County of San Diego
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Rancho Sierra Subdivision
PERMIT NO: PDS-2015-TM-5601

South Grade Road, Alpine

ASSESSOR'S PARCEL NUMBER(S):
404-430-45-00

ENGINEER OF WORK:

Patric de Boer RCE 83583
Registration Expires: 3/31/2019

PREPARED FOR:

BSB Co.
Attn: Brad Bailey.
10035 Prospect Avenue
Santee, CA 92071

PDP SWQMP PREPARED BY:

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, STE. B
SAN DIEGO, CA 92123
(619) 634-8620

DATE OF SWQMP:
October 18th, 2017

PLANS PREPARED BY:
OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, STE. B
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(619) 634-8620

SWQMP APPROVED BY:

APPROVAL DATE:

SDC PDS RCVD 02-15-18
TM5601


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COUNTY OF SAN DIEGO
MDCCCLI

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Table of Contents

Attachments

Acronyms

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
BMP DM	Best Management Practice Design Manual
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDCI	Private Development Construction Inspection Section
PDP	Priority Development Project
PDS	Planning and Development Services
PE	Professional Engineer
RPO	Resource Protection Ordinance
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan
WMAA	Watershed Management Area Analysis
WPO	Watershed Protection Ordinance
WQIP	Water Quality Improvement Plan

PDP SWQMP Preparer's Certification Page

Project Name: Rancho Sierra Subdivision
Permit Application Number: PDS-2015-TM-5601

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

I have read and understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by County staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

_____
Engineer of Work's Signature, PE Number & Expiration Date

Patric de Boer
Print Name

Omega Engineering Consultant
Company

_____
Date

Engineer's Seal:

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Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	1/26/2017	Initial Submittal
2	6/26/2017	Updated per redlines
3	10/18/2017	Site Plan Changes, SWMM calcs added
4		

Final Design

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

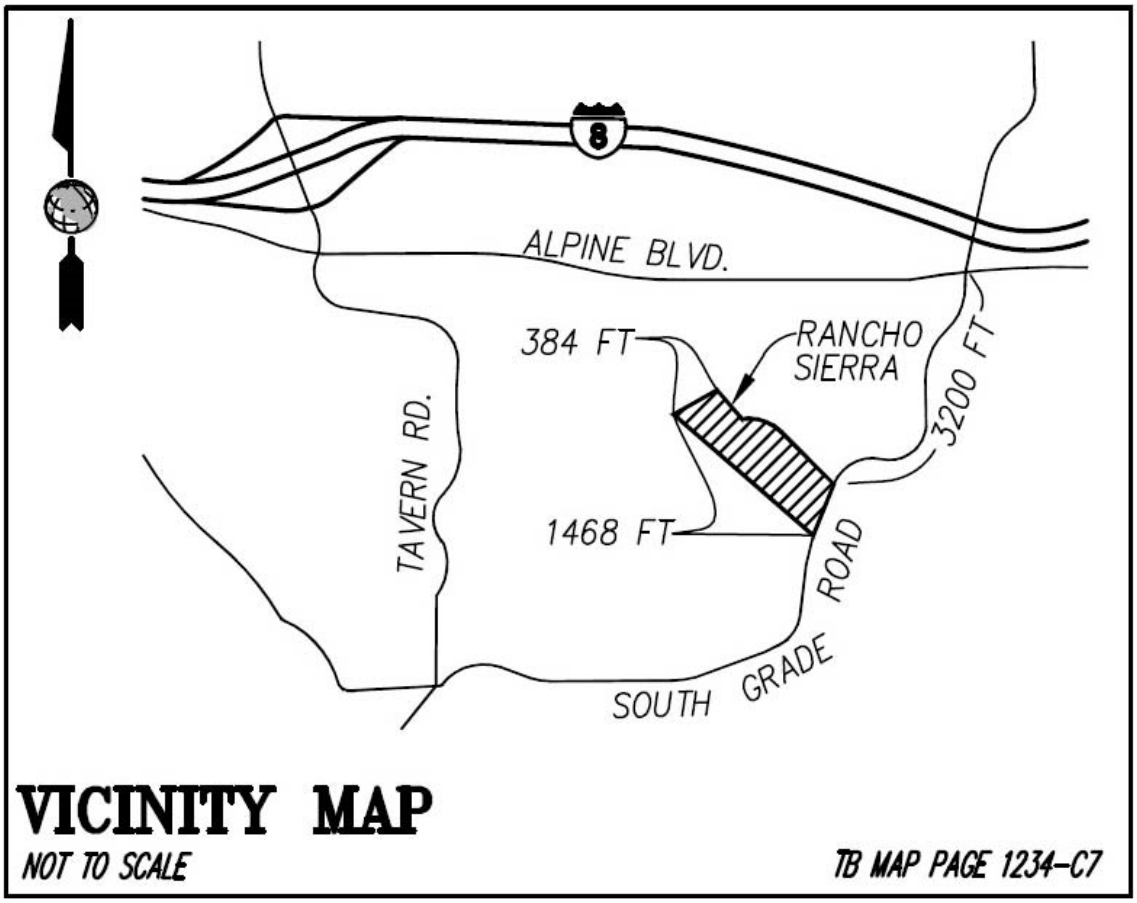
Plan Changes

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Project Vicinity Map

Project Name: Rancho Sierra Subdivision
Record ID: PDS-2015-TM-5601

Site Vicinity Map



Step 1: Project type determination (Standard or Priority Development Project)

Is the project part of another Priority Development Project (PDP)? (☐ Yes ☒ No If so, a PDP SWQMP is required. Go to Step 2.			
The project is (select one): ☒ New Development ☐ Redevelopment[1]			
The total proposed newly created or replaced impervious area is: 134220 ft^2			
The total existing (pre-project) impervious area is: 17400 ft^2			
The total area disturbed by the project is: 526858 ft^2			
If the total area disturbed by the project is 1 acre (43,560 sq. ft.) or more OR the project is part of a larger common plan of development disturbing 1 acre or more, a Waste Discharger Identification (WDID) number must be obtained from the State Water Resources Control Board. WDID: ___			
Is the project in any of the following categories, (a) through (f)?[2]			
Yes ☒	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces [3](collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ☒	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

[1] Redevelopment is defined as: The creation and/or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include routine maintenance activities, such as trenching and resurfacing associated with utility work; pavement grinding; resurfacing existing roadways; new sidewalks construction; pedestrian ramps; or bike lanes on existing roads; and routine replacement of damaged pavement, such as pothole repair.

[2] Applicants should note that any development project that will create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) is considered a new development.

[3] For solar energy farm projects, the area of the solar panels does not count toward the total impervious area of the site.

Project type determination (continued)

Yes ☐	No ☒	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☐	No ☒	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☒	No ☐	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See BMP Design Manual Section 1.4.2 for additional guidance.*

Does the project meet the definition of one or more of the Priority Development Project categories (a) through (f) listed above?

☐ No – the project is not a Priority Development Project (Standard Project).

☒ Yes – the project is a Priority Development Project (PDP).

Further guidance may be found in Chapter 1 and Table 1-2 of the BMP Design Manual.

The following is for **redevelopment PDPs only**:

The area of existing (pre-project) impervious area at the project site is: ft² (A)
The total proposed newly created or replaced impervious area is ft² (B)
Percent impervious surface created or replaced (B/A)*100: %
The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – **only newly created or replaced impervious areas are considered a PDP and subject to stormwater requirements**

OR

☐ greater than fifty percent (50%) – **the entire project site is considered a PDP and subject to stormwater requirements**

Step 1.1: Storm Water Quality Management Plan requirements

Step	Answer	Progression
Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, complete Step 1 Project Type Determination Checklist on Pages 1 and 2, and see PDP exemption information below. For further guidance, see Section 1.4 of the BMP Design Manual *in its entirety*.	☐ Standard Project	Standard Project requirements apply, including Standard Project SWQMP. **Complete Standard Project SWQMP.**
	☒ PDP	Standard and PDP requirements apply, including PDP SWQMP. **Complete PDP SWQMP.**
	☐ PDP with ACP	If participating in offsite alternative compliance, **complete Step 6.3 and an ACP SWQMP.**
	☐ PDP Exemption	**Go to Step 1.2 below.**

Step 1.2: Exemption to PDP definitions

Is the project exempt from PDP definitions based on either of the following:	If so:
☐ Projects that are only new or retrofit paved sidewalks, bicycle lanes, or trails that meet the following criteria: (i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR (ii) Designed and constructed to be hydraulically disconnected from paved streets or roads [i.e., runoff from the new improvement does not drain directly onto paved streets or roads]; OR (iii) Designed and constructed with permeable pavements or surfaces in accordance with County of San Diego Guidance on Green Infrastructure;	Standard Project requirements apply, AND any additional requirements specific to the type of project. County concurrence with the exemption is required. *Provide discussion and list any additional requirements below in this form.* **Complete Standard Project SWQMP**
☐ Projects that are only retrofitting or redeveloping existing paved alleys, streets or roads that are designed and constructed in accordance with the County of San Diego Guidance on Green Infrastructure.	**Complete Green Streets PDP Exempt SWQMP.**
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:	

Step 2: Construction Storm Water BMP Checklist

Minimum Required Standard Construction Storm Water BMPs		
If you answer "Yes" to any of the questions below, your project is subject to Table 1 on the following page (Minimum Required Standard Construction Stormwater BMPs). As noted in Table 1, please select at least the minimum number of required BMPs, or as many as are feasible for your project. If no BMP is selected, an explanation must be given in the box provided. The following questions are intended to aid in determining construction BMP requirements for your project. **Note: All selected BMPs below must be included on the BMP plan incorporated into the construction plan sets.**		
1. Will there be soil disturbing activities that will result in exposed soil areas? (This includes minor grading and trenching.) **Reference Table 1 Items A, B, D, and E** Note: Soil disturbances NOT considered significant include, but are not limited to, change in use, mechanical/electrical/plumbing activities, signs, temporary trailers, interior remodeling, and minor tenant improvement.	☒Yes	☐No
2. Will there be asphalt paving, including patching? **Reference Table 1 Items D and F**	☒Yes	☐No
3. Will there be slurries from mortar mixing, coring, or concrete saw cutting? **Reference Table 1 Items D and F**	☒Yes	☐No
4. Will there be solid wastes from concrete demolition and removal, wall construction, or form work? **Reference Table 1 Items D and F**	☒Yes	☐No
5. Will there be stockpiling (soil, compost, asphalt, concrete, solid waste) for over 24 hours? **Reference Table 1 Items D and F**	☒Yes	☐No
6. Will there be dewatering operations? **Reference Table 1 Items C and D**	☐Yes	☒No
7. Will there be temporary on-site storage of construction materials, including mortar mix, raw landscaping and soil stabilization materials, treated lumber, rebar, and plated metal fencing materials? **Reference Table 1 Items E and F**	☒Yes	☐No
8. Will trash or solid waste product be generated from this project? **Reference Table 1 Item F**	☐Yes	☐No
9. Will construction equipment be stored on site (e.g.: fuels, oils, trucks, etc.?) **Reference Table 1 Item F**	☒Yes	☐No
10. Will Portable Sanitary Services ("Porta-potty") be used on the site? **Reference Table 1 Item F**	☒Yes	☐No

Table 1. Construction Storm Water BMP Checklist

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook[4] Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
A. Select Erosion Control Method for Disturbed Slopes (choose at least one for the appropriate season)			
Vegetation Stabilization Planting[5] (Summer)	SS-2, SS-4	☐	
Hydraulic Stabilization Hydroseeding[2] (Summer)	SS-4	☒	
Bonded Fiber Matrix or Stabilized Fiber Matrix[6] (Winter)	SS-3	☐	
Physical Stabilization Erosion Control Blanket[3] (Winter)	SS-7	☐	
B. Select erosion control method for disturbed flat areas (slope < 5%) (choose at least one)			
County Standard Lot Perimeter Protection Detail	PDS 659[7], SC-2	☒	
Will use erosion control measures from Item A on flat areas also	SS-3, 4, 7	☐	
County Standard Desilting Basin (must treat all site runoff)	PDS 660[8], SC-2	☐	
Mulch, straw, wood chips, soil application	SS-6, SS-8	☐	

4 State of California Department of Transportation (Caltrans). 2003. Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual. March. Available online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm.

5 If Vegetation Stabilization (Planting or Hydroseeding) is proposed for erosion control it may be installed between May 1st and August 15th. Slope irrigation is in place and needs to be operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. The owner must implement a contingency physical BMP by August 15th if vegetation establishment does not occur by that date. If landscaping is proposed, erosion control measures must also be used while landscaping is being established. Established vegetation must have a subsurface mat of intertwined mature roots with a uniform vegetative coverage of 70 percent of the natural vegetative coverage or more on all disturbed areas.

6 All slopes over three feet must have established vegetative cover prior to final permit approval.

7 County of San Diego, Planning & Development Services. 2012. Standard Lot Perimeter Protection Design System. Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds659.pdf.

8 County of San Diego, Planning & Development Services. 2012. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds660.pdf.

Table 1. Construction Storm Water BMP Checklist (continued)

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
C. If runoff or dewatering operation is concentrated, velocity must be controlled using an energy dissipater			
Energy Dissipater Outlet Protection[9]	SS-10	☒	
D. Select sediment control method for all disturbed areas (choose at least one)			
Silt Fence	SC-1	☒	
Fiber Rolls (Straw Wattles)	SC-5	☒	
Gravel & Sand Bags	SC-6 & 8	☒	
Dewatering Filtration	NS-2	☐	
Storm Drain Inlet Protection	SC-10	☒	
Engineered Desilting Basin (sized for 10-year flow)	SC-2	☐	
E. Select method for preventing offsite tracking of sediment (choose at least one)			
Stabilized Construction Entrance	TC-1	☒	
Construction Road Stabilization	TC-2	☒	
Entrance/Exit Tire Wash	TC-3	☐	
Entrance/Exit Inspection & Cleaning Facility	TC-1	☐	
Street Sweeping and Vacuuming	SC-7	☒	
F. Select the general site management BMPs			
F.1 Materials Management			
Material Delivery & Storage	WM-1	☒	
Spill Prevention and Control	WM-4	☒	
F.2 Waste Management[10]			
Waste Management Concrete Waste Management	WM-8	☒	
Solid Waste Management	WM-5	☒	
Sanitary Waste Management	WM-9	☒	
Hazardous Waste Management	WM-6	☐	

Note: The Construction General Permit (Order No. 2009-0009-DWQ) also requires all projects not subject to the BMP Design Manual to comply with runoff reduction requirements through the implementation of post-construction BMPs as described in Section XIII of the order.

[9] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater is also acceptable for velocity reduction.

[10] Not all projects will have every waste identified. The applicant is responsible for identifying wastes that will be onsite and applying the appropriate BMP. For example, if concrete will be used, BMP WM-8 must be selected.

Step 3: County of San Diego PDP SWQMP Site Information Checklist

Step 3.1: Description of Existing Site Condition

Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Area: El Capitan; Subarea: El Capitan; 907.33 Area: Upper Sweetwater; Subarea: Loveland 909.20

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Demolition completed without new construction
- ☐ Agricultural or other non-impervious use
- ☒ Vacant, undeveloped/natural

Description / Additional Information:

The site is an undeveloped parcel with natural surface cover. As the site is crested, it drains to the east and the west, to two separate hydrologic units. No drainage improvements existin onsite, runoff is conveyed via natural surface flow to discharge points at the east and west boundary of the site.

Existing Land Cover Includes (select all that apply and provide each area on site):

- ☒ Vegetative Cover 11.5 Acres (500,940 Square Feet)
- ☐ Non-Vegetated Pervious Areas _____ Acres (_____ Square Feet)
- ☒ Impervious Areas 0.59 Acres (25,700 Square Feet)

Description / Additional Information:

Vegetative cover is natural

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☒ NRCS Type C
- ☐ NRCS Type D

Approximate Depth to Groundwater (GW) (or N/A if no infiltration is used):

- ☐ GW Depth < 5 feet
- ☐ 5 feet < GW Depth < 10 feet
- ☐ 10 feet < GW Depth < 20 feet
- ☒ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒ None
☐ Other

Description / Additional Information:

Step 3.2: Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

(1) Whether existing drainage conveyance is natural or urban;
(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
(3) Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

1: Existing Drainage is natural, no drainage improvements exist onsite.

2: No offsite runoff enters the site. No flow is conveyed through the site.

3: No storm drain system exists on the project site. Runoff is conveyed via overland flow to the discharge points at the west, north and east boundary of the site see chart below for a summary of existing 100-yr flows

4: The westerly portion of the site drains via overland flow and concentrated natural surface flow to a discharge point at the westerly boundary of the site. The central portion of the site drains via overland flow and concentrated natural surface flow to a discharge point at the northerly boundary. The easterly portion of the site drains to a 12" culvert under south grade road. Below is a summary of the flow at each of the three discharge points.

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)	Discharge Pt Q_{100} (cfs)
EX-1	3.66	0.37	11.2	6.85	DP-1 = 6.85
EX-2	2.97	0.30	9.60	4.65	DP-2 = 4.65
EX-3	5.46	0.30	7.70	7.92	DP-3 = 7.92

Proposed conditions will use storage and outlet control to attenuate the flow to not exceed existing conditions. Hydrology and hydraulics calculations can be found in the Drainage Study included in Appendix 6 of this report.

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:
The project proposes the construction of a 10 single family residential buildings. The site development will include a private street to provide access to all 10 of the lots.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):
Proposed Imervious feature include Paving (AC and PCC) and building rooftop

List/describe proposed pervious features of the project (e.g., landscape areas):
Pervious features include landscaping, natural vegetation and rock filled infiltration trenches.

Does the project include grading and changes to site topography?
☒Yes
☐No

Description / Additional Information:
10 building pads will be constructed in both fill and cut conditions. The general runoff flow paths will remain the same, as will the three discharge points.

Insert acreage or square feet for the different land cover types in the table below:

Change in Land Cover Type Summary			
Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	11.5	9.43	-17%
Pervious (non-vegetated)			
Impervious	0.59	3.08	+20

Step 3.4: Description of Proposed Site Drainage Patterns

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒Yes

☐No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:

Project will construct a storm drain system, which will consist of gutters, swales, pipes and infiltration basins. The general drainage pattern of the existing site will be followed with the westerly portion of the site draining to the west, the central portion draining to the north, and the easterly portion draining to the east. Below is a table of calculated discharges for the 100 year storm.

Proposed conditions will use storage and outlet control to attenuate the flow to not exceed existing conditions. Hydrology and hydraulics calculations can be found in the Drainage Study included in Appendix 6 of this report.

Step 3.5: Potential Pollutant Source Areas

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply). Select "Other" if the project is a phased development and provide a description:

- ☒ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☐ Need for future indoor & structural pest control
- ☒ Landscape/Outdoor Pesticide Use
- ☒ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☐ Refuse areas
- ☐ Industrial processes
- ☐ Outdoor storage of equipment or materials
- ☐ Vehicle and Equipment Cleaning
- ☐ Vehicle/Equipment Repair and Maintenance
- ☐ Fuel Dispensing Areas
- ☐ Loading Docks
- ☐ Fire Sprinkler Test Water
- ☐ Miscellaneous Drain or Wash Water
- ☐ Plazas, sidewalks, and parking lots
- ☐ Other (provide description)

Description / Additional Information:
N/A

Step 3.6: Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable): The westerly discharge point flows through un-named natural channels until it confluences with Chocolate Creek, then El Capitan Reservoir, then San Diego River, and then The Pacific Ocean. Runoff from the northerly and easterly discharge point are conveyed by unnamed natural channels until they confluence with Upper Sweetwater River, then Sweetwater Reservoir, then Lower Sweetwater river, and then San Diego Bay.

List any 303(d) impaired water bodies[11] within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Lower San Diego River	*Enteroccocus,* *Fecal Coliform* *Low Dissolved Oxygen* *Maganese* *Nitrogen* *Phosphorus* *Total Dissolved Solids* *Toxicity*	*Est. Completion 2021* *Est. Completion 2019* *Est. Completion 2019* *Est. Completion 2021* *Est. Completion 2019* *Est. Completion 2019* *Est. Completion 2019* *Est. Completion 2021*

Identification of Project Site Pollutants*

*Identification of project site pollutants below is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs. Note the project must also participate in an alternative compliance program (unless prior lawful approval to meet earlier PDP requirements is demonstrated).

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☒	☐
Nutrients	☐	☒	☐
Heavy Metals	☐	☒	☐
Organic Compounds	☐	☒	☐
Trash & Debris	☐	☒	☐

[11] The current list of Section 303(d) impaired water bodies can be found at http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

Oxygen Demanding Substances	☐	☒	☐
Oil & Grease	☐	☒	☐
Bacteria & Viruses	☐	☒	☐
Pesticides	☐	☐	☐

Step 3.7: Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

☒Yes, hydromodification management requirements for flow control and preservation of critical coarse sediment yield areas are applicable.

☐No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA[12] for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

N/A

[12] The Watershed Management Area Analysis (WMAA) is an optional element for inclusion in the Water Quality Improvement Plans (WQIPs) described in the 2013 MS4 Permit [Provision B.3.b.(4)]. It is available online at the Project Clean Water website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=248

Step 3.7.1: Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Projects must satisfy critical coarse sediment yield area (CCSYA) requirements by characterizing the project as one of the scenario-types presented below and satisfying associated criteria. Projects must appropriately satisfy all requirements for identification, avoidance, and bypass, OR may alternatively elect to demonstrate no net impact.

☐ **Scenario 1**: Project is subject to and in compliance with RPO requirements *(without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3) that result in impacts to more than 15% of the project-scale CCSYAs)*.

- ☐ Identify: Project has identified both onsite and upstream CCSYAs as areas that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☐ Avoid: Project has avoided onsite CCSYAs per existing RPO steep slope encroachment criteria. AND,
- ☐ Bypass: Project has demonstrated that both onsite and upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 1 criteria above and must alternatively demonstrate no net impact to the receiving water.

☒ **Scenario 2**: Project is entirely exempt/not subject to RPO requirements without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3).

- ☒ Identify: Project has identified upstream CCSYAs that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☒ Avoid: Project is not required to avoid onsite CCSYAs as none were identified in the previous step. AND,
- ☒ Bypass: Project has demonstrated that upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 2 criteria above and must alternatively demonstrate no net impact to the receiving water. *(Skip to next row).*

☐ **Scenario 3**: Project utilizes exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3) and impacts more than 15% of the project-scale CCSYAs.

- ☐ No Net Impact: Project is not eligible for traditional methods of identification, avoidance, and bypass. Project must demonstrate no net impact to the receiving water.

Critical Coarse Sediment Yield Areas Continued
Demonstrate No Net Impact
If the project elects to satisfy CCSYA criteria through demonstration of no net impact to the receiving water. Applicants must identify the methods utilized from the list below and provide supporting documentation in Attachment 2c of the SWQMP. Check all that are applicable. ☒ N/A, the project appropriately identifies, avoids, and bypasses CCSYAs. ☐ Project has performed additional analysis to demonstrate that impacts to CCSYAs satisfy the no net impact standard of Ep/Sp≤1.1. ☐ Project has provided alternate mapping of CCSYAs. ☐ Project has implemented additional onsite hydromodification flow control measures. ☐ Project has implemented an offsite stream rehabilitation project to offset impacts. ☐ Project has implemented other applicant-proposed mitigation measures.

Step 3.7.2: Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit. The project has three points of compliance, POC#1 is located at the easterly boundary of the site, POC#2 is located at the northerly boundary of the site and POC#3 is located at the westerly boundary.
Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 *If a geomorphic assessment has been performed, provide title, date, and preparer:* *N/A* *Discussion / Additional Information: (optional)* N/A

Step 3.8: Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

N/A

Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed. N/A

Step 4: Source Control BMP Checklist

Source Control BMPs			
All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the County BMP Design Manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following: • "Yes" means the project will implement the source control BMP as described in Chapter 4.2 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification must be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.1 not implemented: N/A			
4.2.2 Storm Drain Stenciling or Signage	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.3 not implemented: N/A			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.4 not implemented: N/A			

Source Control Requirement	Applied?		
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☒No	☐N/A
Discussion / justification if 4.2.5 not implemented: No trash storage areas onsite. Each house will have its own covered trash bin.			
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below):			
☒ A. On-site storm drain inlets	☒Yes	☐No	☐N/A
☐ B. Interior floor drains and elevator shaft sump pumps	☐Yes	☐No	☒N/A
☐ C. Interior parking garages	☐Yes	☐No	☒N/A
☒ D. Need for future indoor & structural pest control	☒Yes	☐No	☐N/A
☒ E. Landscape/outdoor pesticide use	☒Yes	☐No	☐N/A
☐ F. Pools, spas, ponds, fountains, and other water features	☐Yes	☐No	☒N/A
☐ G. Food service	☐Yes	☐No	☒N/A
☐ H. Refuse areas	☐Yes	☐No	☒N/A
☐ I. Industrial processes	☐Yes	☐No	☒N/A
☐ J. Outdoor storage of equipment or materials	☐Yes	☐No	☒N/A
☐ K. Vehicle and equipment cleaning	☐Yes	☐No	☒N/A
☐ L. Vehicle/equipment repair and maintenance	☐Yes	☐No	☒N/A
☐ M. Fuel dispensing areas	☐Yes	☐No	☒N/A
☐ N. Loading docks	☐Yes	☐No	☒N/A
☐ O. Fire sprinkler test water	☐Yes	☐No	☒N/A
☐ P. Miscellaneous drain or wash water	☐Yes	☐No	☒N/A
☐ Q. Plazas, sidewalks, and parking lots	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			

Note: Show all source control measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 5: Site Design BMP Checklist

Site Design BMPs
All development projects must implement site design BMPs SD-A through SD-H where applicable and feasible. See Chapter 4.3 and Appendix E of the County BMP Design Manual for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following: • "Yes" means the project will implement the site design BMP as described in Chapter 4.3 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification must be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.1 not implemented: Proposed site will use natural earthen conveyances wherever possible			
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.2 not implemented: Disturbed areas have been designed to the minimum required for the proposed use.			
4.3.3 Minimize Impervious Area	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.3 not implemented: Impervious areas have been designed to the minimum width and footprint required for the proposed use			
4.3.4 Minimize Soil Compaction	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.5 not implemented:			

Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☐Yes	☒No	☐N/A
Discussion / justification if 4.3.6 not implemented: Project is designed to collect and infiltrate stormwater in three infiltration facilities. Smaller localized collection and infiltration will not have a net impact on the downstream water ways			
4.3.7 Landscaping with Native or Drought Tolerant Species	☒Yes	☒No	☐N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvesting and Using Precipitation	☐Yes	☒No	☐N/A
Discussion / justification if 4.3.8 not implemented: The proposed demand is not enough to consider the use of harvest and use as feasible.			

Note: Show all site design measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 6: PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the County at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the County must confirm the maintenance (see Section 7 of the BMP Design Manual).

Use this section to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (Step 6.2) for each structural BMP within the project (copy the BMP summary information sheet [Step 6.2] as many times as needed to provide summary information for each individual structural BMP).

Step 6.1: Description of structural BMP strategy

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.

The site has been designed to implement infiltration basins, as there is sufficient area to allow for large, shallow basins. Infiltration basins were chosen as they are the cheapest, lowest maintenance and most effective BMP for preventing pollutants from flowing from the site to downstream areas. The infiltration basins also are effective when used for hydromodification storage. The BMPs are numbered as follows: BMP-1~ infiltration basin, BMP-2~ vegetated infiltration basin, BMP-3~ Infiltration basin

Harvest and Use BMP-s were not selected for use as the demand is not enough to justify the cost of implementing the BMPs. Per the automated BMP sizing worksheets, the DCV for the whole site is 10,045 cf, The anticipated demand is only 80 cf. This is far below 25% of the DCV. See Worksheet B.3-1 for more details.

(Continue on following page as necessary.)

Description of structural BMP strategy continued **(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)**
(Continued from previous page)

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. BMP-1, BMP-2 & BMP-3	
Construction Plan Sheet No. TBD	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☒ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☒ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	Andrew J Kann Omega Engineering Consultants 858-634-8620
Who will be the final owner of this BMP?	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	Category 2
Discussion (as needed): *(Continue on subsequent pages as necessary)*	

Step 6.3: Offsite Alternative Compliance Participation Form

PDP INFORMATION	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
What are your PDP Pollutant Control Debits? *See Attachment 1 of the PDP SWQMP	
What are your PDP HMP Debits? (if applicable) *See Attachment 2 of the PDP SWQMP	
ACP Information	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
Project Owner/Address	
What are your ACP Pollutant Control Credits? *See Attachment 1 of the ACP SWQMP	
What are your ACP HMP Debits? (if applicable) *See Attachment 2 of the ACP SWQMP	
Is your ACP in the same watershed as your PDP? ☐ Yes ☐ No	Will your ACP project be completed prior to the completion of the PDP? ☐ Yes ☐ No
Does your ACP account for all Deficits generated by the PDP? ☐ Yes ☐ No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.	What is the difference between your PDP debits and ACP Credits? *(ACP Credits -Total PDP Debits = Total Earned Credits)

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.3-1 (Required) -Worksheet B.1-1 (Required) -Worksheet B.4-1 (if applicable) -Worksheet B.4-2 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☒ Included
Attachment 1b	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☒ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1c	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☒ Included
Attachment 1d	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5”x11” paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☒ Included

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.3)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	10,045	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	30	#
	3	Total Planted Area within Development	20,000	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	No	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	No	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	No	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	No	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.86	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	56	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	24	cubic-feet
	13	Total Anticipated Use Over 36 Hours	80	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.01	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	Yes	yes/no
	17	Is Partial Retention Feasible for this Project?	Yes	yes/no
Result	18	Feasibility Category	3	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this worksheet to determine the types of structural BMPs that are acceptable for implementation at their project site (as required in Section 5 of the BMPDM). User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

B. Negative impacts associated with retention may include geotechnical, groundwater, water balance, or other issues identified by a geotechnical engineer and substantiated through completion of Form I-8.

C. Feasibility Category 1: Applicant must implement capture & use, retention, and/or infiltration elements for the entire DCV.

D. Feasibility Category 2: Applicant must implement capture & use elements for the entire DCV.

E. Feasibility Category 3: Applicant must implement retention and/or infiltration elements for all DMAs with Design Infiltration Rates greater than 0.50 in/hr.

