11	11/13/1972	25	12.209	4.42	4.09
12	1/4/1995	14	12.132	4.82	3.75
13	3/1/1983	71	12.107	5.22	3.46
14	1/25/1995	25	11.987	5.62	3.21
15	2/8/1976	51	11.374	6.02	3
16	1/4/1974	92	10.449	6.43	2.81
17	1/2/1977	18	10.039	6.83	2.65
18	2/28/1978	67	9.541	7.23	2.5
19	1/16/1978	13	8.611	7.63	2.37
20	1/27/1983	50	8.313	8.03	2.25
21	2/28/1981	39	8.022	8.43	2.14
22	3/2/1992	13	7.901	8.84	2.05
23	3/17/1979	13	7.738	9.24	1.96
24	1/9/2005	56	7.596	9.64	1.88
25	3/17/1982	42	7.522	10.04	1.8
26	2/13/1973	9	7.45	10.44	1.73
27	11/13/1998	6	7.38	10.84	1.67
28	2/24/2003	11	7.365	11.24	1.61
29	2/16/1980	49	7.243	11.65	1.55
30	1/15/1993	79	7.085	12.05	1.5
31	1/31/1993	10	7.064	12.45	1.45
32	1/31/1979	18	6.98	12.85	1.41
33	1/24/1969	58	6.908	13.25	1.36
34	3/4/2005	11	6.769	13.65	1.32
35	12/19/1970	67	6.762	14.06	1.29
36	2/6/1976	33	6.612	14.46	1.25
37	1/25/1997	16	6.514	14.86	1.22
38	2/12/1978	32	6.505	15.26	1.18
39	2/8/1993	13	6.474	15.66	1.15
40	1/20/1982	23	6.324	16.06	1.13
41	2/11/2003	12	6.042	16.47	1.1
42	2/14/1995	14	5.952	16.87	1.07
43	2/21/2000	36	5.937	17.27	1.05
44	1/4/1978	6	5.917	17.67	1.02
45	12/16/1987	18	5.893	18.07	1

10-year Q:	15.894	cfs
5-year Q:	12.660	cfs
2-year Q:	7.810	cfs
Lower Flow Threshold:	50%	
0.5xQ2 :	3.905	cfs

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC9 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	42	24.962	0.4	45
2	12/5/1966	53	18.977	0.81	22.5
3	12/4/1974	8	18.22	1.21	15
4	5/8/1977	21	13.541	1.62	11.25
5	1/14/1969	12	13.142	2.02	9
6	1/5/1979	15	11.044	2.43	7.5
7	11/13/1972	26	10.858	2.83	6.43
8	2/21/2005	55	10.761	3.24	5.63
9	1/25/1995	25	10.22	3.64	5
10	1/28/1980	31	10.102	4.05	4.5
11	3/1/1983	71	10.098	4.45	4.09
12	1/14/1978	23	9.815	4.86	3.75
13	11/22/1965	36	9.721	5.26	3.46
14	1/4/1995	14	9.356	5.67	3.21
15	2/8/1976	51	8.793	6.07	3
16	1/4/1974	93	8.258	6.48	2.81
17	1/2/1977	19	8.184	6.88	2.65
18	1/16/1978	14	7.304	7.29	2.5
19	2/28/1981	39	6.87	7.69	2.37
20	3/17/1979	13	6.825	8.1	2.25
21	11/13/1998	6	6.766	8.5	2.14
22	1/27/1983	50	6.753	8.91	2.05
23	2/13/1973	9	6.711	9.31	1.96
24	2/24/2003	11	6.642	9.72	1.88
25	3/2/1992	13	6.455	10.12	1.8
26	3/17/1982	42	6.132	10.53	1.73
27	1/9/2005	57	5.94	10.93	1.67
28	1/31/1979	18	5.928	11.34	1.61
29	2/16/1980	49	5.883	11.74	1.55
30	2/6/1976	33	5.846	12.15	1.5
31	1/15/1993	79	5.778	12.55	1.45
32	12/19/1970	67	5.593	12.96	1.41
33	1/20/1982	23	5.533	13.36	1.36
34	2/12/1978	32	5.527	13.77	1.32
35	1/24/1969	58	5.488	14.17	1.29
36	1/4/1978	6	5.464	14.57	1.25
37	2/11/2003	12	5.439	14.98	1.22
38	3/1/1978	18	5.427	15.38	1.18
39	2/14/1995	14	5.364	15.79	1.15
40	3/4/2005	11	5.358	16.19	1.13
41	3/20/1983	11	5.333	16.6	1.1
42	1/10/1978	16	5.312	17	1.07
43	2/21/2000	36	5.278	17.41	1.05
44	2/8/1993	13	5.234	17.81	1.02
45	1/25/1997	17	5.178	18.22	1

