County of San Diego

Stormwater Quality Management Plan (SWQMP)

For Priority Development Projects (PDPs)

Use for all PDPs (see Storm Water Intake Form, Part 4)

Priority Development Project

Project Information	
Project Name	Shadow Run Ranch TM 5223
Project Address	State Highway 76 and Adams Drive
Assessor's Parcel # (APN)	111-080-07, 08, 09, 10, 14, 18, 19, 21, 111-070-12, 13
Permit # / Record ID	PDS2001-3100-5223

Project Applicant / Project Proponent		
Name	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe	
Address	P.O. Box 1249 Pauma Valley, CA 92061	
Phone	(760) 742-1893	**Email:** wpvr101@yahoo.com

SWQMP Preparer		
Name	Robert D'Amaro	
Company (if applicable)	Masson & Associates, Inc.	
Address	200 East Washington Suite 200, Escondido, CA 92025	
Phone	(760) 741-3570	**Email:** robdamaro@masson-assoc.com
PE Number (if applicable)	C081699	

Preparer's Certification

I 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 County of San Diego BMP Design Manual. The BMP Design Manual 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 Order No. R9-2015-0001 and Order No. R9-2015-0100) requirements for storm water management.

This SWQMP is intended to comply with applicable requirements of the BMP Design Manual. I certify that it 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 SWQMP by County staff is confined to a review and does not relieve me as the person in charge of overseeing the selection and design of storm water BMPs for this project, of my responsibilities for project design.

Signature  **Date** December 20, 2019

COUNTY ACCEPTED

SWQMP Approved By: *Approval Date*:

**** Note* Approval does not constitute compliance with regulatory requirements.***

Submittal Record: List the dates of SWQMP and plan submittals and updates. Briefly describe key changes from previous versions. If responding to plan check comments, note this in the entry and attach the responses as applicable.

No.	Date	Summary of Changes
Preliminary Design / Planning / CEQA		
1	10/11/2019	Initial Submittal
2	11/22/2019	COSD Scoping letter changes
3	12/20/2019	COSD Scoping letter changes
4	Date	Summary of Change
No.	Date	Summary of Change
Final Design		
1	Date	Initial Submittal
2	Date	Summary of Change
3	Date	Summary of Change
4	Date	Summary of Change
No.	Date	Summary of Change
Plan Changes		
1	Date	Initial Submittal
2	Date	Summary of Change
3	Date	Summary of Change
4	Date	Summary of Change
No.	Date	Summary of Change

PDP SWQMP Submittal Checklist

SWQMP Tables: All of the eight tables below must be completed.

☒ Table 1: Scope of SWQMP Submittal ..... Page 2

☒ Table 2: Baseline BMPs for Existing Natural Features and Proposed Features (Groups 1, 2, and 3) ..... Page 3

☒ Table 3: Baseline BMPs for Pollutant-generating Sources (Group 4) ..... Page 4

☒ Table 4: Infeasibility Justifications for Baseline BMPs ..... Page 5

☒ Table 5: DMA Structural Compliance Strategies and Documentation ..... Page 6

☒ Table 6: Critical Coarse Sediment Yield Area (CCSYA) Requirements ..... Page 7

☒ Table 7: Minimum Construction Stormwater BMPs ..... Page 8

☒ Table 8: Infeasibility Justifications for Construction BMPs ..... Page 9

SWQMP Attachments[1]: Use the checklist below to identify which attachments will be included with this submittal. Attachments with boxes already checked (☒) are required for all projects. The applicability of other attachments will be determined upon completing this form.

☒ Attachment 1: Storm Water Intake Form

☒ Attachment 2: DMA Exhibits and Construction Plan Sheets

☒ Attachment 3: Source Control BMP Worksheet

☐ Attachment 4: Previous SWQMP Submittals

☒ Attachment 5: Existing Site and Drainage Description

☒ Attachment 6: Documentation of DMAs without Structural BMPs

☒ Attachment 7: Documentation of DMAs with Structural Pollutant Control BMPs

☒ Attachment 8: Documentation of DMAs with Structural Hydromodification Management BMPs

☒ Attachment 9: Management of Critical Coarse Sediment Yield Areas

☒ Attachment 10: Installation Verification Form

☒ Attachment 11: BMP Maintenance Agreements and Plans

☐ Attachment 12: Documentation of Alternative Compliance Projects (ACPs)

After completing the remainder of this form, check the applicable SWQMP Attachment boxes to summarize your selections.

[1] All SWQMP attachments are available at www.sandiego.gov/stormwater under the Development Resources tab. Some attachments are presented out of order because they are shared between multiple SWQMP forms.

Table 1 – Scope of SWQMP Submittal

Select one option below that describes the scope of this SWQMP Submittal. Document your selection as indicated.	
SWQMP Scope	**Required Documentation**
☒ ***a. SWQMP addresses the entire project***	No additional documentation.
☐ ***b. SWQMP implements requirements of an earlier master SWQMP submittal***	Include a copy of the previous submittal as **Attachment 4**.
☐ ***c. First of multiple SWQMP submittals***	Use the spaces below to identify the elements addressed in this submittal and in future submittals.
(1) Elements addressed in current submittal (streets, common areas, first project phase, etc.):	
(2) Elements to be addressed in future submittal(s) (individual lots, future project phases, etc.):	

Table 2 – Baseline BMPs for Existing and Proposed Site Features

Site Features Select each feature that applies.		BMP Implementation Describe BMP implementation for each selected site feature.				
Group 1: Existing Natural Site Features [See BMPDM Sections 4.3.1 and 4.3.2]						
		Maintain & conserve natural features		**Establish buffers for waterbodies**		
		Full	Partial	Full	Partial	
☒	**Natural waterbodies**	☒	☐	☐	☐	
☒	**Natural storage reservoirs & drainage corridors**	☒	☐			
☒	**Natural areas, soils, & vegetation (incl. trees)**	☒	☐			
Group 2: Common Impervious Outdoor Site Features [See BMPDM Sections 4.3.3 and 4.3.5]						
		Disperse impervious areas (See SD-B)		**Use permeable materials (See SD-D)**		**Minimize impervious areas**
		Full	Partial	Full	Partial	
☒	**Streets and roads**	☐	☒	☐	☐	☒ Check here to confirm that impervious surfaces have been minimized where applicable and feasible for all outdoor impervious areas. If not, explain in Table 4.
☐	**Sidewalks & walkways**	☐	☐	☐	☐	
☐	**Parking areas & lots**	☐	☐	☐	☐	
☒	**Driveways**	☒	☐	☐	☐	
☒	**Patios, decks, & courtyards**	☒	☐	☐	☐	
☒	**Hardcourt recreation areas**	☒	☐	☐	☐	
☐	Add impervious feature	☐	☐	☐	☐	
☐	Add impervious feature	☐	☐	☐	☐	
☐	Add impervious feature	☐	☐	☐	☐	
Group 3: Other Outdoor Site Features [See BMPDM Sections 4.2.6, 4.3.4, 4.3.5, 4.3.7, and 4.3.8]						
☒	**Rooftop areas**	**Disperse rooftop runoff (See SD-B)**		**Install green roofs (optional; See SD-C)**		**Use rain barrels to capture runoff (optional; See SD-E)**
		Full	Partial	Full	Partial	Full / Partial
		☒	☐	☐	☐	☐ / ☐
☒	**Landscaped areas**	**Use water-efficient landscaping (required)**		**Install efficient irrigation systems (required)**		**Minimize erosion of slopes and surfaces (required)**
		Full		Full		Full
		☒		☒		☒
☐	**Water features (pools, spas, etc.)**	**Provide a designated washing area**		**Drain feature to the sanitary sewer (if allowed)**		**Drain feature to a pervious area**
		Full	Partial	Full	Partial	Full / Partial
		☐	☐	☐	☐	☐ / ☐

Note: Justification is required in Table 4 for any feature not selecting at least one BMP (either full or partial implementation). For Group 2 features this means not selecting either SD-B or SD-D. Additional justifications may be required on request by County staff. Also use Table 4 to describe sources or BMPs other than those listed.

Table 3 –Baseline BMPs for Pollutant-generating Sources (Group 4)

A. Requirements for Documentation Select either or both as applicable.	Completion of Part B is not required because: ☐ This is a Small Residential Project, OR ☐ None of these sources or features is proposed.	☒ ***Source Control BMP Requirements Worksheet E.1-1*** (SC in Appendix E of the BMP Design Manual) is included as **Attachment 3** (optional unless requested by County staff).

B. Sources and BMPs Select all proposed sources and features below. Then select the BMPs on the right to be implemented for each.	**Plumb to sanitary sewer**	**Drain feature to a pervious area**	**Provide containment for spills and discharges**	**Prevent contact with rainfall**	**Isolate flows from adjacent areas**	**Prevent wind dispersal**	**Label with stencils or signs**
Common Source Areas							
☐ **Trash & Refuse Storage**	☐	---	☐	☐	☐	☐	---
☐ **Materials & Equipment Storage**	☐	---	☐	☐	☐	☐	---
☐ **Loading & Unloading**	☐	---	☐	☐	☐	---	---
☐ **Fueling**	☐	---	☐	☐	☐	---	---
☐ **Maintenance & Repair**	☐	---	☐	☐	☐	---	---
☐ **Vehicle & Equipment Cleaning**	☐	---	☐	☐	☐	---	---
☐ **Food Preparation or Service**	☐	---	☐	☐	☐	---	---
Distributed Features							
☒ **Storm drain inlets & catch basins**	---	---	---	---	---	---	☒
☐ **Interior floor drains and sumps**	☐	---	---	---	---	---	---
☐ **Drain lines (air conditioning, etc.)**	☐	☐	☐	---	---	---	---
☐ **Fire test sprinkler discharges**	☐	☐	☐	---	---	---	---

Provide the following in Table 4: (1) justification of any source area or feature with NO BMPs selected, (2) justification of individual unselected BMPs *if requested by County staff*, and (3) identification of any proposed pollutant-generating sources and BMPs not listed here.

Note: Pollutant-generating sources and features may not discharge directly to the MS4. Discharging to any of the stormwater BMPs identified in Table 5 Part B is also discouraged. If doing so, however, the source or feature area must be included in applicable DCV calculations.

Table 4 – Explanations and Justifications for Table 2 and 3 Baseline BMPs

☒ **Check here if no explanations or justifications for Table 2 or 3 BMPs are required.**		
• **Required Justifications**: If NO BMPs are selected for a source or feature, justify why <u>all</u> BMPs are either not applicable or are infeasible. For Group 2 features NO BMPs means not selecting either SD-B or SD-D. • **If Requested**: Justify why individual BMPs will not be implemented or will only be partially implemented. • **Additional Explanation**: Describe any proposed features and/or BMPs not listed in Tables 2 or 3.		
BMP-Feature Combination		**Explanation**
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	
Feature	Feature	Explanation
BMP	BMP	

Table 5: DMA Structural Compliance Strategies and Documentation

Part A – Selection and Application Structural Performance Standards

1. Selection of Standards (select one; see BMPDM Section 6.1)

☒ a. Pollutant control + hydromodification ☐ b. Pollutant control only (project is exempt from hydromodification requirements)

2. Application of Structural Performance Standards (select one; see BMPDM Section 1.7)

☒ **New Development Projects:** Standards apply to all impervious surfaces.

☐ **Redevelopment Projects:** Complete the calculations below. Select the applicable scenario based on the results.

a. Existing impervious area (ft²)	b. Impervious area created / replaced (ft²)	c. % Impervious created / replaced [(b/a)*100]

☐ *Scenario 1: c is 50% or more*: Performance standards apply to all impervious surfaces (a + b).

☐ *Scenario 2: c is less than 50%*: Performance standards apply only to created or replaced impervious surfaces (b only).

Part B – Compliance Strategies and Required Attachments

1.*Complete and submit each of the applicable attachments on the right.*

Att. 1	Att. 2	Att. 3	Att. 4	Att. 5
Storm Water Intake Form ☒	DMA Exhibits and Construction Plan Sheets ☒	Source Control BMP Worksheet (see Table 3) ☒	Previous SWQMP Submittals (see Table 1) ☐	Existing Site and Drainage Description ☒

2. *Indicate each compliance strategy below that will be used for one or more DMAs on the site.*

	Att. 6 DMAs without Structural BMPs	Att. 7 DMAs w/ Structural Pollutant Control BMPs	Att. 8 DMAs w/ Structural Hydromod. BMPs	Att. 9 Critical Coarse Sediment Yield Areas	Att. 10 Installation Verification Form	Att. 11 Maintenance Agreements/ Plans	Att. 12 Alternative Compliance Projects
☒Self-mitigating DMAs (BMPDM Section 5.2.1)	☒			☒			
☐De Minimis DMAs (BMPDM Section 5.2.2)	☐			☐			
☒Self-retaining DMAs (BMPDM Section 5.2.3)	☒			☒	☒		
Structural BMPs (select all that apply)							
☒Pollutant Control BMPs (BMPDM Section 5.4)		☒		☒	☒	☒	
☒Hydromodification BMPs (BMPDM Chapter 6)			☒	☒	☒	☒	
☐Alternative Compliance Project (BMPDM Section 1.8)				☐	☐	☐	☐

☒ **Please check this box after you complete this list. Corresponding attachments will be automatically selected on the right.**

- *Attachments 1, 2, and 5 are required for all projects.*

Table 6: Critical Coarse Sediment Yield Area (CCSYA) Requirements

- Identify one applicable compliance pathway for the PDP below.
- Document your selection in **Attachment 9**.

A. Hydromodification Management Exemption (BMPDM Sections 1.6 and 6.1)

☐ **PDP is Exempt from Hydromodification Management Requirements**

Select if hydromodification management exemption was selected in Table 4 Part A.1.

B. Watershed Management Area (WMAA) Mapping (BMPDM Appendix H.1.1.2)

☐ **WMAA mapping demonstrates the following:**

a. <5% of potential onsite CCYSAs will be impacted (built on or obstructed)

b. All potential upstream offsite CCYSAs will be bypassed

C. Resource Protection Ordinance (RPO) Methods (BMPDM Appendix H.1.1.1)

☒ **RPO Scenario 1: PDP is subject to and in compliance with RPO requirements**

a. Project requires one or more discretionary permits (RPO applicability is confirmed during discretionary review)

b. Onsite AND upstream offsite CCSYAs will be avoided and/or bypassed

☐ **RPO Scenario 2: PDP is entirely exempt/not subject to RPO requirements**[2]

a. Project does not require discretionary permits

b. Project will bypass all upstream offsite CCSYAs (no requirements for onsite CCSYAs)

D. No Net Impact Analysis (BMPDM Appendix H.4)

☐ **Project demonstrates no net impact to receiving waters**

[2] Does not include PDPs utilizing exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3).