F. Feasibility Category 4: Applicant must implement standard unlined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.011 to 0.50 in/hr. Applicants may be permitted to implement lined BMPs, reduced size BMPs, and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

G. Feasibility Category 5: Applicant must implement standard lined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.010 in/hr or less. Applicants may also be permitted to implement reduced size and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

H. PDPs participating in an offsite alternative compliance program are not held to the feasibility categories presented herein.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	DMA-1.1	DMA-1.2	DMA-2.1	DMA-3.1							unitless
	1	Basin Drains to the Following BMP Type	Retention	n/a	Retention	Retention							unitless
	2	85th Percentile 24-hr Storm Depth	0.58	0.58	0.58	0.58							inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	1.000	1.000	1.000	1.000							in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	27,084	4,085	51,667	51,383							sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	108,586	1,239	83,551	199,262							sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	Yes	No	No	No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A		1									#
	20	Average Mature Tree Canopy Diameter		25									ft
	21	Number of Rain Barrels Proposed per SD-E		0									#
	22	Average Rain Barrel Size		0									gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	135,670	5,324	135,218	250,645	0	0	0	0	0	0	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.36	0.74	0.49	0.37	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.36	0.74	0.49	0.37	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	32	Initial Design Capture Volume	2,361	190	3,202	4,482	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.36	0.74	0.49	0.37	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	38	Design Capture Volume After Dispersion Techniques	2,361	190	3,202	4,482	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	290	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.36	0.00	0.49	0.37	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	42	Final Effective Tributary Area	48,841	0	66,257	92,739	0	0	0	0	0	0	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	290	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	2,361	0	3,202	4,482	0	0	0	0	0	0	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	DMA-1.1	-	DMA-2.1	DMA-3.1	-	-	-	-	-	-	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	1.000	-	1.000	1.000	-	-	-	-	-	-	in/hr
	2	Design Capture Volume Tributary to BMP	2,361	-	3,202	4,482	-	-	-	-	-	-	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Non-Vegetated		Vegetated	Non-Vegetated							unitless
	4	Provided Surface Area	2,300		2,700	3,800							sq-ft
	5	Provided Surface Ponding Depth	6		6	6							inches
	6	Provided Soil Media Thickness	0		18	0							inches
	7	Provided Gravel Storage Thickness	0		0	0							inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	1,150	0	1,350	1,900	0	0	0	0	0	0	cubic-feet
	9	Soil Media Pore Space	0.40	0.40	0.25	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	6.0	0.0	10.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	6	0	6	6	0	0	0	0	0	0	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	12	0	17	12	0	0	0	0	0	0	hours
	14	Volume Retained by BMP	2,300	0	3,713	3,800	0	0	0	0	0	0	cubic-feet
	15	Fraction of DCV Retained	0.97	0.00	1.16	0.85	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**n/a**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	DMA-1.1	DMA-1.2	DMA-2.1	DMA-3.1	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.58	0.58	0.58	0.58	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	1.000	1.000	1.000	1.000	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	135,670	5,324	135,218	250,645	-	-	-	-	-	-	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	6,557	257	6,536	12,115	-	-	-	-	-	-	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.36	0.74	0.49	0.37	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	2,361	190	3,202	4,482	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	0	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	290	0	0	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	48,841	0	66,257	92,739	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	2,361	0	3,202	4,482	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	n/a	Retention	Retention	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	2,361	0	3,202	4,482	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.53	1.00	1.00	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	91.9%	80.4%	80.4%	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	80.0%	80.0%	80.0%	80.0%	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	100.0%	-	-	-	-	-	-	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	0	0	-	-	-	-	-	-	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	0	0	-	-	-	-	-	-	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.

False

Categorization of Infiltration Feasibility Condition — Form I-8

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

For preliminary analysis the NRCS web soil survey is used. The soil type is reported to be type C and D. The infiltration rate of the most restrictive layer is reported by NRCS to be up to 5.95 inches per hour. Further Geotechnical investigation will come in later reviews. For this submittal the infiltration rate is conservatively assumed to be 1.0 in/hr. This rate is also supported by examining the percolation test data for the septic leech fields, which show an average infiltration rate well above 1.0 inches per hour. This rate will be verified through site testing prior to the first submittal of the ministerial review SWQMP.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

No geotechnical hazards are anticipated to be created by the infiltration of stormwater

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltration of stormwater would not be anticipated to create the risk of groundwater contamination, as the proposed land use is single family residential and there are no know legacy pollutants on this previously undeveloped site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: No ephemeral streams or water features exist near the site. No contaminated ground water are anticipated. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result *	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	Yes, Full infiltration feasible.	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

Form I-8 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	-	-

Provide basis:

N/A, full infiltration feasible

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2.	-	-

Provide basis:

N/A, full infiltration feasible

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Form I-8 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	-	-
Provide basis: N/A, full infiltration feasible Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	-	-
Provide basis: N/A, full infiltration feasible Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	N/A, full infiltration feasible	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed demolition
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
☒ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)

DMA/BMP MAP
RANCHO SIERRA SUBDIVISION - ALPINE, CA

DRAINAGE MANAGEMENT AREA (DMA) DATA				
DMA NO.	AREA (SF)	IMPERVIOUS %	TREATED BY	DESCRIPTION
DMA-1.1	135,670 SF	20%	BMP-1	NATIVE VEGETATION, LANDSCAPE, DRIVEWAY, HOUSE
DMA-1.2	5,324 SF	77%	STREET TREE	ACCESS ROAD LANDSCAPE
DMA-2.1	135,219 SF	38%	BMP-2	NATIVE VEGETATION, LANDSCAPE, DRIVEWAY, HOUSE
DMA-3.1	250,645 SF	21%	BMP-3	NATIVE VEGETATION, LANDSCAPE, DRIVEWAY, HOUSE

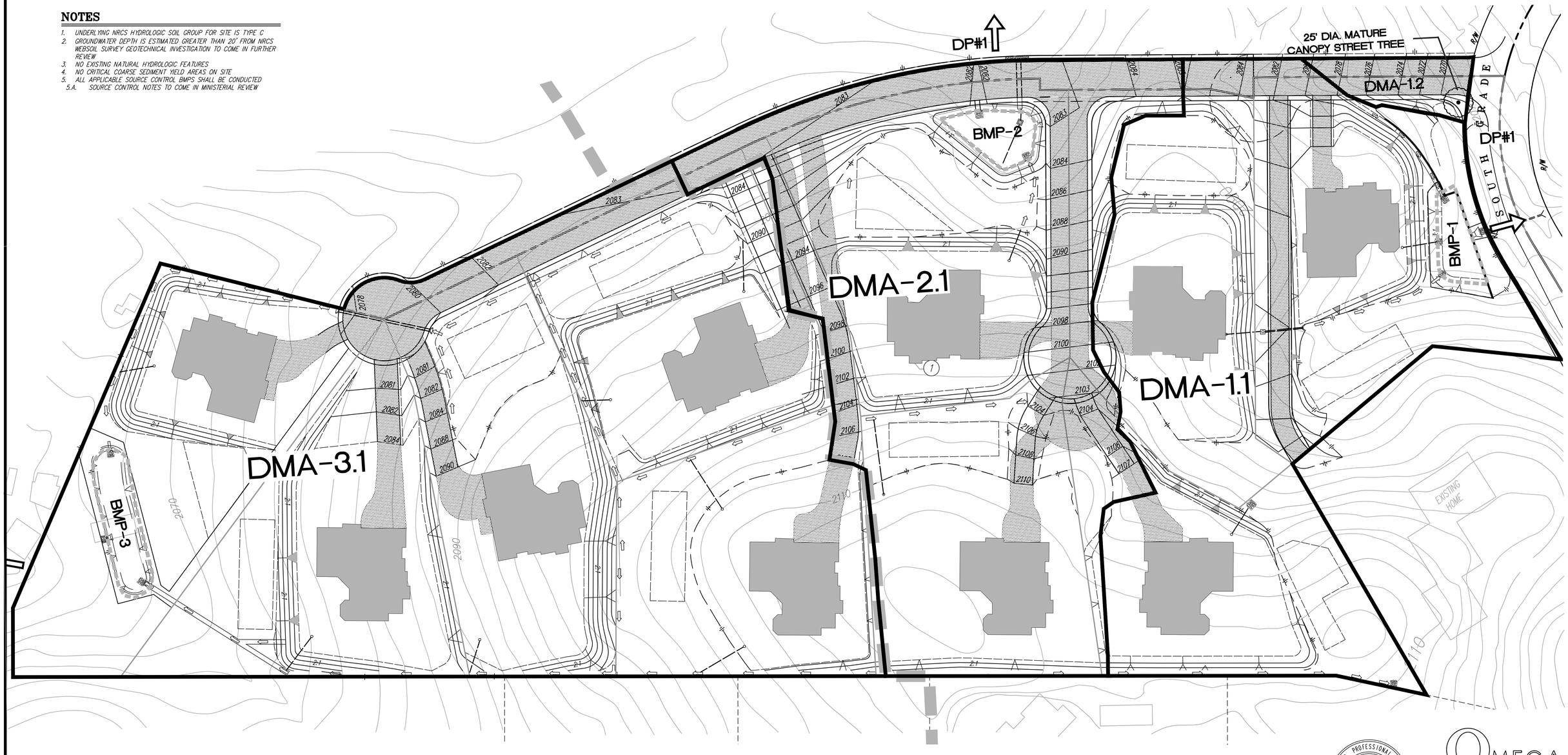
BEST MANAGEMENT PRACTICE (BMP) DATA				
IMP NO.	PONDING AREA	TREATED DMA	RETENTION VOLUME	DESCRIPTION
BMP-1	2,300 SF	DMA-1	2,300 CF	DETENTION BASIN
BMP-2	2,700 SF	DMA-2	3,713 CF	VEGETATED DETENTION BASIN W/ OUTLET CTL
BMP-3	3,800 SF	DMA-3	3,800 CF	DETENTION BASIN W/ OUTLET CTL

LEGEND:

- DRAINAGE MANAGEMENT AREA NO. ..... DMA-#
- INTEGRATED MANAGEMENT AREA NO. ..... IMP-#
- AREA LIMITS .....
- DRAINAGE ARROWS .....
- WATERSHED DIVISION LINE .....
- PAVED AREAS .....
- BUILDING / ROOF AREAS .....
- BMP LIMITS .....

NOTES

1. UNDERLYING NRCS HYDROLOGIC SOIL GROUP FOR SITE IS TYPE C
2. GROUNDWATER DEPTH IS ESTIMATED GREATER THAN 20' FROM NRCS WEBSOIL SURVEY GEOTECHNICAL INVESTIGATION TO COME IN FURTHER REVIEW
3. NO EXISTING NATURAL HYDROLOGIC FEATURES
4. NO CRITICAL COARSE SEDIMENT YIELD AREAS ON SITE
5. ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE CONDUCTED
   5.A. SOURCE CONTROL NOTES TO COME IN MINISTERIAL REVIEW



ANDREW J. KANN, RCE 50940
MY REGISTRATION EXPIRES 9-30-17

DATE

REGISTERED PROFESSIONAL ENGINEER
ANDREW J. KANN
No. 50940
Exp. 9-30-17
CIVIL
STATE OF CALIFORNIA

OMEGA
ENGINEERING CONSULTANTS
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ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☒ Included ☒ Submitted as separate stand-alone document
Attachment 2b	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the BMP Design Manual.	☒ Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☒ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☒ Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

RANCHO SIERRA SUBDIVISION
HYDROMODIFICATION CALCULATIONS

South Grade Rd
Alpine, CA

Date Prepared:
October 19th, 2017

Prepared for:
Brad Bailey
10035 Prospect Avenue, Suite 201
Santee, CA 92071
Ph: (619) 449-8785

Prepared By:
Omega Engineering Consultants
4340 Viewridge Ave, Suite B
San Diego, CA 92123
Ph: (858) 634-8620

Declaration of Responsible Charge:
I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards. I understand that the check of the project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as an engineer of work, of my responsibilities for project design.

Patric T. de Boer RCE 83583
Registration Expires 3-31-2019

PREDEVELOPED HM EXHIBIT
RANCHO SIERRA SUBDIVISION

RUNOFF DATA	
BASIN	AREA
EX-1	3.66 AC
EX-2	2.97 AC
EX-3	5.46 AC

PROJECT IS WITHIN ALPINE HSA 907.33
(EAST PORTION OF PROJECT DRAINS TO THE EL CAPITAN RESERVOIR TO THE EAST)
(WEST PORTION OF PROJECT DRAINS TO THE SWEETWATER-UPPER TO THE WEST)

GRAPHICAL SCALE: 1" = 100'

0 50 100 200

LEGEND:

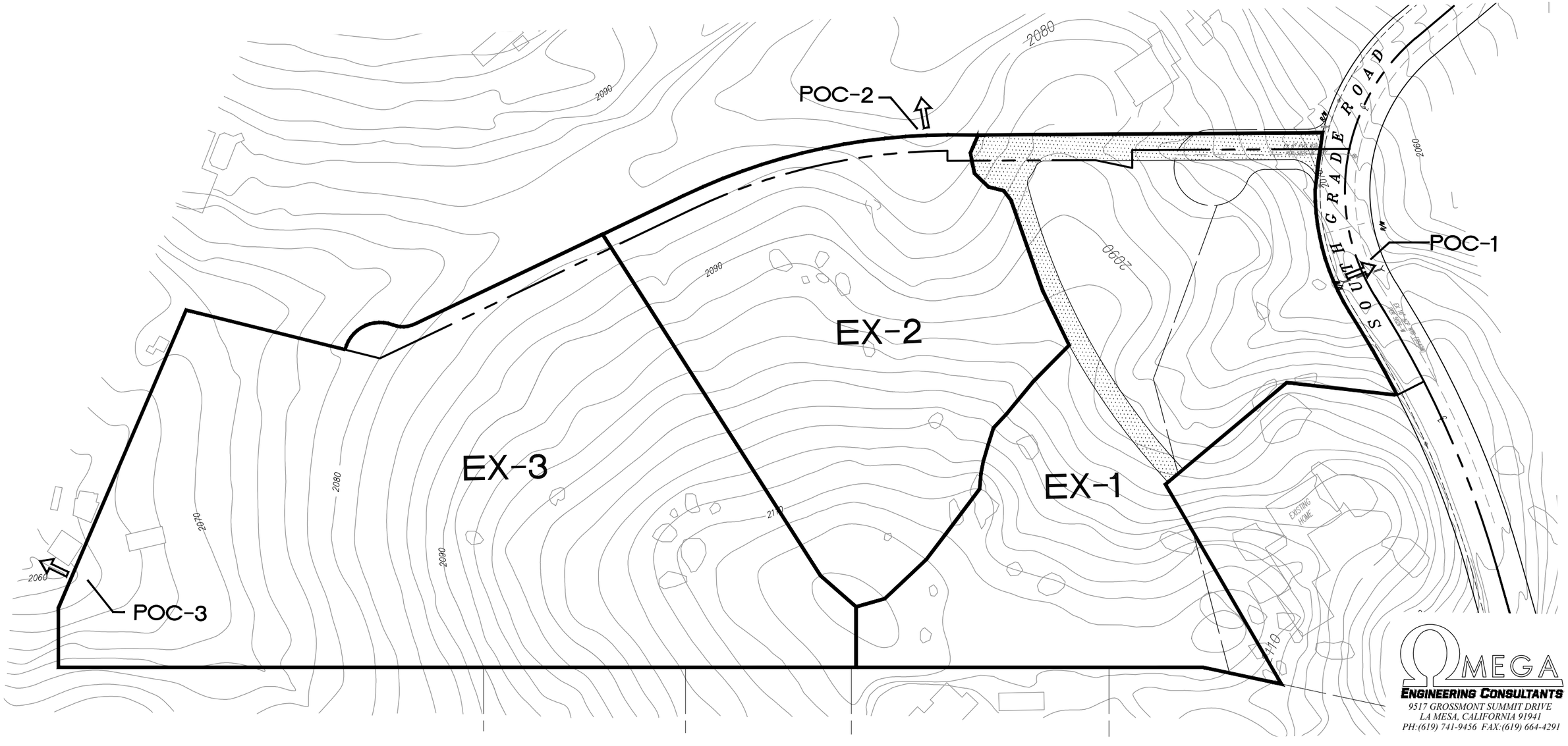
PROJECT BOUNDARY

BASIN BOUNDARY

DRAINAGE ARROWS

PERVIOUS AREA

IMPERVIOUS AREA



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RUNOFF DATA	
BASIN	AREA
DMA-1.1	3.11 AC
DMA-1.2	0.12 AC
DMA-2.1	3.10 AC
DMA-3.1	5.75 AC

PROJECT IS WITHIN ALPINE HSA 907.33
(EAST PORTION OF PROJECT DRAINS TO THE EL CAPITAN RESERVOIR TO THE EAST)
(WEST PORTION OF PROJECT DRAINS TO THE SWEETWATER-UPPER TO THE WEST)

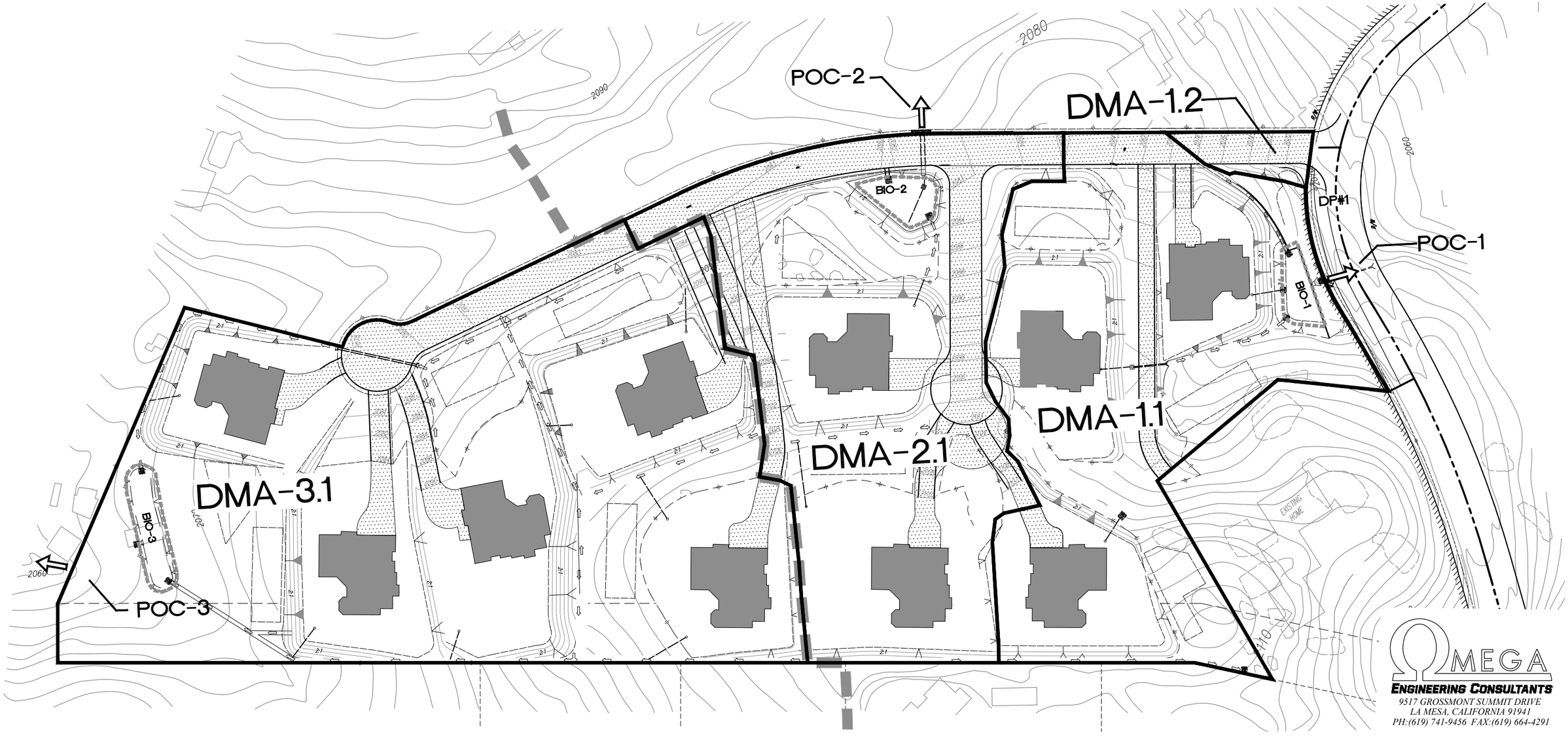
MITIGATED HM EXHIBIT
RANCHO SIERRA SUBDIVISION

GRAPHICAL SCALE: 1" = 100'

0 50 100 200

LEGEND:

- PROJECT BOUNDARY
- BASIN BOUNDARY
- DRAINAGE ARROWS
- PERVIOUS AREA
- IMPERVIOUS AREA



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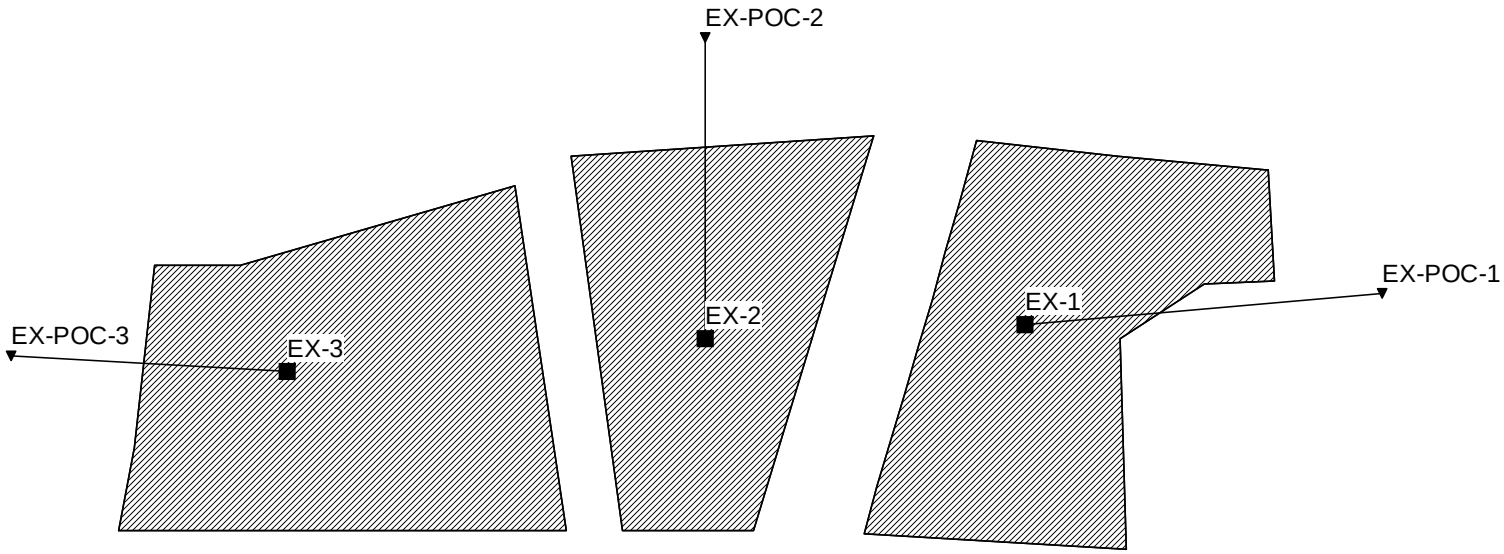
FLINN_SPRINGS



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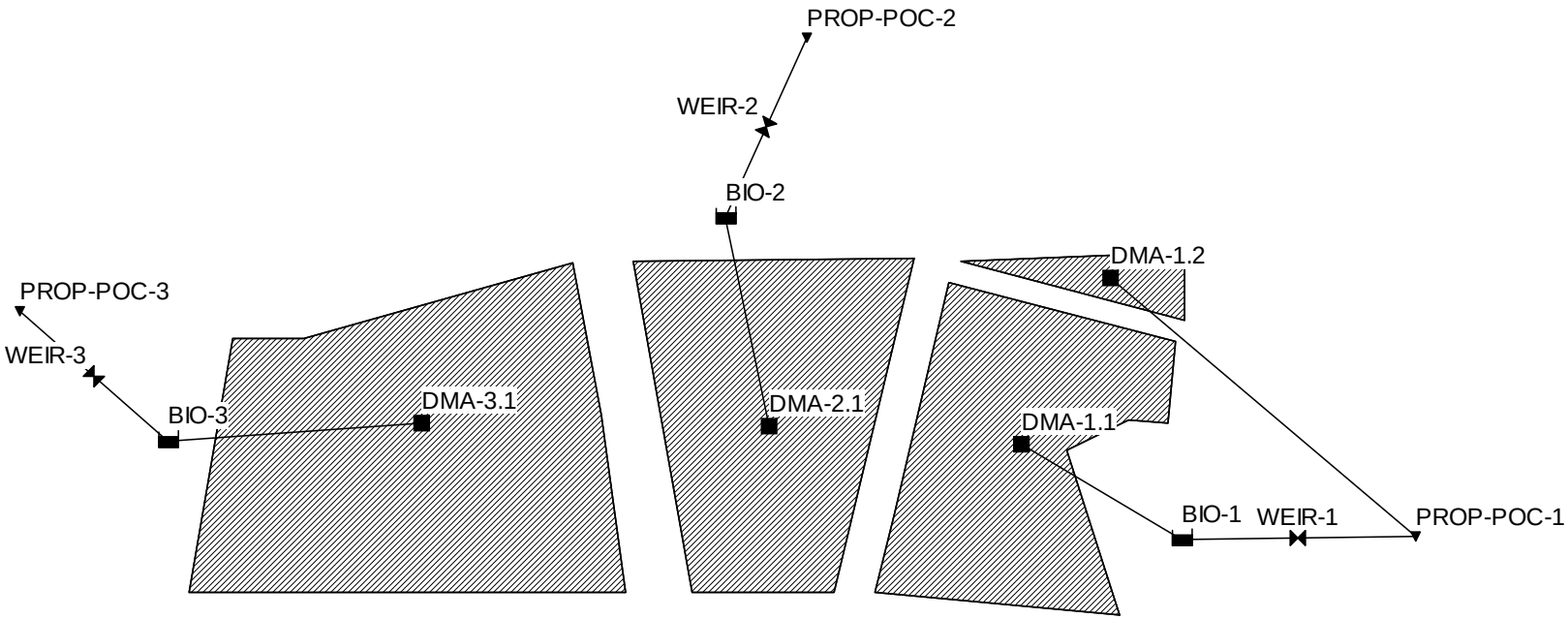

UNMITIGATED HYDROGRAPH FOR BASIN B-1.1

TIME OF CONCENTRATION 18 MIN
6 HR RAINFALL 3.2 INCHES
BASIN AREA 3.1 ACRES
RUNOFF COEFFICIENT 0.53
PEAK DISCHARGE 6.02 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	14	DISCHARGE (CFS) =	0.3
TIME (MIN) =	28	DISCHARGE (CFS) =	0.3
TIME (MIN) =	42	DISCHARGE (CFS) =	0.3
TIME (MIN) =	56	DISCHARGE (CFS) =	0.4
TIME (MIN) =	70	DISCHARGE (CFS) =	0.4
TIME (MIN) =	84	DISCHARGE (CFS) =	0.4
TIME (MIN) =	98	DISCHARGE (CFS) =	0.4
TIME (MIN) =	112	DISCHARGE (CFS) =	0.5
TIME (MIN) =	126	DISCHARGE (CFS) =	0.5
TIME (MIN) =	140	DISCHARGE (CFS) =	0.5
TIME (MIN) =	154	DISCHARGE (CFS) =	0.6
TIME (MIN) =	168	DISCHARGE (CFS) =	0.6
TIME (MIN) =	182	DISCHARGE (CFS) =	0.7
TIME (MIN) =	196	DISCHARGE (CFS) =	0.8
TIME (MIN) =	210	DISCHARGE (CFS) =	1
TIME (MIN) =	224	DISCHARGE (CFS) =	1.4
TIME (MIN) =	238	DISCHARGE (CFS) =	2.1
TIME (MIN) =	252	DISCHARGE (CFS) =	7.05
TIME (MIN) =	266	DISCHARGE (CFS) =	1.1
TIME (MIN) =	280	DISCHARGE (CFS) =	0.8
TIME (MIN) =	294	DISCHARGE (CFS) =	0.5
TIME (MIN) =	308	DISCHARGE (CFS) =	0.4
TIME (MIN) =	322	DISCHARGE (CFS) =	0.4
TIME (MIN) =	336	DISCHARGE (CFS) =	0.3
TIME (MIN) =	350	DISCHARGE (CFS) =	0.3
TIME (MIN) =	364	DISCHARGE (CFS) =	0

Note:
This hydrograph was generated using RatHydro, using input data that was determined via the preceding Rational Method Calculations. The hydrograph was input into Autodesk Hydraflow Hydrographs and was run through a modeled storage element with a raised overflow structure. See the following pages for the Hydraflow Hydrograph calculations for details on the storage and orifice flow analysis.