10-year Q: 13.319 cfs
5-year Q: 10.220 cfs
2-year Q: 6.730 cfs

Lower Flow Threshold: 50%

0.5xQ2 : 3.365 cfs

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node POC10 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	7	3.254	0.44	45
2	12/4/1974	5	3.194	0.88	22.5
3	1/14/1969	7	2.082	1.33	15
4	11/13/1972	20	1.921	1.77	11.25
5	12/5/1966	16	1.897	2.21	9
6	5/8/1977	12	1.823	2.65	7.5
7	1/25/1995	19	1.56	3.1	6.43
8	12/6/1966	7	1.504	3.54	5.63
9	3/1/1983	69	1.474	3.98	5
10	11/13/1998	3	1.291	4.42	4.5
11	1/5/1979	10	1.28	4.87	4.09
12	2/14/1995	15	1.253	5.31	3.75
13	2/13/1973	5	1.226	5.75	3.46
14	2/24/2003	6	1.217	6.19	3.21
15	2/21/2005	12	1.188	6.64	3
16	3/17/1979	7	1.181	7.08	2.81
17	1/16/1978	8	1.123	7.52	2.65
18	1/28/1980	26	1.123	7.96	2.5
19	1/4/1995	8	1.107	8.41	2.37
20	1/2/1977	12	1.095	8.85	2.25
21	2/28/1981	26	1.085	9.29	2.14
22	11/22/1965	29	1.066	9.73	2.05
23	1/4/1978	3	1.061	10.18	1.96
24	1/7/1974	22	1.05	10.62	1.88
25	3/2/1992	9	1.039	11.06	1.8
26	1/10/1978	4	1.024	11.5	1.73
27	2/6/1976	32	1.018	11.95	1.67
28	3/20/1983	6	1.003	12.39	1.61
29	1/18/1993	10	0.994	12.83	1.55
30	2/11/2003	8	0.992	13.27	1.5
31	11/5/1987	4	0.977	13.72	1.45
32	3/17/1982	26	0.975	14.16	1.41
33	1/14/1978	17	0.943	14.6	1.36
34	1/20/1982	12	0.936	15.04	1.32
35	2/21/2000	30	0.932	15.49	1.29
36	1/31/1979	14	0.919	15.93	1.25
37	1/31/1993	4	0.913	16.37	1.22
38	2/8/1976	11	0.91	16.81	1.18
39	1/27/1983	13	0.894	17.26	1.15
40	2/6/1969	4	0.88	17.7	1.13
41	2/8/1993	7	0.868	18.14	1.1
42	2/12/1978	30	0.857	18.58	1.07
43	11/21/1967	13	0.827	19.03	1.05
44	1/9/2005	51	0.825	19.47	1.02
45	12/19/1970	62	0.783	19.91	1

10-year Q: 1.908 cfs
5-year Q: 1.474 cfs
2-year Q: 1.063 cfs

Lower Flow Threshold: 50%

0.5xQ2 : 0.532 cfs

Post-project Flow Frequency - Long-term Simulation

Statistics - Node POC1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	136	19.527	0.16	45
2	12/3/1966	184	15.003	0.32	22.5
3	1/5/1979	116	6.115	0.48	15
4	1/14/1969	207	5.828	0.64	11.25
5	1/27/1980	135	5.712	0.8	9
6	5/8/1977	95	5.503	0.96	7.5
7	12/4/1974	105	5.409	1.12	6.43
8	1/3/1995	127	5.199	1.28	5.63
9	1/14/1978	151	4.674	1.44	5
10	11/22/1965	122	4.296	1.59	4.5
11	2/18/2005	177	4.274	1.75	4.09
12	2/4/1976	193	4.145	1.91	3.75
13	3/2/1992	78	4.109	2.07	3.46
14	2/26/1983	208	4.038	2.23	3.21
15	2/6/1992	97	3.779	2.39	3
16	11/9/1972	187	3.7	2.55	2.81
17	2/24/2003	70	3.683	2.71	2.65
18	1/27/1983	89	3.673	2.87	2.5
19	3/11/1995	69	3.613	3.03	2.37
20	2/7/1993	65	3.607	3.19	2.25
21	3/4/2005	73	3.6	3.35	2.14
22	1/4/1974	166	3.534	3.51	2.05
23	1/22/1967	69	3.451	3.67	1.96
24	2/13/1995	69	3.435	3.83	1.88
25	2/15/1986	62	3.378	3.99	1.8
26	12/16/1987	83	3.358	4.15	1.73
27	2/27/1978	154	3.315	4.31	1.67
28	1/23/1995	123	3.268	4.47	1.61
29	1/7/2005	153	3.226	4.63	1.55
30	1/30/1979	73	3.188	4.78	1.5
31	3/16/1982	89	3.161	4.94	1.45
32	2/6/1969	57	3.11	5.1	1.41
33	1/12/1993	182	2.997	5.26	1.36
34	1/25/1997	55	2.984	5.42	1.32
35	2/11/1973	110	2.984	5.58	1.29
36	11/14/1965	118	2.97	5.74	1.25
37	2/19/2007	59	2.97	5.9	1.22
38	2/12/1978	49	2.955	6.06	1.18
39	1/2/1977	115	2.952	6.22	1.15
40	1/24/1969	122	2.916	6.38	1.13
41	2/28/1981	73	2.903	6.54	1.1
42	3/17/1979	101	2.897	6.7	1.07
43	10/18/2004	92	2.895	6.86	1.05
44	1/20/1982	59	2.887	7.02	1.02
45	2/10/2003	80	2.866	7.18	1

5.764	cfs
4.674	cfs
3.488	cfs
50%	
1.744	cfs

Post-project Flow Frequency - Long-term Simulation

Statistics - Node POC6 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	12/3/1966	296	10.034	0.21	45
2	2/28/1970	223	7.612	0.42	22.5
3	11/14/1965	420	3.334	0.63	15
4	1/14/1978	264	3.073	0.85	11.25
5	1/28/1980	265	3.031	1.06	9
6	2/24/1983	386	2.543	1.27	7.5
7	1/5/1979	360	1.745	1.48	6.43
8	1/4/1974	312	1.586	1.69	5.63
9	1/14/1969	216	1.378	1.9	5
10	2/4/1976	313	1.208	2.11	4.5
11	1/3/1995	348	1.204	2.33	4.09
12	12/4/1974	201	1.128	2.54	3.75
13	5/8/1977	202	1.075	2.75	3.46
14	2/18/2005	312	1.072	2.96	3.21
15	1/6/1993	468	1.057	3.17	3
16	3/14/1982	308	1.047	3.38	2.81
17	1/3/2005	371	1.038	3.59	2.65
18	1/23/1995	224	1.037	3.81	2.5
19	1/27/1983	211	1.037	4.02	2.37
20	1/31/1979	184	1.027	4.23	2.25
21	2/27/1978	218	1.024	4.44	2.14
22	3/2/1992	174	1.017	4.65	2.05
23	2/28/1981	181	1.012	4.86	1.96
24	2/6/1992	267	1.005	5.07	1.88
25	2/27/1991	188	1.003	5.29	1.8
26	11/9/1972	260	0.992	5.5	1.73
27	12/17/1970	230	0.991	5.71	1.67
28	2/13/1995	159	0.987	5.92	1.61
29	2/13/1980	312	0.985	6.13	1.55
30	2/24/2003	149	0.985	6.34	1.5
31	3/4/2005	144	0.983	6.55	1.45
32	12/16/1987	137	0.98	6.77	1.41
33	2/15/1986	134	0.977	6.98	1.36
34	1/22/1967	133	0.975	7.19	1.32
35	1/24/1969	181	0.974	7.4	1.29
36	2/7/1993	134	0.974	7.61	1.25
37	1/20/1982	145	0.973	7.82	1.22
38	11/24/1985	237	0.971	8.03	1.18
39	11/30/2007	134	0.967	8.25	1.15
40	3/11/1995	121	0.964	8.46	1.13
41	1/7/1980	211	0.964	8.67	1.1
42	1/25/1997	122	0.957	8.88	1.07
43	12/9/1965	210	0.95	9.09	1.05
44	2/11/1973	149	0.948	9.3	1.02
45	2/10/2003	130	0.947	9.51	1