Table 7 –Minimum Construction Stormwater BMPs

Minimum Required BMPs by Activity Type Select all applicable activities and at least one BMP for each	References Caltrans[3]	 County of San Diego	
☒ **Erosion Control for Disturbed Slopes** (choose at least 1 per season)			
☐ Vegetation Stabilization Planting[4] (Summer)	SS-2, SS-4		
☒ Hydraulic Stabilization Hydroseeding[9] (Summer)	SS-4		
☒ Bonded Fiber Matrix or Stabilized Fiber Matrix[5] (Winter)	SS-3		
☐ Physical Stabilization Erosion Control Blanket[7] (Winter)	SS-7		
☒ **Erosion control for disturbed flat areas (slope < 5%)**			
☐ County Standard Lot Perimeter Protection Detail	SC-2	PDS 659[6]	
☒ Use of Item A erosion control measures on flat areas	SS-3, SS-4, SS-7		
☐ County Standard Desilting Basin (must treat all site runoff)	SC-2	PDS 660[7]	
☐ Mulch, straw, wood chips, soil application	SS-6, SS-8		
☒ **Energy dissipation (required to control velocity for concentrated runoff or dewatering discharge)**			
☒ Energy Dissipater Outlet Protection	SS-10	RSD D-40[8]	
☒ **Sediment control for all disturbed areas**			
☒ Silt Fence	SC-1		
☒ Fiber Rolls (Straw Wattles)	SC-5		
☒ Gravel & Sand Bags	SC-6, SC-8		
☐ Dewatering Filtration	NS-2		
☒ Storm Drain Inlet Protection	SC-10		
☒ Engineered Desilting Basin (sized for 10-year flow)	SC-2		
☒ **Preventing offsite tracking of sediment**			
☒ 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		
☒ **Materials Management**			
☒ Material Delivery & Storage	WM-1		
☒ Spill Prevention and Control	WM-4		
☒ **Waste Management[9]**			
☒ Waste Management Concrete Waste Management	WM-8		
☒ Solid Waste Management	WM-5		
☐ Sanitary Waste Management	WM-9		
☐ Hazardous Waste Management	WM-6		

[3] See Caltrans 2017 Storm Water Quality Handbooks, Construction Site BMP Manual, available at: (http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm)
[4] Planting or Hydroseeding may be installed between May 1st and August 15th. Slope irrigation must be in place and operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. A contingency physical BMP must be implemented by August 15th if vegetation is not established 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.
[5] All slopes over three feet must have established vegetative cover prior to final permit approval.
[6] County PDS 659. Standard Lot Perimeter Protection Design System (Bldg. Division)
[7] County PDS 660. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Bldg. Division
[8] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater (also acceptable for velocity reduction)
[9] Applicants are responsible to apply appropriate BMPs for specific wastes (e.g., BMP WM-8 for concrete).

Table 8 – Explanations and Justifications for Construction Phase BMPs

☒ **Check here if no explanations or justifications for Table 7 BMPs are required.**		
Justifications for Table 7 Temporary Construction Phase BMPs • **Required Justifications**: Justify all construction activity types for which NO BMPs were selected. • **If Requested**: Justify why specific individual BMPs were not selected. • **Additional Explanation**: Describe any proposed features and/or BMPs not listed in Table 7.		
Activity Type / BMP		**Explanation**
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	
Activity Type	Activity Type	Explanation
BMP	BMP	

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 1: Storm Water Intake Form for All Permit Applications

This form establishes Stormwater Quality Management Plan (SWQMP) requirements for Development Projects per Sections 67.809 and 67.811 of the County of San Diego Watershed Protection Ordinance (WPO).
See ***Storm Water Intake Form Instructions*** for additional guidance and explanation of terms.

Part 1. Project Information	
Project Name:	Shadow Run Ranch TM 5223
Record ID (Permit) No(s):	PDS2001-3100-5223
Assessor's Parcel No(s):	111-080-07, 08, 09, 10, 14, 18, 19, 21, 111-070-12, 13
Street Address (or Intersection):	State Highway 76 and Adams Drive
City, State, Zip:	Pauma Valley, Ca, 92061

Part 2. Applicant / Project Proponent Information	
Name:	Sherrill Ann Schoepe
Company:	Shadow Run Ranch, LLC
Street Address:	P.O. Box 1249
City, State, Zip:	Pauma Valley, CA 92061
Phone Number	(760)742-1893
Email:	wpvr101@yahoo.com

Part 3. Required Information for All Development Projects

Ⓐ **1. Existing (pre-development) impervious surfaces (ft²)**	**2. Created or replaced impervious surfaces (ft²)**	**3. Total disturbed area (acres or ft²)**
350,658	620,063	66.82 Acres

Ⓑ ☐ Check here and provide a WDID# if this project is subject to the California Construction General Permit (Order No. 2009-0009-DWQ)[1]	**WDID # (if issued)**

For County Use Only	Reviewed By:	Review Date:
☐ Standard SWQMP	☐ PDP SWQMP	☐ Green Streets PDP Exemption SWQMP

[1] Available at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

Part 4. Priority Classification & SWQMP Form Selection

(A) *If your project is the following ... (select one)*	(B) *You must complete ...*
☐ **Standard Project**	→ **Standard *SWQMP Form***
☐ a. Project is East of the Pacific/Salton Sea Divide	
☐ b. None of the PDP criteria below applies	
☐ **Priority Development Project (PDP)**	→ **PDP *SWQMP Form***
☐ 1. Project is part of an existing PDP, OR	
☒ 2. Project does any of the following:	
☒ a. Creates or replaces a total of 10,000 ft² or more of impervious surface	
☐ b. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) parking lots; (2) streets, roads, highways, freeways, and/or driveways; (3) restaurants; and (4) hillsides	
☐ c. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) automotive repair shops; and (2) retail gasoline outlets	
☐ d. Discharges directly to an Environmentally Sensitive Area (ESA) AND creates or replaces 2,500 ft² or more of impervious surface	
☐ e. Disturbs one or more acres of land (43,560 ft²) and is expected to generate pollutants post-construction	
☒ f. Is a redevelopment project that creates or replaces 5,000 ft² or more of impervious surface on a site already having at least 10,000 ft² of impervious surface	
☐ **Green Streets PDP Exemption[2]**	→ **Green *Streets PDP Exemption SWQMP Form***

Part 5. Applicant Signature

I have reviewed the information in this form, and it is true and correct to the best of my knowledge.

Applicant / Project Proponent Signature: Ronald J Deutschendorf Date: 12-17-19

- ***Upon completion*** *submit this form to the County.*
- ***If requested****, attach supporting documentation to justify selections made or exemptions claimed.*
- ***If this is a PDP that is part of a larger existing PDP****, you will be required to attach a copy of the existing SWQMP to the newer SWQMP submittal.*

[2] ***Green Streets PDP Exemption Projects*** are those claiming exemption from PDP classification per WPO Section 67.811(b)(2) because they consist exclusively of *either* 1) development of new sidewalks, bike lanes, and/or trails; *or* 2) improvements to existing roads, sidewalks, bike lanes, and/or trails.

2.0 General Requirements

- Attachment 2 consolidates exhibits and plans required for the entire project.
- Complete the table below to indicate which sub-attachments are included with the submittal. Sub-attachments that are not applicable can be excluded from the submittal.
- Unless otherwise stated, features and BMPs identified and described in each corresponding Attachment (6 through 9) must be shown on applicable DMA Exhibits and construction plans submitted for the project.

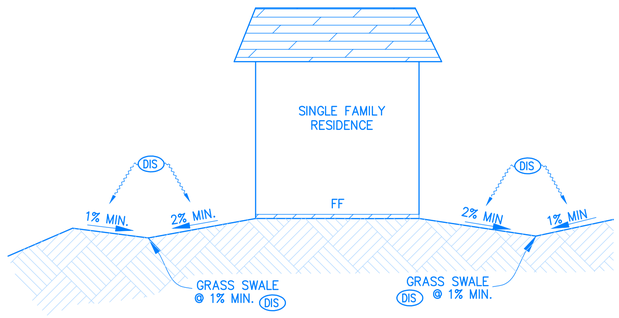
Sub-attachments	Requirement
☒ **2.1: DMA Exhibits**	All PDPs
☐ **2.2: Individual Structural BMP DMA Mapbook**	PDPs with structural BMPs
☒ **2.3: Construction Plan Sets**	All projects

2.1 DMA Exhibits

- DMA Exhibits must show all DMAs on the project site. Exhibits must include all applicable features identified in applicable SWQMP attachments.
- Exhibits may be prepared individually for the BMPs associated with each applicable SWQMP Attachment (6, 7, 8, and/or 9) or combined into one or more consolidated exhibits.
- Use this checklist to ensure required information is included on each exhibit (copy as needed).

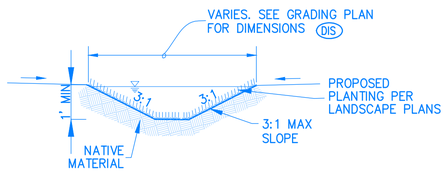
DMA Exhibit ID #:	**Exhibit B – Source Control + (DMA) Exhibit**	
A. Features required for all exhibits		
1. Existing Site Features		
☒ Underlying hydrologic soil group (A, B, C, D)	☒ Topography and impervious areas	
☐ Approximate depth to groundwater	☒ Existing drainage network, directions, and offsite connections	
☒ Natural hydrologic features		
2. Drainage Management Area (DMA) Information		
☒ Proposed drainage network, directions, and offsite connections	☒ DMA boundaries, ID numbers, areas, and type (structural BMP, de minimis, etc.)	
3. Proposed Site Changes, Features, and BMPs		
☒ Proposed demolition and grading	☒ Construction BMPs[2]	
☐ Group 1, 2, and 3 Features[1]	☒ Baseline source control BMPs	
☐ Group 4 Features	☐ Baseline source control BMPs	
B. Proposed Features and BMPs Specific to Individual SWQMP Attachments[3]		
☒ Attachment 6	☒ SSD-BMP impervious dispersion areas ☒ SSD-BMP tree wells	
☒ Attachment 7	☒ Structural pollutant control BMPs	
☒ Attachment 8	☒ Structural hydromodification management BMPs ☒ Point(s) of Compliance (POC) for hydromodification management ☒ Proposed drainage boundary and drainage area to each POC	
☒ Attachment 9	☒ Onsite CCSYAs	☐ Bypass of onsite CCSYAs ☐ Bypass of upstream offsite CCSYAs

[1] Group 1-4 features and baseline BMPs from PDP SWQMP Tables 2 and 3.
[2] Minimum Construction Stormwater BMPs from PDP SWQMP Table 7.
[3] Identify the location, ID numbers, type, and size/detail of BMPs.



TYPICAL LOT DRAINAGE SECTION

NTS



EARTHEN SWALE DETAIL

NTS

Ground Water Depth		
Deep Hole	Depth	Ground Water
A	19	NO
B	19	NO
C	16.5	NO
D	8	NO
H	8	NO
G	8	NO
I	8.5	NO
J	8	NO
K	8	NO
L	--	NO
M	8.17	NO
E	8	NO
F	8	NO
N	9.17	NO
O	8	NO
P	8	NO
Q	8	NO
R	8	NO
S	9.67	NO

SOURCE CONTROL BMP EXHIBIT NOTES

SYMBOL	DESCRIPTION
1	ALL STORMDRAIN INLETS WILL BE MARKED WITH WORDS "NO DUMPING– FLOWS TO OCEAN" OR SIMILAR.
2	FINAL LANDSCAPE PLANS SHALL PRESERVE EXISTING NATURAL TREES, SHRUBS AND GROUND COVER TO THE MAXIMUM EXTENT POSSIBLE.
3	LANDSCAPING SHALL BE DESIGNED TO MINIMIZE IRRIGATION AND RUNOFF, PROMOTE SURFACE INFILTRATION WHERE APPROPRIATE AND MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES THAT CAN CONTRIBUTE TO STORMWATER POLLUTION.
4	LANDSCAPED AREAS SHALL BE DESIGNED TO RETAIN OR DETAIN STORMWATER RUNOFF.
5	LOT OWNERS SHALL BE ENCOURAGE TO CONSIDER USING PEST–RESISTENT PLANTS, ESPECIALLY ADJACENT TO HARDSCAPE AREAS.
6	FINAL LANDSCAPE PLANS SHALL INSURE SUCCESSFUL PLANT ESTABLISHMENT, SELECT PLANTS APPROPRIATE TO SITE SOIL CONDITIONS, SLOPES, CLIMATE, SUN, WIND, RAIN, LAND USE, AIR MOVEMENT, ECOLOGICAL CONSISTENCY AND PLANT INTERACTIONS.
7	STREET AND HARDSCAPE RUNOFF WILL BE DIRECTED TO NATURAL OR LANDSCAPED EARTHEN SWALE FOR PRE–TREATMENT PRIOR TO DISCHARGING INTO BIORETENTION AREAS WHEREVER POSSIBLE.
8	RIP RAP
9	BROW DITCHING

200 100 0 200 400 600

SCALE IN FEET
GRAPHIC SCALE
1"=200'

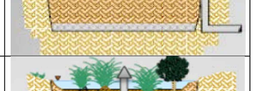
LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE
	MAJOR BASIN BOUNDARY
	MINOR BASIN BOUNDARY
	DIRECTION OF DRAINAGE
	TRAIL
	SOIL GROUP AREAS
B 19' PVW4 WW	GROUND WATER / EXISTING WELLS "SEE GROUND WATER DEPTH TABLE"
	IMPERVIOUS AREA (STREETS, DRIVEWAYS)
	RIP RAP – ENERGY DISSIPATOR
DMA–10.22	DRAINAGE BASIN PER HYDROLOGY STUDY
	DRAINAGE MANAGEMENT AREA
IMP–10.22	DRAINAGE BASIN PER HYDROLOGY STUDY
	INTEGRATED MANAGEMENT PRACTICE
POC–2	POINT OF COMPLIANCE

Q100 - (CFS)					
POC	PRE-DEV.	PRE-DEV FPS	POST DEV. w/o ATTENUATION	POST w/ ATTENUATION	POST FPS
CP # 1	108.8	6.97	95.9	69.29	4.96
CP # 2	38.7	6.64	42.5	25.57	5.11
CP # 3	3,000.1	8.60	3,000.1	3,000.1	8.60

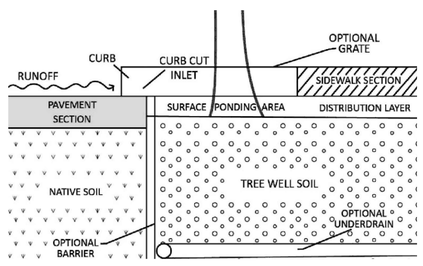
TABLE 1. SUMMARY OF IMPs CHARACTERISTICS

IMP #	Per COSD BMP Design Manual App. E	IMP Size (s.f.)	Riser Dia. (in)	Riser - Ponding Depth (in)	Drying Time (hr)	Freeboard (ft)
IMP 1.14	PR-1	3,125	6	6	6	2.5
IMP 2.01	PR-1	1,740	12	12	7	1.5
IMP 2.06	PR-1	10,344	24	6	20	1.4
IMP 10.10	PR-1	1,220	24	6	12	1
IMP 10.11,12,14	INF-2	4,020	6	6	20	1.5
IMP 10.13	PR-1	1,320	12	12	19	1
IMP 10.16	PR-1	3,500	12	9	9	1
IMP 10.17	INF-2	1,100	12	6	20	1.38
IMP 10.19	PR-1	1,245	6	12	13	1
IMP 10.22	PR-1	6,960	16	18	21	2.42

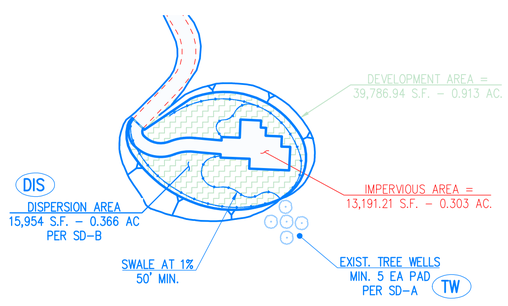
BMP Type	Soil Media	Underdrain present?	Bottom Liner Present ?	Typical Design
Infiltration (INF-1)	Optional	No	No	
Bioretention (INF-2)	BSM	No	No	
Biofiltration with Partial Retention (PR-1)	BSM	Yes- Optional	No	
Biofiltration (BF-1)	BSM	Yes	Yes	

TYPICAL BMP TYPES

Scale: N.T.S.