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option              Value
FLOW_UNITS            CFS
INFILTRATION          GREEN_AMPT
FLOW_ROUTING          KINWAVE
LINK_OFFSETS          DEPTH
MIN_SLOPE             0
ALLOW_PONDING         NO
SKIP_STEADY_STATE     NO

START_DATE            08/08/1963
START_TIME            06:00:00
REPORT_START_DATE     08/08/1963
REPORT_START_TIME     06:00:00
END_DATE              05/23/2008
END_TIME              18:00:00
SWEEP_START           01/01
SWEEP_END             12/31
DRY_DAYS              0
REPORT_STEP           01:00:00
WET_STEP              00:15:00
DRY_STEP              04:00:00
ROUTING_STEP          0:01:00

INERTIAL_DAMPING      PARTIAL
NORMAL_FLOW_LIMITED   BOTH
FORCE_MAIN_EQUATION   H-W
VARIABLE_STEP         0.75
LENGTHENING_STEP      0
MIN_SURFAREA          12.557
MAX_TRIALS            8
HEAD_TOLERANCE        0.005
SYS_FLOW_TOL          5
LAT_FLOW_TOL          5
MINIMUM_STEP          0.5
THREADS               1

[EVAPORATION]
;;Data Source          Parameters
;;--------------       ----------
MONTHLY               0.070   0.100   0.130   0.170   0.190   0.220   0.240   0.220   0.190   0.130   0.090   0.060
DRY_ONLY              NO

[RAINGAGES]
;;Name                Format          Interval        SCF             Source
;;--------------      ---------       ------  ------  ----------
FLINN_SPRINGS         INTENSITY       1:00            1.0             TIMESERIES      FLINN_SPRINGS

[SUBCATCHMENTS]
;;Name                Rain Gage               Outlet                  Area            %Imperv         Width           %Slope          CurbLen
SnowPack
;;--------------      ----------------        ----------------        --------        --------        --------        --------        --------
----------
EX-3                  FLINN_SPRINGS           EX-POC-3                5.46            0.0             309             7               0

EX-2                  FLINN_SPRINGS           EX-POC-2                2.97            0               273             8               0

EX-1                  FLINN_SPRINGS           EX-POC-1                3.66            0               266             9               0

DMA-3.1               FLINN_SPRINGS           BIO-3                   5.75            21              218             4               0

DMA-2.1               FLINN_SPRINGS           BIO-2                   3.10            38              199             7               0
```

DMA-1.1 FLINN_SPRINGS BIO-1 3.11 20 222 7 0

DMA-1.2 FLINN_SPRINGS PROP-POC-1 0.12 77 266 7.0 0

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
EX-3	0.012	0.15	0.05	0.10	25	OUTLET	
EX-2	0.012	0.15	0.05	0.10	25	OUTLET	
EX-1	0.012	0.15	0.05	0.10	25	OUTLET	
DMA-3.1	0.012	0.15	0.05	0.10	25	PERVIOUS	100
DMA-2.1	0.012	0.15	0.05	0.10	25	PERVIOUS	100
DMA-1.1	0.012	0.15	0.05	0.10	25	PERVIOUS	100
DMA-1.2	0.012	0.15	0.05	0.10	25	PERVIOUS	100

[INFILTRATION]

;;Subcatchment	Suction	Ksat	IMD
EX-3	6.0	0.1	0.32
EX-2	6.0	0.1	0.32
EX-1	6.0	0.1	0.32
DMA-3.1	6.0	0.1	0.32
DMA-2.1	6.0	0.1	0.32
DMA-1.1	6.0	0.1	0.32
DMA-1.2	6.0	0.1	0.32

[OUTFALLS]

;;Name	Elevation	Type	Stage Data	Gated	Route To
EX-POC-2	0	FREE		NO	
EX-POC-3	0	FREE		NO	
PROP-POC-1	0	FREE		NO	
PROP-POC-2	0	FREE		NO	
EX-POC-1	0	FREE		NO	
PROP-POC-3	0	FREE		NO	

[STORAGE]

;;Name	Elev.	MaxDepth	InitDepth	Shape	Curve Name/Params	N/A	Fevap
Psi	Ksat	IMD					
BIO-3	0	3.0	0	TABULAR	BIO-3	0	0
6.0	1.0	0.33					
BIO-2	0	3.0	0	TABULAR	BIO-2	0	0
6.0	1.0	0.32					
BIO-1	0	3.0	0	TABULAR	BIO-1	0	0
6.0	1.0	0.32					

[WEIRS]

;;Name	From Node	To Node	Type	CrestHt	Qcoeff	Gated	EndCon
EndCoeff	Surcharge	RoadWidth	RoadSurf				
WEIR-3	BIO-3	PROP-POC-3	V-NOTCH	0.5	3.33	NO	0
0	YES						
WEIR-2	BIO-2	PROP-POC-2	V-NOTCH	0.667	3.33	NO	0
0	YES						
WEIR-1	BIO-1	PROP-POC-1	V-NOTCH	0.5	3.33	NO	0
0	YES						

[XSECTIONS]

;;Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels	Culvert

```
WEIR-3                  TRIANGULAR      2.0                     3               1               1
WEIR-2                  TRIANGULAR      2.0                     3               1               1
WEIR-1                  TRIANGULAR      2.0                     3               1               1

[CURVES]
;;Name                 Type            X-Value         Y-Value
;;--------------       ----------      ----------      ----------
BIO-2                   Storage         0               2700
BIO-2                                   3               2700
;
BIO-3                   Storage         0               3800
BIO-3                                   2               3800
;
BIO-1                   Storage         0               2300
BIO-1                                   2               2300

[TIMESERIES]
;;Name                 Date            Time            Value
;;--------------       ----------      ----------      ----------
FLINN_SPRINGS           8/8/1963        6:00            0.01
FLINN_SPRINGS           8/8/1963        7:00            0.01
FLINN_SPRINGS           9/4/1963        1:00            0.02
FLINN_SPRINGS           9/4/1963        2:00            0.01
FLINN_SPRINGS           9/4/1963        4:00            0.01
FLINN_SPRINGS           9/4/1963        5:00            0.04
FLINN_SPRINGS           9/4/1963        6:00            0.06
FLINN_SPRINGS           9/4/1963        7:00            0.12
FLINN_SPRINGS           9/4/1963        8:00            0.08
FLINN_SPRINGS           9/4/1963        9:00            0.14
FLINN_SPRINGS           9/4/1963        10:00           0.18
FLINN_SPRINGS           9/4/1963        11:00           0.06
FLINN_SPRINGS           9/17/1963       2:00            0.02
FLINN_SPRINGS           9/17/1963       3:00            0.03
FLINN_SPRINGS           9/17/1963       4:00            0.02
FLINN_SPRINGS           9/17/1963       6:00            0.05
FLINN_SPRINGS           9/17/1963       7:00            0.04
FLINN_SPRINGS           9/17/1963       8:00            0.03
FLINN_SPRINGS           9/17/1963       15:00           0.01
FLINN_SPRINGS           9/17/1963       16:00           0.06
FLINN_SPRINGS           9/17/1963       17:00           0.05
FLINN_SPRINGS           9/17/1963       18:00           0.06
FLINN_SPRINGS           9/17/1963       19:00           0.11
FLINN_SPRINGS           9/17/1963       20:00           0.17
FLINN_SPRINGS           9/17/1963       21:00           0.14
FLINN_SPRINGS           9/17/1963       22:00           0.08
FLINN_SPRINGS           9/17/1963       23:00           0.17
FLINN_SPRINGS           9/17/1963       24:00           0.02
FLINN_SPRINGS           9/18/1963       2:00            0.01
FLINN_SPRINGS           9/18/1963       3:00            0.02
FLINN_SPRINGS           9/18/1963       4:00            0.05
FLINN_SPRINGS           9/18/1963       5:00            0.01
FLINN_SPRINGS           9/18/1963       6:00            0.02
FLINN_SPRINGS           9/18/1963       7:00            0.01
FLINN_SPRINGS           9/18/1963       8:00            0.06
FLINN_SPRINGS           9/18/1963       9:00            0.03
FLINN_SPRINGS           9/18/1963       10:00           0.01
FLINN_SPRINGS           9/18/1963       11:00           0.02
FLINN_SPRINGS           9/18/1963       12:00           0.15
FLINN_SPRINGS           9/18/1963       13:00           0.09
FLINN_SPRINGS           9/19/1963       7:00            0.07
FLINN_SPRINGS           9/19/1963       9:00            0.01
FLINN_SPRINGS           10/16/1963      12:00           0.03
FLINN_SPRINGS           10/16/1963      13:00           0.03
FLINN_SPRINGS           10/16/1963      14:00           0.01
FLINN_SPRINGS           10/16/1963      15:00           0.02
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RAIN GAUGE TIME SERIES HAS BEEN APPENDED, AS THE FULL SET IS 160+ PAGES LONG. THE FULL TIME SERIES HAS BEEN INCLUDED IN THE CD IN THE BINDER POCKET OF THIS REPORT.

POC-1

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node ex-poc-1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	4	3.382	0.75	46
2	1/25/1995	3	1.717	1.49	23
3	11/22/1965	9	1.604	2.24	15.33
4	10/20/2004	6	1.596	2.99	11.5
5	1/31/1979	9	1.487	3.73	9.2
6	11/30/2007	4	1.305	4.48	7.67
7	2/14/1995	9	1.249	5.22	6.57
8	2/22/2004	5	1.227	5.97	5.75
9	1/14/1969	6	1.2	6.72	5.11
10	11/20/1983	2	1.128	7.46	4.6
11	1/9/2005	2	1.126	8.21	4.18
12	3/1/1983	3	1.114	8.96	3.83
13	2/8/1998	3	1.096	9.7	3.54
14	1/4/1995	6	1.062	10.45	3.29
15	4/1/1982	4	1.018	11.19	3.07
16	2/10/1978	4	0.976	11.94	2.88
17	2/3/1998	3	0.962	12.69	2.71
18	2/16/1980	4	0.961	13.43	2.56
19	11/29/1970	4	0.934	14.18	2.42
20	1/13/1993	3	0.876	14.93	2.3
21	3/24/1983	3	0.868	15.67	2.19
22	3/3/1980	1	0.841	16.42	2.09
23	8/17/1977	4	0.838	17.16	2
24	2/13/1973	2	0.795	17.91	1.92
25	2/28/1991	6	0.774	18.66	1.84
26	3/5/1995	15	0.735	19.4	1.77
27	3/14/1982	3	0.7	20.15	1.7
28	1/7/1993	2	0.698	20.9	1.64
29	9/10/1976	2	0.64	21.64	1.59
30	10/29/1974	3	0.626	22.39	1.53
31	12/18/1967	4	0.606	23.13	1.48
32	3/4/1978	2	0.605	23.88	1.44
33	2/19/1993	2	0.605	24.63	1.39
34	10/28/1974	4	0.598	25.37	1.35
35	2/14/1998	2	0.59	26.12	1.31
36	10/31/1987	4	0.587	26.87	1.28
37	11/11/1985	3	0.587	27.61	1.24
38	2/19/1980	8	0.581	28.36	1.21
39	2/28/1978	1	0.545	29.1	1.18
40	1/31/1996	1	0.525	29.85	1.15
41	1/3/1977	1	0.508	30.6	1.12
42	1/29/1980	4	0.508	31.34	1.1
43	12/28/1977	2	0.505	32.09	1.07
44	1/30/1980	2	0.503	32.84	1.05
45	3/1/1978	5	0.493	33.58	1.02
46	1/27/2008	8	0.492	34.33	1
47	3/18/1983	1	0.482	35.07	0.98
48	12/5/1966	5	0.479	35.82	0.96
49	2/10/1982	6	0.477	36.57	0.94
50	3/13/1996	2	0.44	37.31	0.92
51	2/8/1976	10	0.428	38.06	0.9
52	10/20/1979	3	0.425	38.81	0.88
53	3/1/1981	2	0.42	39.55	0.87
54	2/6/1969	1	0.403	40.3	0.85
55	2/21/2005	2	0.396	41.04	0.84
56	1/3/2005	2	0.392	41.79	0.82
57	1/29/1980	7	0.374	42.54	0.81
58	2/22/1969	3	0.358	43.28	0.79
59	12/27/1984	4	0.352	44.03	0.78
60	12/7/1992	4	0.352	44.78	0.77
61	1/5/1992	6	0.347	45.52	0.75
62	2/18/1980	2	0.343	46.27	0.74
63	10/19/2004	10	0.339	47.01	0.73
64	3/16/1982	4	0.335	47.76	0.72
65	1/18/1979	2	0.331	48.51	0.71
66	3/8/1973	1	0.321	49.25	0.7
67	4/14/2003	2	0.32	50	0.69
68	2/21/1980	1	0.317	50.75	0.68
69	11/30/1982	5	0.316	51.49	0.67
70	3/5/1978	6	0.298	52.24	0.66
71	1/16/1993	5	0.295	52.99	0.65
72	12/6/1966	4	0.295	53.73	0.64
73	2/26/2004	2	0.287	54.48	0.63
75	2/15/1992	1	0.262	55.97	0.61
75	2/25/2003	1	0.262	55.97	0.61
76	2/23/2004	3	0.256	56.72	0.61
77	11/24/1984	3	0.255	57.46	0.6
78	1/21/1964	1	0.243	58.21	0.59
79	3/11/1978	4	0.241	58.96	0.58
80	1/25/1969	3	0.241	59.7	0.57
81	1/4/1974	3	0.239	60.45	0.57
82	3/6/1980	2	0.217	61.19	0.56
83	2/15/1986	2	0.215	61.94	0.55
84	1/15/1993	5	0.206	62.69	0.55
85	12/25/1988	1	0.205	63.43	0.54
86	3/10/2001	1	0.197	64.18	0.53
87	4/13/1976	3	0.193	64.93	0.53
88	3/23/1964	2	0.183	65.67	0.52
89	1/10/1978	1	0.173	66.42	0.52
90	11/15/1965	2	0.171	67.16	0.51
91	12/21/1970	2	0.154	67.91	0.51
92	4/8/1965	3	0.15	68.66	0.5
93	12/6/1998	1	0.146	69.4	0.49
94	1/18/1993	1	0.145	70.15	0.49
95	11/11/1964	1	0.143	70.9	0.48
98	2/26/1987	1	0.142	73.13	0.47
98	2/21/2000	1	0.142	73.13	0.47
98	2/12/1992	2	0.142	73.13	0.47
99	3/16/1986	1	0.139	73.88	0.46
100	11/14/1993	4	0.124	74.63	0.46
101	2/8/1993	1	0.122	75.37	0.46
102	10/27/2004	2	0.121	76.12	0.45

10-year Q:	1.525	cfs	(Adjust Column "I" to interpolate from Table)
5-year Q:	1.184	cfs	
2-year Q:	0.838	cfs	
Lower Flow Threshold:	10%		
0.1xQ2 (Pre):	0.084	cfs	

103	1/12/2001	1	0.121	76.87	0.45
104	1/17/1990	1	0.117	77.61	0.44
106	2/13/2001	1	0.115	79.1	0.43
106	2/17/1998	1	0.115	79.1	0.43
107	3/11/1973	3	0.112	79.85	0.43
108	3/2/1983	5	0.108	80.6	0.43
109	11/22/1965	1	0.108	81.34	0.42
110	4/22/1967	1	0.103	82.09	0.42
111	12/18/1984	1	0.101	82.84	0.41
112	11/26/1967	2	0.09	83.58	0.41
113	2/19/2007	2	0.089	84.33	0.41
114	3/15/2003	1	0.087	85.07	0.4
115	11/20/1967	1	0.07	85.82	0.4
116	3/1/1981	1	0.064	86.57	0.4
117	12/19/1978	2	0.063	87.31	0.39
118	3/31/1992	1	0.058	88.06	0.39
119	12/19/1970	1	0.056	88.81	0.39
120	2/5/1976	1	0.056	89.55	0.38
121	1/29/1981	1	0.055	90.3	0.38
122	3/1/1970	1	0.055	91.04	0.38
124	12/27/1984	1	0.048	92.54	0.37
124	12/6/1997	1	0.048	92.54	0.37
125	2/13/1992	1	0.045	93.28	0.37
126	1/16/1979	1	0.041	94.03	0.37
127	9/10/1976	1	0.041	94.78	0.36
128	12/14/1965	1	0.029	95.52	0.36
130	2/24/1998	1	0.027	97.01	0.35
130	2/22/2000	1	0.027	97.01	0.35
131	1/9/1980	1	0.027	97.76	0.35
132	3/24/1964	1	0.024	98.51	0.35
133	1/11/2005	1	0.018	99.25	0.35

Post-project (Mitigated) Flow Frequency - Long-term Simulation

Statistics - Node PROP-POC-1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	5	3.002	0.3	46
2	11/22/1965	10	1.432	0.6	23
3	1/31/1979	15	1.347	0.9	15.33
4	10/20/2004	7	1.064	1.2	11.5
5	2/22/2004	6	1.059	1.5	9.2
6	2/14/1995	11	0.962	1.8	7.67
7	1/4/1995	7	0.953	2.1	6.57
8	3/1/1983	4	0.874	2.4	5.75
9	11/29/1970	6	0.84	2.7	5.11
10	2/10/1978	5	0.834	3	4.6
11	2/16/1980	5	0.826	3.3	4.18
12	8/17/1977	5	0.698	3.6	3.83
13	9/10/1976	5	0.648	3.9	3.54
14	3/5/1995	16	0.645	4.2	3.29
15	1/14/1969	11	0.62	4.5	3.07
16	2/28/1991	9	0.614	4.8	2.88
17	11/30/2007	5	0.571	5.11	2.71
18	4/1/1982	5	0.52	5.41	2.56
19	1/25/1995	3	0.481	5.71	2.42
20	12/18/1967	6	0.473	6.01	2.3
21	3/1/1978	6	0.461	6.31	2.19
22	10/28/1974	5	0.453	6.61	2.09
23	1/28/1980	26	0.388	6.91	2
24	11/11/1985	6	0.383	7.21	1.92
25	1/13/1993	4	0.37	7.51	1.84
26	2/8/1976	12	0.362	7.81	1.77
27	11/30/1982	7	0.356	8.11	1.7
28	12/5/1966	6	0.355	8.41	1.64
29	3/14/1982	5	0.339	8.71	1.59
30	1/31/1996	5	0.329	9.01	1.53
31	10/31/1987	5	0.319	9.31	1.48
32	10/20/1979	4	0.313	9.61	1.44
33	2/19/1980	8	0.297	9.91	1.39
34	2/8/1998	4	0.296	10.21	1.35
35	3/24/1983	4	0.291	10.51	1.31
36	2/3/1998	4	0.271	10.81	1.28
37	12/6/1966	5	0.264	11.11	1.24
38	3/13/1996	7	0.257	11.41	1.21
39	2/10/1982	7	0.244	11.71	1.18
40	1/9/2005	5	0.24	12.01	1.15
41	2/22/1969	4	0.229	12.31	1.12
42	1/27/2008	8	0.226	12.61	1.1
43	3/16/1982	6	0.214	12.91	1.07
44	12/7/1992	5	0.213	13.21	1.05
45	1/5/1992	7	0.207	13.51	1.02
46	10/19/2004	10	0.18	13.81	1
47	10/27/2004	7	0.178	14.11	0.98
48	1/11/2001	7	0.173	14.41	0.96
49	1/7/1993	3	0.173	14.71	0.94
50	2/15/1986	6	0.168	15.02	0.92
51	3/11/1978	5	0.16	15.32	0.9
52	1/16/1993	6	0.153	15.62	0.88
53	2/13/1973	4	0.144	15.92	0.87
54	3/2/1983	9	0.14	16.22	0.85
55	10/29/1974	4	0.104	16.52	0.84
56	1/15/1993	6	0.095	16.82	0.82
57	2/19/1993	6	0.095	17.12	0.81
58	2/14/1998	3	0.084	17.42	0.79
59	2/23/2004	4	0.083	17.72	0.78
60	2/6/1969	2	0.078	18.02	0.77
61	3/1/1981	4	0.076	18.32	0.75
62	3/3/1980	7	0.072	18.62	0.74
63	12/23/1995	1	0.072	18.92	0.73
64	11/20/1983	9	0.07	19.22	0.72
65	1/3/2005	4	0.068	19.52	0.71
66	2/8/1993	1	0.061	19.82	0.7
67	4/28/2005	1	0.058	20.12	0.69
68	2/28/1978	1	0.056	20.42	0.68
69	1/29/1983	2	0.054	20.72	0.67
70	9/3/1976	1	0.053	21.02	0.66
71	1/9/1980	1	0.051	21.32	0.65
72	1/30/1980	1	0.051	21.62	0.64
73	1/25/1969	6	0.051	21.92	0.63
74	1/3/1977	1	0.05	22.22	0.62
75	2/25/1996	1	0.05	22.52	0.61
76	3/18/1983	1	0.05	22.82	0.61
77	3/5/1978	7	0.048	23.12	0.6
78	3/4/1978	2	0.047	23.42	0.59
79	12/4/1987	2	0.045	23.72	0.58
80	3/31/1992	1	0.045	24.02	0.57
81	5/11/1989	1	0.044	24.32	0.57
82	12/28/1977	6	0.044	24.62	0.56
83	8/16/1983	1	0.044	24.92	0.55
84	4/1/1968	1	0.042	25.23	0.55
85	11/10/1964	2	0.041	25.53	0.54
86	1/12/1993	1	0.04	25.83	0.53
87	11/14/1993	4	0.04	26.13	0.53
88	2/21/2005	5	0.04	26.43	0.52
89	3/8/1973	4	0.04	26.73	0.52
90	11/7/1966	4	0.04	27.03	0.51
91	3/18/2002	1	0.04	27.33	0.51
92	11/15/1965	1	0.04	27.63	0.5
93	1/22/1967	7	0.039	27.93	0.49
94	1/4/1987	5	0.039	28.23	0.49
95	2/18/1980	3	0.039	28.53	0.48
96	3/16/1986	1	0.039	28.83	0.48
97	10/26/1991	2	0.039	29.13	0.47
98	1/18/1979	1	0.038	29.43	0.47
99	11/11/1972	1	0.038	29.73	0.46
100	2/28/1970	2	0.037	30.03	0.46
101	12/25/1988	4	0.036	30.33	0.46
102	4/14/2003	1	0.036	30.63	0.45

10-year Q: 1.061 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.839 cfs
2-year Q: 0.388 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Post Mit): 0.039 cfs

103	1/28/2005	1	0.035	30.93	0.45
104	2/15/1992	1	0.035	31.23	0.44
105	3/24/1994	1	0.035	31.53	0.44
106	3/1/1976	2	0.035	31.83	0.43
107	3/6/1975	3	0.035	32.13	0.43
108	3/17/1983	2	0.035	32.43	0.43
109	12/27/1984	4	0.035	32.73	0.42
110	1/17/1988	3	0.034	33.03	0.42
111	1/12/1997	1	0.034	33.33	0.41
112	2/25/1981	1	0.034	33.63	0.41
113	2/19/2007	2	0.034	33.93	0.41
114	5/8/1977	9	0.034	34.23	0.4
115	1/14/1990	2	0.034	34.53	0.4
116	5/7/1971	2	0.034	34.83	0.4
117	2/18/1969	3	0.034	35.14	0.39
118	3/23/1995	1	0.034	35.44	0.39
119	2/25/2003	1	0.033	35.74	0.39
120	2/6/1966	2	0.033	36.04	0.38
121	2/21/1980	3	0.033	36.34	0.38
122	10/10/1986	1	0.033	36.64	0.38
123	3/10/2001	1	0.033	36.94	0.37
124	3/31/1965	7	0.033	37.24	0.37
125	4/13/1976	1	0.033	37.54	0.37
126	2/14/1980	4	0.032	37.84	0.37
127	12/9/1996	1	0.032	38.14	0.36
128	11/24/1984	3	0.032	38.44	0.36
129	2/28/2006	2	0.032	38.74	0.36
130	4/22/1967	3	0.032	39.04	0.35
131	2/23/1979	1	0.032	39.34	0.35
132	1/10/1978	1	0.032	39.64	0.35
133	4/23/1980	1	0.031	39.94	0.35
134	7/31/1991	1	0.031	40.24	0.34
135	11/22/1965	1	0.031	40.54	0.34
136	2/17/1997	1	0.031	40.84	0.34
137	12/6/1998	1	0.031	41.14	0.34
138	1/18/1993	1	0.031	41.44	0.33
139	2/21/2000	1	0.031	41.74	0.33
140	3/21/1983	1	0.03	42.04	0.33
141	2/26/1987	1	0.03	42.34	0.33
142	11/11/1993	1	0.03	42.64	0.32
143	4/7/1999	1	0.03	42.94	0.32
144	2/26/2004	2	0.03	43.24	0.32
145	3/20/1973	1	0.03	43.54	0.32
146	3/20/1992	2	0.03	43.84	0.32
147	1/4/1974	6	0.03	44.14	0.31
148	1/21/1964	1	0.03	44.44	0.31
149	1/17/1990	1	0.029	44.74	0.31
150	2/17/1998	1	0.029	45.05	0.31
151	2/13/2001	1	0.029	45.35	0.3
152	2/12/1992	1	0.029	45.65	0.3
153	2/27/1991	11	0.029	45.95	0.3
154	3/17/1979	1	0.029	46.25	0.3
155	4/20/2007	1	0.029	46.55	0.3
156	11/7/1963	1	0.029	46.85	0.29
157	11/25/1985	8	0.029	47.15	0.29
158	1/30/1986	1	0.029	47.45	0.29
159	11/21/2004	1	0.029	47.75	0.29
160	11/11/1964	1	0.028	48.05	0.29
161	3/5/1970	1	0.028	48.35	0.29
162	11/20/1967	1	0.028	48.65	0.28
163	3/11/1973	1	0.027	48.95	0.28
164	11/26/1967	1	0.027	49.25	0.28
165	3/12/1996	1	0.027	49.55	0.28
166	12/21/1970	1	0.027	49.85	0.28
167	11/23/1973	4	0.027	50.15	0.28
168	4/17/2000	8	0.027	50.45	0.27
169	11/25/1983	1	0.027	50.75	0.27
170	9/10/1976	1	0.027	51.05	0.27
171	3/1/1981	1	0.027	51.35	0.27
172	11/12/2003	2	0.027	51.65	0.27
173	11/30/2007	1	0.027	51.95	0.27
174	2/14/2008	3	0.026	52.25	0.26
175	3/15/2003	1	0.026	52.55	0.26
176	10/10/1966	2	0.026	52.85	0.26
177	9/5/1991	1	0.026	53.15	0.26
178	2/13/1980	1	0.026	53.45	0.26
179	12/19/1978	1	0.026	53.75	0.26
180	1/12/2001	1	0.026	54.05	0.26
181	12/10/1985	1	0.026	54.35	0.25
182	2/8/1994	1	0.026	54.65	0.25
183	2/6/1992	4	0.026	54.95	0.25
184	2/14/1980	1	0.026	55.26	0.25
185	1/14/1978	2	0.025	55.56	0.25
186	2/17/1994	2	0.025	55.86	0.25
187	2/18/1994	1	0.025	56.16	0.25
188	12/6/1997	1	0.025	56.46	0.24
189	11/21/1967	2	0.025	56.76	0.24
190	2/13/1992	1	0.025	57.06	0.24
191	12/23/1982	1	0.025	57.36	0.24
192	2/18/2004	1	0.025	57.66	0.24
193	3/16/1986	1	0.025	57.96	0.24
194	1/6/1979	4	0.025	58.26	0.24
195	1/26/2001	1	0.025	58.56	0.24
196	12/14/1965	4	0.025	58.86	0.23
197	1/26/1969	1	0.025	59.16	0.23
198	3/25/1989	1	0.025	59.46	0.23
200	2/24/1998	1	0.025	60.06	0.23
200	2/22/2000	1	0.025	60.06	0.23
201	1/10/1995	1	0.024	60.36	0.23
202	4/20/1988	1	0.024	60.66	0.23
203	12/4/1972	2	0.024	60.96	0.23
204	4/18/1981	1	0.024	61.26	0.23
205	11/16/1972	1	0.024	61.56	0.22
206	1/17/1988	1	0.024	61.86	0.22
207	11/22/1996	2	0.024	62.16	0.22
208	10/30/1996	3	0.024	62.46	0.22
209	3/5/1981	1	0.024	62.76	0.22
210	3/23/1964	1	0.024	63.06	0.22
211	12/27/1984	1	0.024	63.36	0.22
212	2/27/1978	1	0.024	63.66	0.22
213	11/19/1967	1	0.024	63.96	0.22