10-year Q:	3.050	cfs
5-year Q:	1.378	cfs
2-year Q:	1.014	cfs
Lower Flow Threshold:	50%	
0.5xQ2 (Pre):	0.507	cfs

Post-project Flow Frequency - Long-term Simulation

Statistics - Node POC7 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	68	10.3	0.17	45
2	12/3/1966	140	7.806	0.35	22.5
3	1/5/1979	85	3.279	0.52	15
4	1/14/1978	129	3.193	0.69	11.25
5	11/22/1965	90	2.796	0.87	9
6	1/14/1969	74	2.474	1.04	7.5
7	1/27/1980	109	2.395	1.21	6.43
8	1/3/1995	127	2.334	1.38	5.63
9	12/4/1974	68	2.327	1.56	5
10	2/18/2005	160	1.934	1.73	4.5
11	5/8/1977	95	1.849	1.9	4.09
12	2/26/1983	177	1.808	2.08	3.75
13	2/4/1976	165	1.683	2.25	3.46
14	1/27/1983	71	1.462	2.42	3.21
15	1/4/1974	162	1.331	2.6	3
16	3/2/1992	69	1.217	2.77	2.81
17	3/16/1982	89	1.207	2.94	2.65
18	1/23/1995	108	1.195	3.11	2.5
19	1/31/1979	73	1.046	3.29	2.37
20	2/6/1992	98	1.035	3.46	2.25
21	2/27/1978	157	1.028	3.63	2.14
22	3/11/1995	57	1.027	3.81	2.05
23	3/4/2005	64	1.023	3.98	1.96
24	12/16/1987	85	1.018	4.15	1.88
25	11/12/1972	93	1.017	4.33	1.8
26	2/24/2003	69	1.014	4.5	1.73
27	1/7/2005	143	1.014	4.67	1.67
28	2/28/1981	72	1.013	4.84	1.61
29	2/7/1993	57	1.012	5.02	1.55
30	2/15/1986	56	1.011	5.19	1.5
31	1/22/1967	72	1.004	5.36	1.45
32	1/12/1993	163	0.998	5.54	1.41
33	1/25/1997	54	0.985	5.71	1.36
34	11/24/1985	54	0.972	5.88	1.32
35	2/6/1969	41	0.972	6.06	1.29
36	2/13/1995	52	0.968	6.23	1.25
37	2/13/1980	205	0.968	6.4	1.22
38	1/24/1969	83	0.966	6.57	1.18
39	11/14/1965	103	0.964	6.75	1.15
40	2/19/2007	48	0.96	6.92	1.13
41	1/2/1977	118	0.959	7.09	1.1
42	1/20/1982	51	0.957	7.27	1.07
43	2/11/1973	112	0.955	7.44	1.05
44	1/5/2008	69	0.947	7.61	1.02
45	10/18/2004	79	0.945	7.79	1

10-year Q:	2.972	cfs
5-year Q:	2.327	cfs
2-year Q:	1.025	cfs
Lower Flow Threshold:	50%	
0.5xQ2 (Pre):	0.512	cfs

Post-project Flow Frequency - Long-term Simulation

Statistics - Node POC8 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/28/1970	166	28.93	0.21	45
2	12/3/1966	161	27.381	0.42	22.5
3	1/5/1979	105	13.453	0.62	15
4	11/22/1965	110	13.43	0.83	11.25
5	1/14/1978	147	13.144	1.04	9
6	1/28/1980	130	12.611	1.25	7.5
7	1/3/1995	152	10.715	1.46	6.43
8	1/4/1974	186	10.542	1.66	5.63
9	2/18/2005	200	9.765	1.87	5
10	1/14/1969	379	9.404	2.08	4.5
11	12/4/1974	88	9.375	2.29	4.09
12	2/24/1983	263	9.197	2.49	3.75
13	2/4/1976	208	7.949	2.7	3.46
14	2/27/1978	203	7.911	2.91	3.21
15	1/23/1995	132	7.675	3.12	3
16	1/12/1993	215	7.077	3.33	2.81
17	5/8/1977	100	6.955	3.53	2.65
18	3/14/1982	169	6.787	3.74	2.5
19	1/27/1983	107	6.503	3.95	2.37
20	2/25/1981	233	6.148	4.16	2.25
21	1/31/1979	100	5.267	4.37	2.14
22	12/28/2004	417	5.124	4.57	2.05
23	3/2/1992	91	2.649	4.78	1.96
24	11/9/1972	202	2.569	4.99	1.88
25	12/16/1987	103	2.498	5.2	1.8
26	2/6/1992	118	2.477	5.41	1.73
27	2/13/1980	259	2.474	5.61	1.67
28	2/27/1991	118	2.43	5.82	1.61
29	2/15/1986	86	2.417	6.03	1.55
30	12/17/1970	172	2.408	6.24	1.5
31	2/24/2003	95	2.396	6.44	1.45
32	3/4/2005	91	2.393	6.65	1.41
33	2/7/1993	89	2.333	6.86	1.36
34	3/11/1995	82	2.331	7.07	1.32
35	1/25/1997	115	2.327	7.28	1.29
36	11/14/1965	145	2.207	7.48	1.25
37	11/24/1985	242	2.182	7.69	1.22
38	1/20/1982	96	2.143	7.9	1.18
39	1/7/1980	187	2.118	8.11	1.15
40	1/22/1967	115	2.064	8.32	1.13
41	1/6/1993	118	1.982	8.52	1.1
42	2/11/1973	127	1.934	8.73	1.07
43	11/30/2007	85	1.858	8.94	1.05
44	2/10/2003	109	1.851	9.15	1.02
45	10/18/2004	118	1.783	9.36	1