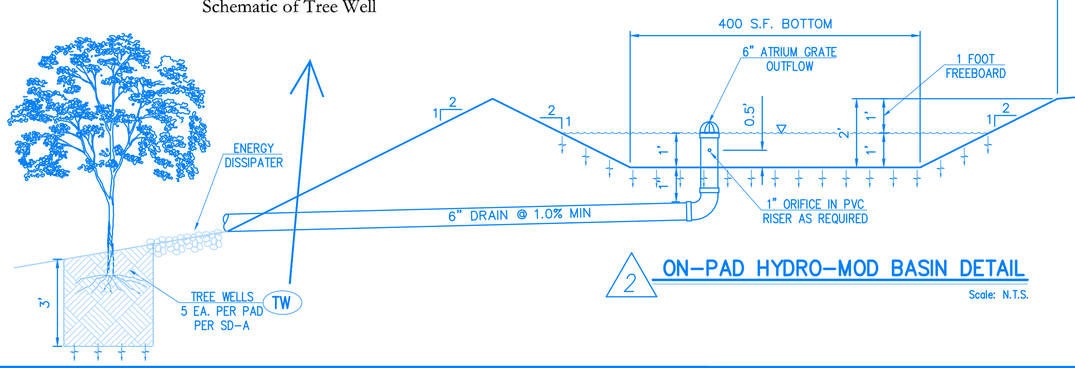
Schematic of Tree Well



1 LARGE LOT DETAIL

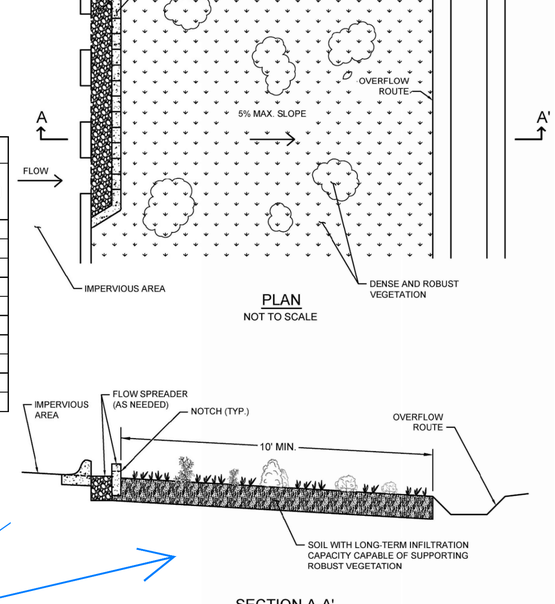
Scale: N.T.S.

SINGLE RESIDENTIAL LOTS ARE DESIGNED TO INCORPORATE L.I.D. PRACTICES:
1) ROOF RUNOFF TO RUN OVER THE 10' MIN. DISPERSION AREA AND HYDRO–MOD BASIN BEFORE LEAVING THE PAD;
2) DISCONNECTING IMPERVIOUS SURFACES;
3) PITCHING DRIVEWAYS TOWARDS YARDS TO FILTER THE RUNOFF;
4) PAD GRADING WILL DIVERT RUNOFF AWAY FROM TOPS OF SLOPES;
5) SLOPES WILL BE PERMANENTLY STABILIZED WITH LANDSCAPING.



2 ON–PAD HYDRO–MOD BASIN DETAIL

Scale: N.T.S.



Planning ▲ Engineering ▲ Surveying
Solved.
200 E. Washington Ave., Suite 200
Escondido, CA 92025
O. 760.741.3570
F. 760.741.1786
www.masson-assoc.com
MASSON & ASSOCIATES, INC.

DATE: Dec 20, 19 9:50am by:rthigpen
FILE: I:\DWG\04.4201\PROD\Reports\SWQMP\4201-SWQMP-C3D.dwg

EXHIBIT "B"
SOURCE CONTROL + (DMA) EXHIBIT
SHADOW RUN RANCH, PAUMA VALLEY
TRACT NO. TM 5233 RPL-3

P.N. 4201 DATE: Dec 20, 19 9:50am

2.2 Individual Structural BMP DMA Mapbook

- Use this page as a cover sheet for the Structural DMA Mapbook.
- An individual Structural DMA Mapbook must be submitted for any project site with one or more structural BMPs. One Mapbook is required for each unique subsequent owner with responsibility for maintenance of a Structural BMP. Mapbook exhibits will be incorporated as exhibits in Stormwater Maintenance Agreements (SWMAs) and Maintenance Notifications (MNs). See Attachment 11 for additional information on maintenance agreements. If the Mapbook has been provided for each subsequent owner in Attachment 11, they are not required here.
- Place each map on 8.5"x11" paper.
- Show at a minimum the DMA, Structural BMP, Assessor's parcel boundaries with parcel numbers, and any existing hydrologic features within the DMA.

☐	All Mapbooks are attached
☐	All Mapbooks are in Attachment 11

2.3 Construction Plan Sets

- DMAs, features, and BMPs identified and described in this attachment must also be shown on all applicable construction and landscape plans.
- As applicable, plan sheets must identify:
    - All features and BMPs identified in Sub-attachment 2.1 (DMA Exhibits).
    - The additional information listed below.
- Use this checklist to ensure required information is included on each plan (copy as needed).

Plan Type	**Preliminary Grading Plan**
Required Information[4]	
☒ Structural BMP(s) and Significant Site Design BMPs (if applicable) with ID numbers.	
☒ 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) and Significant Site Design BMPs (if applicable).	
☒ 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).	
☒ 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 (if available) 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 manufacturer model number must be provided. Photocopies of general brochures are not acceptable.	
☒ Include all source control and site design measures described in the SWQMP.	
☒ Include all construction BMPs described in the SWQMP.	

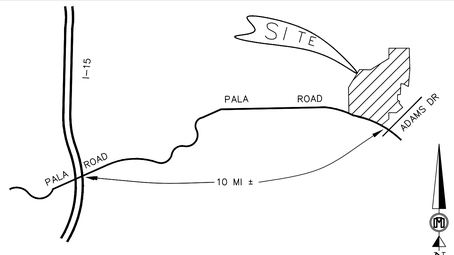
[4] For Building Permit Applications, refer to Form PDS 272, https://www.sandiegocounty.gov/content/dam/sdc/pds/docs/pds272.pdf

COUNTY OF SAN DIEGO TRACT NO. TM 5223 RPL-3

SHADOW RUN RANCH, PAUMA VALLEY

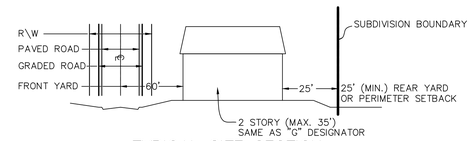
PRELIMINARY GRADING PLAN

FOR DETAIL OF GRADING
SEE SHEETS 2 & 3



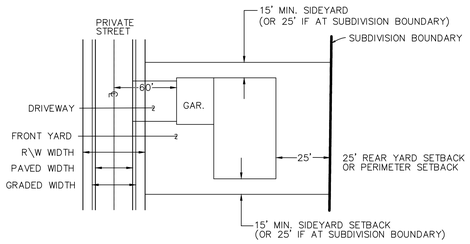
VICINITY MAP

NO SCALE



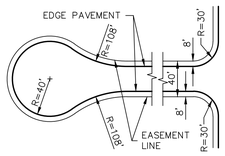
TYPICAL SITE SECTION

NO SCALE



TYPICAL SITE PLAN

NO SCALE



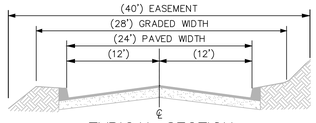
TYPICAL CUL DE SAC DETAIL

NOT TO SCALE

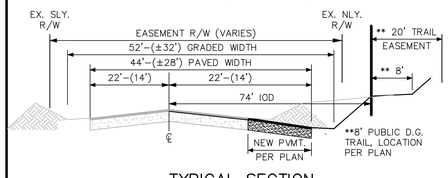
TYPICAL STREET SECTIONS

STRUCTURAL SECTION CHART FOR PRIVATE ROADS

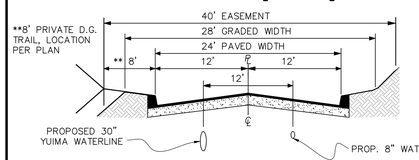
STREET GRADES	STRUCTURAL SECTION
0% TO 10%	DISINTEGRATED GRANITE
10% TO 15%	2" AC OVER 6" CLASS II AB (MINIMUM) OR PER SOIL ENGINEER'S RECOMMENDATIONS
15% TO 20%	3" AC OVER 7" CLASS II AB (MINIMUM) OR PER SOIL ENGINEER'S RECOMMENDATIONS



TYPICAL SECTION
ADAMS DRIVE [EXISTING] "PRD 6"



TYPICAL SECTION
HIGHWAY 76 [PUBLIC]

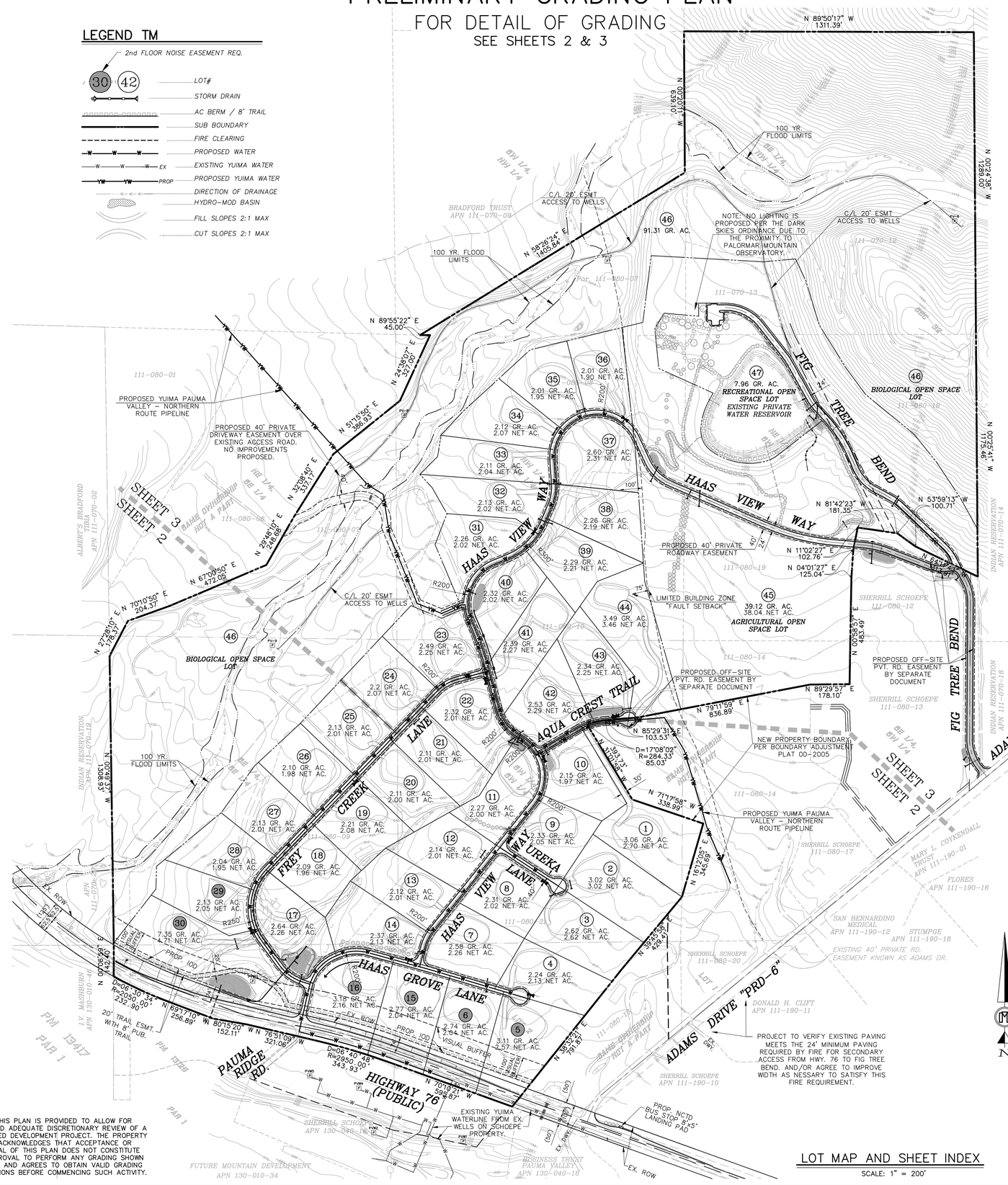


TYPICAL SECTION
PROPOSED PRIVATE ROADS

NOTE: THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

LEGEND TM

- 2nd FLOOR NOISE EASEMENT REQ.
- 30 / 42 ..... LOT#
- ..... STORM DRAIN
- ..... AC BERM / 8' TRAIL
- ..... SUB BOUNDARY
- ..... FIRE CLEARING
- ..... PROPOSED WATER
- W W W W EX ..... EXISTING YUIMA WATER
- YW YW PROP ..... PROPOSED YUIMA WATER
- ..... DIRECTION OF DRAINAGE
- ..... HYDRO-MOD BASIN
- ..... FILL SLOPES 2:1 MAX
- ..... CUT SLOPES 2:1 MAX



LOT MAP AND SHEET INDEX

SCALE: 1" = 200'

200 100 0 200 400 600
SCALE IN FEET
GRAPHIC SCALE 1"=200'

OWNER/SUBDIVIDER

SHERRILL ANN SCHOEPE, GENERAL PARTNER
SHADOW RUN RANCH, LLC
PO BOX 1249
PAUMA VALLEY, CA 92061
(760) 742-1893

Sherrill Ann Schoepe, Trustee

PLANNERS

TRS CONSULTANTS
438 CAMINO DEL RIO SOUTH, SUITE 223
SAN DIEGO, CA 92108
(619) 299-2525

ENGINEER

MASSON & ASSOCIATES INC.
200 E. WASHINGTON AVE. SUITE 200
ESCONDIDO, CA. 92025
(760) 741-3570

ROBERT D'AMARO, R.C.E. C081699
EXP. 03/31/2020

REGISTERED PROFESSIONAL ENGINEER ROBERT D'AMARO No. C081699 Exp. 03/31/20 CIVIL STATE OF CALIFORNIA

ZONING

		NORTHWESTERLY PORTION	SOUTHEASTERLY PORTION
USE REGULATIONS		A70	A70
NEIGHBORHOOD REGS.		M	M
	DENSITY	.25	.25
	LOT SIZE	4 AC.	4 AC.
	BUILDING TYPE	C	C
	MAX. FLR. AREA	–	–
	FLR. AREA RATIO	–	–
	HEIGHT	G	G
	COVERAGE	–	–
	SETBACK	C	C
	OPEN SPACE	–	–
SPECIAL AREA REGS.		F	–

LEGAL DESCRIPTION

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS: PORTIONS OF SECTIONS 5&6, T10S, R1W, S.B.B.M. & PORTIONS OF SECTIONS 31&32, T9S, R1W, S.B.B.M.