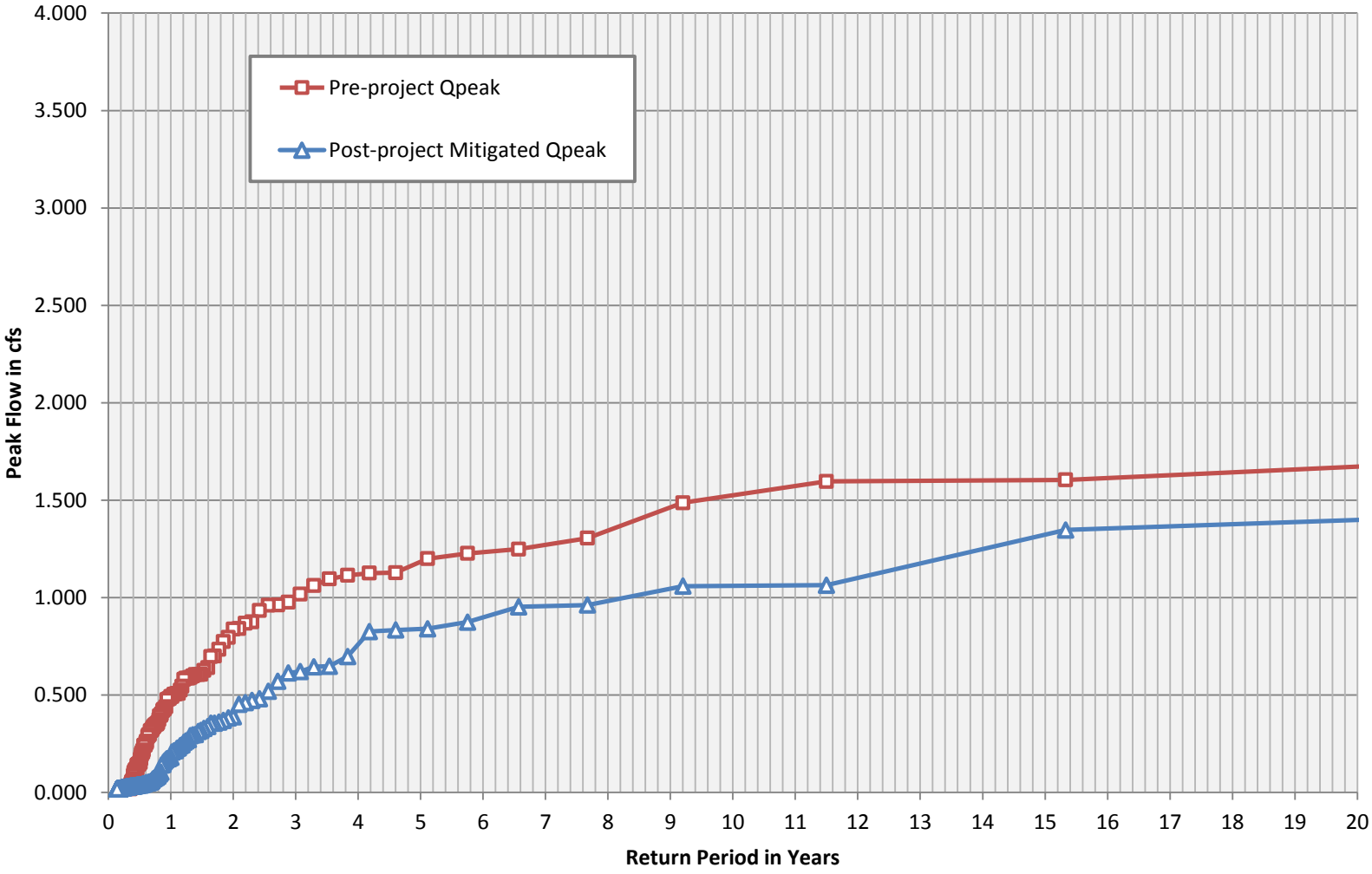
214	11/9/2002	1	0.023	64.26	0.21
215	2/11/1973	6	0.023	64.56	0.21
216	3/20/1981	1	0.023	64.86	0.21
218	3/5/2000	1	0.023	65.47	0.21
218	3/25/1998	1	0.023	65.47	0.21
219	11/9/1982	1	0.023	65.77	0.21
220	3/31/1978	1	0.023	66.07	0.21
221	12/28/2004	1	0.023	66.37	0.21
222	2/6/1965	2	0.023	66.67	0.21
223	3/10/1969	1	0.023	66.97	0.21
224	12/8/1984	1	0.022	67.27	0.21
225	3/28/1979	1	0.022	67.57	0.2
226	12/16/2002	1	0.022	67.87	0.2
227	2/27/2001	1	0.022	68.17	0.2
228	12/25/2003	1	0.022	68.47	0.2
229	1/5/1978	1	0.022	68.77	0.2
230	3/6/1994	1	0.022	69.07	0.2
231	2/3/2004	1	0.022	69.37	0.2
232	4/10/1965	1	0.022	69.67	0.2
233	3/2/1992	1	0.021	69.97	0.2
234	3/21/2006	1	0.021	70.27	0.2
235	4/3/1965	2	0.021	70.57	0.2
236	12/20/1984	1	0.021	70.87	0.19
237	12/18/1984	1	0.021	71.17	0.19
238	12/4/1971	1	0.021	71.47	0.19
239	12/19/1984	1	0.021	71.77	0.19
240	1/29/1981	1	0.021	72.07	0.19
241	1/26/1997	1	0.021	72.37	0.19
242	1/2/2006	1	0.021	72.67	0.19
243	1/19/1980	1	0.021	72.97	0.19
244	1/21/1969	1	0.021	73.27	0.19
245	1/8/1974	1	0.021	73.57	0.19
246	1/7/1974	1	0.021	73.87	0.19
247	11/24/1978	1	0.021	74.17	0.19
248	2/8/1983	1	0.021	74.47	0.19
249	1/9/1978	1	0.021	74.77	0.18
250	10/9/1986	1	0.021	75.08	0.18
251	2/27/1983	1	0.021	75.38	0.18
253	3/6/2001	1	0.021	75.98	0.18
253	3/28/1998	1	0.021	75.98	0.18
254	10/20/2004	1	0.021	76.28	0.18
255	3/4/2005	1	0.021	76.58	0.18
256	4/14/1971	1	0.021	76.88	0.18
257	10/16/1971	1	0.021	77.18	0.18
258	3/4/1983	1	0.021	77.48	0.18
259	2/3/1975	1	0.021	77.78	0.18
260	3/3/1983	1	0.021	78.08	0.18
261	4/18/1995	1	0.021	78.38	0.18
262	4/12/1999	1	0.021	78.68	0.18
263	2/5/1978	1	0.02	78.98	0.17
264	3/1/1979	1	0.02	79.28	0.17
265	12/19/1970	1	0.02	79.58	0.17
266	3/10/1986	1	0.02	79.88	0.17
267	1/11/1995	1	0.02	80.18	0.17
268	1/6/1993	1	0.02	80.48	0.17
269	1/25/1994	1	0.02	80.78	0.17
270	3/11/2006	1	0.02	81.08	0.17
271	3/10/1975	1	0.02	81.38	0.17
272	4/21/1988	1	0.02	81.68	0.17
273	1/28/1981	1	0.02	81.98	0.17
274	1/11/2005	2	0.02	82.28	0.17
275	1/15/1978	2	0.02	82.58	0.17
276	2/5/1976	1	0.02	82.88	0.17
277	3/2/1978	1	0.02	83.18	0.17
278	3/11/2006	1	0.02	83.48	0.17
279	12/9/1965	1	0.02	83.78	0.16
280	12/10/1982	1	0.02	84.08	0.16
281	4/11/1967	2	0.02	84.38	0.16
282	2/26/2004	1	0.02	84.68	0.16
283	3/6/1980	2	0.02	84.98	0.16
284	3/19/1983	1	0.02	85.29	0.16
285	2/28/1991	1	0.02	85.59	0.16
286	11/8/2002	1	0.02	85.89	0.16
287	10/16/1971	1	0.02	86.19	0.16
288	11/25/1965	1	0.02	86.49	0.16
289	12/8/2007	1	0.02	86.79	0.16
290	1/6/1993	1	0.02	87.09	0.16
291	2/22/2008	1	0.02	87.39	0.16
292	4/16/1995	1	0.02	87.69	0.16
293	4/1/2004	1	0.02	87.99	0.16
294	3/26/1998	1	0.02	88.29	0.16
295	3/17/1982	1	0.02	88.59	0.16
296	3/11/1995	2	0.019	88.89	0.16
297	3/31/1967	1	0.019	89.19	0.15
298	3/1/1970	1	0.019	89.49	0.15
299	11/4/1987	5	0.019	89.79	0.15
300	4/11/1998	1	0.019	90.09	0.15
301	4/5/2006	1	0.019	90.39	0.15
302	1/27/1994	1	0.019	90.69	0.15
303	1/16/1979	1	0.019	90.99	0.15
304	2/10/1970	1	0.019	91.29	0.15
305	5/12/1998	1	0.019	91.59	0.15
306	3/21/1969	1	0.019	91.89	0.15
307	11/28/1975	1	0.019	92.19	0.15
308	12/30/1976	1	0.019	92.49	0.15
309	11/12/1983	1	0.019	92.79	0.15
310	1/16/1978	1	0.019	93.09	0.15
311	1/18/1979	1	0.019	93.39	0.15
312	1/26/2008	1	0.019	93.69	0.15
313	1/17/1978	1	0.019	93.99	0.15
314	1/1/1982	1	0.019	94.29	0.15
315	12/6/1986	1	0.019	94.59	0.15
316	2/2/1988	1	0.019	94.89	0.15
317	2/24/1987	1	0.019	95.2	0.15
320	2/17/2000	1	0.018	96.1	0.14
320	2/12/2003	1	0.018	96.1	0.14
320	2/12/2000	1	0.018	96.1	0.14
321	3/14/1975	1	0.018	96.4	0.14
322	2/9/1981	1	0.018	96.7	0.14
323	11/26/1970	1	0.018	97	0.14
324	11/27/1975	1	0.018	97.3	0.14

325	3/29/2006	1	0.018	97.6	0.14
326	11/18/1986	1	0.018	97.9	0.14
327	11/21/1978	1	0.018	98.2	0.14
328	4/8/1965	4	0.018	98.5	0.14
329	11/10/1969	1	0.018	98.8	0.14
330	4/15/1998	1	0.018	99.1	0.14
331	4/15/1976	1	0.018	99.4	0.14
332	3/31/1967	1	0.018	99.7	0.14

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.084	0.039
2-year	0.838	0.388
5-year	1.184	0.839
10-year	1.525	1.061

Peak Flow Frequency Curves



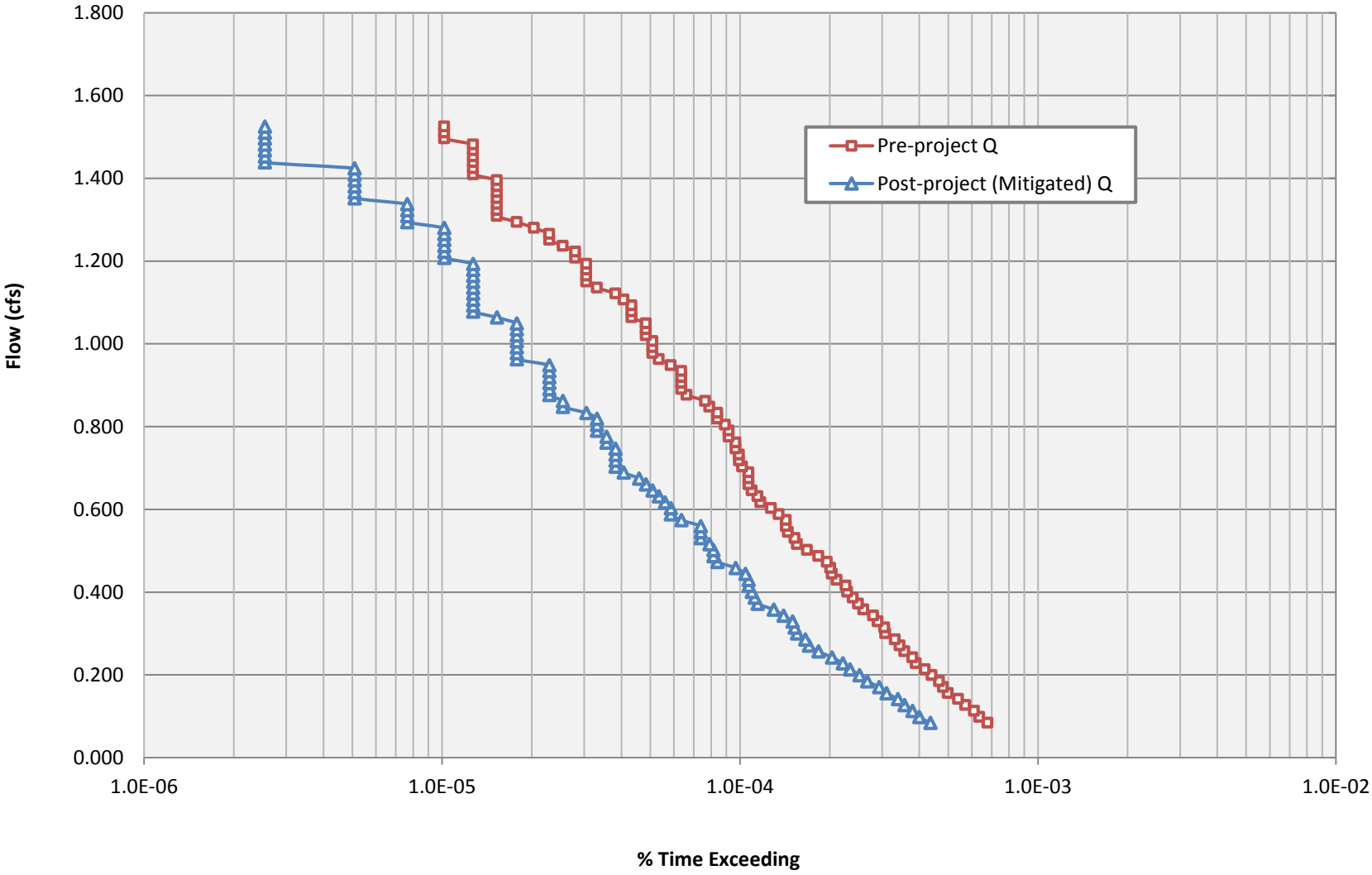
Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.084	cfs
Q10 (Pre):	1.525	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.01441	64
Total Hourly Data:	392652	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.084	266	6.77E-04	171	4.36E-04	64%	Pass
1	0.098	250	6.37E-04	157	4.00E-04	63%	Pass
2	0.113	240	6.11E-04	149	3.79E-04	62%	Pass
3	0.127	224	5.70E-04	140	3.57E-04	63%	Pass
4	0.141	212	5.40E-04	133	3.39E-04	63%	Pass
5	0.156	196	4.99E-04	122	3.11E-04	62%	Pass
6	0.170	189	4.81E-04	115	2.93E-04	61%	Pass
7	0.185	183	4.66E-04	105	2.67E-04	57%	Pass
8	0.199	173	4.41E-04	99	2.52E-04	57%	Pass
9	0.214	164	4.18E-04	92	2.34E-04	56%	Pass
10	0.228	153	3.90E-04	87	2.22E-04	57%	Pass
11	0.242	149	3.79E-04	80	2.04E-04	54%	Pass
12	0.257	140	3.57E-04	72	1.83E-04	51%	Pass
13	0.271	135	3.44E-04	67	1.71E-04	50%	Pass
14	0.286	130	3.31E-04	65	1.66E-04	50%	Pass
15	0.300	121	3.08E-04	61	1.55E-04	50%	Pass
16	0.314	120	3.06E-04	60	1.53E-04	50%	Pass
17	0.329	114	2.90E-04	59	1.50E-04	52%	Pass
18	0.343	110	2.80E-04	55	1.40E-04	50%	Pass
19	0.358	102	2.60E-04	51	1.30E-04	50%	Pass
20	0.372	98	2.50E-04	45	1.15E-04	46%	Pass
21	0.386	94	2.39E-04	44	1.12E-04	47%	Pass
22	0.401	90	2.29E-04	43	1.10E-04	48%	Pass
23	0.415	89	2.27E-04	42	1.07E-04	47%	Pass
24	0.430	83	2.11E-04	42	1.07E-04	51%	Pass
25	0.444	80	2.04E-04	41	1.04E-04	51%	Pass
26	0.458	79	2.01E-04	38	9.68E-05	48%	Pass
27	0.473	77	1.96E-04	33	8.40E-05	43%	Pass
28	0.487	72	1.83E-04	32	8.15E-05	44%	Pass
29	0.502	66	1.68E-04	32	8.15E-05	48%	Pass
30	0.516	61	1.55E-04	31	7.90E-05	51%	Pass
31	0.531	60	1.53E-04	29	7.39E-05	48%	Pass
32	0.545	57	1.45E-04	29	7.39E-05	51%	Pass
33	0.559	56	1.43E-04	29	7.39E-05	52%	Pass
34	0.574	56	1.43E-04	25	6.37E-05	45%	Pass
35	0.588	53	1.35E-04	23	5.86E-05	43%	Pass
36	0.603	50	1.27E-04	23	5.86E-05	46%	Pass
37	0.617	46	1.17E-04	22	5.60E-05	48%	Pass
38	0.631	45	1.15E-04	21	5.35E-05	47%	Pass
39	0.646	43	1.10E-04	20	5.09E-05	47%	Pass
40	0.660	42	1.07E-04	19	4.84E-05	45%	Pass
41	0.675	42	1.07E-04	18	4.58E-05	43%	Pass
42	0.689	42	1.07E-04	16	4.07E-05	38%	Pass
43	0.703	40	1.02E-04	15	3.82E-05	38%	Pass
44	0.718	39	9.93E-05	15	3.82E-05	38%	Pass
45	0.732	39	9.93E-05	15	3.82E-05	38%	Pass
46	0.747	38	9.68E-05	15	3.82E-05	39%	Pass
47	0.761	38	9.68E-05	14	3.57E-05	37%	Pass
48	0.776	36	9.17E-05	14	3.57E-05	39%	Pass
49	0.790	36	9.17E-05	13	3.31E-05	36%	Pass
50	0.804	35	8.91E-05	13	3.31E-05	37%	Pass
51	0.819	33	8.40E-05	13	3.31E-05	39%	Pass
52	0.833	33	8.40E-05	12	3.06E-05	36%	Pass
53	0.848	31	7.90E-05	10	2.55E-05	32%	Pass
54	0.862	30	7.64E-05	10	2.55E-05	33%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
55	0.876	26	6.62E-05	9	2.29E-05	35%	Pass
56	0.891	25	6.37E-05	9	2.29E-05	36%	Pass
57	0.905	25	6.37E-05	9	2.29E-05	36%	Pass
58	0.920	25	6.37E-05	9	2.29E-05	36%	Pass
59	0.934	25	6.37E-05	9	2.29E-05	36%	Pass
60	0.948	23	5.86E-05	9	2.29E-05	39%	Pass
61	0.963	21	5.35E-05	7	1.78E-05	33%	Pass
62	0.977	20	5.09E-05	7	1.78E-05	35%	Pass
63	0.992	20	5.09E-05	7	1.78E-05	35%	Pass
64	1.006	20	5.09E-05	7	1.78E-05	35%	Pass
65	1.021	19	4.84E-05	7	1.78E-05	37%	Pass
66	1.035	19	4.84E-05	7	1.78E-05	37%	Pass
67	1.049	19	4.84E-05	7	1.78E-05	37%	Pass
68	1.064	17	4.33E-05	6	1.53E-05	35%	Pass
69	1.078	17	4.33E-05	5	1.27E-05	29%	Pass
70	1.093	17	4.33E-05	5	1.27E-05	29%	Pass
71	1.107	16	4.07E-05	5	1.27E-05	31%	Pass
72	1.121	15	3.82E-05	5	1.27E-05	33%	Pass
73	1.136	13	3.31E-05	5	1.27E-05	38%	Pass
74	1.150	12	3.06E-05	5	1.27E-05	42%	Pass
75	1.165	12	3.06E-05	5	1.27E-05	42%	Pass
76	1.179	12	3.06E-05	5	1.27E-05	42%	Pass
77	1.193	12	3.06E-05	5	1.27E-05	42%	Pass
78	1.208	11	2.80E-05	4	1.02E-05	36%	Pass
79	1.222	11	2.80E-05	4	1.02E-05	36%	Pass
80	1.237	10	2.55E-05	4	1.02E-05	40%	Pass
81	1.251	9	2.29E-05	4	1.02E-05	44%	Pass
82	1.266	9	2.29E-05	4	1.02E-05	44%	Pass
83	1.280	8	2.04E-05	4	1.02E-05	50%	Pass
84	1.294	7	1.78E-05	3	7.64E-06	43%	Pass
85	1.309	6	1.53E-05	3	7.64E-06	50%	Pass
86	1.323	6	1.53E-05	3	7.64E-06	50%	Pass
87	1.338	6	1.53E-05	3	7.64E-06	50%	Pass
88	1.352	6	1.53E-05	2	5.09E-06	33%	Pass
89	1.366	6	1.53E-05	2	5.09E-06	33%	Pass
90	1.381	6	1.53E-05	2	5.09E-06	33%	Pass
91	1.395	6	1.53E-05	2	5.09E-06	33%	Pass
92	1.410	5	1.27E-05	2	5.09E-06	40%	Pass
93	1.424	5	1.27E-05	2	5.09E-06	40%	Pass
94	1.438	5	1.27E-05	1	2.55E-06	20%	Pass
95	1.453	5	1.27E-05	1	2.55E-06	20%	Pass
96	1.467	5	1.27E-05	1	2.55E-06	20%	Pass
97	1.482	5	1.27E-05	1	2.55E-06	20%	Pass
98	1.496	4	1.02E-05	1	2.55E-06	25%	Pass
99	1.511	4	1.02E-05	1	2.55E-06	25%	Pass
100	1.525	4	1.02E-05	1	2.55E-06	25%	Pass

Flow Duration Curve
[Pre vs. Post (Mitigated)]



POC-2

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node EX-POC-2 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	4	2.775	0.75	46
2	1/25/1995	3	1.481	1.49	23
3	10/20/2004	6	1.381	2.24	15.33
4	11/22/1965	9	1.34	2.99	11.5
5	1/31/1979	9	1.226	3.73	9.2
6	11/30/2007	4	1.139	4.48	7.67
7	2/14/1995	9	1.065	5.22	6.57
8	1/14/1969	6	1.051	5.97	5.75
9	2/22/2004	5	1.024	6.72	5.11
10	1/9/2005	2	0.977	7.46	4.6
11	11/20/1983	2	0.972	8.21	4.18
12	2/8/1998	3	0.955	8.96	3.83
13	3/1/1983	3	0.937	9.7	3.54
14	4/1/1982	4	0.871	10.45	3.29
15	1/4/1995	5	0.868	11.19	3.07
16	2/3/1998	2	0.845	11.94	2.88
17	2/10/1978	4	0.812	12.69	2.71
18	2/16/1980	4	0.8	13.43	2.56
19	3/24/1983	3	0.768	14.18	2.42
20	11/29/1970	4	0.761	14.93	2.3
21	3/3/1980	1	0.753	15.67	2.19
22	1/13/1993	2	0.748	16.42	2.09
23	8/17/1977	4	0.713	17.16	2
24	2/13/1973	2	0.691	17.91	1.92
25	2/28/1991	6	0.666	18.66	1.84
26	1/7/1993	2	0.621	19.4	1.77
27	3/5/1995	15	0.605	20.15	1.7
28	3/14/1982	3	0.602	20.9	1.64
29	3/4/1978	2	0.545	21.64	1.59
30	10/29/1974	2	0.541	22.39	1.53
31	9/10/1976	2	0.533	23.13	1.48
32	2/14/1998	2	0.531	23.88	1.44
33	2/19/1993	2	0.52	24.63	1.39
34	10/28/1974	4	0.517	25.37	1.35
35	11/11/1985	2	0.516	26.12	1.31
36	12/18/1967	4	0.502	26.87	1.28
37	2/28/1978	1	0.498	27.61	1.24
38	2/19/1980	8	0.496	28.36	1.21
39	10/31/1987	4	0.491	29.1	1.18
40	1/31/1996	1	0.463	29.85	1.15
41	1/3/1977	1	0.461	30.6	1.12
42	1/30/1980	2	0.459	31.34	1.1
43	12/28/1977	2	0.458	32.09	1.07
44	3/18/1983	1	0.438	32.84	1.05
45	1/27/2008	8	0.433	33.58	1.02
46	1/29/1980	4	0.419	34.33	1
47	12/5/1966	5	0.408	35.07	0.98
48	3/1/1978	4	0.402	35.82	0.96
49	2/10/1982	6	0.402	36.57	0.94
50	3/13/1996	2	0.402	37.31	0.92
51	2/6/1969	1	0.375	38.06	0.9
52	3/1/1981	2	0.374	38.81	0.88
53	2/21/2005	2	0.362	39.55	0.87
54	2/8/1976	10	0.357	40.3	0.85
55	10/20/1979	3	0.353	41.04	0.84
56	1/3/2005	2	0.348	41.79	0.82
57	1/29/1980	7	0.319	42.54	0.81
58	2/18/1980	2	0.315	43.28	0.79
59	2/22/1969	3	0.312	44.03	0.78
60	12/27/1984	3	0.308	44.78	0.77
61	1/18/1979	2	0.305	45.52	0.75
62	12/7/1992	4	0.304	46.27	0.74
63	1/5/1992	6	0.304	47.01	0.73
64	3/8/1973	1	0.297	47.76	0.72
65	10/19/2004	10	0.296	48.51	0.71
66	4/14/2003	1	0.295	49.25	0.7
67	2/21/1980	1	0.289	50	0.69
68	3/16/1982	4	0.279	50.75	0.68
69	11/30/1982	5	0.269	51.49	0.67
70	3/5/1978	6	0.258	52.24	0.66
71	1/16/1993	5	0.25	52.99	0.65
72	12/6/1966	4	0.248	53.73	0.64
73	2/26/2004	2	0.247	54.48	0.63
75	2/25/2003	1	0.243	55.97	0.61
75	2/15/1992	1	0.243	55.97	0.61
76	2/23/2004	3	0.237	56.72	0.61
77	1/21/1964	1	0.223	57.46	0.6
78	11/24/1984	3	0.222	58.21	0.59
79	1/25/1969	3	0.211	58.96	0.58
80	3/11/1978	4	0.21	59.7	0.57
81	1/4/1974	3	0.203	60.45	0.57
82	2/15/1986	2	0.198	61.19	0.56
83	3/6/1980	2	0.192	61.94	0.55
84	12/25/1988	4	0.191	62.69	0.55
85	3/10/2001	1	0.184	63.43	0.54
86	4/13/1976	3	0.181	64.18	0.53
87	1/15/1993	5	0.174	64.93	0.53
88	1/10/1978	1	0.162	65.67	0.52
89	11/15/1965	2	0.16	66.42	0.52
90	3/23/1964	2	0.156	67.16	0.51
91	12/21/1970	2	0.143	67.91	0.51
92	12/6/1998	1	0.137	68.66	0.5
93	1/18/1993	1	0.136	69.4	0.49
94	11/11/1964	1	0.134	70.15	0.49
97	2/26/1987	1	0.134	72.39	0.47
97	2/21/2000	1	0.134	72.39	0.47
97	2/12/1992	2	0.134	72.39	0.47
98	3/16/1986	1	0.131	73.13	0.47
99	4/8/1965	3	0.129	73.88	0.46
100	11/14/1993	4	0.117	74.63	0.46
101	2/8/1993	1	0.116	75.37	0.46
102	1/12/2001	1	0.113	76.12	0.45

10-year Q: 1.266 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 1.014 cfs
2-year Q: 0.713 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Pre): 0.071 cfs

103	1/17/1990	1	0.111	76.87	0.45
105	2/13/2001	1	0.109	78.36	0.44
105	2/17/1998	1	0.109	78.36	0.44
106	10/27/2004	2	0.107	79.1	0.43
107	3/11/1973	3	0.106	79.85	0.43
108	11/22/1965	1	0.102	80.6	0.43
109	4/22/1967	1	0.098	81.34	0.42
110	12/18/1984	1	0.094	82.09	0.42
111	3/2/1983	5	0.091	82.84	0.41
112	11/26/1967	2	0.086	83.58	0.41
113	2/19/2007	2	0.084	84.33	0.41
114	3/15/2003	1	0.083	85.07	0.4
115	11/20/1967	1	0.066	85.82	0.4
116	3/1/1981	1	0.061	86.57	0.4
117	12/19/1978	2	0.06	87.31	0.39
118	3/31/1992	1	0.055	88.06	0.39
119	2/5/1976	1	0.053	88.81	0.39
120	12/19/1970	1	0.052	89.55	0.38
121	1/29/1981	1	0.051	90.3	0.38
122	3/1/1970	1	0.051	91.04	0.38
124	12/27/1984	1	0.046	92.54	0.37
124	12/6/1997	1	0.046	92.54	0.37
125	2/13/1992	1	0.043	93.28	0.37
126	1/16/1979	1	0.039	94.03	0.37
127	9/10/1976	1	0.039	94.78	0.36
128	12/14/1965	1	0.028	95.52	0.36
130	2/22/2000	1	0.026	97.01	0.35
130	2/24/1998	1	0.026	97.01	0.35
131	1/9/1980	1	0.026	97.76	0.35
132	3/24/1964	1	0.023	98.51	0.35
133	1/11/2005	1	0.017	99.25	0.35

Post-project (Mitigated) Flow Frequency - Long-term Simulation

Statistics - Node PROP-POC-2 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	5	2.944	1.25	46
2	11/22/1965	13	1.451	2.5	23
3	1/31/1979	11	1.359	3.75	15.33
4	2/14/1995	3	1.074	5	11.5
5	2/22/2004	5	1.068	6.25	9.2
6	10/20/2004	7	1.063	7.5	7.67
7	1/4/1995	6	0.958	8.75	6.57
8	3/1/1983	4	0.854	10	5.75
9	11/29/1970	4	0.845	11.25	5.11
10	2/10/1978	4	0.834	12.5	4.6
11	2/16/1980	4	0.82	13.75	4.18
12	1/14/1969	6	0.763	15	3.83
13	3/5/1995	12	0.66	16.25	3.54
14	3/1/1991	6	0.658	17.5	3.29
15	11/30/2007	4	0.516	18.75	3.07
16	11/30/1982	6	0.498	20	2.88
17	12/18/1967	5	0.49	21.25	2.71
18	3/1/1978	5	0.487	22.5	2.56
19	10/28/1974	5	0.46	23.75	2.42
20	11/11/1985	6	0.446	25	2.3
21	2/15/1986	8	0.435	26.25	2.19
22	12/5/1966	6	0.431	27.5	2.09
23	1/29/1980	4	0.411	28.75	2
24	4/1/1982	3	0.409	30	1.92
25	2/8/1976	9	0.391	31.25	1.84
26	3/14/1982	4	0.367	32.5	1.77
27	9/10/1976	3	0.348	33.75	1.7
28	10/27/2004	4	0.348	35	1.64
29	3/13/1996	7	0.343	36.25	1.59
30	10/31/1987	4	0.333	37.5	1.53
31	2/8/1998	4	0.331	38.75	1.48
32	2/23/2004	4	0.328	40	1.44
33	1/25/1995	4	0.323	41.25	1.39
34	2/10/1982	3	0.321	42.5	1.35
35	1/11/2001	7	0.319	43.75	1.31
36	1/13/1993	3	0.311	45	1.28
37	2/3/1998	4	0.304	46.25	1.24
38	12/6/1966	4	0.299	47.5	1.21
39	1/27/2008	5	0.292	48.75	1.18
40	3/24/1983	3	0.291	50	1.15
41	2/20/1980	3	0.243	51.25	1.12
42	1/9/2005	4	0.232	52.5	1.1
43	3/16/1982	8	0.228	53.75	1.07
44	1/5/1992	5	0.228	55	1.05
45	1/7/1993	3	0.227	56.25	1.02
46	10/19/2004	10	0.22	57.5	1
47	2/22/1969	3	0.213	58.75	0.98
48	3/2/1983	5	0.186	60	0.96
49	1/16/1993	4	0.18	61.25	0.94
50	3/12/1978	3	0.177	62.5	0.92
51	10/20/1979	3	0.176	63.75	0.9
52	2/6/1969	2	0.175	65	0.88
53	12/7/1992	3	0.16	66.25	0.87
54	2/13/1973	2	0.154	67.5	0.85
55	11/20/1983	2	0.132	68.75	0.84
56	1/15/1993	6	0.132	70	0.82
57	2/14/1995	3	0.124	71.25	0.81
58	12/25/1988	3	0.121	72.5	0.79
59	10/29/1974	2	0.111	73.75	0.78
60	2/14/1998	2	0.106	75	0.77
61	1/25/1969	4	0.097	76.25	0.75
62	5/7/1971	3	0.097	77.5	0.74
63	2/1/1996	2	0.087	78.75	0.73
64	3/5/1978	5	0.082	80	0.72
65	11/14/1993	3	0.06	81.25	0.71
66	3/6/1975	3	0.06	82.5	0.7
67	3/1/1981	2	0.059	83.75	0.69
68	3/3/1980	1	0.054	85	0.68
69	11/7/1966	2	0.049	86.25	0.67
70	11/24/1984	2	0.042	87.5	0.66
71	1/5/1974	2	0.037	88.75	0.65
72	4/8/1965	2	0.035	90	0.64
73	2/19/2007	1	0.035	91.25	0.63
74	3/4/1978	1	0.032	92.5	0.62
75	1/29/1980	1	0.029	93.75	0.61
76	2/18/1980	1	0.025	95	0.61
77	1/3/2005	2	0.019	96.25	0.6
78	1/3/1977	1	0.016	97.5	0.59
79	12/18/1984	1	0.015	98.75	0.58