10-year Q:	13.271	cfs
5-year Q:	9.765	cfs
2-year Q:	3.749	cfs
Lower Flow Threshold:	50%	
0.5xQ2 (Pre):	1.875	cfs

Post-project Flow Frequency - Long-term Simulation

Statistics - Node POC9 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)	(years)
1	2/28/1970	149	32.158	0.18	45	
2	12/3/1966	156	23.356	0.35	22.5	
3	1/5/1979	108	13.592	0.53	15	
4	1/14/1969	90	12.705	0.7	11.25	
5	1/14/1978	140	11.743	0.88	9	
6	11/22/1965	105	11.097	1.05	7.5	
7	1/27/1980	125	11.007	1.23	6.43	
8	1/3/1995	144	9.76	1.41	5.63	
9	12/4/1974	84	8.72	1.58	5	
10	5/8/1977	100	8.405	1.76	4.5	
11	2/18/2005	189	7.483	1.93	4.09	
12	2/24/1983	246	6.46	2.11	3.75	
13	1/4/1974	180	6.402	2.28	3.46	
14	2/4/1976	211	5.187	2.46	3.21	
15	3/2/1992	86	5.008	2.64	3	
16	1/23/1995	125	4.853	2.81	2.81	
17	1/27/1983	101	4.824	2.99	2.65	
18	1/31/1979	93	4.678	3.16	2.5	
19	2/27/1978	191	4.677	3.34	2.37	
20	3/14/1982	160	4.67	3.51	2.25	
21	2/6/1992	111	4.627	3.69	2.14	
22	3/4/2005	88	4.528	3.87	2.05	
23	1/12/1993	202	4.235	4.04	1.96	
24	1/7/2005	169	4.228	4.22	1.88	
25	2/28/1981	157	4.228	4.39	1.8	
26	1/22/1967	102	4.222	4.57	1.73	
27	2/24/2003	90	4.066	4.75	1.67	
28	12/16/1987	97	3.964	4.92	1.61	
29	3/11/1995	77	3.753	5.1	1.55	
30	2/27/1991	113	3.724	5.27	1.5	
31	2/7/1993	83	3.716	5.45	1.45	
32	2/15/1986	81	3.685	5.62	1.41	
33	11/30/2007	87	3.463	5.8	1.36	
34	1/24/1969	129	3.328	5.98	1.32	
35	11/9/1972	193	3.314	6.15	1.29	
36	11/24/1985	162	3.295	6.33	1.25	
37	2/13/1995	93	3.274	6.5	1.22	
38	1/25/1997	110	3.246	6.68	1.18	
39	1/20/1982	92	3.24	6.85	1.15	
40	2/13/1980	247	3.201	7.03	1.13	
41	11/14/1965	140	3.173	7.21	1.1	
42	2/10/2003	101	3.157	7.38	1.07	
43	1/5/2008	112	3.137	7.56	1.05	
44	2/19/2007	80	3.128	7.73	1.02	
45	11/21/1996	80	3.109	7.91	1	