NOTES

1. ZONING – EXISTING: (A70) LIMITED AGRICULTURE
2. GENERAL PLAN LAND USE DESIGNATION: – EXISTING: (19) AGRICULTURE
3. COMMUNITY PLAN: PALA/PAUMA SUBREGIONAL PLAN
4. GENERAL PLAN REGIONAL CATEGORY: ESTATE DEVELOPMENT AREA (EDA)
5. MINIMUM LOT SIZE: 2 AC (GROSS)
6. TOTAL LOTS: 47 TOTAL, 44 RESIDENTIAL, 3 OPEN SPACE
7. SITE AREA: 248.26 AC. Gross
8. SITE ADDRESS: NORTH SIDE OF PALA ROAD (SR-76), WEST OF ADAMS DRIVE
9. CALIFORNIA COORDINATE INDEX: 427-1764
10. SOURCE OF TOPOGRAPHY: IDAHO MAPPING SERVICES, BOISE, IDAHO ON 09-15-2000
11. ASSESSOR'S PARCEL NO's.: 111-080-07,08,09,10,18, & 19; 111-070-12 & 13; PROTIONS OF 111-080-14,15, & 16
12. WATER SUPPLIED BY: YUIMA M.W.D.
13. SEWAGE SUPPLIED BY: INDIVIDUAL SEWER SEPTIC SYSTEMS DESIGN BY: VINJIE MIDDLETON
14. GAS SUPPLIED BY: PROPANE TANKS AND DELEVERY SERVICE ON EACH LOT
15. ELECTRIC SUPPLIED BY: SAN DIEGO GAS & ELECTRIC
16. FIRE PROTECTION: CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION
17. SCHOOL DISTRICTS: FALLBROOK UNION HIGH SCHOOL, VALLEY CENTER-PAUMA UNIFIED
18. LEGAL ACCESS: HIGHWAY 76
19. BOUNDARY INFORMATION HAS BEEN COMPILED FROM RECORD DATA
20. GRADING AS SHOWN, AND PURSUANT TO THE COUNTY GRADING ORDINANCE
21. ALL IMPROVEMENTS TO COUNTY OF SAN DIEGO STANDARDS
22. PROPOSED PRIVATE DRIVEWAYS TO BE GRADED TO 20' WIDTH WITH 16' PAVED, PER COUNTY STANDARD DS-7
23. GRADING OF DRIVEWAYS AND PADS SHALL BE DONE INDIVIDUALLY
24. TAX RATE AREA: 94143 AND 94158
25. NO STREET LIGHTS ARE PROPOSED
26. ASSOCIATED PERMITS: M.U.P. / P.R.D.
27. BOUNDARY ADJUSTMENT 00-0205 SUBMITTED PREVIOUSY, TO RECORD PRIOR TO T.M.

PARK LAND DEDICATION STATEMENT

THE SUBDIVIDER SHALL PAY PARK IN LIEU FEES PURSUANT TO CHAPTER 1 OF DIVISION 10 OF TITLE 8 OF THE SAN DIEGO COUNTY CODE, PRIOR TO APPROVAL OF FINAL MAP, AND WILL REQUEST A CREDIT FOR UP TO 50% OF PARK FEES FOR AN ONSITE PRIVATE PARK, THE DESIGN OF WHICH IS SHOWN ON THE MAJOR USE PERMIT PLOT PLAN (PDS2000-3300-00-030).

SPECIAL ASSESSMENT STATEMENT

THE SUBDIVIDER DOES NOT PROPOSE TO REQUEST THE BOARD OF SUPERVISORS FOR PERMISSION TO INITIATE PROCEEDINGS UNDER A SPECIAL ACT FOR CONSTRUCTION OF ANY OF THE SUBDIVISION IMPROVEMENTS.

SOLAR ACCESS STATEMENT

THIS IS A SOLAR SUBDIVISION AS REQUIRED BY SECTION 81.401(m) OF THE SUBDIVISION ORDINANCE. ALL LOTS WITHIN THIS SUBDIVISION HAVE A MINIMUM OF 100 SQUARE FEET OF UNRESTRICTED ACCESS TO SUNLIGHT ON THE BUILDABLE PORTION OF THE LOT.

ACCESS NOTE

IT IS THE RESPONSIBILITY OF THE SUBDIVIDER TO PROVIDE INSURABLE ACCESS TO EACH PARCEL CREATED BY THIS MAP.

EARTHWORK QUANTITIES **

CUT 63,660.0 CY. FILL 63,660.0 CY. IMPORT/EXPORT 0 CY. BALANCE

** NOTE: EARTHWORK QUANTITIES ARE ESTIMATES ONLY. EARTHWORK QUANTITIES INDICATED ARE RAW VOLUMES TO FINISHED SURFACE AND ARE ESTIMATES FOR PERMIT PURPOSES ONLY. QUANTITIES DO NOT INCLUDE ANY ALLOWANCES FOR STREET UNDERCUT, FOOTING/TRENCHING SPOILS ETC...

CONTRACTOR RESPONSIBLE FOR REVIEWING AND IMPLEMENTING THE RECOMMENDATIONS IN THE SOILS REPORT AND VERIFYING QUANTITIES PRIOR TO BIDDING.

SOILS ENGINEER

VINJE & MIDDLETON ENGINEERING
2450 VINEYARD AVENUE
ESCONDIDO, CA 92025
(760) 743-1504

THIS DOES NOT CONSTITUTE APPROVAL OR DISAPPROVAL; INFORMATION HAS BEEN SUBMITTED TO THE COUNTY OF SAN DIEGO DEPARTMENT OF ENVIRONMENTAL HEALTH IN SATISFACTORY FORM ON JULY 2005 REF. # VH0730

MASSON & ASSOCIATES, INC.
200 East Washington Avenue, Suite 200
Escondido, CA 92025 P. 760.741.3570
www.masson-assoc.com
Planning ▲ Engineering ▲ Surveying ▲ Telecom

CALIF. COORD. INDEX: 427-1764

DATE: Dec 20, 19 9:46am by: dmasson I:\EE1\DWG\SHADOW\GRADING\GP\GP01.dwg

COUNTY OF SAN DIEGO TRACT NO. TM 5223 RPL–3

SHADOW RUN RANCH, PAUMA VALLEY
PRELIMINARY GRADING PLAN

TABLE 1. SUMMARY OF IMPs CHARACTERISTICS						
IMP #	Per COSD BMP Design Manual App. E	IMP Size (s.f.)	Riser Dia. (in)	Riser - Ponding Depth (in)	Drying Time (hr)	Freeboard (ft)
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IMP 2.06	PR-1	10,344	24	6	20	1.4
IMP 10.10	PR-1	1,220	24	6	12	1
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IMP 10.13	PR-1	1,320	12	12	19	1
IMP 10.16	PR-1	3,500	12	9	9	1
IMP 10.17	INF-2	1,100	12	6	20	1.38
IMP 10.19	PR-1	1,245	6	12	13	1

Q100 - (CFS)					
POC	PRE-DEV.	PRE-DEV FPS	POST DEV. w/o ATTENUATION	POST w/ ATTENUATION	POST FPS
CP # 1	108.8	6.97	95.9	69.29	4.96
CP # 2	38.7	6.64	42.5	25.57	5.11
CP # 3	3,000.1	8.60	3,000.1	3,000.1	8.60

LEGEND GP

- BROWDITCH
- SWALE / PAD DRAINAGE
- STORM DRAIN
- DAYLIGHT
- FILL SLOPES 2:1 MAX
- CUT SLOPES 2:1 MAX
- 30 (780.0) — LOT# / PAD GRADE
- AC BERM / 8' TRAIL
- SUB BOUNDARY
- FIRE CLEARING
- W W — PROPOSED WATER
- W W EX — EXISTING YUIMA WATER
- YW YW PROP — PROPOSED YUIMA WATER
- IMP–2.01 1,740 S.F. 8.3% — HYDRO–MOD BASIN / IMP# / DIRECTION OF DRAINAGE % SLOPE
- 796.2 FS — STREET ELEVATION
- LEACH FIELD

PROJECT TO VERIFY EXISTING PAVING MEETS THE 24' MINIMUM PAVING REQUIRED BY FIRE FOR SECONDARY ACCESS FROM HWY. 76 TO FIG TREE BEND. AND/OR AGREE TO IMPROVE WIDTH AS NESSARY TO SATISFY THIS FIRE REQUIREMENT.

PROJECT TO VERIFY EXISTING PAVING MEETS THE 24' MINIMUM PAVING REQUIRED BY FIRE FOR SECONDARY ACCESS FROM HWY. 76 TO FIG TREE BEND. AND/OR AGREE TO IMPROVE WIDTH AS NESSARY TO SATISFY THIS FIRE REQUIREMENT.

SCALE IN FEET
GRAPHIC SCALE
1"=100'

MASSON & ASSOCIATES, INC.
200 East Washington Avenue, Suite 200
Escondido, CA 92025 P. 760.741.3570
www.masson-assoc.com
Planning ▲ Engineering ▲ Surveying ▲ Telecom

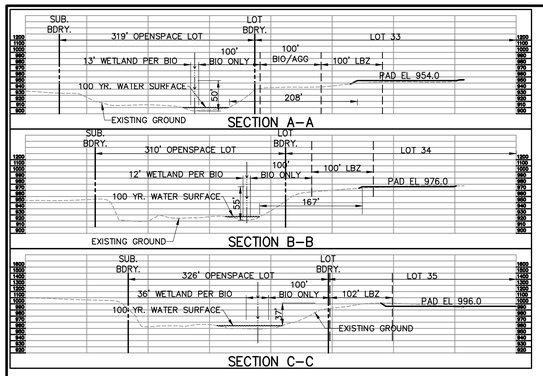
DATE: DEC 20, 19 7:58am by: dmasson FILE: E:\DWG\AA\420\VPROD\TM\1tm-grading\420 gp02.dwg

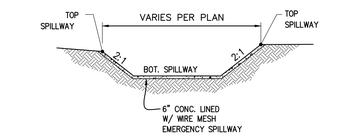
CALIF. COORD. INDEX: 427–1764

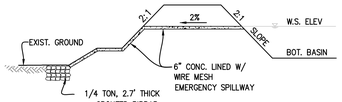
COUNTY OF SAN DIEGO TRACT NO. TM 5223 RPL-3

SHADOW RUN RANCH, PAUMA VALLEY

PRELIMINARY GRADING PLAN







EMERGENCY SPILLWAY @ RESERVOIR

N.T.S

TABLE 1. SUMMARY OF IMPs CHARACTERISTICS

IMP #	Per COSD BMP Design Manual App. E	IMP Size (s.f.)	Riser Dia. (in)	Riser - Ponding Depth (in)	Drying Time (hr)	Freeboard (ft)
IMP 1.14	PR-1	3,125	6	6	6	2.5
IMP 2.01	PR-1	1,740	12	12	7	1.5
IMP 2.06	PR-1	10,344	24	6	20	1.4
IMP 10.10	PR-1	1,220	24	6	12	1
IMP 10.11,12,14	INF-2	4,020	6	6	20	1.5
IMP 10.13	PR-1	1,320	12	12	19	1
IMP 10.16	PR-1	3,500	12	9	9	1
IMP 10.17	INF-2	1,100	12	6	20	1.38
IMP 10.19	PR-1	1,245	6	12	13	1

NOTE: NO LIGHTING IS PROPOSED PER THE DARK SKIES ORDINANCE DUE TO THE PROXIMITY TO PALOMAR MOUNTAIN OBSERVATORY.

C/L 20' ESMT ACCESS TO WELLS

111-070-12

Por. 111-080-07

VOLLEYBALL COURT

PARKING LOT (16 SPACES)

111-080-13

TENNIS COURT

PATHS

PICNIC AREA

PLAY EQUIP.

DRAINAGE BASIN

SUBDIVISION BOUNDARY

PROPOSED 100' LIMITED BUILDING ZONE (TYP.)

100 YR. FLOOD LIMITS

WETLAND PER BIO

OPEN SPACE BOUNDARY

BIOLOGICAL OPEN SPACE LOT

AGRICULTURAL OPEN SPACE LOT

C/L 20' ESMT ACCESS TO WELLS

PROPOSED BIO BUFFER EASEMENT AS INDICATED

PROPOSED YUIMA PAUMA VALLEY / NORTHERN ROUTE PIPELINE

PROPOSED 40' PRIVATE DRIVEWAY EASEMENT OVER 40' EXISTING ACCESS ROAD. NO IMPROVEMENTS PROPOSED.

WETLAND PER BIO

PV-9

C/L 20' ESMT ACCESS TO WELLS

FAULT SETBACK 100' LBZ

ELSINORE FAULT

IMP-2.01 18 TREES

PROPOSED STEEP SLOPE EASEMENTS

8' RET. WALL

NORTH BRANCE FAULT

SOUTH BRANCE FAULT

MAIN FAULT

FAULT SETBACK 75' LBZ

IMP-10.15 25 TREES

IMP-10.16 3,500 SF

IMP-1.14 3,125 SF

IMP-10.17 1,100 SF

IMP-10.19 1,245 SF

IMP-10.10 1,220 SF

IMP-10.11,12,14 4,020 SF

IMP-10.13 1,320 SF

IMP-2.01 1,740 S.F.

W.S. AREA 2.61 AC.

AREA = 212,456 S.F. / 4.88 AC.

EXISTING 24" OUTLET (EL 1085.4)

±1082.6 WATER SURFACE ELEVATION AT SPILLWAY SEE DETAIL UPER LEFT THIS SHEET

EXISTING 6" OUTLET PIPE

EXISTING 10" OUTLET PIPE

6" DRAW DOWN DRAIN VALVE [AREA 3]

10" DRAW DOWN DRAIN VALVE [AREA 3]

PROPOSED 20' FIRE CLEARING ZONE (TYP.)

PROPOSED OFF-SITE PVT. RD. EASEMENT BY SEPARATE DOCUMENT

PROPOSED YUIMA PAUMA VALLEY – NORTHERN ROUTE PIPELINE

FIG TREE BEND

HAAS VIEW WAY

AQUA CREST TRAIL

ADAMS DRIVE "PRD-6"

INDIAN RESERVATION APN 111-070-14

INDIAN RESERVATION APN 111-070-18

SHERRILL SCHOEPE 111-080-12

SHERRILL SCHOEPE 111-080-13

111-080-14

111-080-19

111-080-18

111-080-06

111-080-07

SAME OWNERSHIP NOT A PART

SE 1/4, SW 1/4

SEE LETTER OF PERMISSION TO DEDICATE AND CONSTRUCT IMPROVEMENTS BY SHERRILL SCHOEPE DATED: APRIL 2012.

PROPOSED OFF-SITE PVT. RD. EASEMENT BY SEPARATE DOCUMENT

PROJECT TO VERIFY EXISTING PAVING MEETS THE 24' MINIMUM PAVING REQUIRED BY FIRE FOR SECONDARY ACCESS FROM HWY. 76 TO FIG TREE BEND. AND,/OR AGREE TO IMPROVE WIDTH AS NESSARY TO SATISFY THIS FIRE REQUIREMENT.