10-year Q: 1.070 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.843 cfs
2-year Q: 0.411 cfs

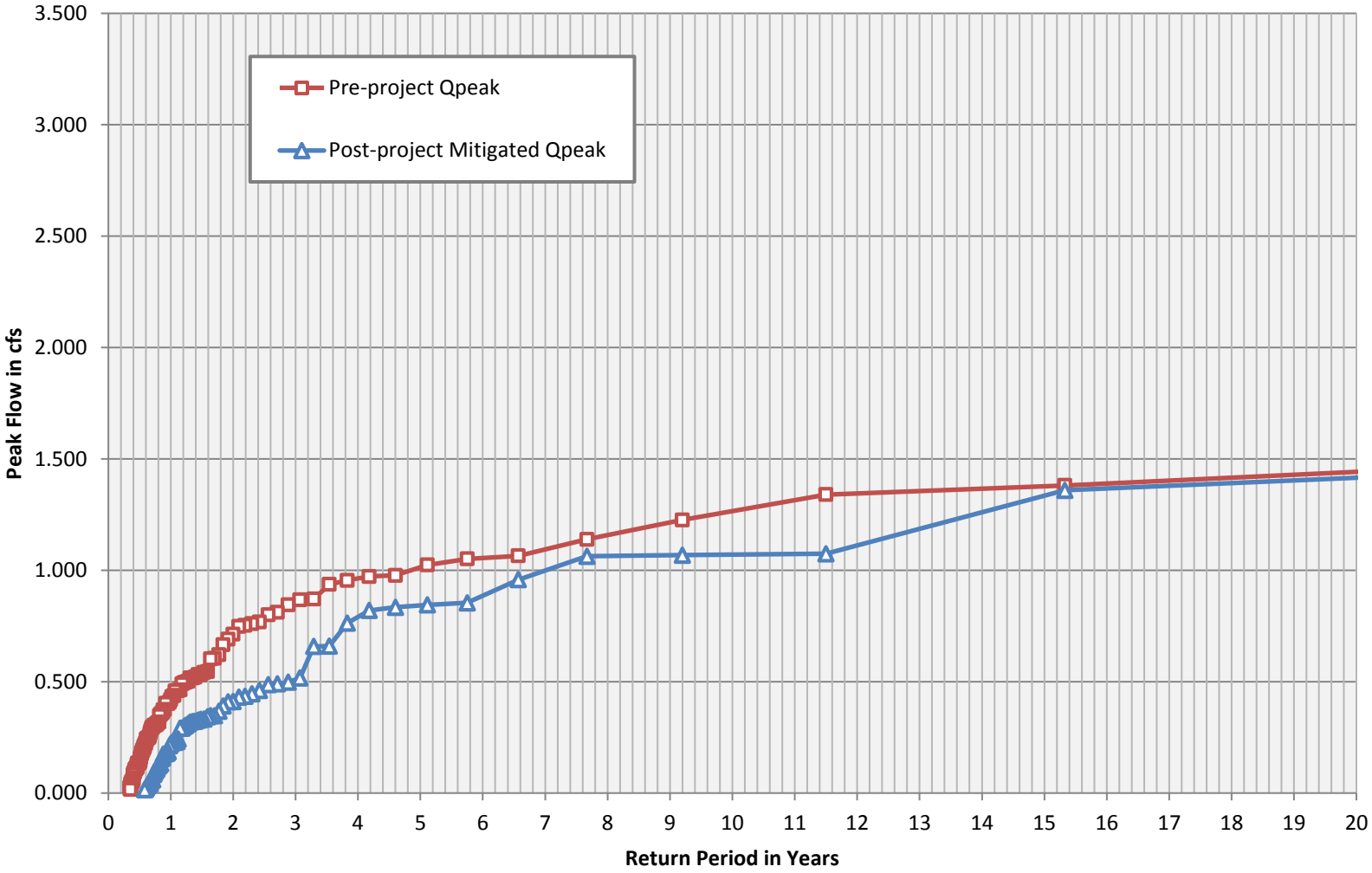
Lower Flow Threshold: 10%

0.1xQ2 (Post Mit): 0.041 cfs

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.071	0.041
2-year	0.713	0.411
5-year	1.014	0.843
10-year	1.266	1.070

Peak Flow Frequency Curves

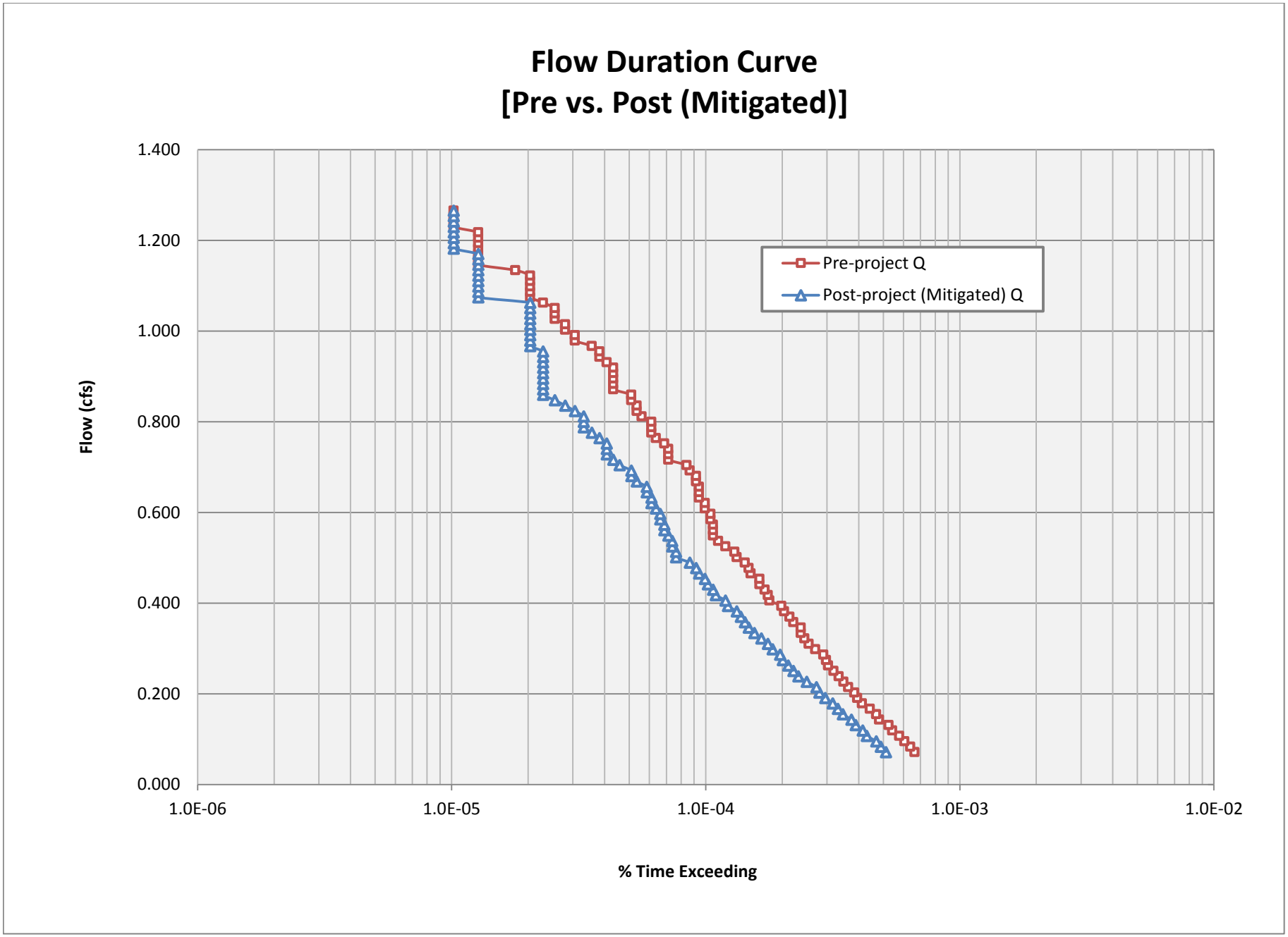


Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.071	cfs
Q10 (Pre):	1.266	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.01194	64
Total Hourly Data:	392652	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.071	261	6.65E-04	201	5.12E-04	77%	Pass
1	0.083	251	6.39E-04	192	4.89E-04	76%	Pass
2	0.095	238	6.06E-04	184	4.69E-04	77%	Pass
3	0.107	227	5.78E-04	169	4.30E-04	74%	Pass
4	0.119	213	5.42E-04	163	4.15E-04	77%	Pass
5	0.131	206	5.25E-04	153	3.90E-04	74%	Pass
6	0.143	189	4.81E-04	147	3.74E-04	78%	Pass
7	0.155	184	4.69E-04	136	3.46E-04	74%	Pass
8	0.167	174	4.43E-04	130	3.31E-04	75%	Pass
9	0.179	162	4.13E-04	124	3.16E-04	77%	Pass
10	0.191	155	3.95E-04	116	2.95E-04	75%	Pass
11	0.203	151	3.85E-04	110	2.80E-04	73%	Pass
12	0.215	143	3.64E-04	107	2.73E-04	75%	Pass
13	0.227	137	3.49E-04	98	2.50E-04	72%	Pass
14	0.239	131	3.34E-04	91	2.32E-04	69%	Pass
15	0.250	125	3.18E-04	87	2.22E-04	70%	Pass
16	0.262	119	3.03E-04	83	2.11E-04	70%	Pass
17	0.274	117	2.98E-04	79	2.01E-04	68%	Pass
18	0.286	114	2.90E-04	77	1.96E-04	68%	Pass
19	0.298	106	2.70E-04	72	1.83E-04	68%	Pass
20	0.310	100	2.55E-04	69	1.76E-04	69%	Pass
21	0.322	96	2.44E-04	65	1.66E-04	68%	Pass
22	0.334	93	2.37E-04	61	1.55E-04	66%	Pass
23	0.346	93	2.37E-04	58	1.48E-04	62%	Pass
24	0.358	87	2.22E-04	56	1.43E-04	64%	Pass
25	0.370	84	2.14E-04	54	1.38E-04	64%	Pass
26	0.382	80	2.04E-04	52	1.32E-04	65%	Pass
27	0.394	78	1.99E-04	48	1.22E-04	62%	Pass
28	0.406	70	1.78E-04	47	1.20E-04	67%	Pass
29	0.418	69	1.76E-04	43	1.10E-04	62%	Pass
30	0.430	67	1.71E-04	42	1.07E-04	63%	Pass
31	0.442	64	1.63E-04	40	1.02E-04	63%	Pass
32	0.453	64	1.63E-04	39	9.93E-05	61%	Pass
33	0.465	59	1.50E-04	37	9.42E-05	63%	Pass
34	0.477	58	1.48E-04	36	9.17E-05	62%	Pass
35	0.489	56	1.43E-04	34	8.66E-05	61%	Pass
36	0.501	52	1.32E-04	30	7.64E-05	58%	Pass
37	0.513	51	1.30E-04	30	7.64E-05	59%	Pass
38	0.525	47	1.20E-04	29	7.39E-05	62%	Pass
39	0.537	44	1.12E-04	29	7.39E-05	66%	Pass
40	0.549	42	1.07E-04	28	7.13E-05	67%	Pass
41	0.561	42	1.07E-04	27	6.88E-05	64%	Pass
42	0.573	42	1.07E-04	27	6.88E-05	64%	Pass
43	0.585	41	1.04E-04	26	6.62E-05	63%	Pass
44	0.597	41	1.04E-04	26	6.62E-05	63%	Pass
45	0.609	39	9.93E-05	25	6.37E-05	64%	Pass
46	0.621	39	9.93E-05	24	6.11E-05	62%	Pass
47	0.633	37	9.42E-05	24	6.11E-05	65%	Pass
48	0.645	37	9.42E-05	23	5.86E-05	62%	Pass
49	0.657	37	9.42E-05	23	5.86E-05	62%	Pass
50	0.668	36	9.17E-05	21	5.35E-05	58%	Pass
51	0.680	36	9.17E-05	20	5.09E-05	56%	Pass
52	0.692	34	8.66E-05	20	5.09E-05	59%	Pass
53	0.704	33	8.40E-05	18	4.58E-05	55%	Pass
54	0.716	28	7.13E-05	17	4.33E-05	61%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
55	0.728	28	7.13E-05	16	4.07E-05	57%	Pass
56	0.740	28	7.13E-05	16	4.07E-05	57%	Pass
57	0.752	27	6.88E-05	16	4.07E-05	59%	Pass
58	0.764	25	6.37E-05	15	3.82E-05	60%	Pass
59	0.776	24	6.11E-05	14	3.57E-05	58%	Pass
60	0.788	24	6.11E-05	13	3.31E-05	54%	Pass
61	0.800	24	6.11E-05	13	3.31E-05	54%	Pass
62	0.812	22	5.60E-05	13	3.31E-05	59%	Pass
63	0.824	21	5.35E-05	12	3.06E-05	57%	Pass
64	0.836	21	5.35E-05	11	2.80E-05	52%	Pass
65	0.848	20	5.09E-05	10	2.55E-05	50%	Pass
66	0.860	20	5.09E-05	9	2.29E-05	45%	Pass
67	0.872	17	4.33E-05	9	2.29E-05	53%	Pass
68	0.883	17	4.33E-05	9	2.29E-05	53%	Pass
69	0.895	17	4.33E-05	9	2.29E-05	53%	Pass
70	0.907	17	4.33E-05	9	2.29E-05	53%	Pass
71	0.919	17	4.33E-05	9	2.29E-05	53%	Pass
72	0.931	16	4.07E-05	9	2.29E-05	56%	Pass
73	0.943	15	3.82E-05	9	2.29E-05	60%	Pass
74	0.955	15	3.82E-05	9	2.29E-05	60%	Pass
75	0.967	14	3.57E-05	8	2.04E-05	57%	Pass
76	0.979	12	3.06E-05	8	2.04E-05	67%	Pass
77	0.991	12	3.06E-05	8	2.04E-05	67%	Pass
78	1.003	11	2.80E-05	8	2.04E-05	73%	Pass
79	1.015	11	2.80E-05	8	2.04E-05	73%	Pass
80	1.027	10	2.55E-05	8	2.04E-05	80%	Pass
81	1.039	10	2.55E-05	8	2.04E-05	80%	Pass
82	1.051	10	2.55E-05	8	2.04E-05	80%	Pass
83	1.063	9	2.29E-05	8	2.04E-05	89%	Pass
84	1.075	8	2.04E-05	5	1.27E-05	63%	Pass
85	1.086	8	2.04E-05	5	1.27E-05	63%	Pass
86	1.098	8	2.04E-05	5	1.27E-05	63%	Pass
87	1.110	8	2.04E-05	5	1.27E-05	63%	Pass
88	1.122	8	2.04E-05	5	1.27E-05	63%	Pass
89	1.134	7	1.78E-05	5	1.27E-05	71%	Pass
90	1.146	5	1.27E-05	5	1.27E-05	100%	Pass
91	1.158	5	1.27E-05	5	1.27E-05	100%	Pass
92	1.170	5	1.27E-05	5	1.27E-05	100%	Pass
93	1.182	5	1.27E-05	4	1.02E-05	80%	Pass
94	1.194	5	1.27E-05	4	1.02E-05	80%	Pass
95	1.206	5	1.27E-05	4	1.02E-05	80%	Pass
96	1.218	5	1.27E-05	4	1.02E-05	80%	Pass
97	1.230	4	1.02E-05	4	1.02E-05	100%	Pass
98	1.242	4	1.02E-05	4	1.02E-05	100%	Pass
99	1.254	4	1.02E-05	4	1.02E-05	100%	Pass
100	1.266	4	1.02E-05	4	1.02E-05	100%	Pass


Flow Duration Curve
[Pre vs. Post (Mitigated)]
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

POC-3

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node EX-POC-3 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	4	4.848	0.68	46
2	11/22/1965	9	2.188	1.36	23
3	1/25/1995	3	2.173	2.04	15.33
4	1/31/1979	10	2.116	2.72	11.5
5	10/20/2004	7	2.008	3.4	9.2
6	2/22/2004	5	1.68	4.08	7.67
7	2/14/1995	9	1.621	4.76	6.57
8	11/30/2007	4	1.61	5.44	5.75
9	1/4/1995	6	1.548	6.12	5.11
10	1/14/1969	7	1.531	6.8	4.6
11	3/1/1983	4	1.494	7.48	4.18
12	11/20/1983	2	1.429	8.16	3.83
13	1/9/2005	3	1.407	8.84	3.54
14	11/29/1970	5	1.374	9.52	3.29
15	2/10/1978	4	1.362	10.2	3.07
16	2/8/1998	4	1.358	10.88	2.88
17	2/16/1980	4	1.336	11.56	2.71
18	4/1/1982	4	1.31	12.24	2.56
19	2/3/1998	3	1.175	12.93	2.42
20	1/13/1993	3	1.135	13.61	2.3
21	8/17/1977	4	1.097	14.29	2.19
22	3/5/1995	15	1.055	14.97	2.09
23	3/24/1983	3	1.042	15.65	2
24	2/28/1991	7	0.998	16.33	1.92
25	2/13/1973	2	0.99	17.01	1.84
26	3/3/1980	1	0.988	17.69	1.77
27	3/14/1982	4	0.892	18.37	1.7
28	9/10/1976	3	0.878	19.05	1.64
29	12/18/1967	6	0.841	19.73	1.59
30	1/7/1993	2	0.831	20.41	1.53
31	10/31/1987	5	0.793	21.09	1.48
32	10/29/1974	3	0.788	21.77	1.44
33	2/19/1993	3	0.771	22.45	1.39
34	2/19/1980	8	0.764	23.13	1.35
35	10/28/1974	5	0.755	23.81	1.31
36	3/1/1978	6	0.72	24.49	1.28
37	1/29/1980	4	0.717	25.17	1.24
38	11/11/1985	5	0.714	25.85	1.21
39	3/4/1978	2	0.703	26.53	1.18
40	2/14/1998	3	0.685	27.21	1.15
41	2/10/1982	6	0.637	27.89	1.12
42	1/31/1996	1	0.634	28.57	1.1
43	12/5/1966	6	0.622	29.25	1.07
44	2/28/1978	1	0.617	29.93	1.05
45	1/27/2008	8	0.602	30.61	1.02
46	2/8/1976	12	0.597	31.29	1
47	10/20/1979	4	0.592	31.97	0.98
48	1/3/1977	2	0.582	32.65	0.96
49	12/28/1977	2	0.58	33.33	0.94
50	1/30/1980	2	0.57	34.01	0.92
51	3/18/1983	1	0.55	34.69	0.9
52	3/13/1996	7	0.498	35.37	0.88
53	3/1/1981	2	0.497	36.05	0.87
54	1/29/1980	11	0.496	36.73	0.85
55	1/3/2005	2	0.466	37.41	0.84
56	3/16/1982	5	0.455	38.1	0.82
57	2/21/2005	2	0.447	38.78	0.81
58	2/22/1969	4	0.444	39.46	0.79
59	12/7/1992	4	0.442	40.14	0.78
60	2/6/1969	1	0.442	40.82	0.77
61	12/27/1984	4	0.435	41.5	0.75
62	1/5/1992	6	0.424	42.18	0.74
63	10/19/2004	10	0.416	42.86	0.73
64	12/6/1966	5	0.416	43.54	0.72
65	11/30/1982	5	0.414	44.22	0.71
66	1/16/1993	6	0.392	44.9	0.7
67	2/18/1980	5	0.384	45.58	0.69
68	3/5/1978	7	0.377	46.26	0.68
69	1/18/1979	2	0.37	46.94	0.67
70	2/26/2004	2	0.365	47.62	0.66
71	2/21/1980	2	0.36	48.3	0.65
72	4/14/2003	2	0.357	48.98	0.64
73	3/8/1973	2	0.357	49.66	0.63
74	1/4/1974	3	0.316	50.34	0.62
75	11/24/1984	3	0.315	51.02	0.61
76	3/11/1978	4	0.298	51.7	0.61
77	1/25/1969	5	0.296	52.38	0.6
78	2/23/2004	3	0.295	53.06	0.59
80	2/25/2003	2	0.289	54.42	0.57
80	2/15/1992	2	0.289	54.42	0.57
81	1/15/1993	6	0.273	55.1	0.57
82	1/21/1964	2	0.272	55.78	0.56
83	3/6/1980	5	0.259	56.46	0.55
84	2/15/1986	2	0.24	57.14	0.55
85	3/23/1964	2	0.236	57.82	0.54
86	12/25/1988	4	0.223	58.5	0.53
87	3/10/2001	2	0.215	59.18	0.53
88	4/13/1976	3	0.21	59.86	0.52
89	4/8/1965	3	0.199	60.54	0.52
90	1/10/1978	1	0.188	61.22	0.51
91	11/15/1965	2	0.185	61.9	0.51
92	12/21/1970	2	0.168	62.59	0.5
93	12/6/1998	1	0.157	63.27	0.49
94	1/18/1993	1	0.156	63.95	0.49
95	11/11/1964	1	0.154	64.63	0.48
98	2/21/2000	2	0.153	66.67	0.47
98	2/26/1987	1	0.153	66.67	0.47
98	2/12/1992	2	0.153	66.67	0.47
99	3/16/1986	1	0.149	67.35	0.46
100	11/14/1993	4	0.147	68.03	0.46
101	3/2/1983	5	0.145	68.71	0.46
102	10/27/2004	2	0.144	69.39	0.45

10-year Q: 2.046 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 1.544 cfs
2-year Q: 1.042 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Pre): 0.104 cfs

103	1/12/2001	1	0.13	70.07	0.45
104	2/8/1993	1	0.128	70.75	0.44
105	1/17/1990	1	0.125	71.43	0.44
107	2/17/1998	1	0.123	72.79	0.43
107	2/13/2001	1	0.123	72.79	0.43
108	3/11/1973	3	0.12	73.47	0.43
109	11/22/1965	1	0.115	74.15	0.42
110	12/18/1984	1	0.111	74.83	0.42
111	4/22/1967	1	0.11	75.51	0.41
112	11/26/1967	2	0.096	76.19	0.41
113	2/19/2007	2	0.094	76.87	0.41
114	3/15/2003	1	0.092	77.55	0.4
115	11/20/1967	1	0.073	78.23	0.4
116	3/1/1981	1	0.067	78.91	0.4
117	12/19/1978	2	0.066	79.59	0.39
118	12/19/1970	1	0.062	80.27	0.39
119	1/29/1981	1	0.06	80.95	0.39
120	3/1/1970	1	0.06	81.63	0.38
121	3/31/1992	1	0.06	82.31	0.38
122	2/5/1976	1	0.059	82.99	0.38
124	12/6/1997	1	0.05	84.35	0.37
124	12/27/1984	2	0.05	84.35	0.37
125	2/13/1992	1	0.047	85.03	0.37
126	9/10/1976	1	0.043	85.71	0.37
127	1/16/1979	1	0.043	86.39	0.36
128	12/14/1965	2	0.03	87.07	0.36
130	2/24/1998	1	0.028	88.44	0.35
130	2/22/2000	1	0.028	88.44	0.35
131	1/9/1980	1	0.028	89.12	0.35
132	3/24/1964	2	0.025	89.8	0.35
133	1/11/2005	1	0.019	90.48	0.35
134	11/9/2002	1	0.014	91.16	0.34
137	3/25/1998	1	0.012	93.2	0.34
137	3/28/1979	1	0.012	93.2	0.34
137	3/5/2000	1	0.012	93.2	0.34
138	3/4/1983	1	0.011	93.88	0.33
139	1/15/1978	1	0.009	94.56	0.33
140	4/7/1999	1	0.008	95.24	0.33
141	2/2/1988	1	0.008	95.92	0.33
142	3/10/1986	1	0.006	96.6	0.32
143	11/16/1965	1	0.005	97.28	0.32
144	12/19/1984	1	0.004	97.96	0.32
145	2/18/1994	1	0.004	98.64	0.32
146	1/26/1969	1	0.003	99.32	0.32

Post-project (Mitigated) Flow Frequency - Long-term Simulation

Statistics - Node PROP-POC-3 Total Inflow

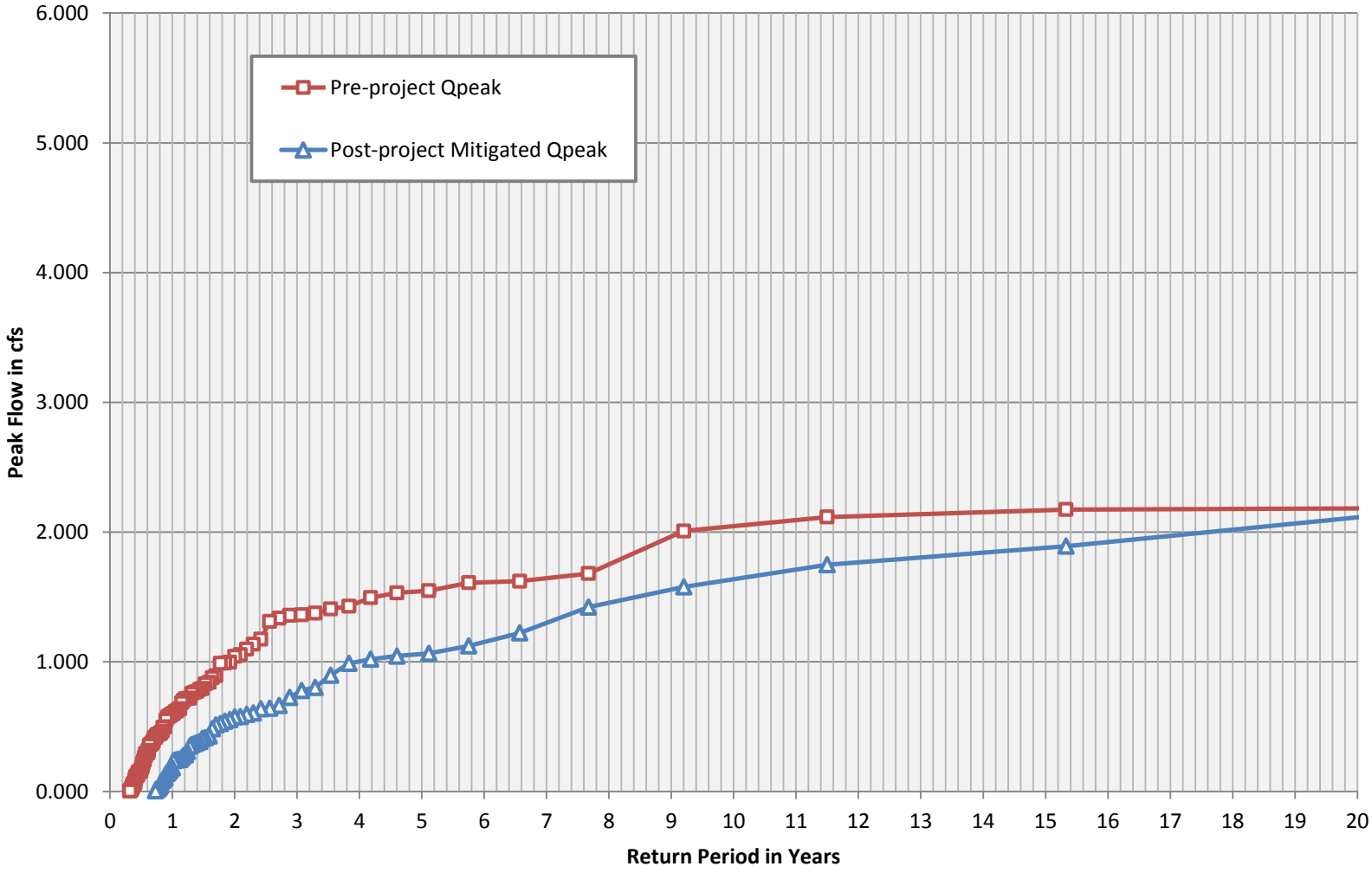
Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/20/1980	6	4.563	1.56	46
2	1/31/1979	13	2.257	3.13	23
3	11/22/1965	11	1.891	4.69	15.33
4	10/20/2004	8	1.748	6.25	11.5
5	1/4/1995	8	1.577	7.81	9.2
6	11/29/1970	6	1.422	9.38	7.67
7	3/1/1983	5	1.223	10.94	6.57
8	2/22/2004	16	1.122	12.5	5.75
9	2/10/1978	6	1.065	14.06	5.11
10	2/16/1980	6	1.045	15.63	4.6
11	3/5/1995	14	1.02	17.19	4.18
12	1/14/1969	8	0.988	18.75	3.83
13	2/14/1995	5	0.897	20.31	3.54
14	11/30/2007	5	0.803	21.88	3.29
15	12/18/1967	7	0.778	23.44	3.07
16	3/1/1978	6	0.725	25	2.88
17	1/25/1995	5	0.663	26.56	2.71
18	3/1/1991	7	0.642	28.13	2.56
19	9/10/1976	4	0.638	29.69	2.42
20	4/1/1982	4	0.606	31.25	2.3
21	12/5/1966	8	0.596	32.81	2.19
22	8/17/1977	5	0.578	34.38	2.09
23	10/28/1974	5	0.576	35.94	2
24	3/14/1982	6	0.555	37.5	1.92
25	11/11/1985	6	0.543	39.06	1.84
26	2/8/1976	10	0.524	40.63	1.77
27	2/8/1998	5	0.515	42.19	1.7
28	10/31/1987	6	0.484	43.75	1.64
29	3/24/1983	5	0.429	45.31	1.59
30	1/29/1980	5	0.415	46.88	1.53
31	1/9/2005	4	0.409	48.44	1.48
32	2/3/1998	5	0.386	50	1.44
33	11/30/1982	6	0.378	51.56	1.39
34	2/10/1982	5	0.368	53.13	1.35
35	1/13/1993	4	0.362	54.69	1.31
36	1/27/2008	5	0.35	56.25	1.28
37	12/6/1966	5	0.31	57.81	1.24
38	1/5/1992	6	0.284	59.38	1.21
39	12/7/1992	6	0.277	60.94	1.18
40	1/11/2001	6	0.263	62.5	1.15
41	10/19/2004	10	0.248	64.06	1.12
42	3/16/1982	7	0.247	65.63	1.1
43	1/7/1993	4	0.246	67.19	1.07
44	2/20/1980	4	0.243	68.75	1.05
45	10/20/1979	4	0.239	70.31	1.02
46	2/15/1986	5	0.184	71.88	1
47	3/2/1983	6	0.183	73.44	0.98
48	2/22/1969	4	0.166	75	0.96
49	1/16/1993	5	0.154	76.56	0.94
50	2/13/1973	3	0.143	78.13	0.92
51	3/12/1978	3	0.136	79.69	0.9
52	1/29/1980	3	0.107	81.25	0.88
53	3/13/1996	3	0.105	82.81	0.87
54	1/15/1993	6	0.089	84.38	0.85
55	10/27/2004	3	0.087	85.94	0.84
56	10/29/1974	3	0.074	87.5	0.82
57	3/5/1978	4	0.046	89.06	0.81
58	1/25/1969	3	0.034	90.63	0.79
59	2/14/1998	3	0.032	92.19	0.78
60	11/20/1983	2	0.021	93.75	0.77
61	3/1/1981	1	0.019	95.31	0.75
62	1/3/2005	1	0.016	96.88	0.74
63	2/1/1996	1	0.005	98.44	0.73