12.171	cfs
8.720	cfs
4.365	cfs
50%	
2.183	cfs

Post-project Flow Frequency - Long-term Simulation

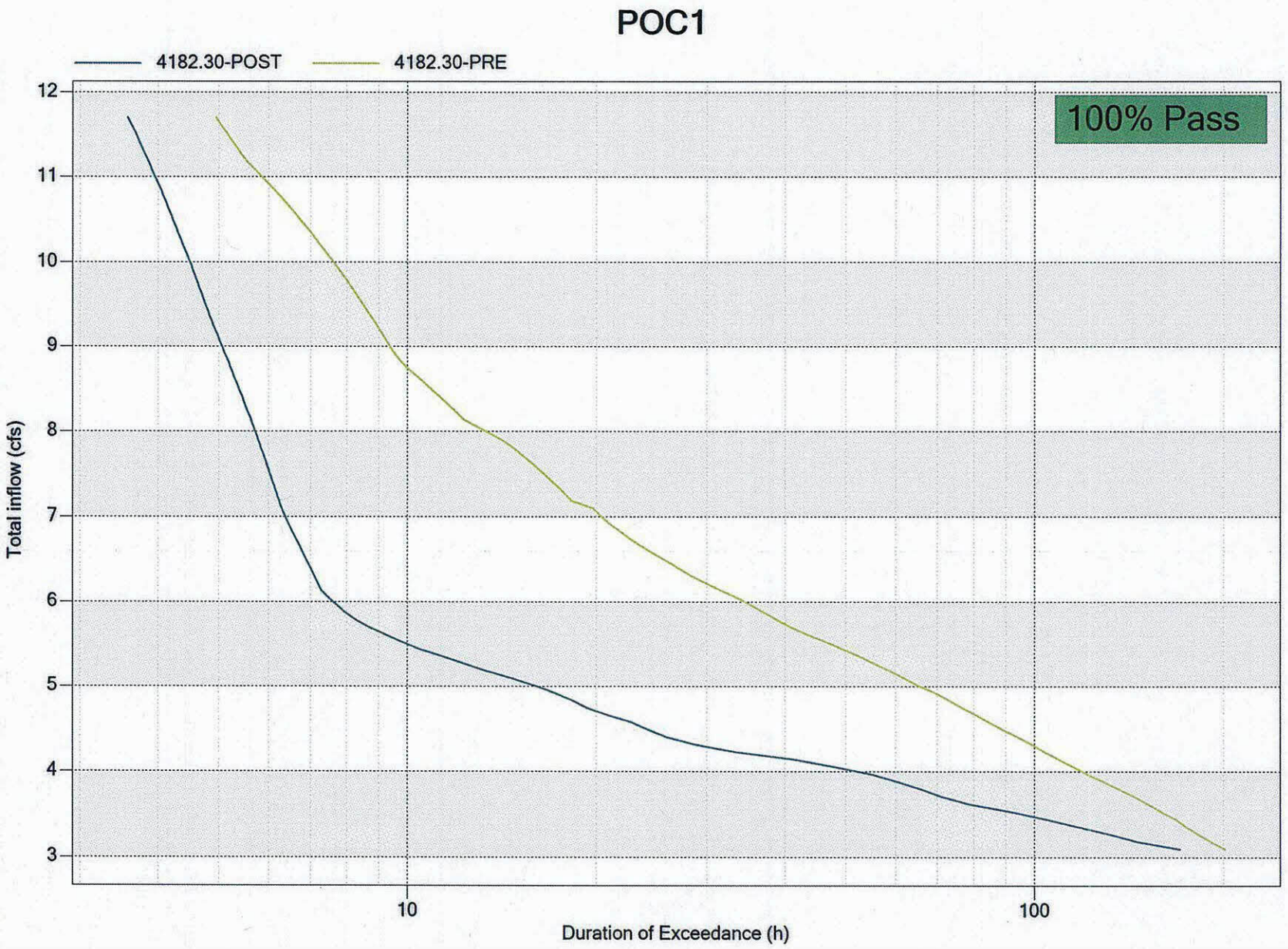
Statistics - Node POC10 Total Inflow

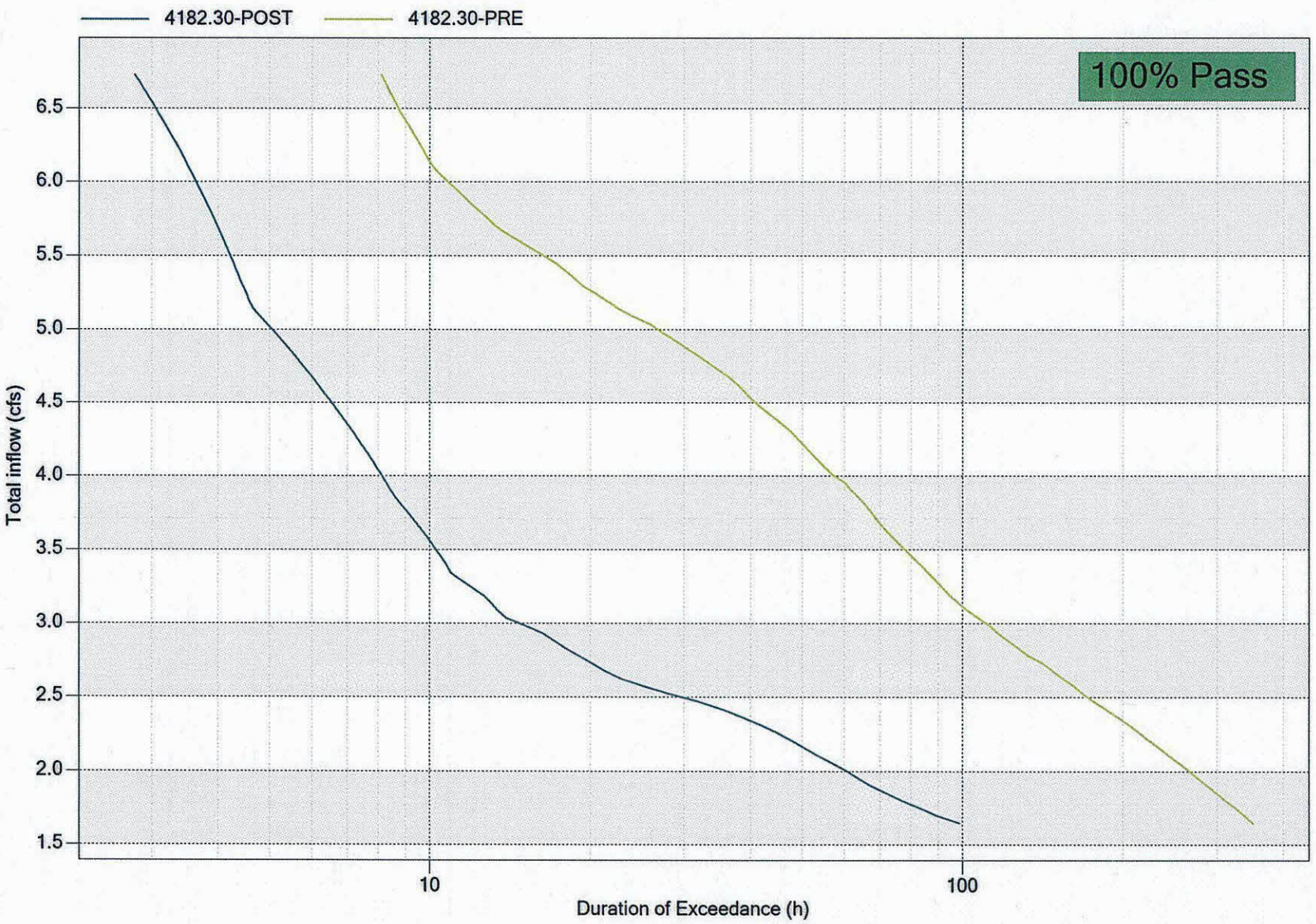
Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)	(years)
1	2/28/1970	49	3.108	0.17	45	
2	12/3/1966	94	2.225	0.34	22.5	
3	1/14/1969	28	1.679	0.51	15	
4	1/5/1979	38	1.339	0.68	11.25	
5	12/4/1974	24	1.164	0.85	9	
6	1/3/1995	51	1.112	1.02	7.5	
7	1/27/1980	67	1.021	1.18	6.43	
8	5/8/1977	27	1.006	1.35	5.63	
9	1/14/1978	74	0.841	1.52	5	
10	2/21/2005	62	0.83	1.69	4.5	
11	11/22/1965	42	0.805	1.86	4.09	
12	3/2/1992	30	0.8	2.03	3.75	
13	2/26/1983	161	0.773	2.2	3.46	
14	2/4/1976	155	0.762	2.37	3.21	
15	11/13/1972	33	0.756	2.54	3	
16	2/24/2003	32	0.727	2.71	2.81	
17	2/7/1993	41	0.697	2.88	2.65	
18	1/4/1974	140	0.689	3.05	2.5	
19	3/4/2005	29	0.687	3.21	2.37	