SEE SHEET 2

SEE SHEET 2

SCALE IN FEET
GRAPHIC SCALE
1"=100'

LEGEND GP

- BROWDITCH
- SWALE / PAD DRAINAGE
- STORM DRAIN
- DAYLIGHT
- FILL SLOPES 2:1 MAX
- CUT SLOPES 2:1 MAX
- 30 / 780.0 — LOT# / PAD GRADE
- AC BERM / 8' TRAIL
- SUB BOUNDARY
- FIRE CLEARING
- W——W — PROPOSED WATER
- W——W——EX — EXISTING YUIMA WATER
- YW——YW——PROP — PROPOSED YUIMA WATER
- IMP-2.01 / 1,740 S.F. / 8.3% — HYDRO-MOD BASIN / IMP# / DIRECTION OF DRAINAGE % SLOPE
- 796.2 FS — STREET ELEVATION
- LEACH FIELD

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CALIF. COORD. INDEX: 427-1764

DATE: DEC 20, 19 9:29am by: dmasson N:\E\DWG\PLAN\PROD\TM\Grading\Add\gp03.dwg

COUNTY OF SAN DIEGO TRACT NO. TM 5223 RPL–3

SHADOW RUN RANCH, PAUMA VALLEY
PRELIMINARY GRADING PLAN

Draft Grading Plan Notes (must be included on the Preliminary Grading Plan for public review and public hearing):

"PRE–CONSTRUCTION MEETING: (Prior to Preconstruction Conference, and prior to any clearing, grubbing, trenching, grading, or any land disturbances.)

(BIOLOGICAL RESOURCES)

BIO GR#1 – TEMPORARY FENCING: [PDS, PCC] [DPW,PDCI] [PC] [PDS, FEE]. INTENT: In order to prevent inadvertent disturbance to onsite open space and adjacent areas containing native habitat, temporary construction fencing shall be installed. DESCRIPTION OF REQUIREMENT: Prior to the commencement of any grading and or clearing in association with this grading plan, temporary orange construction fencing shall be placed to protect from inadvertent disturbance of proposed onsite open space and adjacent offsite native habitat. The placement of such fencing shall be approved by the PDS, Permit Compliance Section. Upon approval, the fencing shall remain in place until the conclusion of grading activities after which the fencing shall be removed. DOCUMENTATION: The applicant shall provide evidence that the fencing has been installed and have a California licensed surveyor certify that the fencing is located on the boundary of the open space easement(s). The applicant shall submit photos of the fencing along with the certification letter to the [PDS, PCC] for approval. TIMING: Prior to Preconstruction Conference, and prior to any clearing, grubbing, trenching, grading, or any land disturbances the fencing shall be installed, and shall remain for the duration of the grading and clearing. MONITORING: The [PDS, PCC] shall either attend the preconstruction conference and approve the installation of the temporary fencing, or review the certification and pictures provided by the applicant.

BIO GR#2 – RESOURCE AVOIDANCE: [PDS, PCC] [DPW, PDCI] PDS, FEE X2].
INTENT: In order to avoid impacts to Least Bell's vireo and Southwestern willow flycatcher, which are a sensitive biological resource pursuant to the Migratory Bird Treaty Act (MBTA), a Resource Avoidance Area (RAA), shall be implemented on all plans. DESCRIPTION OF REQUIREMENT: There shall be no brushing, clearing and/or grading such that none will be allowed within 500 feet of raptor nesting habitat during the breeding season of Least Bell's vireo and Southwestern willow flycatcher within Resource Avoidance Area (RAA) as indicated on these plans. The breeding season is defined as occurring between March 15th and September 15th, and May 1st thru September 1st. The Director of Planning and Land Use [PDS, PCC] may waive this condition, through written concurrence from the US Fish and Wildlife Service and the California Department of Fish and Wildlife, provided that no raptors are present in the vicinity of the brushing, clearing or grading. DOCUMENTATION: The applicant shall provide a letter of agreement with this condition; alternatively, the applicant may submit a written request for waiver of this condition. Although, No Grading shall occur within the RAA until concurrence is received from the County and the Wildlife Agencies. TIMING: Prior to preconstruction conference and prior to any clearing, grubbing, trenching, grading, or any land disturbances and throughout the duration of the grading and construction, compliance with this condition is mandatory unless the requirement is waived by the County upon receipt of concurrence from the Wildlife Agencies. MONITORING: The [DPW, PDCI] shall not allow any grading in the RAA during the specified dates, unless a concurrence from the [PDS, PCC] is received. The [PDS, PCC] shall review the concurrence letter."

(CULTURAL RESOURCES)

CULT GR#–1–ARCHAELOGICAL MONITORING [PDS, FEE X2]

INTENT: In order to comply with the Mitigation Monitoring and Reporting Program for PDS2001–3100–5223 and the County of San Diego Guidelines for Significance – Cultural Resources, a Cultural Resource Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The County approved 'Project Archaeologist,' Luiseno Native American Monitor, and [PDS, PCC], shall attend the pre–construction meeting with the contractors to explain and coordinate the requirements of the grading monitoring program. The Project Archaeologist and Luiseno Native American Monitor shall monitor the original cutting of previously undisturbed deposits in all areas identified for development including off–site improvements. The archaeological grading monitoring program shall comply with the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Archeological and Historic Resources. DOCUMENTATION: The applicant shall have the contracted Project Archeologist and Luiseno Native American attend the preconstruction meeting to explain the monitoring requirements. TIMING: Prior to any clearing, grubbing, trenching, grading, or any land disturbances this condition shall be completed. MONITORING: The [DPW, PDCI] shall invite the [PDS, PCC] to the preconstruction conference to coordinate the Archaeological Monitoring requirements of this condition. The [PDS, PCC] shall attend the preconstruction conference and confirm the attendance of the approved Project Archeologist.

(PALEONTOLOGICAL RESOURCES)

PALEO GR#1 – PALEONTOLOGICAL MONITORING: [DPW, PDCI] [PDS, PCC] [PC] [PDS, FEE X2]

INTENT: In order to comply with the Mitigation Monitoring and Reporting Program pursuant to PDS2001–3100 5223, a Paleontological Resource Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The County approved Project Paleontologist, and the PDS Permit Compliance Coordinator (PCC), shall attend the pre–construction meeting with the contractors to explain and coordinate the requirements of the grading monitoring program. The Project Paleontologist shall monitor during the original cutting of previously undisturbed deposits for the project, both on and off site, the Qualified Paleontological Resources Monitor shall be on–site to monitor as determined necessary by the Qualified Paleontologist. The grading monitoring program shall comply with the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Paleontological Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>. DOCUMENTATION: The applicant shall have the contracted Project Paleontologist attend the preconstruction meeting to explain the monitoring requirements. TIMING: Prior to Preconstruction Conference, and prior to any clearing, grubbing, trenching, grading, or any land disturbances this condition shall be completed. MONITORING: The [DPW, PDCI] shall invite the [PDS, PCC] to the preconstruction conference to coordinate the Paleontological Resource Monitoring requirements of this condition. The [PDS, PCC] shall attend the preconstruction conference and confirm the attendance of the approved Project Paleontologist.

DURING CONTRUCTION: (The following actions shall occur throughout the duration of the grading construction).

(AIR QUALITY)

AIR GR#1–AIR QUALITY

INTENT: In order to mitigate for construction phase particulate emissions. DESCRIPTION OF REQUIREMENT: The project shall comply with the following Air Quality measures:
- a. All haul/dump trucks entering or leaving the site with soil or fill material must maintain at least 2 feet of freeboard or cover loads of all haul/dump trucks securely (unnumbered design measure).
- b. Dust control measures of the Grading Ordinance will be enhanced with a minimum of three (3) daily applications of water to the construction areas, between dozer/scraper passes and on any unpaved roads within the project limits.
- c. Grading is to be terminated in winds exceed 25 mph.
- d. Sweepers and water trucks shall be used to control dust and debris at public street access points.
- e. Dirt storage piles will be stabilized by chemical binders, tarps, fencing or other suppression measures.
- f. Internal construction–roadways will be stabilized by paving, chip sealing or chemicals after rough grading.
- g. A minimum of four 15 mph signs shall be posted and enforced on unpaved areas during construction.
- h. Electricity from the utility grid shall be used to power construction equipment to the maximum extent feasible.

DOCUMENTATION: The applicant shall comply with the Air Quality requirements of this condition. TIMING: The following actions shall occur throughout the duration of the grading construction. MONITORING: The [DPW, PDCI] shall make sure that the grading contractor complies with the Air Quality requirements of this condition. The [DPW, PDCI] shall contact the [PDS, PCC] if the applicant fails to comply with this condition.

(BIOLOGICAL RESOURCES)

BIO GR#3 – BIOLOGICAL MONITORING [PDS, FEE X3]

INTENT: In order to prevent inadvertent disturbance to Least Bell's vireo and Southwestern willow flycatcher , all grading located adjacent to Frey creek shall be monitored by a biological monitor. DESCRIPTION OF REQUIREMENT: A County approved biologist shall perform biological monitoring during all grading, clearing, grubbing, trenching, and construction activities. The Project Biologist shall supervise and monitor grading activities to ensure against damage to biological resources that are intended to be protected and preserved. The monitor(s) shall be on site during all grading and clearing activities that are in or adjacent to any wetland or potential occupied habitat, Biological open space areas or sensitive habitats. If there are disturbances, the monitor must report them immediately to the [PDS PCC]. Additionally, the biologist shall perform the following duties:

1. Perform weekly inspection of fencing and erosion control measures (daily during rain events) near proposed preservation areas and report deficiencies immediately to the DPW Construction Inspector;
2. Perform periodically monitor the work area for excessive dust generation in compliance with the County grading ordinance and report deficiencies immediately to the DPW Construction Inspector;
3. Monitor construction lighting periodically to ensure lighting is the lowest illumination possible allowed for safety, selectively placed, shielded, and directed away from preserved habitat;
4. Monitor equipment maintenance, staging, and fuel dispensing areas to ensure there is no runoff to Waters of the US;
5. Monitor noise levels to ensure they are not in excess of 60 decibels during the breeding season of Least Bell's vireo and Southwestern willow flycatcher defined as April 15 and September 15;
6. Stop or divert all work when deficiencies require mediation and notify DPW Construction Inspector and [PDS PCC] within 24 hours; (8) produce periodic (monthly during grading) and final reports and submit to the Wildlife Agencies and the PDS (final report will release bond);
7. Confer with the Wildlife Agencies and [PDS PCC] within 24 hours any time protected habitat or Least Bell's vireo and Southwestern willow flycatcher are being affected by construction;
8. Attend construction meetings and other meetings as necessary.

DOCUMENTATION: The Project Biologist shall prepare and submit to the satisfaction the [PDS, PCC] monitoring reports, which indicate that the monitoring has occurred as indicated above. TIMING: The following actions shall occur throughout the duration of the grading construction. MONITORING: The [DPW, PDCI] shall assure that the Project Biologist is on–site performing the Monitoring duties of this condition during all applicable grading activities as determined by the Biologist. The [DPW, PDCI] shall contact the [PDS, PCC] if the Project Biologist or applicant fails to comply with this condition. The [PDS, PCC] shall review and approve the monitoring reports for compliance with this condition.

(CULTURAL RESOURCES)

CULT #GR–2–ARCHAEOLOGICAL MONITORING [PDS, FEE X2]

INTENT: In order to comply with the Mitigation Monitoring and Reporting Program for PDS2001–3100–5223 and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Archeological and Historic Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>, a Cultural Resource Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Archaeologist and Luiseno Native American Monitor shall monitor the original cutting of previously undisturbed deposits in all areas identified for development including off–site improvements. The archaeological grading monitoring program shall comply with the following requirements during earth–disturbing activities:
- a. During the original cutting of previously undisturbed deposits, the Project Archaeologist and Luiseno Native American Monitor shall be onsite as determined necessary by the Project Archaeologist. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections will be determined by the Project Archaeologist in consultation with the Luiseno Native American Monitor. Monitoring of the cutting of previously disturbed deposits will be determined by the Project Archaeologist in consultation with the Luiseno Native American Monitor.
- b. In the event that previously unidentified potentially significant cultural resources are discovered, the Project Archaeologist or the Native American monitor, shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow evaluation of potentially significant cultural resources. At the time of discovery, the Project Archaeologist shall contact the PDS Staff Archaeologist. The Project Archaeologist, in consultation with the PDS Staff Archaeologist and the Luiseno Native American monitor, shall determine the significance of the discovered resources. Construction activities will be allowed to resume in the affected area only after the PDS Staff Archaeologist has concurred with the evaluation. Isolates and clearly non–significant deposits shall be minimally documented in the field. Should the cultural materials for isolates and non–significant deposits not be collected by the Project Archaeologist, then the Native American monitor may collect the cultural material for transfer to a Tribal Curation facility or repatriation program. A Research Design and Data Recovery Program to mitigate impacts to significant cultural resources shall be prepared by the Project Archaeologist in coordination with the Luiseno Native American monitor. The County Archaeologist shall review and approve the Program, which shall be carried out using professional archaeological methods. The Research Design and Data Recovery Program shall include (1) pursuant to CEQA §21083.2(g), reasonable efforts to preserve (avoidance) "unique" cultural resources or Sacred Sites; (2) the capping of identified Sacred Sites or unique cultural resources and placement of development over the cap, if avoidance is infeasible; and (3) data recovery for non–unique cultural resources. The preferred option is preservation (avoidance).
- c. "If any human remains are discovered, the Property Owner or their representative shall contact the County Coroner and the PDS Staff Archaeologist. Upon identification of human remains, no further disturbance shall occur in the area of the find until the County Coroner has made the necessary findings as to origin. If the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted by the Property Owner or their representative in order to determine proper treatment and disposition of the remains. The immediate vicinity where the Native American human remains are located is not to be damaged or disturbed by further development activity until consultation with the MLD regarding their recommendations as required by Public Resources Code Section 5097.98 has been conducted. Public Resources Code §5097.98, CEQA §15064.5 and Health & Safety Code §7050.5 shall be followed in the event that human remains are discovered.
- d. The Project Archaeologist shall submit monthly status reports to the Director of PDS starting from the date of the Notice to Proceed to termination of implementation of the grading monitoring program. The reports shall briefly summarize all activities during the period and the status of progress on overall plan implementation. Upon completion of the implementation phase, a final report shall be submitted describing the plan compliance procedures and site conditions before and after construction.

DOCUMENTATION: The applicant shall implement the archaeological grading monitoring program pursuant to this condition. TIMING: The following actions shall occur throughout the duration of the grading construction. MONITORING: The [DPW, PDCI] shall make sure that the Project Archeologist is on–site performing the monitoring duties of this condition. The [DPW, PDCI] shall contact the [PDS, PCC] if the Project Archeologist or applicant fails to comply with this condition.

(PALEONTOLOGICAL RESOURCES)

PALEO GR#2 – PALEONTOLOGICAL MONITORING: [DPW, PDCI] [PDS, PCC] [PC] [PDS, FEE X2]

INTENT: In order to comply with Mitigation Monitoring and Reporting Program pursuant to 3100–5223, and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Paleontological Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>, a Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Paleontologist shall monitor During the original cutting of previously undisturbed deposits for the project, both on and off site, the Qualified Paleontological Resources Monitor shall be on–site to monitor as determined necessary by the Qualified Paleontologist. The grading monitoring program shall comply with the following requirements during grading:
- a. If paleontological resources are encountered during grading/excavation, the following shall be completed:
  1. The Qualified Paleontological Resources Monitor shall have the authority to direct, divert, or halt any grading/excavation activity until such time that the sensitivity of the resource can be determined and the appropriate salvage implemented.
  2. The Qualified Monitor shall immediately contact the Qualified Paleontologist.
  3. The Qualified Paleontologist shall contact the County's Permit Compliance Coordinator immediately.
  4. The Qualified Paleontologist shall determine if the discovered resource is significant. If it is not significant, grading/excavation shall resume."
- b. If the paleontological resource is significant or potentially significant, the Qualified Paleontologist or Qualified Paleontological Resources Monitor, under the supervision of the Qualified Paleontologist, shall complete the following tasks in the field:
  1. Salvage unearthed fossil remains, including simple excavation of exposed specimens or, if necessary, plaster–jacketing of large and/or fragile specimens or more elaborate quarry excavations of richly fossiliferous deposits;
  2. Record stratigraphic and geologic data to provide a context for the recovered fossil remains, typically including a detailed description of all paleontological localities within the project site, as well as the lithology of fossil–bearing strata within the measured stratigraphic section, if feasible, and photographic documentation of the geologic setting; and
  3. Transport the collected specimens to a laboratory for processing (cleaning, curation, cataloging, etc.).