10-year Q:	1.636	cfs	(Adjust Column "I" to interpolate from Table)
5-year Q:	1.061	cfs	
2-year Q:	0.576	cfs	
Lower Flow Threshold:	10%		
0.1xQ2 (Post Mit):	0.058	cfs	

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.104	0.058
2-year	1.042	0.576
5-year	1.544	1.061
10-year	2.046	1.636

Peak Flow Frequency Curves

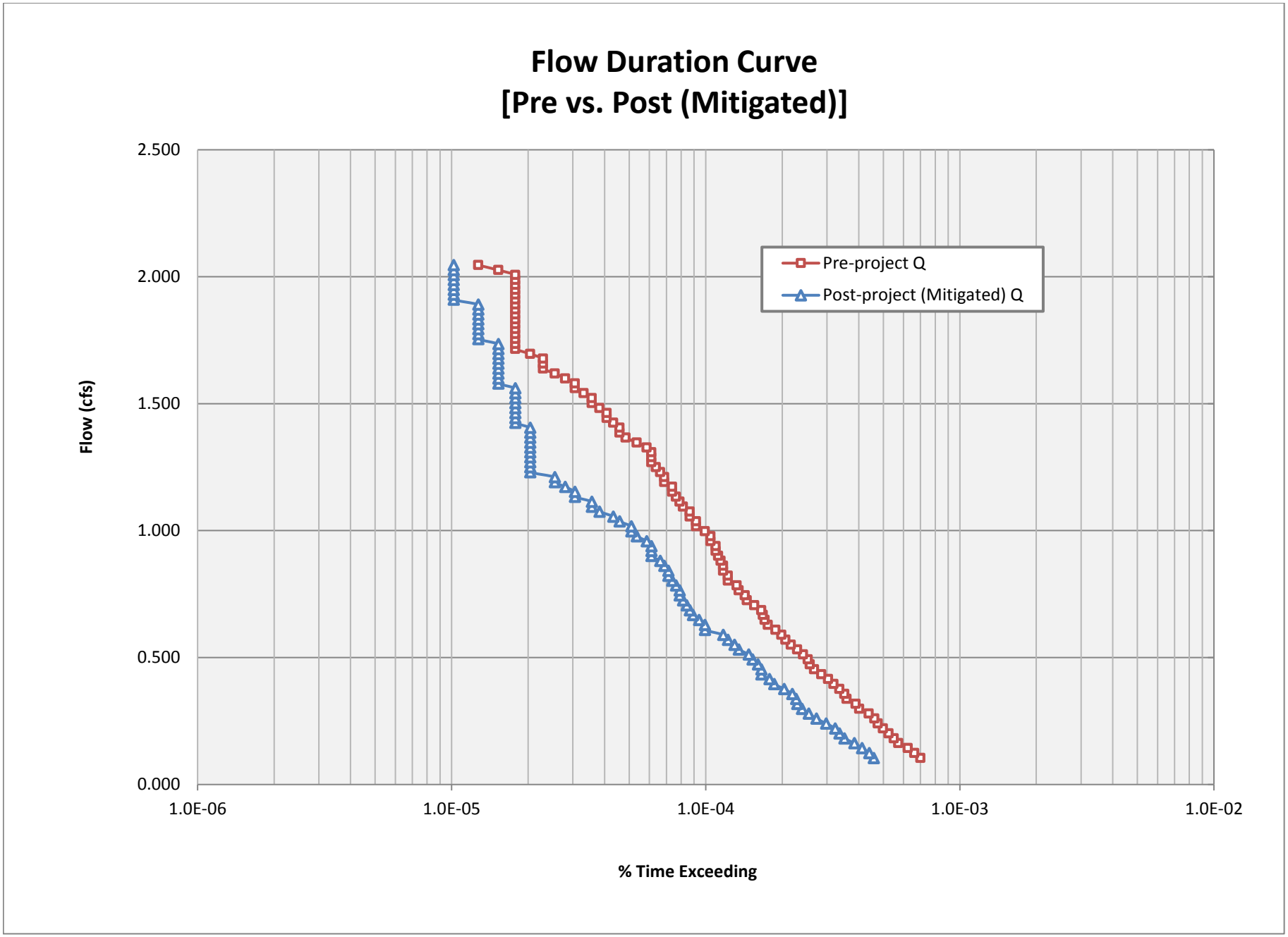


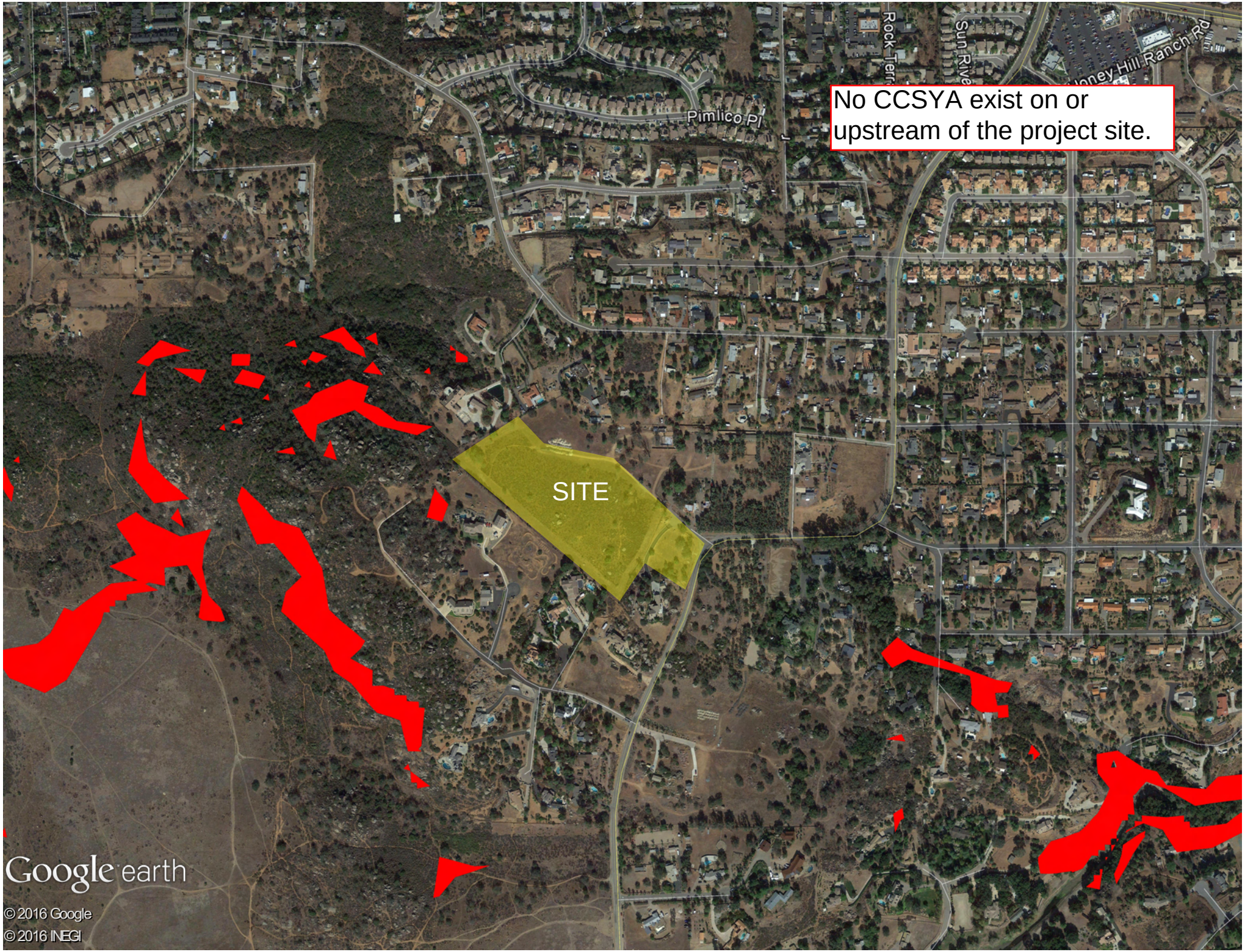
Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.104	cfs
Q10 (Pre):	2.046	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.01941	64
Total Hourly Data:	392652	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.104	275	7.00E-04	180	4.58E-04	65%	Pass
1	0.124	260	6.62E-04	173	4.41E-04	67%	Pass
2	0.143	245	6.24E-04	162	4.13E-04	66%	Pass
3	0.162	225	5.73E-04	151	3.85E-04	67%	Pass
4	0.182	216	5.50E-04	138	3.51E-04	64%	Pass
5	0.201	206	5.25E-04	132	3.36E-04	64%	Pass
6	0.221	196	4.99E-04	127	3.23E-04	65%	Pass
7	0.240	187	4.76E-04	117	2.98E-04	63%	Pass
8	0.260	181	4.61E-04	107	2.73E-04	59%	Pass
9	0.279	172	4.38E-04	100	2.55E-04	58%	Pass
10	0.298	158	4.02E-04	94	2.39E-04	59%	Pass
11	0.318	153	3.90E-04	90	2.29E-04	59%	Pass
12	0.337	141	3.59E-04	89	2.27E-04	63%	Pass
13	0.357	138	3.51E-04	86	2.19E-04	62%	Pass
14	0.376	132	3.36E-04	80	2.04E-04	61%	Pass
15	0.395	125	3.18E-04	73	1.86E-04	58%	Pass
16	0.415	119	3.03E-04	70	1.78E-04	59%	Pass
17	0.434	112	2.85E-04	65	1.66E-04	58%	Pass
18	0.454	105	2.67E-04	65	1.66E-04	62%	Pass
19	0.473	101	2.57E-04	63	1.60E-04	62%	Pass
20	0.492	99	2.52E-04	60	1.53E-04	61%	Pass
21	0.512	95	2.42E-04	58	1.48E-04	61%	Pass
22	0.531	90	2.29E-04	53	1.35E-04	59%	Pass
23	0.551	85	2.16E-04	51	1.30E-04	60%	Pass
24	0.570	81	2.06E-04	48	1.22E-04	59%	Pass
25	0.590	78	1.99E-04	46	1.17E-04	59%	Pass
26	0.609	74	1.88E-04	39	9.93E-05	53%	Pass
27	0.628	69	1.76E-04	39	9.93E-05	57%	Pass
28	0.648	67	1.71E-04	37	9.42E-05	55%	Pass
29	0.667	66	1.68E-04	35	8.91E-05	53%	Pass
30	0.687	65	1.66E-04	34	8.66E-05	52%	Pass
31	0.706	61	1.55E-04	33	8.40E-05	54%	Pass
32	0.725	57	1.45E-04	32	8.15E-05	56%	Pass
33	0.745	56	1.43E-04	31	7.90E-05	55%	Pass
34	0.764	53	1.35E-04	31	7.90E-05	58%	Pass
35	0.784	52	1.32E-04	30	7.64E-05	58%	Pass
36	0.803	48	1.22E-04	29	7.39E-05	60%	Pass
37	0.823	48	1.22E-04	28	7.13E-05	58%	Pass
38	0.842	46	1.17E-04	28	7.13E-05	61%	Pass
39	0.861	46	1.17E-04	27	6.88E-05	59%	Pass
40	0.881	45	1.15E-04	26	6.62E-05	58%	Pass
41	0.900	44	1.12E-04	24	6.11E-05	55%	Pass
42	0.920	43	1.10E-04	24	6.11E-05	56%	Pass
43	0.939	43	1.10E-04	24	6.11E-05	56%	Pass
44	0.958	41	1.04E-04	23	5.86E-05	56%	Pass
45	0.978	41	1.04E-04	21	5.35E-05	51%	Pass
46	0.997	39	9.93E-05	20	5.09E-05	51%	Pass
47	1.017	36	9.17E-05	20	5.09E-05	56%	Pass
48	1.036	36	9.17E-05	18	4.58E-05	50%	Pass
49	1.055	34	8.66E-05	17	4.33E-05	50%	Pass
50	1.075	34	8.66E-05	15	3.82E-05	44%	Pass
51	1.094	32	8.15E-05	14	3.57E-05	44%	Pass
52	1.114	31	7.90E-05	14	3.57E-05	45%	Pass
53	1.133	30	7.64E-05	12	3.06E-05	40%	Pass
54	1.153	29	7.39E-05	12	3.06E-05	41%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
55	1.172	29	7.39E-05	11	2.80E-05	38%	Pass
56	1.191	27	6.88E-05	10	2.55E-05	37%	Pass
57	1.211	27	6.88E-05	10	2.55E-05	37%	Pass
58	1.230	26	6.62E-05	8	2.04E-05	31%	Pass
59	1.250	25	6.37E-05	8	2.04E-05	32%	Pass
60	1.269	24	6.11E-05	8	2.04E-05	33%	Pass
61	1.288	24	6.11E-05	8	2.04E-05	33%	Pass
62	1.308	24	6.11E-05	8	2.04E-05	33%	Pass
63	1.327	23	5.86E-05	8	2.04E-05	35%	Pass
64	1.347	21	5.35E-05	8	2.04E-05	38%	Pass
65	1.366	19	4.84E-05	8	2.04E-05	42%	Pass
66	1.386	18	4.58E-05	8	2.04E-05	44%	Pass
67	1.405	18	4.58E-05	8	2.04E-05	44%	Pass
68	1.424	17	4.33E-05	7	1.78E-05	41%	Pass
69	1.444	16	4.07E-05	7	1.78E-05	44%	Pass
70	1.463	16	4.07E-05	7	1.78E-05	44%	Pass
71	1.483	15	3.82E-05	7	1.78E-05	47%	Pass
72	1.502	14	3.57E-05	7	1.78E-05	50%	Pass
73	1.521	14	3.57E-05	7	1.78E-05	50%	Pass
74	1.541	13	3.31E-05	7	1.78E-05	54%	Pass
75	1.560	12	3.06E-05	7	1.78E-05	58%	Pass
76	1.580	12	3.06E-05	6	1.53E-05	50%	Pass
77	1.599	11	2.80E-05	6	1.53E-05	55%	Pass
78	1.618	10	2.55E-05	6	1.53E-05	60%	Pass
79	1.638	9	2.29E-05	6	1.53E-05	67%	Pass
80	1.657	9	2.29E-05	6	1.53E-05	67%	Pass
81	1.677	9	2.29E-05	6	1.53E-05	67%	Pass
82	1.696	8	2.04E-05	6	1.53E-05	75%	Pass
83	1.716	7	1.78E-05	6	1.53E-05	86%	Pass
84	1.735	7	1.78E-05	6	1.53E-05	86%	Pass
85	1.754	7	1.78E-05	5	1.27E-05	71%	Pass
86	1.774	7	1.78E-05	5	1.27E-05	71%	Pass
87	1.793	7	1.78E-05	5	1.27E-05	71%	Pass
88	1.813	7	1.78E-05	5	1.27E-05	71%	Pass
89	1.832	7	1.78E-05	5	1.27E-05	71%	Pass
90	1.851	7	1.78E-05	5	1.27E-05	71%	Pass
91	1.871	7	1.78E-05	5	1.27E-05	71%	Pass
92	1.890	7	1.78E-05	5	1.27E-05	71%	Pass
93	1.910	7	1.78E-05	4	1.02E-05	57%	Pass
94	1.929	7	1.78E-05	4	1.02E-05	57%	Pass
95	1.948	7	1.78E-05	4	1.02E-05	57%	Pass
96	1.968	7	1.78E-05	4	1.02E-05	57%	Pass
97	1.987	7	1.78E-05	4	1.02E-05	57%	Pass
98	2.007	7	1.78E-05	4	1.02E-05	57%	Pass
99	2.026	6	1.53E-05	4	1.02E-05	67%	Pass
100	2.046	5	1.27E-05	4	1.02E-05	80%	Pass


Flow Duration Curve
[Pre vs. Post (Mitigated)]
2.500
2.000
1.500
1.000
0.500
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q


No CCSYA exist on or upstream of the project site.
SITE
Pimlico Pl
Rock Terr
Sun Rive
Mooney Hill Ranch Rd
Google earth
© 2016 Google
© 2016 INEGI

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☐ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Stormwater Maintenance Notification / Agreement (when applicable)	☐ Included ☐ Not Applicable

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This must be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the County's standard format depending on the Category (PDP applicant to contact County staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the BMP Design Manual for a description of the different categories.

ATTACHMENT 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

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County of San Diego BMP Design Manual Verification Form	
Project Summary Information	
Project Name	Rancho Sierra Subdivision
Record ID (e.g., grading/improvement plan number)	TBD
Project Address	Vacant Lot, South Grade Road, Alpine
Assessor's Parcel Number(s) (APN(s))	404-430-00
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Area: El Capitan; Subarea: El Capitan; 907.33 Area: Upper Sweetwater; Subarea: Loveland 909.20
Responsible Party for Construction Phase	
Developer's Name	TBD
Address	TBD
Email Address	TBD
Phone Number	TBD
Engineer of Work	Omega Engineering Consultants
Engineer's Phone Number	858-634-8620
Responsible Party for Ongoing Maintenance	
Owner's Name(s)*	TBD
Address	TBD
Email Address	TBD
Phone Number	TBD
*Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.	

County of San Diego BMP Design Manual Verification Form Page 2 of 4					
Stormwater Structural Pollutant Control & Hydromodification Control BMPs* (List all from SWQMP)					
Description/Type of Structural BMP	**Plan Sheet #**	**STRUCT-URAL BMP ID#**	**Maint-enance Category**	**Maintenance Agreement Recorded Doc #**	**Revisions**
Infiltration trench (retention)	TBD	1	2		
Infiltration trench (retention)	TBD	2	2		
Infiltration trench (retention)	TBD	3	2		
*All Priority Development Projects (PDPs) require a Structural BMP					

Note: If this is a partial verification of Structural BMPs, provide a list and map denoting Structural BMPs that have already been submitted, those for this submission, and those anticipated in future submissions.

County of San Diego BMP Design Manual Verification Form Page 3 of 4

Checklist for Applicant to submit to PDCI:

- ☐ Copy of the final accepted SWQMP and any accepted addendum.
- ☐ Copy of the most current plan showing the Stormwater Structural BMP Table, plans/cross-section sheets of the Structural BMPs and the location of each verified as-built Structural BMP.
- ☐ Photograph of each Structural BMP.
- ☐ Photograph(s) of each Structural BMP during the construction process to illustrate proper construction.
- ☐ Copy of the approved Structural BMP maintenance agreement and associated security

By signing below, I certify that the Structural BMP(s) for this project have been constructed and all BMPs are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign your name and seal.

Professional Engineer's Printed Name:

_____

Professional Engineer's Signed Name:

_____

SEAL

Date:_____

County of San Diego BMP Design Manual Verification Form Page 4 of 4

COUNTY - OFFICIAL USE ONLY:

For PDCI: Verification Package #: _____

PDCI Inspector: _____

Date Project has/expects to close: _____

Date verification received from EOW: _____

By signing below, PDCI Inspector concurs that every noted Structural BMP has been installed per plan.

PDCI Inspector's Signature: _____ Date: _____

FOR WPP:

Date Received from PDCI: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the information provided for the following Structural BMPs is acceptable to enter into the Structural BMP Maintenance verification inventory:

List **acceptable** Structural BMPs:

WPP Reviewer's Signature: _____ Date: _____

ATTACHMENT 5

Copy of Plan Sheets Showing Permanent Storm Water BMPs, Source Control, and Site Design

This is the cover sheet for Attachment 5.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Step 6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by County staff
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
- ☐ Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

ATTACHMENT 6

Copy of Project's Drainage Report

This is the cover sheet for Attachment 6.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

RANCHO SIERRA SUBDIVISION
PRELIMINARY DRAINAGE STUDY

South Grade Rd
Alpine, CA

Date Prepared:
October 19th, 2017

Prepared for:
Brad Bailey
10035 Prospect Avenue, Suite 201
Santee, CA 92071
Ph: (619) 449-8785

Prepared By:
Omega Engineering Consultants
4340 Viewridge Ave, Suite B
San Diego, CA 92123
Ph: (858) 634-8620

Declaration of Responsible Charge:
I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards. I understand that the check of the project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as an engineer of work, of my responsibilities for project design.

Patric T. de Boer RCE 83583
Registration Expires 3-31-2019

Table of Contents

Appendices

Site & Project Description

This preliminary drainage study has been prepared as part of the Tentative Map for the development of a property on South Grade Road, Alpine, CA (lat: 32.8273 long: -116.7588) (street address TBD) for the proposed use as a residential subdivision. The project site is currently vacant. It is located on the westerly side of South Grade Rd. approximately 0.63 miles south of Highway 8. See Figure No. 1 for a Vicinity Map. See Figure 2 for the proposed drainage limits. See Figure 3 for the existing drainage limits.

The site straddles a ridge, and the two ends of the site drain to different Hydrologic Units. The easterly portion of the site is located in the Alpine Hydrologic subarea (907.33) on the southeasterly edge of the El Capitan Hydrologic on the southeasterly border of the San Diego Hydrologic Unit. The westerly portion of the site drains to Loveland Hydrologic subarea (909.31), in the Upper Sweetwater Hydrologic Area (909.30), in the Sweetwater Hydrologic Unit (909.00).

The runoff generated by the westerly portion of the site flows to the westerly corner of the site via overland flow. It thence flows through a series of unnamed creeks to the northwest into Chocolate Creek then enters El Capitan Reservoir (approximately 3.55 mi from site) eventually reaching The Pacific Ocean (approximately 29.20 mi from site).

Runoff generated by the easterly portion of the site drains via overland flow to two different discharge points. Runoff from both discharge points flows along unnamed channels, confluencing with an uncategorized body of water named Small Lake and thence to the Upper Sweetwater River (approximately 2.21 mi from the project site) eventually reaching San Diego Bay (approximately 23.77 mi from site).

This project is not subject to requiring approval of construction under Regional Water Quality Control Board section 401 or 404. No construction over water bodies or dredging is to occur on-site.

Methodology

This drainage report has been prepared in accordance with current City of San Diego regulations and procedures, with the exception of the drainage basin weighted C values. These were calculated according to The County of San Diego Hydrology Manual. All of the proposed conduits and conveyances have been designed to intercept and convey the 100-year storm. The Modified Rational Method was used to compute the anticipated runoff. See the attached calculations for particulars. The following references have been used in preparation of this report:

(1) Handbook of Hydraulics, E.F. Brater & H.W. King, 6th Ed., 1976.
(2) Modern Sewer Design, American Iron & Steel Institute, 1st Ed., 1980.
(3) County of San Diego Hydrology Manual, 2003

Culvert Design and Analysis:
The storm drain culverts were sized using the K' values from King's Handbook Appendix 7-14, (Appendix 7.0 of this report). The following formula was used:

Q= (K'/n)*d^(8/3)*s^(0.5)
K'= Discharge Factor
d=Diameter of Conduit (ft)
n=Manning's Coefficient
Q=Runoff Discharge (cfs)
s=Pipe Slope (ft/ft)

Rational Method:
Q=CIA
Where:
Q=peak discharge, in cubic feet per second (cfs)
C=runoff coefficient, proportion of the rainfall that runs off the surface (no units)
=(0.90*(% impervious)+Cp*(1-% Impervious)) page 5, County Hydrology Manual
I =average rainfall intensity for a duration equal to the Tc for the area, (in/hr)
= 7.44*P6*Tc-0.645
A = drainage area contributing to the design location, in acres
Cp= Pervious Coefficient Runoff Value, County of San Diego Hydrology Manual minimum of 0.35
$Tc = \frac{1.8\,(1.1-C)*(Tc)^{0.5}}{S^{0.33}}$*
S= Slope of drainage course*

Existing Conditions

The existing site is vacant with native cover of brush and oak trees. The project area is 3% impervious with the majority of the site varying from a 5% slope to a 12% slope. The runoff from the Easterly portion of the site drains offsite to South Grade Road to the East referred to in this report as Discharge Point 1. The "middle" of the site drains northerly to the adjacent property at Discharge Point 2. The westerly portion of the site drains to the westerly adjacent property at a Discharge Point 3

There are currently no permanent buildings on the site, but a portion of an existing driveway of an existing offsite house are within the onsite drainage basins. The westerly property boundary runs along a ridge and thence perpendicular to the existing slope, as such, the site does not receive runoff from off-site drainage basins.

Proposed Conditions

The proposed development includes grading and improvement of portions of the site. The site will be the future location of a ten lot, single family dwelling subdivision. The project proposes to modify the drainage patterns, and increase the total impervious percentage from 3% to 25%, but maintain the same outfall points. The increase in impervious area and discharge rates will be mitigated by 3 separate retention basins.

Existing Runoff Analysis

The Modified Rational Method was used for calculating existing peak flow rates for the 100 year, 6 hour storm. Analysis of the existing conditions breaks the site into three separate drainage areas. See the attached calculations for details.

The Soil Hydrologic Groups Map from the San Diego Hydrology Manual reflects group C soil (soil map in Appendix 1.1). Per table 3-1 of the County Hydrology Manual, Runoff coefficients of 0.30 are to be used for undisturbed natural terrain. For basins with impervious area a weighted runoff coefficient was calculated using a value of 0.90 for impervious areas.

Below is a summary of the basin data:

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)	Discharge Pt Q_{100} (cfs)
EX-1	3.66	0.37	11.2	6.85	DP-1 = 6.85
EX-2	2.97	0.30	9.60	4.65	DP-2 = 4.65
EX-3	5.46	0.30	7.70	7.92	DP-3 = 7.92

Proposed Runoff Analysis

The Rational Method was used for calculating proposed peak flow rates for the 100 year, 6 hour storm. Analysis of the proposed conditions breaks the site into three drainage areas each.

Each drainage area will feature a infiltration BMP to treat stormwater before it is discharged from the site. The infiltration basin located in the central portion and the westerly portion of the site (B-1.1, & C-1.1) will be used for 100 year flow attenuation. B-1.1 and C-1.1 will generate a greater peak flowrate at Discharge Point 2 & 3 than the existing conditions. To mitigate this the infiltration basins have been designed with V-notch Weir's that restrict the outflow to be less than the existing conditions. The other two discharge points do not require 100 year storage, as the changes to the tributary area and slope of the basins reduced the runoff at each of the points over existing conditions.

The storage requirements were determined by creating a hydrograph of the flows generated by Basin B-1.1 and C-1.1. These were created using RatHydro, program written by Rick Engineering

which plots a hydrograph based off of input data that was generated via the Rational Method. The peak of the resulting hydrograph matches the Rational Method peak flow rate. These hydrographs were input into Autodesk Hydraflow Hydrographs, a

The detention basins are sized to store the treatment control volume (From the project SWMP) and the 100-year flood control volume as determined in the hydrographs in this report.

Below is a summary of the basin data:

Basin #	Area (ac)	C	Slope	Q_{100} (prior to flow control)	Q_{100} (after flow control)	Discharge Pt Q_{100} (cfs)
A-1	3.11	0.42	4.7	5.53	5.53	DP-1 = 5.92
A-2	0.12	0.76	25.0	0.79	0.79	
A-3	3.10	0.53	8.62	7.05	4.04	DP-2 = 4.04
A-4	5.75	0.43	4.38	9.38	6.98	DP-3 = 6.98

See the attached calculations for details.

Results and Conclusions

The proposed development of the site shall result in an increase in impervious area. This increase in impervious area and flowrates at two of the three discharge points will be mitigated through the use of onsite detention facilities with outlet control. This will result in a 100-yr peak stormwater flow rate that is equal to or less than the existing condition for all outfall locations.

The development will modify onsite drainage patterns in order to route runoff to the detention facilities, but discharge locations and offsite runoff flow path will be unchanged. The proposed measures will mitigate the increase in runoff and the development is not expected to negatively impact flooding, erosion , or siltation of downstream channels and waterways. None of the proposed structures or improvements will be located within flood hazard areas.