20	2/6/1992	28	0.686	3.38	2.25	
21	1/25/1995	31	0.682	3.55	2.14	
22	1/27/1983	56	0.651	3.72	2.05	
23	1/22/1967	25	0.65	3.89	1.96	
24	2/13/1995	38	0.639	4.06	1.88	
25	1/31/1979	35	0.636	4.23	1.8	
26	3/11/1995	31	0.634	4.4	1.73	
27	2/15/1986	24	0.632	4.57	1.67	
28	2/27/1978	89	0.608	4.74	1.61	
29	12/16/1987	27	0.599	4.91	1.55	
30	3/17/1982	56	0.587	5.08	1.5	
31	2/6/1969	21	0.586	5.25	1.45	
32	2/19/2007	30	0.579	5.41	1.41	
33	1/25/1997	35	0.568	5.58	1.36	
34	1/20/1982	34	0.563	5.75	1.32	
35	1/7/2005	107	0.562	5.92	1.29	
36	11/13/1998	16	0.56	6.09	1.25	
37	2/11/1973	60	0.56	6.26	1.22	
38	1/2/1977	23	0.541	6.43	1.18	
39	1/12/1993	155	0.537	6.6	1.15	
40	1/4/1978	67	0.535	6.77	1.13	
41	2/10/2003	63	0.531	6.94	1.1	
42	11/14/1965	103	0.515	7.11	1.07	
43	9/25/1986	20	0.512	7.28	1.05	
44	1/24/1969	76	0.501	7.45	1.02	
45	11/30/2007	33	0.496	7.61	1	