DOCUMENTATION: The applicant shall implement the grading monitoring program pursuant to this condition. TIMING: The following actions shall occur throughout the duration of the grading construction. MONITORING: The [DPW, PDCI] shall make sure that the Project Archeologist is on–site performing the Monitoring duties of this condition. The [DPW, PDCI] shall contact the [PDS, PCC] if the Project Paleontologist or applicant fails to comply with this condition.

ROUGH GRADING: (Prior to rough grading approval and issuance of any building permit).

(BIOLOGICAL RESOURCES)

BIO GR#4 – BIOLOGICAL MONITORING [PDS, FEE]

INTENT: In order to comply with the adopted Mitigation Monitoring and Reporting Program (MMRP) pursuant to PDS2001–3100–5223 and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Biological Resources, <http://www.sdcounty.ca.gov/dplu/procguid.html> a Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Biologist shall prepare and submit a final letter report substantiating his/her supervision of the grading activities and substantiating that grading did not impact additional areas of Least Bell's vireo and Southwestern willow flycatcher or other sensitive biological resources. The report shall conform to the County of San Diego Report Format Guidelines for Biological Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>. It shall also include but not be limited to the following items:
- a. Photos of the temporary fencing that was installed during the trenching, grading, or clearing activities.
- b. Monitoring logs showing the date and time that the monitor was on site.
- c. Photos of the site after the grading and clearing activities.

DOCUMENTATION: The applicant shall submit the final biological monitoring report to the [PDS, PCC] for review and approval. TIMING: Upon completion of all grading activities, and prior to Rough Grading final Inspection (Grading Ordinance SEC 87.421.a.2), <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf> the final report shall be completed. MONITORING: The [PDS, PCC] shall review the final report for compliance with the project MMRP, and inform [DPW, PDCI] that the requirement is completed.

(CULTURAL RESOURCES)

CULT #GR–3–ARCHAEOLOGICAL MONITORING [PDS, FEE]

INTENT: In order to comply with the adopted Mitigation Monitoring and Reporting Program (MMRP) pursuant to PDS2001–3100–5223, and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Archaeological Resources, <http://www.sdcounty.ca.gov/dplu/procguid.html> an Archaeological Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Archaeologist shall prepare one of the following reports upon completion of the grading activities that require monitoring:
- a. If no archaeological resources are encountered during earth–disturbing activities, then submit a final Negative Monitoring Report substantiating that earth–disturbing activities are completed and no cultural resources were encountered. Archaeological monitoring logs showing the date and time that the monitor was on site and any comments from the Luiseno Native American monitor must be included in the Negative Monitoring Report.
- b. If archaeological resources were encountered during the earth–disturbing activities, the Project Archaeologist shall provide an Archaeological Monitoring Report stating that the field monitoring activities have been completed, and that resources have been encountered. The report shall detail all cultural artifacts and deposits discovered during monitoring and the anticipated time schedule for completion of the curation phase of the monitoring.

DOCUMENTATION: The applicant shall submit the Archaeological Monitoring report to the [PDS, PCC] for review and approval. TIMING: Upon completion of all earth–disturbing activities, and prior to Rough Grading final Inspection (Grading Ordinance SEC 87.421.a.2 <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf>), the report shall be completed. MONITORING: The [PDS, PCC] shall review the report or field monitoring memo for compliance with the project MMRP, and inform [DPW, PDCI] that the requirement is completed.

(PALEONTOLOGICAL RESOURCES)

PALEO GR#3 – PALEONTOLOGICAL MONITORING: [PDS, PCC] [RG, BP] [PDS, FEE].
INTENT: In order to comply with the adopted Mitigation Monitoring and Reporting Program (MMRP) pursuant to PDS2001–3100 5223, and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Paleontological Resources, <http://www.sdcounty.ca.gov/dplu/procguid.html> a Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Paleontologist shall prepare one of the following letters upon completion of the grading activities that require monitoring:
- a. If no paleontological resources were discovered, submit a "No Fossils Found" letter from the grading contractor to the [PDS, PCC] stating that the monitoring has been completed and that no fossils were discovered, and including the names and signatures from the fossil monitors. The letter shall be in the format of Attachment E of the County of San Diego Guidelines for Determining Significance for Paleontological Resources.
- b. If Paleontological resources were encountered during grading, a letter shall be prepared stating that the field grading monitoring activities have been completed, and that resources have been encountered. The letter shall detail the anticipated time schedule for completion of the curation phase of the monitoring.

DOCUMENTATION: The applicant shall submit the letter report to the [PDS, PCC] for review and approval. TIMING: Upon completion of all grading activities, and prior to Rough Grading final Inspection (Grading Ordinance SEC 87.421.a.2) <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf>, the letter report shall be completed. MONITORING: The [PDS, PCC] shall review the final negative letter report or field monitoring memo for compliance with the project MMRP, and inform [DPW, PDCI] that the requirement is completed.

FINAL GRADING RELEASE: (Prior to any occupancy, final grading release, or use of the premises in reliance of this permit).

(BIOLOGICAL RESOURCES)

BIO GR#5 – OPEN SPACE SIGNAGE & FENCING [PDS, FEE]

INTENT: In order to comply with Condition BIO# 4, 5 pursuant to the adopted Mitigation Monitoring and Reporting Program (MMRP) for PDS2001–3100–5223, the fencing and signage shall be installed. DESCRIPTION OF REQUIREMENT: The permanent fences or walls, and open space signs shall be placed along the open space boundary of lots(s) 12–24, 17–20, 23–36, and 45 as shown on Figure 5 – Open Space, Fencing, and Signage Exhibit of the approved Biological Resources Survey Report for the Shadow Run Ranch Project, prepared by Vincent Scheidt.
- a. Evidence shall be site photos and a statement from a California Registered Engineer, or licensed surveyor that the permanent walls or fences, and open space signs have been installed.
- b. The signs must be corrosion resistant, a minimum of 6" x 9" in size, on posts not less than three (3) feet in height from the ground surface, and must state the following:

Sensitive Environmental Resources
Area Restricted by Easement
Entry without express written permission from the County of San Diego is prohibited. To report a violation or for more information about easement restrictions and exceptions contact the County of San Diego, Planning & Development Services
Reference: (PDS2001–3100 5223, Env. Log. 3910–00–02–035)

DOCUMENTATION: The applicant shall install the fencing and signage and provide the documentation photos and certification statement to the [PDS, PCC]. TIMING: Prior to the occupancy of any structure or prior to Final Grading Release (Grading Ordinance Sec. 87.421.a.3) <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf> the fencing and signage shall be installed. MONITORING: The [PDS, PCC] shall review the photos and statement for compliance with this condition.

BIO GR#6 – EASEMENT AVOIDANCE [PDS, FEE]

INTENT: In order to protect sensitive resources, pursuant to County Grading Ordinance Section 87.112 <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf> the open space easements shall be avoided. DESCRIPTION OF REQUIREMENT: The easement indicated on this plan is for the protection of native habitat within Frey creek that is a sensitive environmental resources and prohibits all of the following on any portion of the land subject to said easement: grading; excavation; placement of soil, sand, rock, gravel, or other material; clearing of vegetation; construction, erection, or placement of any building or structure; vehicular activities; trash dumping; or use for any purpose other than as open space. It is unlawful to grade or clear within an open space easement; any disturbance shall constitute a violation of the County Grading Ordinance Section 87.112 <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf> and will result in enforcement action and restoration. DOCUMENTATION: The applicant shall provide a letter statement to the [PDS, PCC] stating that all Sensitive Resource Easements were avoided during the grading construction, and that no impacts or encroachment into the open space occurred. TIMING: Prior to Final Grading Release the letter verifying the easements were not disturbed shall be submitted. MONITORING: The [DPW, PDCI] shall not allow any grading, clearing or encroachment into the open space easement."

(CULTURAL RESOURCES)

CULT #GR–4–ARCHAEOLOGICAL MONITORING [PDS, FEE]

INTENT: In order to comply with the adopted Mitigation Monitoring and Reporting Program (MMRP) pursuant to PDS2001–3100–5223, and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Archaeological Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>, an Archaeological Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Archaeologist shall prepare a final report that documents the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program if cultural resources were encountered during earth–disturbing activities. The report shall include the following:

- a. Department of Parks and Recreation Primary and Archaeological Site forms.
- b. Daily Monitoring Logs
- c. Evidence that all prehistoric cultural resources collected during the archaeological grading monitoring program have been submitted to a San Diego curation facility or a culturally affiliated Tribal curation facility that meets federal standards per 36 CFR Part 79, and, therefore, would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records, including title, shall be transferred to the San Diego curation facility and shall be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility stating that archaeological materials have been received and that all fees have been paid.

  Evidence that all historic cultural resources collected during the archaeological grading monitoring program have been submitted to a San Diego curation facility that meets federal standards per 36 CFR Part 79, and, therefore, would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records, including title, shall be transferred to the San Diego curation facility and shall be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility stating that archaeological materials have been received and that all fees have been paid.
- d. If no cultural resources are discovered, a brief letter to that effect must be submitted stating that the archaeological grading monitoring activities have been completed. Daily Monitoring Logs must be submitted with the negative monitoring report.

DOCUMENTATION: The applicant shall submit the report to the [PDS, PCC] for review and approval. Once approved, a final copy of the report shall be submitted to the South Coastal Information Center (SCIC) and the culturally–affiliated Tribe. TIMING: Prior to the occupancy of any structure or use of the premises in reliance of PDS2000–3300–030, and prior to Final Grading Release (Grading Ordinance Sec. 87.421.a.3 <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf>), the final report shall be completed. MONITORING: The [PDS, PCC] shall review the final report for compliance with the project MMRP and the report format guidelines. Upon acceptance of the report, [PDS, PCC] shall inform [PDS, LDR] and [DPW, PDCI] that the requirement is complete and the bond amount can be relinquished. If the monitoring was bonded separately, then [PDS, PCC] shall inform [PDS or DPW FISCAL] to release the bond back to the applicant.

(PALEONTOLOGICAL RESOURCES)

PALEO GR#5 – PALEONTOLOGICAL MONITORING: [PDS, PCC] [RG, BP] [PDS, FEE].
INTENT: In order to comply with the adopted Mitigation Monitoring and Reporting Program (MMRP) pursuant to PDS2001–3100 5223, and the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements for Paleontological Resources <http://www.sdcounty.ca.gov/dplu/procguid.html>, a Grading Monitoring Program shall be implemented. DESCRIPTION OF REQUIREMENT: The Project Paleontologist shall prepare a final report that documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program if resources were encountered during grading. The report shall include the following:
- a. If paleontological resources were discovered, the Following tasks shall be completed by or under the supervision of the Project Paleontologist:
  1. Prepare collected fossil remains for curation, to include cleaning the fossils by removing the enclosing rock material, stabilizing fragile specimens using glues and other hardeners, if necessary, and repairing broken specimens;
  2. Curate, catalog and identify all fossil remains to the lowest taxon possible, inventory specimens, assigning catalog numbers, and enter the appropriate specimen and locality data into a collection database;
  3. Submit a detailed report prepared by the Project Paleontologist in the format provided in Appendix D of the County of San Diego's Guidelines for Determining Significance for Paleontological Resources and identifying which accredited institution has agreed to accept the curated fossils. Submit TWO hard copies of the final Paleontological Resources Mitigation Report to the Director of PDS for final approval of the mitigation, and submit an electronic copy of the complete report in Microsoft Word on a CD. In addition, submit one copy of the report to the San Diego Natural History Museum and one copy to the institution that received the fossils.
  4. Transfer the cataloged fossil remains and copies of relevant field notes, maps, stratigraphic sections, and photographs to an accredited institution (museum or university) in California that maintains paleontological collections for archival storage and/or display, and submit Proof of Transfer of Paleontological Resources, in the form of a letter, from the director of the paleontology department of the accredited institution to the Director of PDS verifying that the curated fossils from the project site have been received by the institution."
- b. If no resources were discovered, a brief letter to that effect and stating that the grading monitoring activities have been completed, shall be sent to the Director of Planning and Land Use by the Project Paleontologist.

DOCUMENTATION: The applicant shall submit the letter report to the [PDS, PCC] for review and approval. TIMING: Prior to the Final Grading Release (Grading Ordinance Sec. 87.421.a.3) <http://www.sdcounty.ca.gov/dpw/docs/propgradord.pdf>, the final report shall be completed. MONITORING: The [PDS, PCC] shall review the final report for compliance with the project MMRP, and inform [DPW, PDCI] that the requirement is completed."

MASSON & ASSOCIATES, INC.
200 East Washington Avenue, Suite 200
Escondido, CA 92025 P. 760.741.3570
www.masson-assoc.com
Planning ▲ Engineering ▲ Surveying ▲ Telecom

DATE: Dec 20, 19 10:31am by: dmasson FILE: I:\DWG\04\4201\PROD\TM\TM-grading\4201gp04.dwg

3.0 Cover Sheet and General Requirements

- Standard SWQMP Form Table 2 and PDP SWQMP Form Table 3 require the identification of pollutant-generating sources and associated BMPs for development projects.

- In some cases, County staff may request additional, more detailed documentation of source control BMP design details. If requested, applicants must submit a completed copy of this Source Control BMP Worksheet. This requirement can be satisfied either by submitting a copy of BMPDM Attachment E.1 (Source Control BMP Requirements) or equivalent documentation at the County's discretion.

- Submit this documentation using this cover sheet.

- Sources and BMPs must also be shown as applicable on DMA exhibits and construction plans (see Attachment 2).

Refer to DMA Exhibit for Source Control as well.