The effect that development of the site will have on runoff flow rates is mitigated by the construction of infiltration . These facilities will be constructed with outlet cont0rol structures to mitigate the 100-yr storm water discharge as well as comply with hydromodification criteria. See separate report for hydromodification information.

Due to the outlet controls proposed, the project is not expected to create adverse downstream erosive conditions. It is the opinion of Omega Engineering Consultants that the project will not cause adverse effects to the downstream facilities or receiving waters.

RANCHO SIERRA SUBDIVISION
HYDROLOGY AND HYDRAULICS CALCS (Table No. 1)

10/20/2017

BASIN	AREA (SF)	AREA (AC)	% Imp	"C" Value
EX-1	159,643	3.66	11%	0.37
EX-2	129,502	2.97	0%	0.30
EX-3	237,713	5.46	0%	0.30
EXISTING TOTAL	**526,858**	**12.09**		
A-1.1	135,670	3.11	20%	0.42
A-1.2	5,324	0.12	77%	0.76
B-1.1	135,219	3.10	38%	0.53
C-1.1	250,645	5.75	21%	0.43
PROP TOTAL	**526,858**	**12.09**		

Basin Confluence	Symbol
A-1.1 & A-1.1	CP-1

(A) "CP#1" Confluence Point Number 1

(B) C value for bare ground is 0.30 (Table 3-1 County Hydrology Manual)
C value for impervious surfaces is 0.9
Basins with mixed surface type use a weighted average
of these 2 values. (impervious % x 0.9)+(pervious % x 0.30)

RANCHO SIERRA SUBDIVISION
HYDROLOGY AND HYDRAULICS CALCS (Table No. 3)

10/20/2017

Sub-Basin	AREA Ac.	"C"	CA	L_m(ft) Overland	L (ft) Travel	H (ft) (elev)	S(%) (avg.)	Ti min	Tt min.	Tc mins	I in/hr	Q cfs	Q tot cfs		NOTES 100 year storm-Unmitigated
															P(6)= 3.20
EX-1	3.66	0.37	1.34	100	500	56.00	11.20	8.70	2.2	10.87	5.11	6.85	6.85		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 1 =			**6.85**	**CFS**	
EX-2	2.97	0.30	0.89	100	375	36.00	9.60	8.70	1.8	10.55	5.21	4.65	4.65		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 2 =			**4.65**	**CFS**	
EX-3	5.46	0.30	1.64	100	670	52.00	7.76	8.70	3.1	11.83	4.84	7.92	7.92		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 3 =			**7.92**	**CFS**	
A-1.1	3.11	0.42	1.31	70	510	24.00	4.71	11.50	3.1	14.58	4.23	5.53	5.53		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
A-1.2	0.12	0.76	0.09	100	40	10.00	25.00	2.20	1.2	5.00	8.43	0.79	0.79		
										14.58	0.20		**5.92**		**Confluence Point 1**
										Proposed Discharge Pt. 1=			**5.92**	**CFS**	
B-1.1	3.10	0.53	1.64	70	580	50.00	8.62	11.50	2.7	14.19	4.30	7.05	7.05		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
										Proposed Discharge Pt. 1=			**7.05**	**CFS**	
C-1.1	5.75	0.43	2.45	70	1050	46.00	4.38	11.50	5.5	17.02	3.83	9.38	9.38		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
										Proposed Discharge Pt. 1=			**9.38**	**CFS**	

RANCHO SIERRA SUBDIVISION
HYDROLOGY AND HYDRAULICS CALCS (Table No. 3)

10/20/2017

Sub-Basin	AREA Ac.	"C"	CA	L_m(ft) Overland	L (ft) Travel	H (ft) (elev)	S(%) (avg.)	Ti min	Tt min.	Tc mins	I in/hr	Q cfs	Q tot cfs		NOTES 100 year storm-Mitigated
															P(6)= 3.20
EX-1	3.66	0.37	1.34	100	500	56.00	11.20	8.70	2.2	10.87	5.11	6.85	6.85		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 1 =			**6.85**	**CFS**	
EX-2	2.97	0.30	0.89	100	375	36.00	9.60	8.70	1.8	10.55	5.21	4.65	4.65		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 2 =			**4.65**	**CFS**	
EX-3	5.46	0.30	1.64	100	670	52.00	7.76	8.70	3.1	11.83	4.84	7.92	7.92		**T_t per the Kirpich Formula**
										Existing Discharge Pt. 3 =			**7.92**	**CFS**	
A-1.1	3.11	0.42	1.31	70	510	24.00	4.71	11.50	3.1	14.58	4.23	5.53	5.53		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
A-1.2	0.12	0.76	0.09	100	40	10.00	25.00	2.20	1.2	5.00	8.43	0.79	0.79		
										14.58	0.20		**5.92**		**Confluence Point 1**
										Proposed Discharge Pt. 1=			**5.92**	**CFS**	
B-1.1	3.10	0.53	1.64	70	580	50.00	8.62	11.50	2.7	14.19	4.30	7.05	4.04		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
										Proposed Discharge Pt. 1=			**4.04**	**CFS**	***Mitigated Flow**
C-1.1	5.75	0.43	2.45	70	1050	46.00	4.38	11.50	5.5	17.02	3.83	9.38	6.98		**T_t per the Kirpich Formula (Concentrated flow in earthen swales**
										Proposed Discharge Pt. 1=			**6.98**	**CFS**	***Mitigated Flow**

EXISTING HYDROLOGY
RANCHO SIERRA SUBDIVISION

RUNOFF DATA					
BASIN	AREA	C	TIME OF CONC.	INTENSITY	Q_{100}
EX-1.1	3.66 AC	0.37	10.87 MINS	5.11 IN/HR	6.85 CFS
EX-1.2	2.97 AC	0.30	10.55 MINS	5.21 IN/HR	4.65 CFS
EX-2.1	5.46 AC	0.30	11.83 MINS	4.84 IN/HR	7.92 CFS

PROJECT IS WITHIN ALPINE HSA 907.33
(EAST PORTION OF PROJECT DRAINS TO THE EL CAPITAN RESERVOIR TO THE EAST)
(WEST PORTION OF PROJECT DRAINS TO THE SWEETWATER-UPPER TO THE WEST)

GRAPHICAL SCALE: 1" = 100'

0 50 100 200

LEGEND:

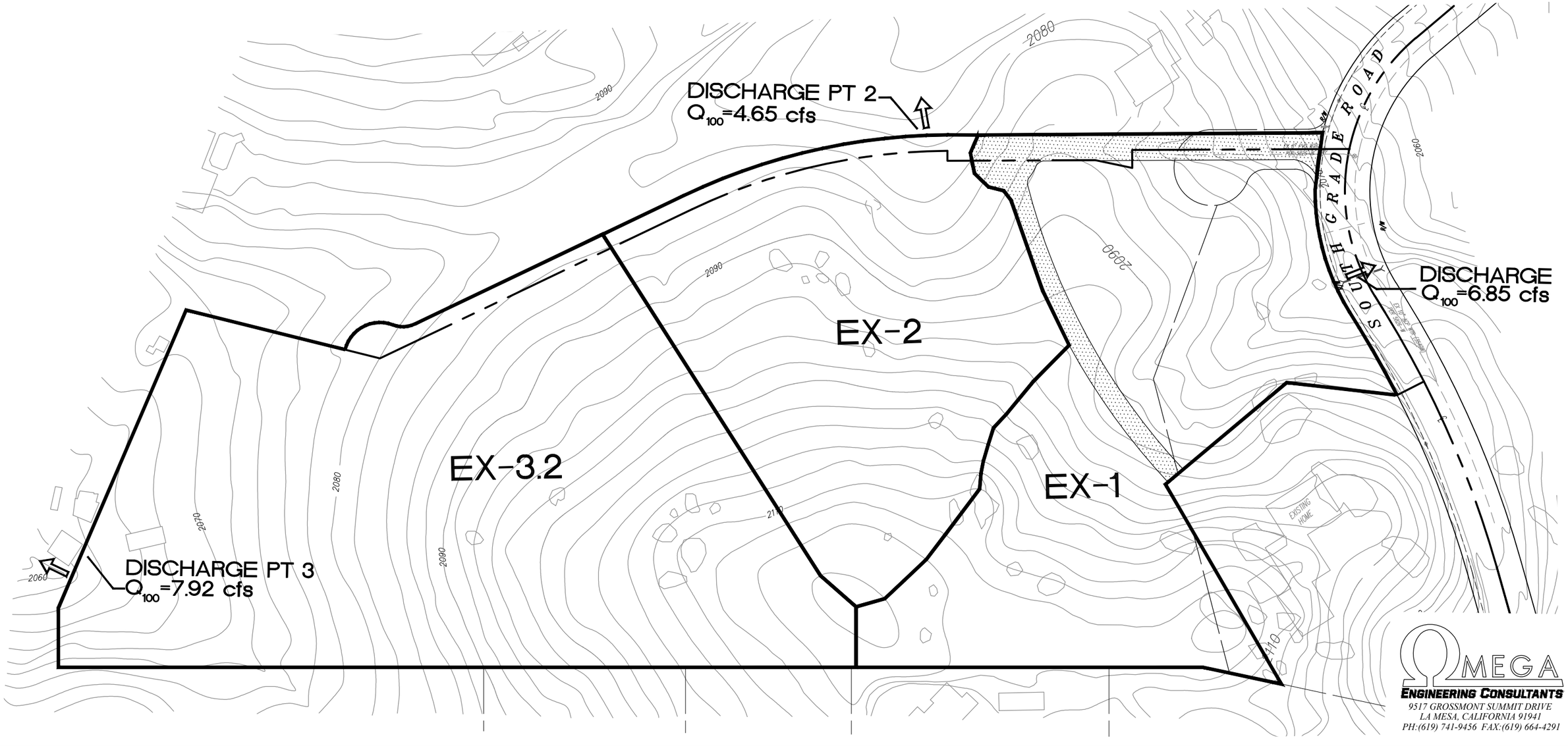
PROJECT BOUNDARY

BASIN BOUNDARY

DRAINAGE ARROWS

PERVIOUS AREA

IMPERVIOUS AREA



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ENGINEERING CONSULTANTS
9517 GROSSMONT SUMMIT DRIVE
LA MESA, CALIFORNIA 91941
PH:(619) 741-9456 FAX:(619) 664-4291

RUNOFF DATA					
BASIN	AREA	C	TIME OF CONC.	INTENSITY	Q_{100}
A-1.1	3.11 AC	0.42	14.58 MINS	4.23 IN/HR	5.53 CFS
A-1.2	0.12 AC	0.76	5.00 MINS	8.43 IN/HR	0.79 CFS
B-1.1	3.10 AC	0.53	14.19 MINS	4.30 IN/HR	4.04 CFS
C-1.1	5.75 AC	0.43	17.02 MINS	17.02 IN/HR	6.98 CFS

PROJECT IS WITHIN ALPINE HSA 907.33
(EAST PORTION OF PROJECT DRAINS TO THE EL CAPITAN RESERVOIR TO THE EAST)
(WEST PORTION OF PROJECT DRAINS TO THE SWEETWATER-UPPER TO THE WEST)

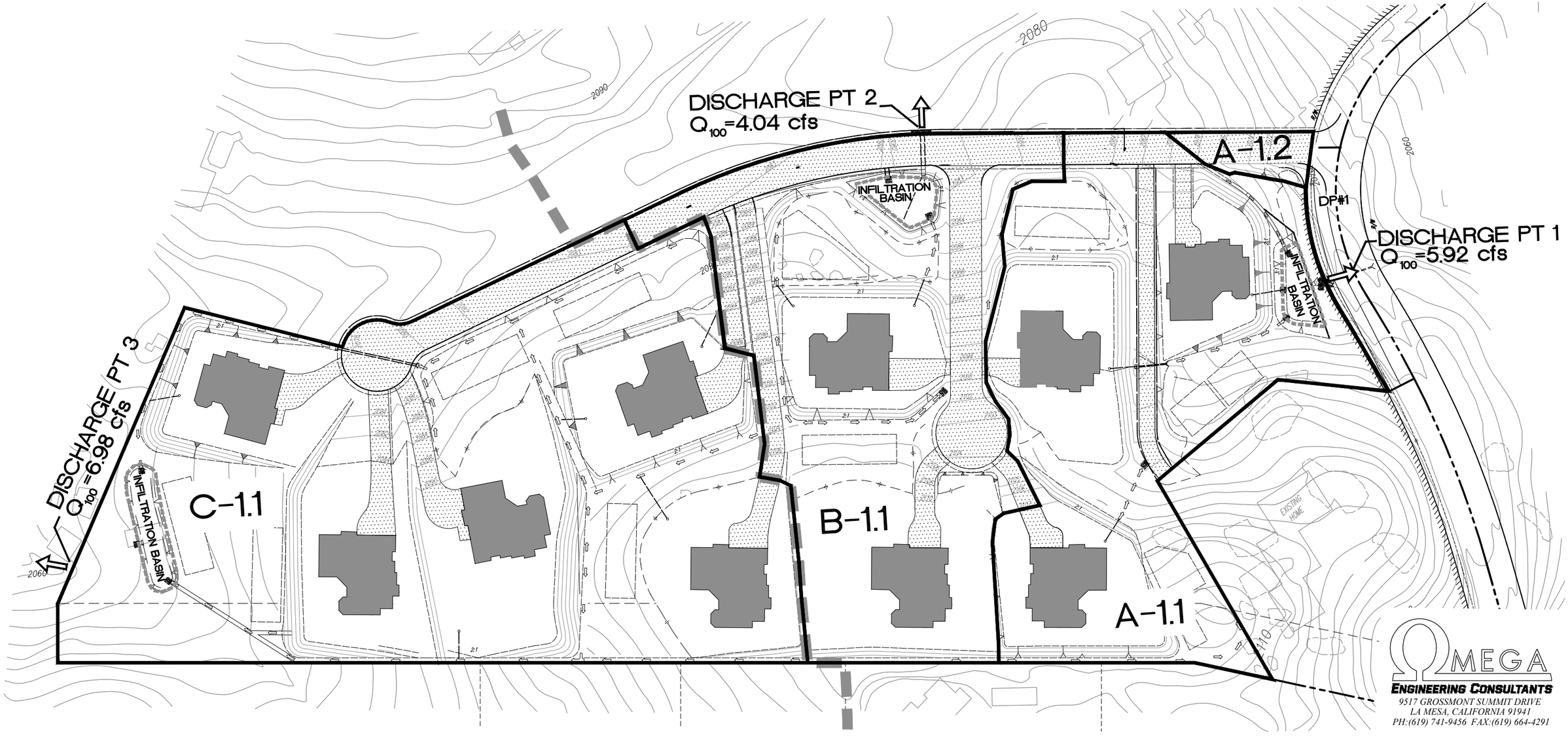
PROPOSED HYDROLOGY
RANCHO SIERRA SUBDIVISION

GRAPHICAL SCALE: 1" = 100'

0 50 100 200

LEGEND:

- PROJECT BOUNDARY
- BASIN BOUNDARY
- DRAINAGE ARROWS
- PERVIOUS AREA
- IMPERVIOUS AREA



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UNMITIGATED HYDROGRAPH FOR BASIN C-1.1

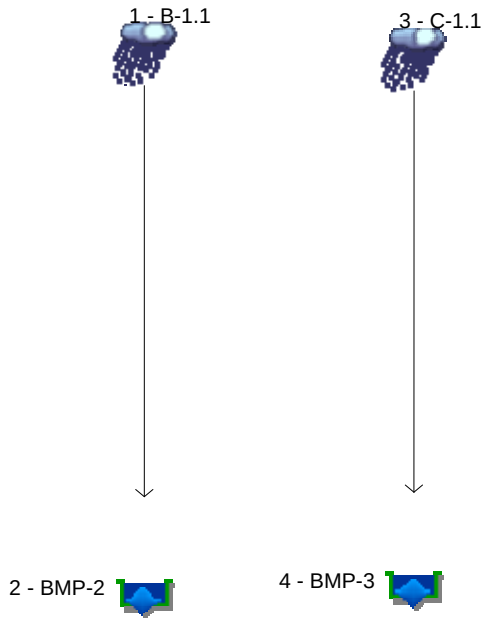
TIME OF CONCENTRATION 18 MIN
6 HR RAINFALL 3.2 INCHES
BASIN AREA 3.1 ACRES
RUNOFF COEFFICIENT 0.53
PEAK DISCHARGE 6.02 CFS

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	17	DISCHARGE (CFS) =	0.6
TIME (MIN) =	34	DISCHARGE (CFS) =	0.6
TIME (MIN) =	51	DISCHARGE (CFS) =	0.6
TIME (MIN) =	68	DISCHARGE (CFS) =	0.7
TIME (MIN) =	85	DISCHARGE (CFS) =	0.7
TIME (MIN) =	102	DISCHARGE (CFS) =	0.8
TIME (MIN) =	119	DISCHARGE (CFS) =	0.8
TIME (MIN) =	136	DISCHARGE (CFS) =	0.9
TIME (MIN) =	153	DISCHARGE (CFS) =	1
TIME (MIN) =	170	DISCHARGE (CFS) =	1.1
TIME (MIN) =	187	DISCHARGE (CFS) =	1.3
TIME (MIN) =	204	DISCHARGE (CFS) =	1.5
TIME (MIN) =	221	DISCHARGE (CFS) =	2.2
TIME (MIN) =	238	DISCHARGE (CFS) =	5.1
TIME (MIN) =	255	DISCHARGE (CFS) =	9.38
TIME (MIN) =	272	DISCHARGE (CFS) =	1.8
TIME (MIN) =	289	DISCHARGE (CFS) =	1.2
TIME (MIN) =	306	DISCHARGE (CFS) =	0.9
TIME (MIN) =	323	DISCHARGE (CFS) =	0.8
TIME (MIN) =	340	DISCHARGE (CFS) =	0.7
TIME (MIN) =	357	DISCHARGE (CFS) =	0.6
TIME (MIN) =	374	DISCHARGE (CFS) =	0

Note:
This hydrograph was generated using RatHydro, using input data that was determined via the preceding Rational Method Calculations. The hydrograph was input into Autodesk Hydraflow Hydrographs and was run through a modeled storage element with a raised overflow structure. See the following pages for the Hydraflow Hydrograph calculations for details on the storage and orifice flow analysis.

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5



Legend

Hyd.	Origin	Description
1	Manual	B-1.1
2	Reservoir	BMP-2
3	Manual	C-1.1
4	Reservoir	BMP-3

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

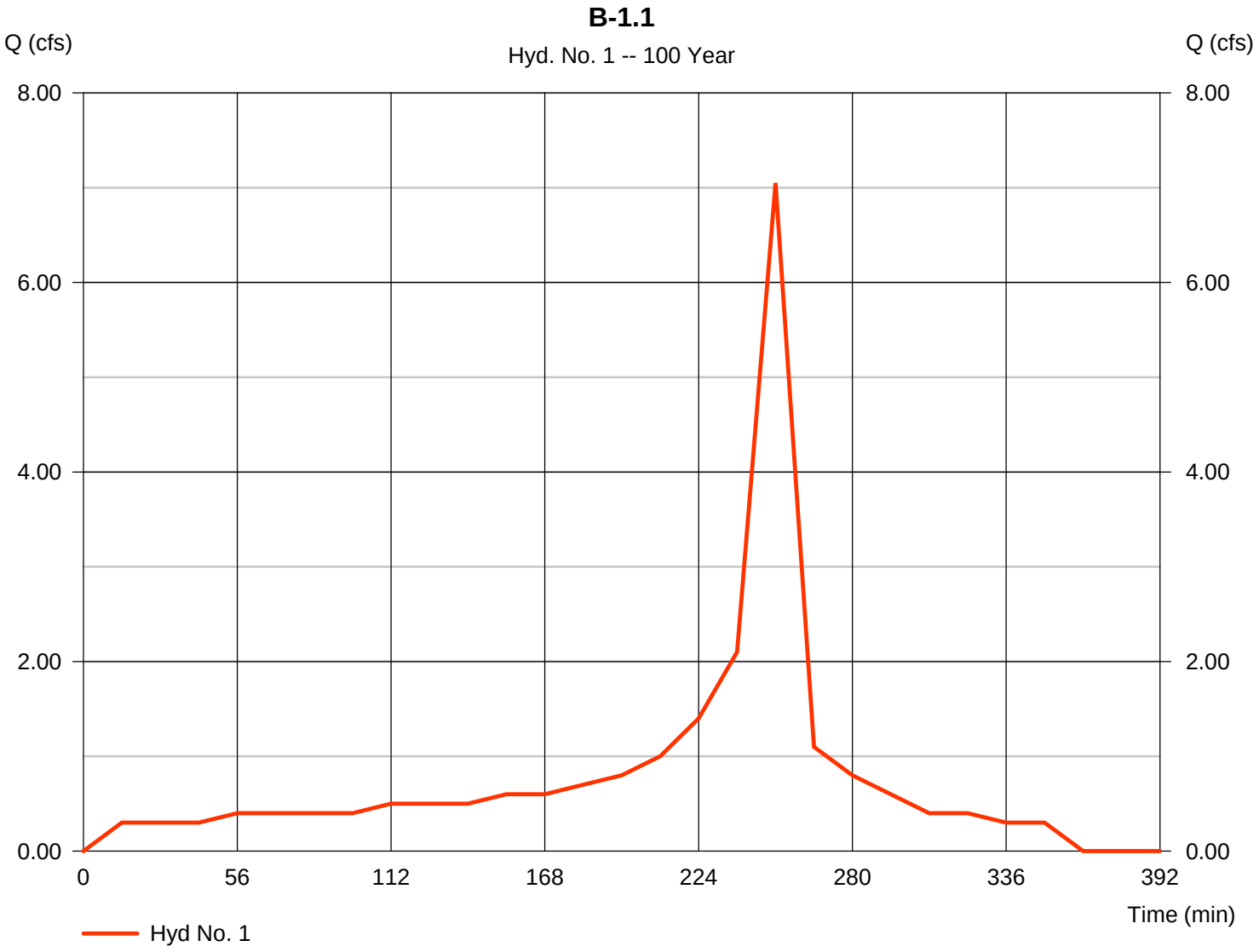
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	7.050	14	252	18,606	------	------	------	B-1.1
2	Reservoir	4.039	14	252	17,879	1	102.00	4,442	BMP-2
3	Manual	9.380	17	255	33,946	------	------	------	C-1.1
4	Reservoir	6.977	17	255	33,917	3	102.45	8,078	BMP-3

Hydrograph Report

Hyd. No. 1

B-1.1

Hydrograph type	= Manual	Peak discharge	= 7.050 cfs
Storm frequency	= 100 yrs	Time to peak	= 252 min
Time interval	= 14 min	Hyd. volume	= 18,606 cuft



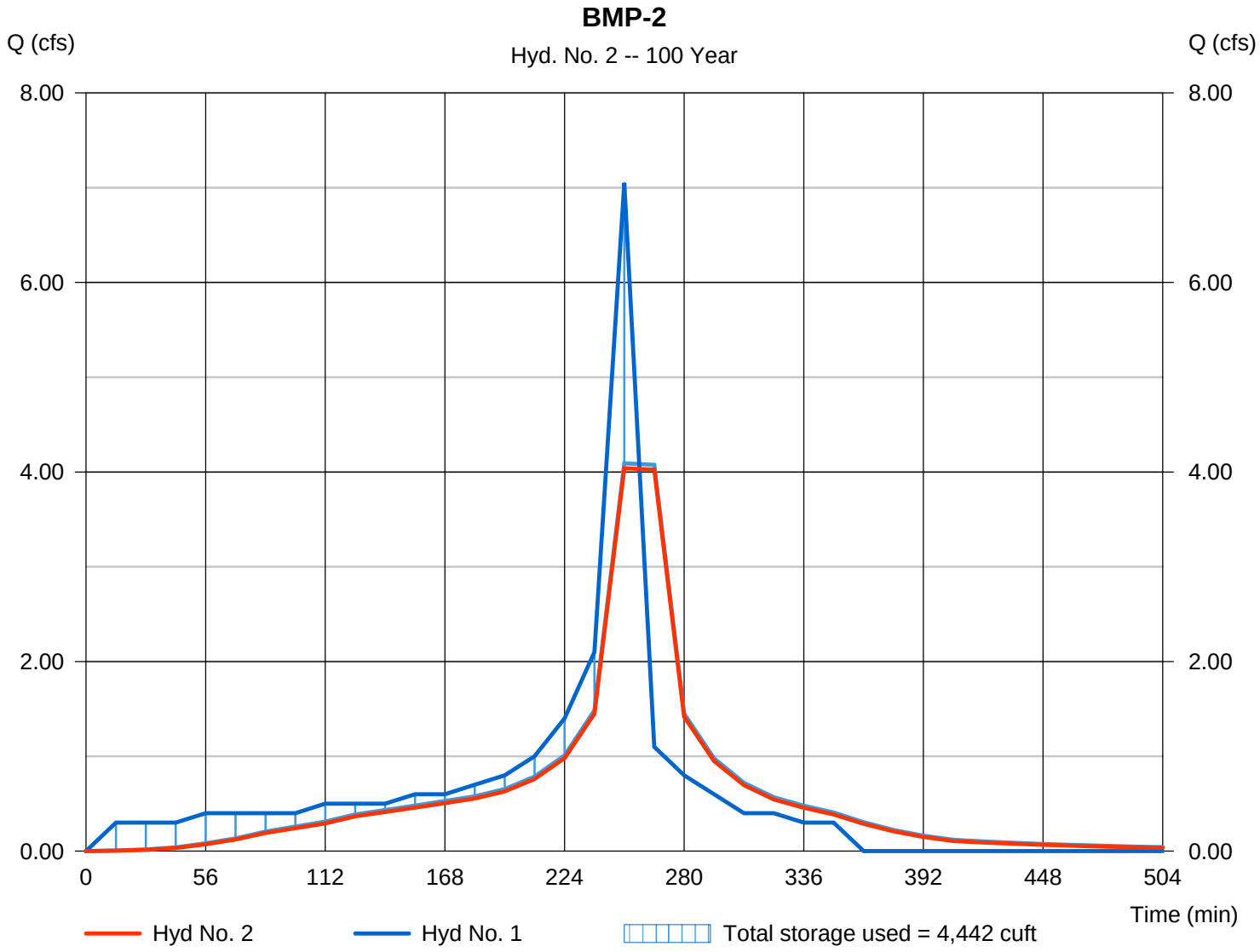
Hydrograph Report

Hyd. No. 2

BMP-2

Hydrograph type	=	Reservoir	Peak discharge	=	4.039 cfs
Storm frequency	=	100 yrs	Time to peak	=	252 min
Time interval	=	14 min	Hyd. volume	=	17,879 cuft
Inflow hyd. No.	=	1 - B-1.1	Max. Elevation	=	102.00 ft
Reservoir name	=	BIO-2	Max. Storage	=	4,442 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 1 - BIO-2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 100.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	2,600	0	0
2.00	102.00	2,600	5,199	5,199

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

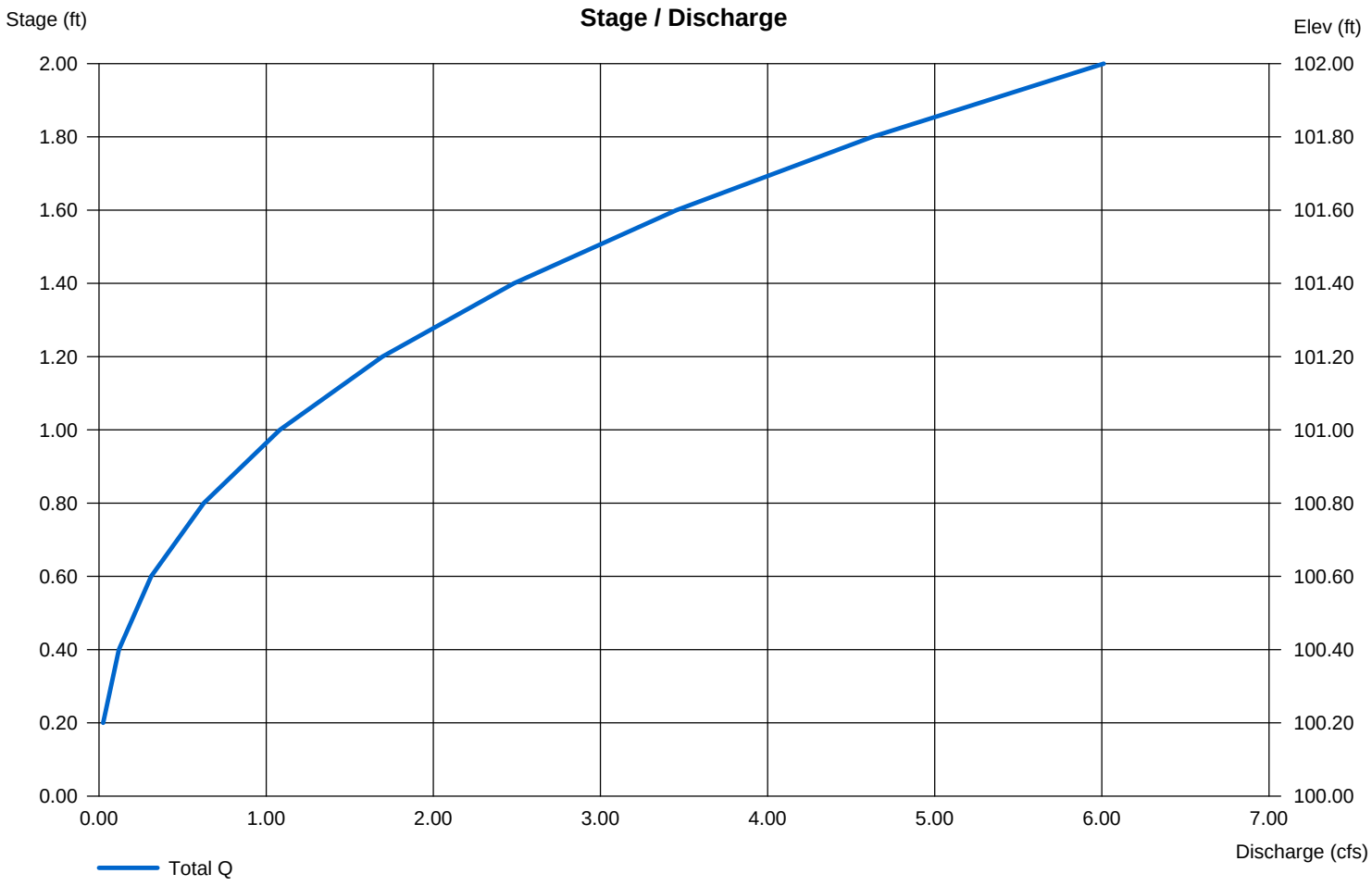
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 100.00	0.00	0.00	0.00
Weir Coeff.	= 1.05	3.33	3.33	3.33
Weir Type	= 45 degV	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 1.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