1.242	cfs
0.841	cfs
0.650	cfs
50%	
0.325	cfs

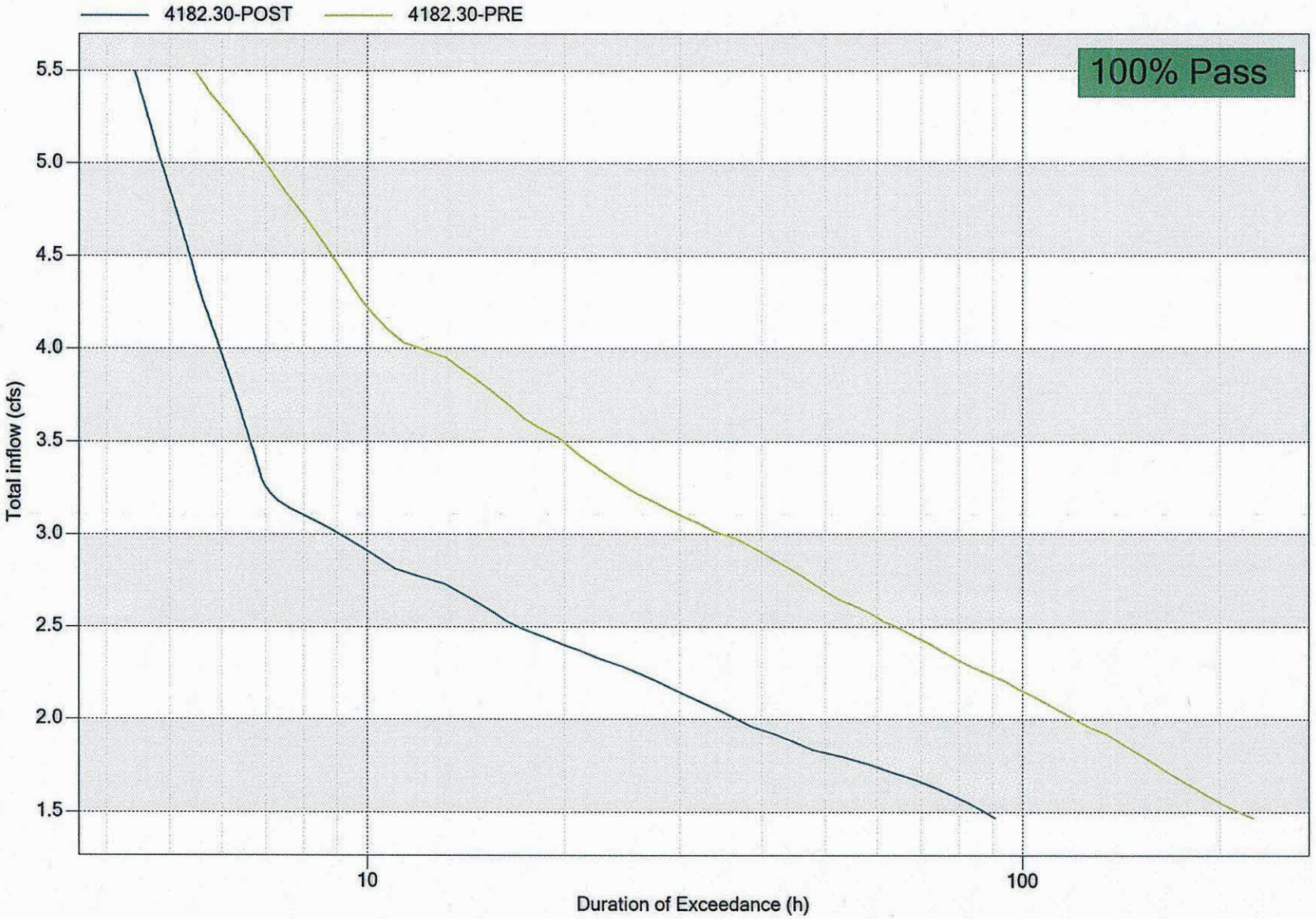
Attachment 6

Flow Duration Comparison Curve

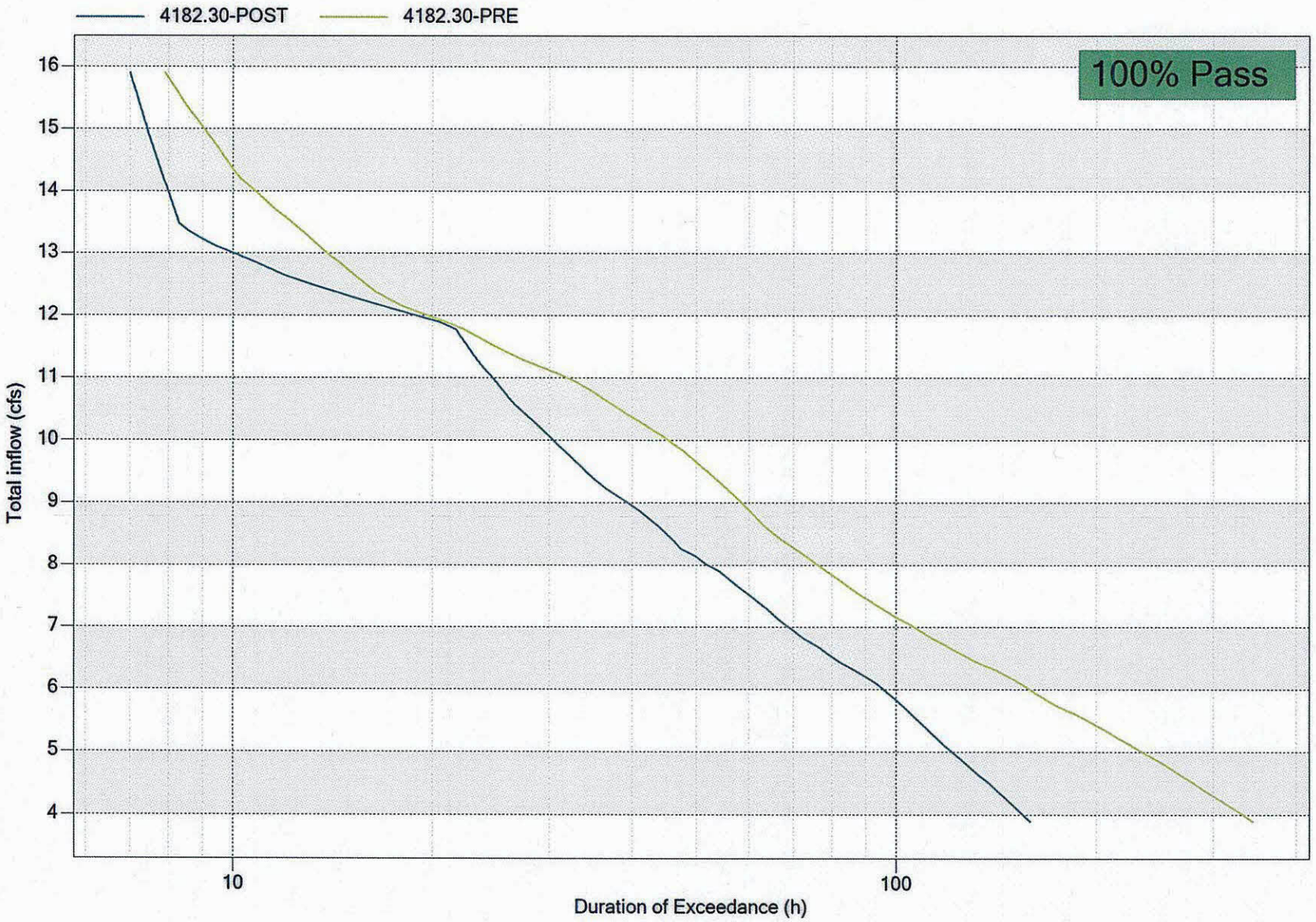

POC1
4182.30-POST
4182.30-PRE
100% Pass
Total inflow (cfs)
12
11
10
9
8
7
6
5
4
3
10
100
Duration of Exceedance (h)