If These Sources Will Be on the Project Site …	… Then Your SWQMP Must Consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
☑ **A.** Onsite storm drain inlets ☐ Not Applicable	☑ Locations of inlets.	☑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar. See stencil template provided in Appendix I-4	☑ Maintain and periodically repaint or replace inlet markings. ☑ Provide storm water pollution prevention information to new site owners, lessees, or operators. ☑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks ☑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **B.** Interior floor drains and elevator shaft sump pumps ☑ Not Applicable		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages ☑ Not Applicable		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **D1.** Need for future indoor & structural pest control ☑ Not Applicable		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
☑ **D2.** Landscape/ Outdoor Pesticide Use ☐ Not Applicable	☑ Show locations of existing trees or areas of shrubs and ground cover to be undisturbed and retained. ☑ Show self-retaining landscape areas, if any. ☑ Show storm water treatment facilities.	State that final landscape plans will accomplish all of the following. ☑ Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible. ☑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. ☑ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of periodic saturated soil conditions. ☑ Consider using pest-resistant plants, especially adjacent to hardscape. ☑ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use,	☑ Maintain landscaping using minimum or no pesticides. ☑ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks ☑ Provide IPM information to new owners, lessees and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features. ☑ Not Applicable	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	❑ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks
❑ **F.** Food service ☑ Not Applicable	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **G.** Refuse areas ☑ Not Applicable	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. Also show how the designated area will be protected from wind dispersal. ❑ Any drains from dumpsters, compactors, and tallow bin areas must be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on- site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative** **Table and Narrative**
❑ **H.** Industrial processes. ☑ Not Applicable	❑ Show process area.	❑ If industrial processes are to be located onsite, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Storm Water Discharges" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) ☑ Not Applicable	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or runoff from area and protected from wind dispersal. ❑ Storage of non-hazardous liquids must be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release Prevention Program ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning ☑ Not Applicable	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs must either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes must have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut- off to discourage such use). (3) Washing areas for cars, vehicles, and equipment must be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities must be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility must discharge to the sanitary sewer, or a wastewater reclamation system must be installed.	❑ If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations must not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. ❑ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance ☑ Not Applicable	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to protect from rainfall, run-on runoff, and wind dispersal. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains must not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the report, note that all of the following restrictions apply to use the site: ❑ No person must dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal must be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids must be contained or drained from the vehicle immediately. ❑ No person must leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **L.** Fuel Dispensing Areas ☑ Not Applicable	❑ Fueling areas[2] must have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are (1) graded at the minimum slope necessary to prevent ponding; and (2) separated from the rest of the site by a grade break that prevents run-on of storm water to the MEP. ❑ Fueling areas must be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] must not drain onto the fueling area.		❑ The property owner must dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks

[2] The fueling area must be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
M. Loading Docks ☑ Not Applicable	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks must be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts must be positioned to direct storm water away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ❑ Loading dock areas draining directly to the sanitary sewer must be equipped with a spill control valve or equivalent device, which must be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **N.** Fire Sprinkler Test Water ☑ Not Applicable		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks
O. Miscellaneous Drain or Wash Water ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim ☑ Not Applicable		❑ Boiler drain lines must be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop mounted equipment with potential to produce pollutants must be roofed and/or have secondary containment. ❑ Any drainage sumps onsite must feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **P.** Plazas, sidewalks, and parking lots. ☑ Not Applicable			❑ Plazas, sidewalks, and parking lots must be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing must be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser must be collected and discharged to the sanitary sewer and not discharged to a storm drain.

5.0 General Requirements

- Each Priority Development Project (PDP) must provide a description of existing site conditions and proposed changes to them, including changes to topography and drainage.
- Has a **Drainage Report** has been prepared for the PDP?

  ☒ **Yes**

  - Review of the Drainage Report must be concurrent with the PDP SWQMP.
  - Include the summary page of the Drainage Report with this cover page, and provide the following information:

Title: Drainage Study for Shadow Run Ranch
Prepared By: Masson & Associates, Inc.
Date: 10/11/19

  - Do not complete the rest of this attachment (also exclude these additional pages from your submittal). Additional documentation of site and drainage conditions is not required unless requested by County staff.

  ☐ **No** -- Complete and submit the remainder of this attachment below.

DRAINAGE STUDY

FOR

SHADOW RUN RANCH

HIGHWAY 76, PAUMA VALLEY
SAN DIEGO COUNTY, CALIFORNIA
TM 5223 RPL-3

Engineer:

MASSON & ASSOCIATES, INC.
200 East Washington Avenue, Suite 200
Escondido, CA 92025
(760) 741-3570
PN 04201



Prepared by: _____ Date: 12/20/2019
Robert D'Amaro RCE #C081699 Exp. 03/31/20

Date	Comments
12/01/01	Original
6/13/05	1st Revision
3/06/09	2nd Revision
5/31/12	3rd Revision
12/16/13	4th Revision
05/16/14	Final
07/30/14	Public Notice Copies
12/20/19	Updated report and attenuation calculations

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Appendix E – Existing storm drain Hydraulics Basin 1, 2 and 3

ADDENDEMS

Response letter: "Other County Requirements" (Addendum to Geotechnical Plan)

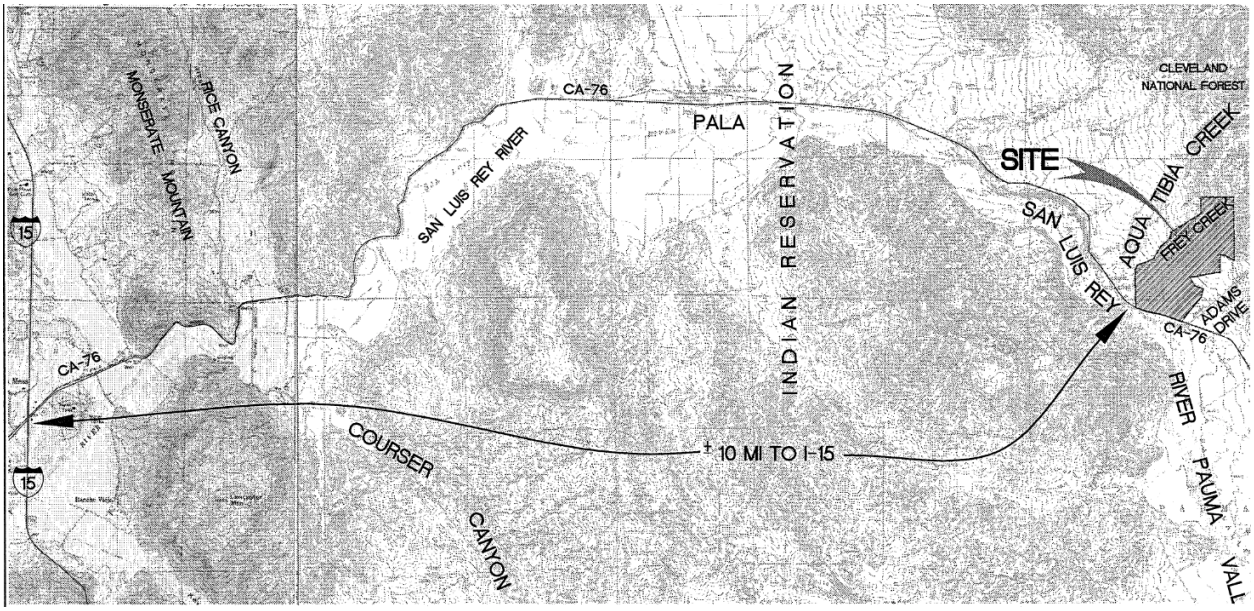
Attachment – 1 Relocate reservoir spillway
Attachment – 2 Reservoir drainage (1000 yr flood calcs)
Attachment – 3 Reservoir overtopping (seiche - short term concentrated flows)
Attachment – 4 NA
Attachment – 5 Detailed Operation and Maintenance plan
Attachment – 6 Emergency drawdown calculations

EXHIBITS

Exhibit A – Pre-Development Hydrology Map
Exhibit B – Post-Development Hydrology Map

1.0 PROJECT DESCRIPTION

The proposed project is located north and adjacent to Highway 76 and west of Adams Drive approximately 10 miles east of the I-15 freeway. The site is approximately 248 acres in size. The majority of the site is currently covered with Orange and Avocado groves. Elevation of the site ranges from 740 to 1430 MSL and slopes southerly toward Highway 76. Several natural drainage courses traverse the property with tributary areas less than 1 square mile terminating at existing culverts that cross Highway 76. One natural drainage channel crossing the western portion of the site (Frey Creek Basin) has a tributary area of approximately 4 square miles and terminates at Highway 76 where an existing bridge structure spans the creek. The proposed project is a 44 lot subdivision of single family homes with a minimum lot size of 2 acres. The project will include a system of private roads which will enter the project from Adams Drive with a secondary or emergency access to the site off of Highway 76. Approximately 202.5 acres of the 248.3 acre site will remain in its natural state as open space.



VICINITY MAP

2.0 PURPOSE

The purpose of this study is to determine the peak runoff rates and velocities for the pre-development and post-development conditions. Comparisons will be made at the same discharge points for each drainage basin affecting the site and adjacent properties. The adequacy of existing conveyance facilities affected by the project such as culverts, sidewalk underdrains, curb inlets, and bioretention facilities will be determined.

3.0 METHODOLOGY

The Rational Method as outlined in the County of San Diego Hydrology Manual, dated June 2003, was used to determine the runoff flow rate for basins 1 and 2 which have tributary areas less than 1 square mile. The Soil Conservation Service – NRCS Hydrologic Method as outlined in the County's hydrology manual was used to determine the peak flow rate for basin 3 which has a tributary area of approximately 4 square miles. The 100-year frequency storm event was analyzed to determine peak runoff rates discharging the site for both the existing and post-development condition. The Rick Engineering Company Rational Method program for San Diego County and Hydrology Studio were used for attenuation calculations, and San Diego Hydrology Model 3.1 (SDHM) were used for the hydromodification calculations.

Soil type on-site and within the tributary areas was determined to be a combination of types A, B and C from the Soil Hydrologic Groups map (see Appendix A). Runoff coefficients, "C" were determined from Table 3-1 (Appendix A) based on Land Use and Soil Type as follows:

- Undisturbed Natural Terrain / Permanent Open Space → C = 0.20 – 0.30
- Low Density Residential (LDR) / Residential, 1.0 DU/AC or less → C = 0.27 – 0.36

Weighted Coefficients were used in the calculations to determine C in areas with multiple soil types and impervious areas.

4.0 HYDROLOGY

4.1 Pre-Development Conditions

A pre-development hydrology map delineating basin areas, flow paths, concentration points, and existing drainage facilities has been prepared and is attached to this report as Exhibit "A". Pre-development hydrology calculations can be found in Appendix C.

Basin 1 – Runoff currently flows southerly over existing natural terrain and groves terminating at Highway 76 where a double 42" RCP culvert conveys runoff under Highway 76.

Basin 2 – Runoff currently flows southerly through the groves in a mostly defined natural channel toward Highway 76 where an existing 36" RCP culvert conveys runoff under Highway 76.

Basin 3 – The Frey Creek basin begins northerly and easterly of the proposed site. Runoff from the hillsides flows toward the creek bed which runs southwesterly through the hills crossing the northern portion of the site and running south toward Highway 76 across the western side of the

property. At Highway 76 a large bridge structure spans the creek with the deck approximately 20' above the creek bed.

4.2 Post-Development Conditions

A post-development hydrology map delineating basin areas, flow paths, concentration points, and proposed drainage facilities has been prepared and is attached to this report as Exhibit "B". Post-development hydrology calculations can be found in Appendix C.

Basin 1 – In the post-development condition, runoff will continue to flow southerly towards the existing culvert at Highway 76, as described in the pre-development conditions section for Basin 1. The runoff, however, will be interrupted by streets traversing the site and will be directed through proposed new culverts and routed in brow ditches or earthen channels back to the natural drainage courses traversing the site. Runoff discharging from proposed streets, driveways, homes and existing groove areas will be routed through proposed bioretention facilities and/or tree wells and dispersion areas prior to discharging to the natural terrain. The development will not result in an increase in peak discharge from basin 1.

Basin 2 – In the post-development condition, runoff will continue to flow southerly toward the existing culvert at Highway 76, as described in the pre-development conditions for Basin 2. The runoff, however, will be routed through proposed new culverts and routed in brow ditches or earthen channels back to the natural drainage courses traversing the site. All runoff will continue to concentrate at the existing culvert crossing at Highway 76. Runoff discharging from proposed streets, driveways, homes and existing groove areas will be routed through proposed bioretenton and/or tree wells and dispersion areas prior to discharging to the natural terrain. The development will result in increase in peak discharge from basin 2 of approximately 42.5 cfs. The bioretention facilities proposed for this project will mitigate any increase in runoff also the two larger bioretention facilities Imp's 10.22 and 2.06 will be larger and designed to allow for more ponding to mitigate the increase in discharge.

Basin 3 – In the post development condition the characteristics of the basin will remain pretty much the same as in the pre-development condition with the exception of approximately 15 acres of the 4 square mile tributary basin will be developed with single family homes. The development will affect less than 1% of the total drainage shed. On pad bioretention facilities are proposed for each lot in this tributary area. Additionally all the impervious areas from the driveways, and homes will be treated by on pad dispersion areas and water released off pad through existing mature groves utilizing tree wells for additional WQ treatment. See hydro-mod calculations and attenuation analysis (Appendix C & F).

5.0 CONCLUSION

The development of this site will create an increase in total runoff, however the construction of bioretention facilities and associated Hydromodification improvements will mitigate any increase in runoff. There will be no net increase in peak runoff at the locations of the existing culverts crossing under Highway 76. All runoff discharging from the site across Highway 76 enters the San Luis Rey River south of the Highway. Table 1 below provides a summary of the pre- and post-development areas and flows at the project discharge points. Hydromodification by its definition will handle any post construction changes in flow characteristics.

Note: Ref. section 6.2.7 of the Hydraulic Design Manual.

“Conjunctive use of detention facilities for water quality treatment and flood management is acceptable, and encouraged when it is desirable and feasible. When an aboveground detention facility is used for both water quality and flood control, the flood storage volume shall be provided in addition to the storage volume designated for water quality treatment.” ***

*** Per Table 2 below: See provided calculations showing that the DCV can be retained within the soil and storage layers of the basin using the pore storage volume, therefore the flood storage volume will be counted at the bottom surface elevation of the basin for Attenuation calcultaions.

See the SDHM Hydromodification modeling in (Appendix F)

Table 1 – Attenuation of 100-year Flows

	Q100 - (CFS)		
POC	PRE-DEV.	POST DEV. w/o ATTENUATION	POST w/ ATTENUATION
CP # 1	108.8	95.9	69.29
CP # 2	38.7	42.5	25.57
CP # 3	3,000.1	3,000.1	3,000.1

Table 2 – DCV Volume Pore Storage Calculations

DCV retained by underground storage - Basin 1												
	Void	IMP 10.10	IMP 10.11,12,14	IMP 10.13	IMP 10.15	IMP 10.19	DB 1.11	DB 1.12	DB 1.13	IMP 1.14	DB 1.15	
Final DCV Tributary to BMP		1,075	3,374	1,591	0	1,045	0	0	0	1,861	0	C.F.
Provided Surface Area		1,220	4,020	1,320	0	1,245	0	0	0	3,125	0	S.F.
Provided Soil Media Thickness	40%	21	21	21	0	21	0	0	0	21	0	IN.
Provided Gravel Thickness	40%	12	12	16	0	12	0	0	0	12	0	IN.
Underground storage provided		1,342	4,422	1,628	0	1,370	0	0	0	3,438	0	C.F.
Excess underground storage		267	1,048	37	0	325	0	0	0	1,577	0	C.F.
DCV retained by underground storage - Basin 2												
	Void	DB 2.04	IMP-10.21	IMP-10.16	IMP-10.17	IMP-10.18	IMP-10.22	DB 2.01	DB 2.02	IMP 2.06	Large Lot	
Final DCV Tributary to BMP	Void	0	0	2,734	940	0	6,072	2,863	0	9,910	0	C.F.
Provided Surface Area		0	0	3,500	1,100	0	6,960	1,740	0	10,344	400	S.F.
Provided Soil Media Thickness	40%	0	0	21	21	0	21	21	0	21	0	IN.
Provided Gravel Thickness	40%	0	0	12	12	0	12	30	0	12	0	IN.
Underground storage provided		0	0	3,850	1,210	0	7,656	2,958	0	11,378	0	C.F.
Excess underground storage		0	0	1,116	270	0	1,584	95	0	1,468	0	C.F.
				= Drainage areas directed to "Basins w/ underground pore storage layers"								
				= Drainage areas directed to "Dispersion Areas" and "Tree Wells"								

5.1 Description of Existing Site Condition

Provide the requested information below for the project site in its existing condition.

a. Current Site Status

Select all that apply to any portion of the site.