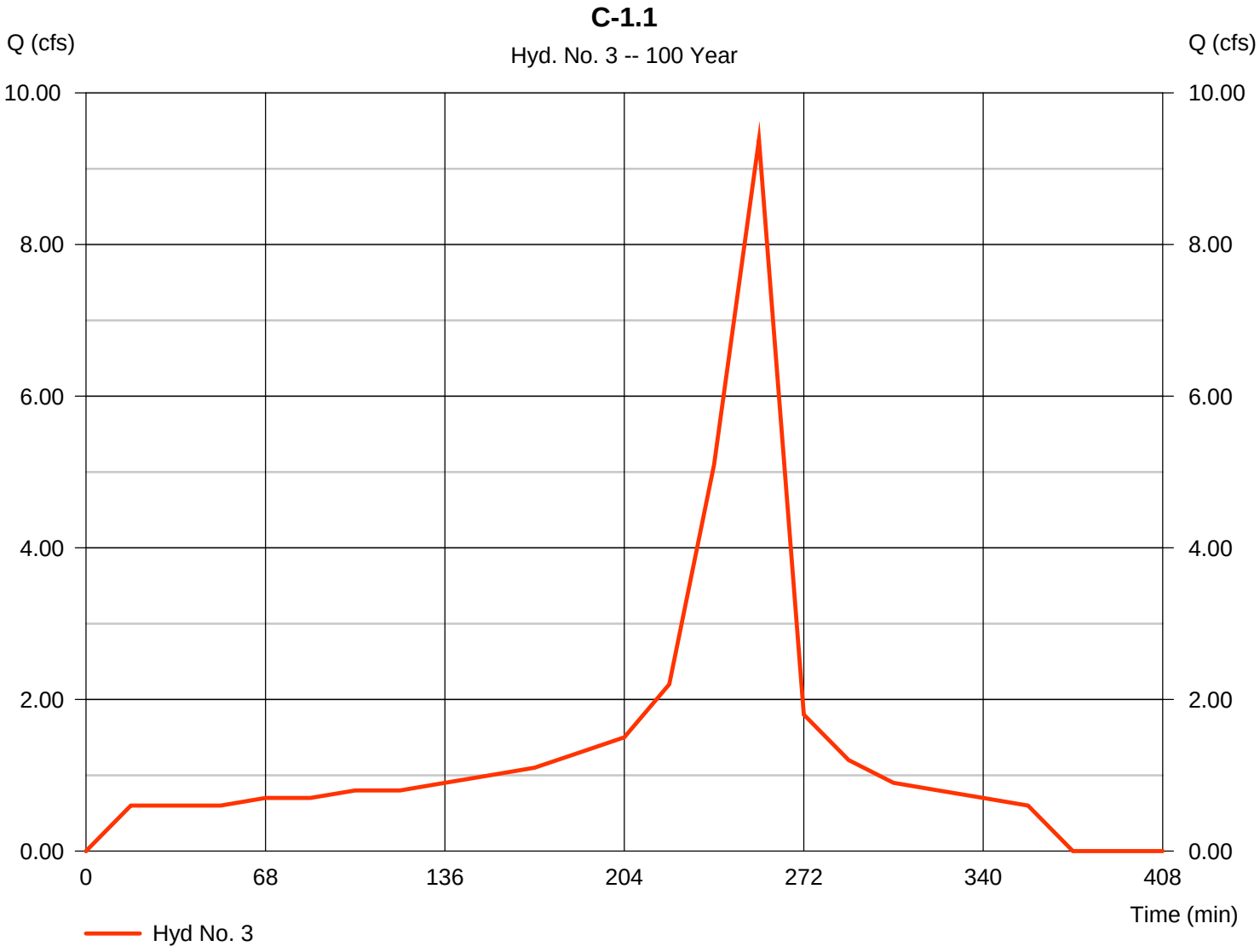


Hydrograph Report

Hyd. No. 3

C-1.1

Hydrograph type	= Manual	Peak discharge	= 9.380 cfs
Storm frequency	= 100 yrs	Time to peak	= 255 min
Time interval	= 17 min	Hyd. volume	= 33,946 cuft



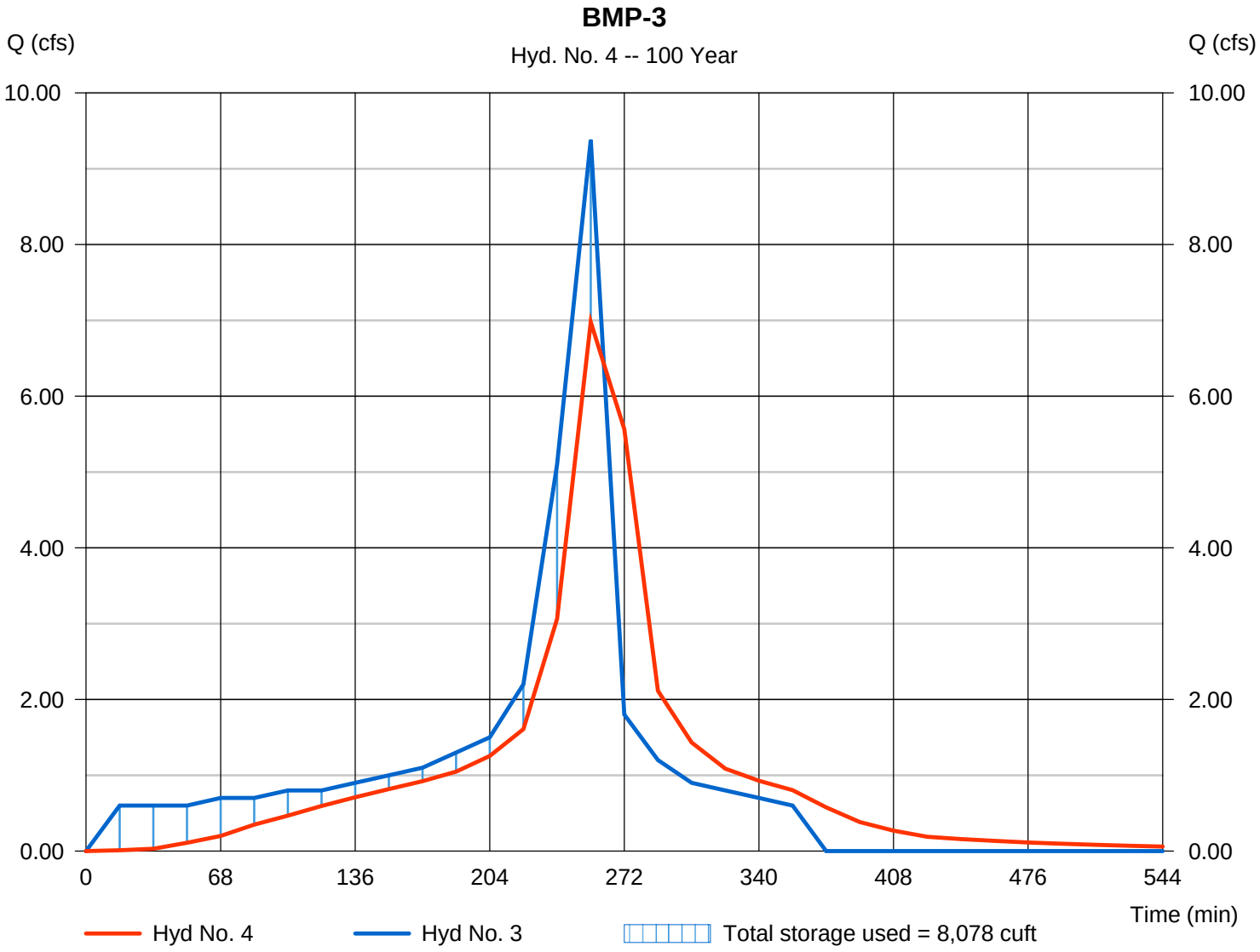
Hydrograph Report

Hyd. No. 4

BMP-3

Hydrograph type	=	Reservoir	Peak discharge	=	6.977 cfs
Storm frequency	=	100 yrs	Time to peak	=	255 min
Time interval	=	17 min	Hyd. volume	=	33,917 cuft
Inflow hyd. No.	=	3 - C-1.1	Max. Elevation	=	102.45 ft
Reservoir name	=	BIO-3	Max. Storage	=	8,078 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - BIO-3

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 100.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	3,800	0	0
2.50	102.50	3,800	9,499	9,499

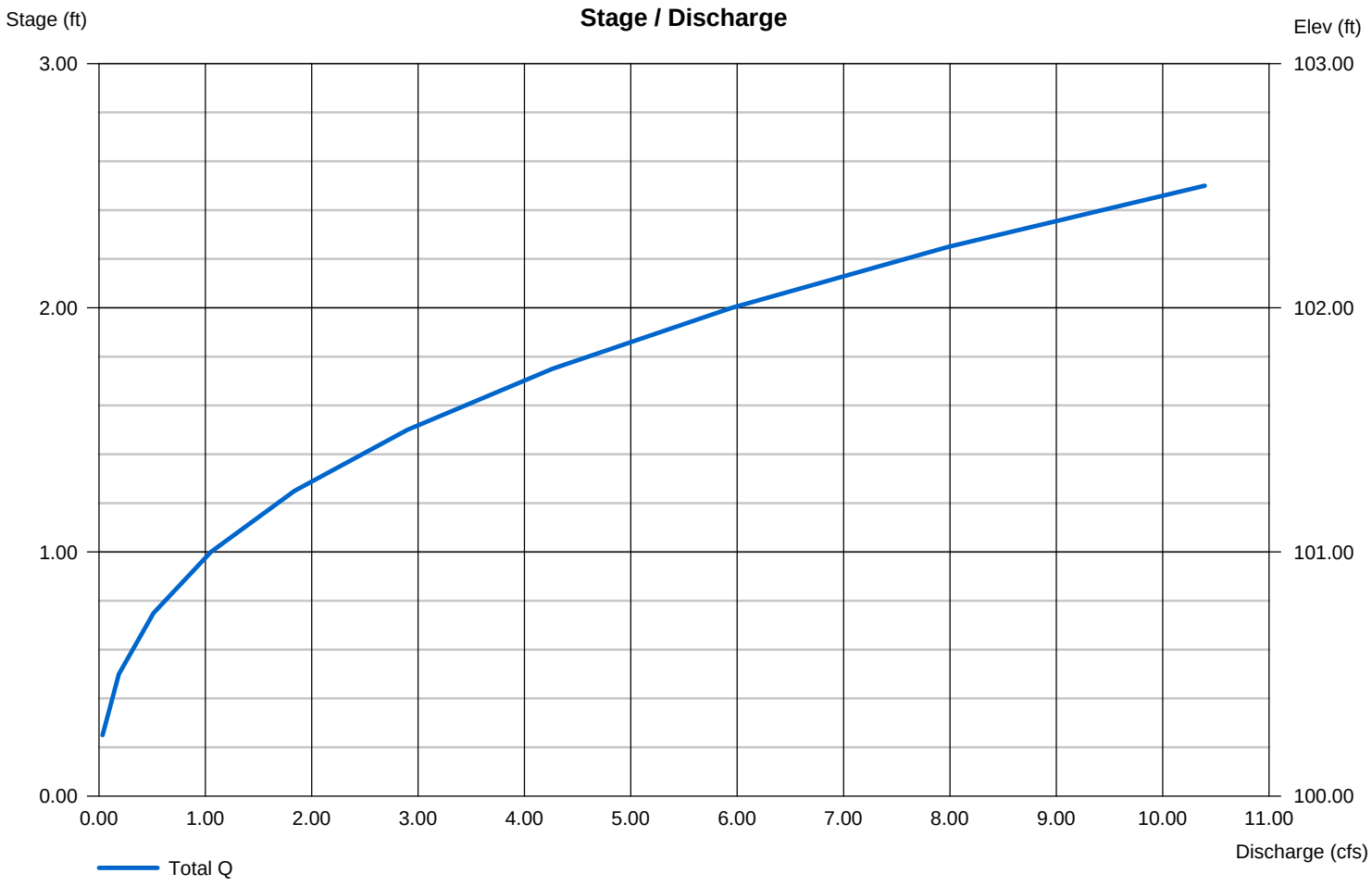
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 100.00	0.00	0.00	0.00
Weir Coeff.	= 1.05	3.33	3.33	3.33
Weir Type	= 45 degV	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Appendices

Appendix 1

County of San Diego Hydrology Manual

Soil Hydrologic Groups

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE
GROUP 'C'

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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3 0 3 Miles

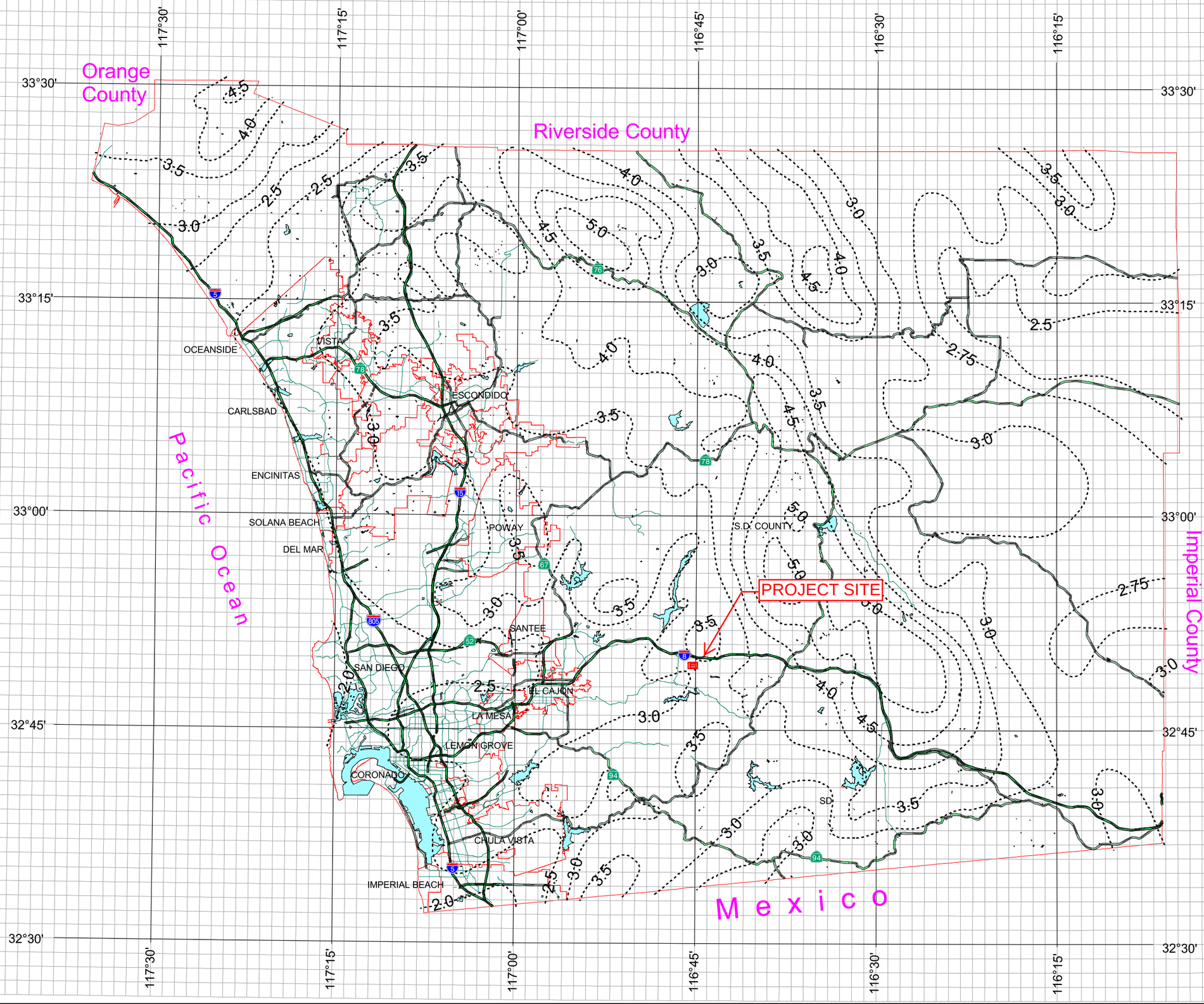
Appendix 2

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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Department of Public Works
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Appendix 3

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
POWAY
S.D. COUNTY
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

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3 0 3 Miles

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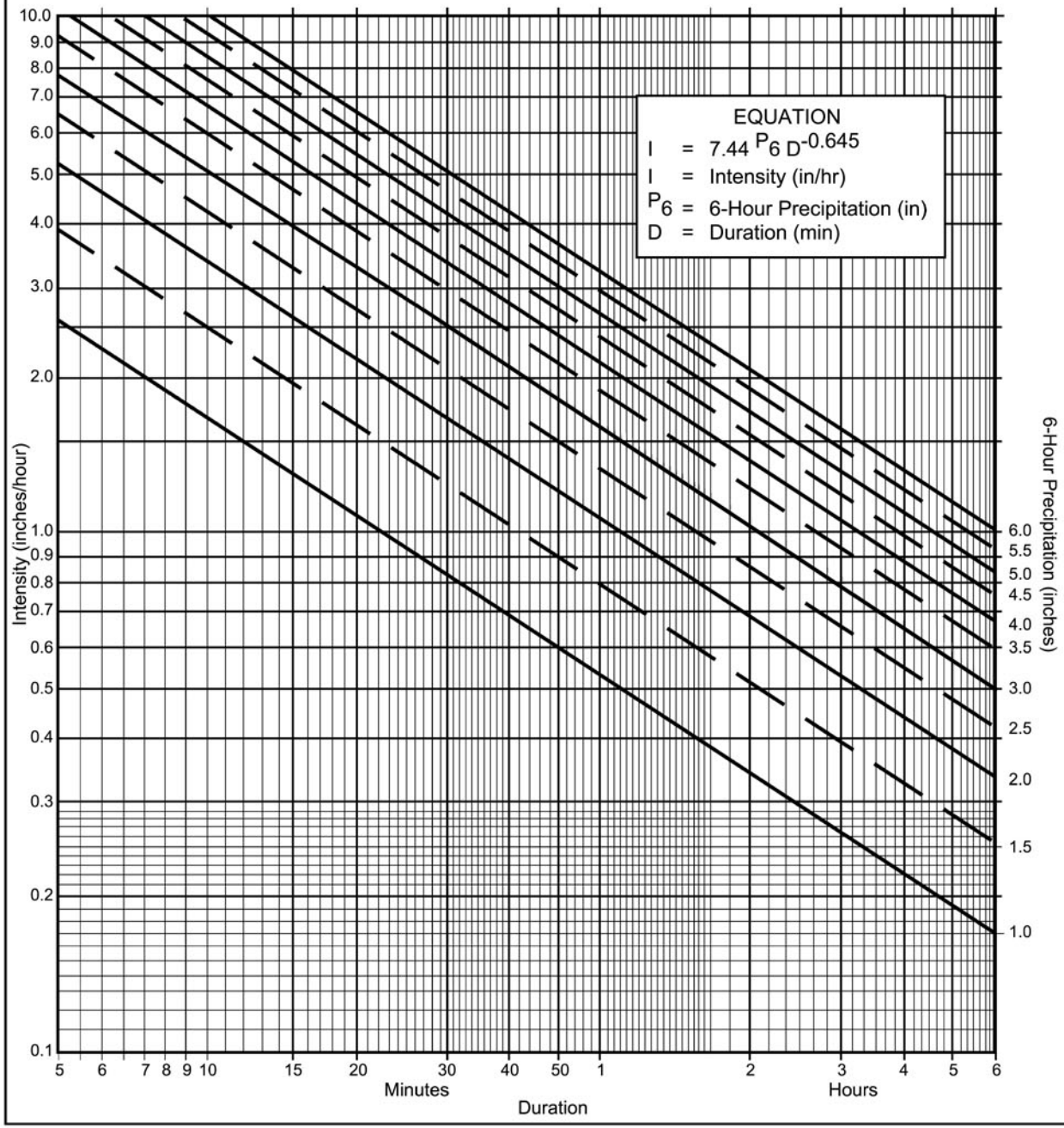
Appendix 4



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

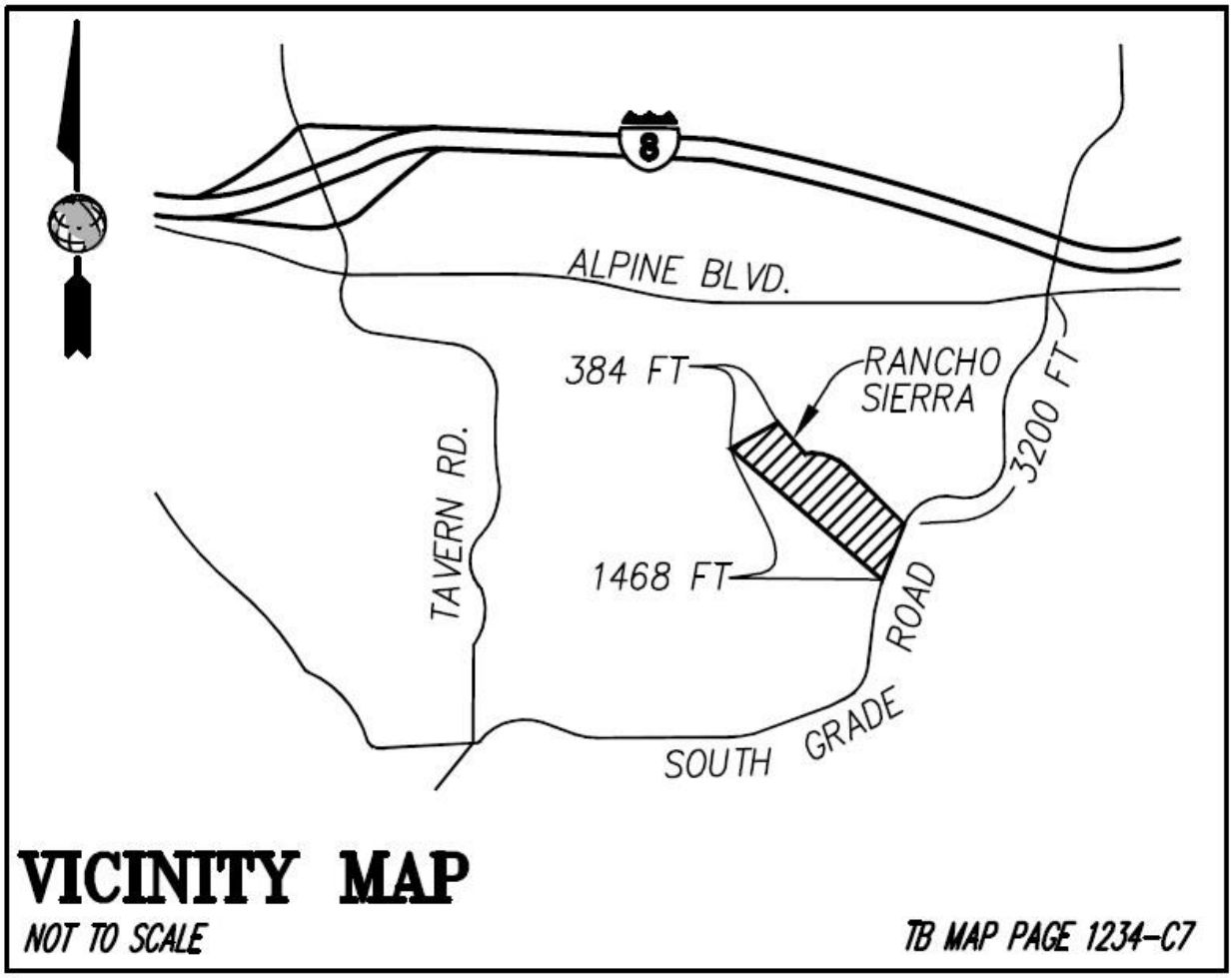
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



VICINITY MAP

NOT TO SCALE

TB MAP PAGE 1234-C7

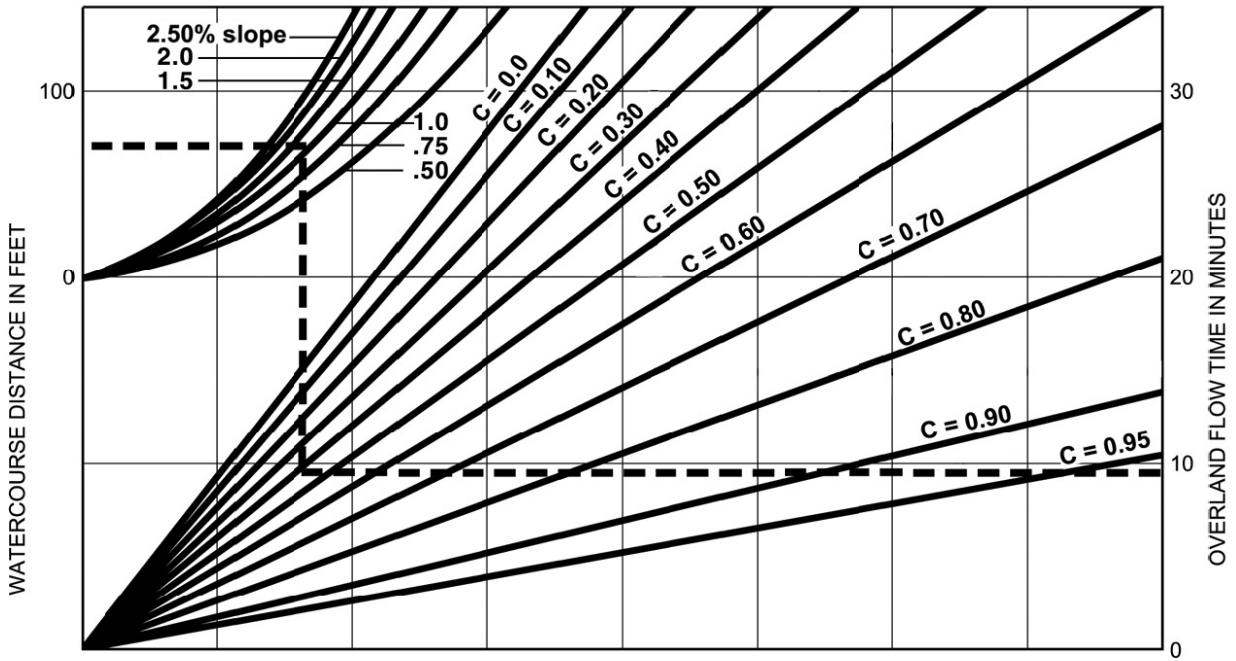
Appendix 5

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Appendix 6



EXAMPLE:

Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

Rational Formula - Overland Time of Flow Nomograph

FIGURE 3-3

Appendix 7

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

ATTACHMENT 7

Copy of Project's Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 7.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Diego County Area, California

Rancho Sierra

March 11, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 8, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 2, 2010—Jun 7, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

San Diego County Area, California (CA638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	0.2	1.7%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	11.8	97.7%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	0.0	0.2%
FeE2	Fallbrook rocky sandy loam, 9 to 30 percent slopes, ero ded	0.0	0.3%
Totals for Area of Interest		**12.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Diego County Area, California

CmrG—Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hb9v
Elevation: 500 to 4,000 feet
Mean annual precipitation: 8 to 35 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 110 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 45 percent
Rock outcrop: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 4 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and granodiorite

Typical profile

H1 - 0 to 8 inches: coarse sandy loam
H2 - 8 to 12 inches: weathered bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 4 to 20 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow loamy (1975) (R019XD060CA)

Minor Components

Las posas

Percent of map unit: 5 percent

Vista

Percent of map unit: 5 percent

FaD2—Fallbrook sandy loam, 9 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hbbv
Elevation: 200 to 3,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Fallbrook and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 12 inches: loam, sandy loam
H2 - 6 to 12 inches: sandy clay loam, clay loam
H3 - 12 to 28 inches: loam, sandy loam
H3 - 12 to 28 inches: weathered bedrock
H4 - 28 to 47 inches:
H4 - 28 to 47 inches:

H5 - 47 to 51 inches:

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Loamy (1975) (R019XD029CA)

Minor Components

Vista

Percent of map unit: 10 percent

Cieneba

Percent of map unit: 2 percent

Bonsall

Percent of map unit: 2 percent

Las posas

Percent of map unit: 1 percent

FaE2—Fallbrook sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hbbw
Elevation: 300 to 2,000 feet
Mean annual precipitation: 12 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 250 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Fallbrook and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 2 inches: sandy loam
H2 - 2 to 24 inches: sandy clay loam, loam
H2 - 2 to 24 inches: sandy loam
H3 - 24 to 28 inches: weathered bedrock
H4 - 28 to 32 inches:

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: Loamy (1975) (R019XD029CA)

Minor Components

Vista

Percent of map unit: 10 percent

Cieneba

Percent of map unit: 2 percent

Bonsall

Percent of map unit: 2 percent

Las posas

Percent of map unit: 1 percent

FeE2—Fallbrook rocky sandy loam, 9 to 30 percent slopes, ero ded

Map Unit Setting

National map unit symbol: hbc0
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 25 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 110 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Fallbrook and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 4 inches: sandy loam
H2 - 4 to 24 inches: sandy clay loam, loam
H2 - 4 to 24 inches: sandy loam
H3 - 24 to 28 inches: weathered bedrock
H4 - 28 to 32 inches:

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: Loamy (1975) (R019XD029CA)

Minor Components

Rock outcrop
Percent of map unit: 10 percent

Cieneba
Percent of map unit: 10 percent

Vista
Percent of map unit: 5 percent

Las posas
Percent of map unit: 5 percent