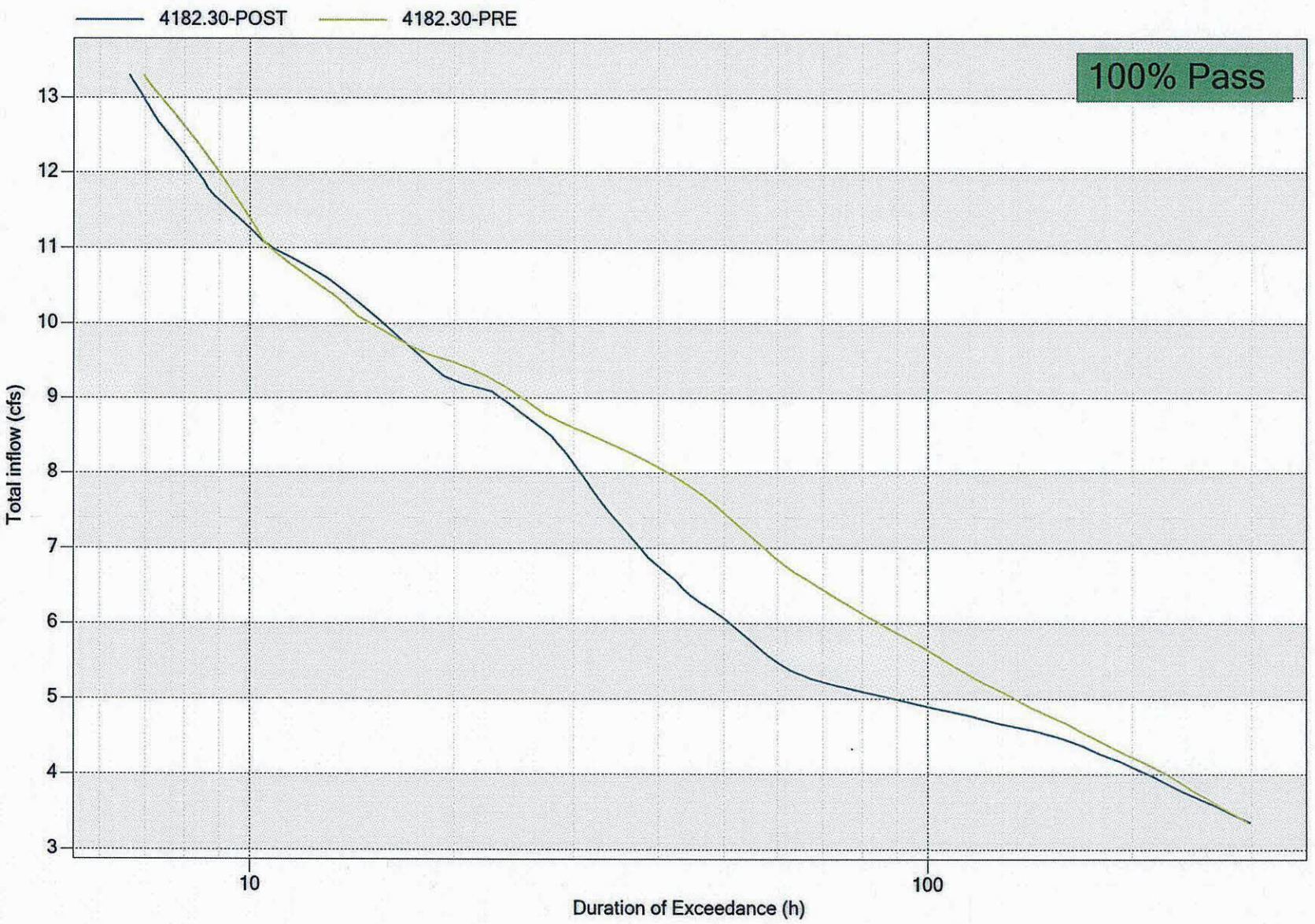

POC6
4182.30-POST
4182.30-PRE
100% Pass
Total inflow (cfs)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
10
100
Duration of Exceedance (h)

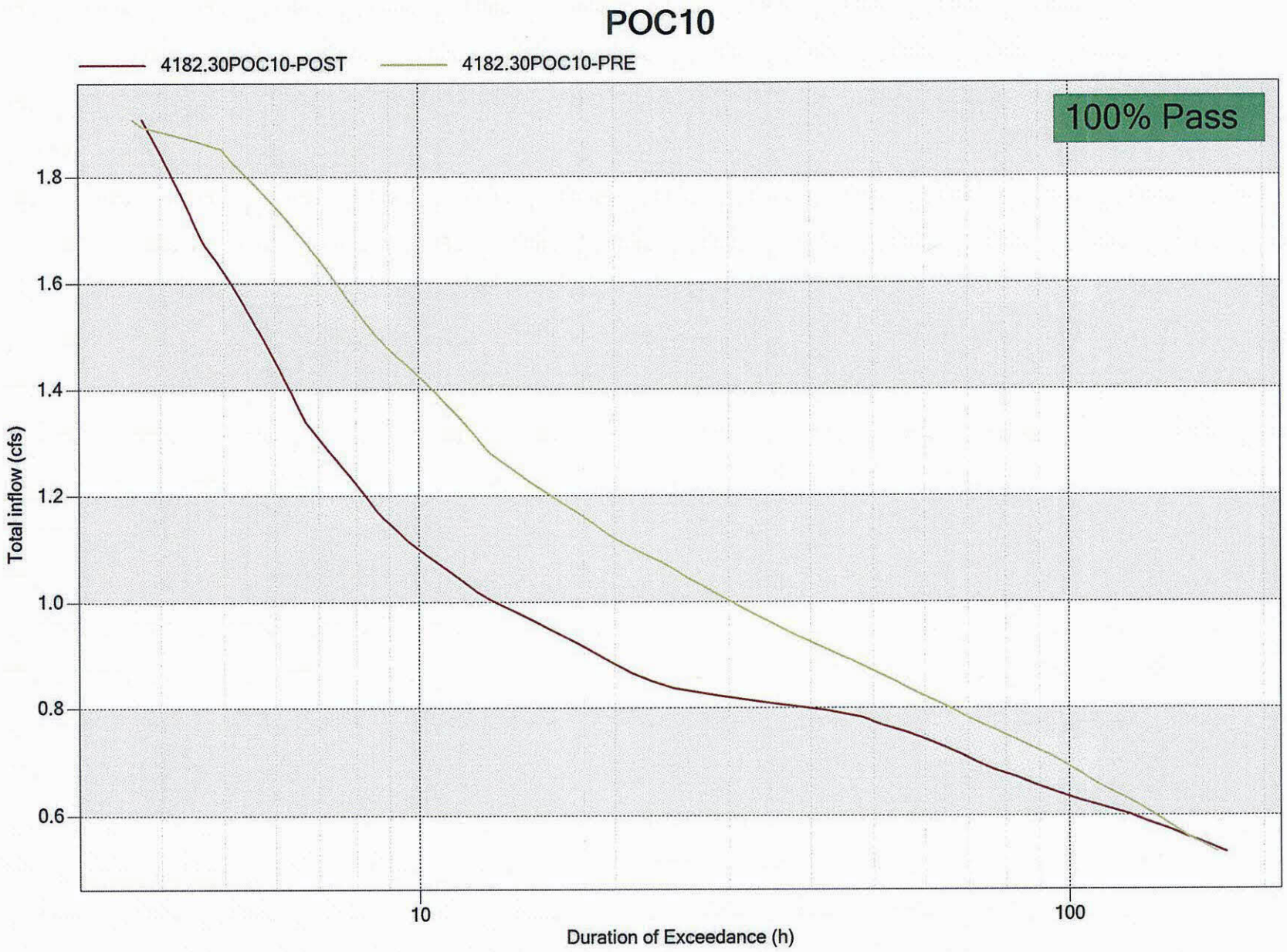
POC7


4182.30-POST
4182.30-PRE
100% Pass
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
Total inflow (cfs)
10
100
Duration of Exceedance (h)

POC8


4182.30-POST
4182.30-PRE
100% Pass
Total inflow (cfs)
16
15
14
13
12
11
10
9
8
7
6
5
4
10
100
Duration of Exceedance (h)


POC9
4182.30-POST
4182.30-PRE
100% Pass
Total inflow (cfs)
13
12
11
10
9
8
7
6
5
4
3
10
100
Duration of Exceedance (h)


POC10
4182.30POC10-POST
4182.30POC10-PRE
100% Pass
1.8
1.6
1.4
1.2
1.0
0.8
0.6
Total inflow (cfs)
10
100
Duration of Exceedance (h)