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

b. Existing Land Cover

Provide the area (in acres or square feet) within all applicable categories of land cover below. The total area should equal that of the entire project site.

	Area *(acres or ft²)*
☒ Vegetative Cover	230.69 ac
☒ Non-Vegetated Pervious Areas	4.72ac
☒ Impervious Areas	8.05 ac

c. Underlying Soil

Select all soil groups that are present on the site.

NRCS Hydrologic Soil Group(s)			
Type A	Type B	Type C	Type D
☒	☒	☒	☐

5.2 Description of Existing Site Drainage

Describe how storm water runoff is conveyed from the site. At a minimum, address the following:

- Is the existing drainage conveyance ☒ **natural** or ☐ **urban**?
- Is runoff from offsite conveyed through the site? ☒ **Yes** ☐ **No**
  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.
- Describe the existing project site drainage conveyance network (including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels).
- 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. Summarize the pre-project drainage areas and design flows to each of the existing runoff discharge locations.
- Provide additional information as necessary or requested to describe the site drainage.

Description (add pages as necessary to provide all requested information).

A pre-development hydrology map delineating basin areas, flow paths, concentration points, and existing drainage facilities has been prepared and is attached to this report as Exhibit "A". Pre-development hydrology calculations can be found in Appendix B.

Basin 1 – Runoff currently flows southerly over existing natural terrain and groves terminating at Highway 76 where a double 42" RCP culvert conveys runoff under Highway 76.

Basin 2 – Runoff currently flows southerly through the groves in a mostly defined natural channel toward Highway 76 where an existing 36" RCP culvert conveys runoff under Highway 76.

Basin 3 – The Frey Creek basin begins northerly and easterly of the proposed site. Runoff from the hillsides flows toward the creek bed which runs southwesterly through the hills crossing the northern portion of the site and running south toward Highway 76 across the western side of the property. At Highway 76 a large bridge structure spans the creek with the deck approximately 20' above the creek bed.

5.3 Description of Proposed Site Development

Provide a general description of the proposed site development, including at a minimum the information requested below. Add pages as necessary.

a. Project description/ Proposed land use and/or activities (project location, development type, size, numbers of units, etc.)

The proposed project is located north and adjacent to Highway 76 and west of Adams Drive approximately 10 miles east of the I-15 freeway. The site is approximately 248 acres in size. The majority of the site is currently covered with Orange and Avocado groves. Elevation of the site ranges from 740 to 1430 MSL and slopes southerly toward Highway 76. Several natural drainage courses traverse the property with tributary areas less than 1 square mile terminating at existing culverts that cross Highway 76. One natural drainage channel crossing the western portion of the site (Frey Creek Basin) has a tributary area of approximately 4 square miles and terminates at Highway 76 where an existing bridge structure spans the creek. The proposed project is a 44 lot subdivision of single family homes with a minimum lot size of 2 acres. The project will include a system of private roads which will enter the project from Adams Drive with a secondary or emergency access to the site off of Highway 76. Approximately 138 acres of the 248 acre site will remain in its natural state as open space.

b. List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features).

The project proposes 44 single family residences on minimum 2 acre lots with private streets and driveways to access all lots.

c. List/describe proposed pervious features of the project (e.g., landscape areas):

The proposed project includes numerous pervious areas surrounding each that are in the front and back yards. Existing tree groves will be preserved where possible. Additionally there will be an agricultural open space lot that is approximately 39 acres.

d. Does the project include grading and changes to site topography? ☒ **Yes** ☐ **No**
*If **yes**, describe below.*

Each of the 44 lots will be graded with a pad that has private street and driveway access to all lots. Site topography will be conserved in areas without pads and roadways. Biofiltration basins will also be graded in at key areas to treat and control post development flows.

5.4 Description of Proposed Site Drainage

A. Changes to Site Drainage -- Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)? ☒ **Yes** ☐ **No**

If **yes**:

- Describe (1) the proposed project site drainage conveyance network (including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels), and (2) 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.

Description (add pages as necessary to provide all requested information).

In the post-development condition, the site is split into three overall drainage basins, with each basin containing several subbasins. Refer to Appendix C, Exhibit "B" in the drainage report for a A post-development hydrology map delineating basin areas, flow paths, concentration points, and proposed drainage facilities.

Basin 1 – In the post-development condition, runoff will continue to flow southerly towards the existing culvert at Highway 76, as described in the pre-development conditions section for Basin 1. The runoff, however, will be interrupted by streets traversing the site and will be directed through additional culverts and routed in brow ditches or earthen channels back to the natural drainage courses traversing the site. Runoff discharging from proposed streets, driveways, homes and existing groove areas will be routed through proposed bioretention facilities or tree wells prior to discharging to the natural terrain. The development will not result in an increase in peak discharge from basin 1.

Basin 2 – In the post-development condition, runoff will continue to flow southerly toward the existing culvert at Highway 76, as described in the pre-development conditions for Basin 2. The runoff, however, will be routed through culverts at roadway crossings and picked up in brow ditches prior to being discharged back into the natural terrain. All runoff will continue to concentrate at the existing culvert crossing at Highway 76. Runoff discharging from proposed streets, driveways, homes and existing groove areas will be routed through proposed bioretenton facilities prior to discharging to the natural terrain. The development will result in increase in peak discharge from basin 2 of approximately 42.5 cfs. The bioretention facilities proposed for this project will mitigate any increase in runoff also the two larger bioretention facilities Imp's 10.22 and 2.06 will be larger and designed to allow for more ponding to mitigate the increase in discharge.

Basin 3 – In the post development condition the characteristics of the basin will remain pretty much the same as in the pre-development condition with the exception of approximately 15 acres of the 4 square mile tributary basin will be developed with single family homes. The development will affect less than 1% of the total drainage shed. On pad bioretention facilities are proposed for each lot in this tributary area. Additionally all the impervious areas from the driveways, and homes will be treated by on pad dispersion areas and water released off pad through existing mature groves utilizing tree wells for additional WQ treatment.

6.0 General Requirements

- Use this attachment to document all proposed (1) self-mitigating, (2) de minimis, and (3) self-retaining DMAs. Indicate under "DMA Compliance Option" below which design options will be used to satisfy structural performance requirements for one or more DMA.

DMA Compliance Option	Required Sub-attachments	BMPDM Design Resources
☒ **Self-mitigating**	• Sub-attachment 6.1	• BMPDM Section 5.2.1
☐ **De minimis**	• Sub-attachment 6.2	• BMPDM Section 5.2.2
☒ **Self-retaining**[1]	• Sub-attachment 6.3	• BMPDM Section 5.2.3 (all options)
SSD-BMP Type(s)		
☒ **Impervious Area Dispersion**	• Sub-attachment 6.3.1	• Fact Sheet SD-B (Appendix E.8)
☒ **Tree Wells**	• Sub-attachment 6.3.2	• Fact Sheet SD-A (Appendix E.7)

- Submit this cover page and all "Required Sub-attachments" listed for each selected DMA compliance option.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" for additional explanation of design requirements. Each constructed feature must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.

[1] If "Self-retaining" is selected, also choose the types of Significant Site Design BMPs (SSD-BMPs) to be used. SSD-BMPs are Site Design BMPs that are sized and constructed to fully satisfy all applicable Structural Performance Standards for a DMA.

6.1 Self-mitigating DMAs (complete this page once for ALL self-mitigating DMAs)

Self-mitigating DMAs consist of natural or landscaped areas that drain directly offsite or to the public storm drain system. These DMAs are excluded from DCV calculations.

- Provide the information requested below for each proposed self-mitigating DMA. Add rows or copy the table if additional entries are needed.

DMA #	***a. DMA Area (ft^2)***	***Incidental Impervious Area***		***Permit # and Sheet #***
		b. Size(ft^2)	***c. % (b/a*100)***	
1.02	216,665	0	0	Exhibit B – Source Control + (DMA) Exhibit
1.05	118,356	0	0	Exhibit B – Source Control + (DMA) Exhibit
1.08	97,001	0	0	Exhibit B – Source Control + (DMA) Exhibit
1.09	267,077	0	0	Exhibit B – Source Control + (DMA) Exhibit
1.10	1,034,956	0	0	Exhibit B – Source Control + (DMA) Exhibit
20.10	217,800	0	0	Exhibit B – Source Control + (DMA) Exhibit

- "DMA #", "DMA Area", and "Permit # and Sheet #" are required for all DMAs listed.
- "Incidental Impervious Area" calculations are required only where applicable (see below).
- Each self-mitigating DMA must <u>fully</u> satisfy all design requirements and restrictions described in BMPDM Section 5.2.1 and any other guidance or instruction identified by the County. Check the boxes below to confirm that all required conditions are satisfied <u>for every DMA listed</u>.

  ☒ Each DMA is hydraulically separate from other DMAs that contain permanent storm water pollutant control BMPs.

  <u>Natural and Landscaped Areas</u>

  ☒ Each DMA consists solely of natural or landscaped areas, except for incidental impervious areas (see below).

  ☒ Each area drains directly offsite or to the public storm drain system.

  ☒ Soils are undisturbed native topsoil, or disturbed soils that have been amended and aerated to promote water retention characteristics equivalent to undisturbed native topsoil.

  ☒ Vegetation is native and/or non-native/non-invasive drought tolerant species that do not require regular application of fertilizers and pesticides.

  <u>Incidental Impervious Areas (if applicable; see above)</u>

Minor impervious areas may be permitted within the DMA if they satisfy the following criteria:

- ☐ They are not hydraulically connected to other impervious areas (unless it is a storm water conveyance system such as a brow ditch).
- ☐ They comprise less than 5% of the total DMA. Calculate the % incidental impervious area in the table above (c= b/a). DMAs are <u>not</u> self-mitigating if this area is 5% or greater.

6.2 De Minimis DMAs (complete this page once for ALL de minimis DMAs)

De minimis DMAs consist of areas too small to be considered significant contributors of pollutants and not practicable to drain to a BMP. They are excluded from DCV calculations. Examples include driveway aprons connecting to existing streets, portions of sidewalks, retaining walls, and similar features at the external boundaries of a project.

- Provide the information requested below for each proposed de minimis DMA. Add rows or copy the table if additional entries are needed.

DMA #	***DMA Area (ft^2)***	***Permit # and Sheet #***

- "DMA #", "DMA Area", and "Permit # and Sheet #" are required.

- Check the boxes below to confirm that each required condition is satisfied for ALL de minimis DMAs on the site.

  ☐ Each DMA listed is less than 250 square feet and not adjacent or hydraulically connected to each other.

  ☐ Each DMA listed <u>fully</u> satisfies all design requirements and restrictions described in BMPDM Section 5.2.2 De Minimis DMAs.

6.3 Self-retaining DMAs using Significant Site Design BMPs

Self-retaining DMAs use Site Design BMPs to fully-retain the entire DCV, at a minimum. Site Design BMPs that fully retain the DCV, at a minimum, therefore replacing the need for a Structural BMP (S-BMP), are classified as Significant Site Design BMPs (SSD-BMPs). To satisfy pollutant control requirements only, self-retaining means retention of the entire DCV. However, under some circumstances, a self-retaining DMA can also satisfy hydromodification management requirements by implementing BMPs that retain a greater volume of runoff.

- Provide the information requested below for each proposed self-retaining DMA. Add rows or copy the table if additional entries are needed.

DMA #	DMA Area (ft^2)	**BMP Type** (choose one per DMA)		*Permit # and Sheet #*
		Dispersion Area (Att. 6.3.1)	**Tree Wells (Att. 6.3.2)**	
		☐	☐	
1.12	582,229	☒	☐	Exhibit B – Source Control + (DMA) Exhibit
1.13	98,437	☒	☐	Exhibit B – Source Control + (DMA) Exhibit
10.15	33,879	☐	☒	Exhibit B – Source Control + (DMA) Exhibit
10.18	61,029	☒	☒	Exhibit B – Source Control + (DMA) Exhibit
2.01	230,263	☒	☒	Exhibit B – Source Control + (DMA) Exhibit
2.02	544,918	☒	☐	Exhibit B – Source Control + (DMA) Exhibit
Large Lot	39,786	☒	☒	Exhibit B – Source Control + (DMA) Exhibit
2.04	877,918	☒	☐	Exhibit B – Source Control + (DMA) Exhibit
10.21	29,955	☒	☒	Exhibit B – Source Control + (DMA) Exhibit

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.
[3]Including the permeable pavement.

Copy and Paste table here for additional DMAs

- "DMA #", "DMA Area", and "Permit # and Sheet #" are required.
- Select one BMP Type per DMA. Provide detailed documentation for each DMA in Attachments 6.3.1 (Impervious Dispersion Areas) and/or 6.3.2 (Tree Wells) below.
- Each self-retaining DMA must fully satisfy all design requirements and restrictions described in BMPDM Section 5.2.3, applicable BMPDM Appendix E Fact Sheets, and any other guidance or instruction identified by the County.

6.3.1 Self-retaining DMAs with Impervious Dispersion Areas

Impervious area dispersion (dispersion) refers to the practice of effectively disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops (through downspout disconnection), walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges and reduce volumes. Dispersion with partial or full infiltration results in significant volume reduction by means of infiltration and evapotranspiration. When adequately sized, dispersion can also be used to satisfy both the pollutant control and hydromodification management structural performance standards for a DMA.

- Each self-retaining DMA with impervious area dispersion must fully satisfy all design requirements and restrictions described in BMPDM Section 5.2.3, Fact Sheet SD-B: Impervious Area Dispersion, and any other guidance or instruction identified by the County.
- Documentation of compliance with all applicable conditions must be submitted with this sub-attachment using the ***Summary Sheet for DMAs with Impervious Area Dispersion*** on the next page. One version of this Summary Sheet must be completed for each applicable DMA.
- Applicants are responsible to comply with all other applicable requirements, regardless of whether they are included in the summary sheet.
- The following applies if the dispersion area is **native soil** (SD-B in Appendix E):
    - For pollutant control only, the DMA is considered self-retaining if the impervious to pervious ratio is:
        - 2:1 when the pervious area is composed of Hydrologic Soil Group A
        - 1:1 when the pervious area is composed of Hydrologic Soil Group B
- The following applies if the dispersion area includes **amended soil** (SD-B in Appendix E):
    - DMAs using impervious area dispersion can be considered to meet both pollutant control and hydromodification flow control requirements if the impervious to pervious area ratio is

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.
[3]Including the permeable pavement.

1:1 or less and all other design requirements of SD-B are satisfied, including 11 inches of amended soil.

- The following apply if the dispersion area is **permeable pavement** (SD-D in Appendix E):
  - For pollutant control only, a DMA is considered self-retaining if the ratio of total drainage area (including permeable pavement) to area of permeable pavement is 1.5:1 or less, and all other design requirements of SD-D are satisfied.
  - Hydromodification management performance standards can be satisfied using permeable pavement only if constructed to Structural BMP specifications. In this case, the permeable pavement must be sized and constructed in accordance with the requirements of INF-3.

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.
[3]Including the permeable pavement.

Summary Sheet for DMAs with Impervious Area Dispersion (Complete 1 sheet per DMA)

DMA # 1.12

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
34,922	547,307	1:15.7

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

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[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

DMA # 1.13

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft²)	*Permeable Dispersion Area (ft²)*	*Ratio I:P*
7,304	91,132	1:12.5

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft²)	*Permeable Dispersion Area (ft²)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

DMA Area[3] (ft²)	*Permeable Pavement Area (ft²)*	*Ratio DMA:Pavement*

B. Minimum Design Criteria

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

DMA # 10.18

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
12,921	10,669	1.2:1

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

DMA # 10.21

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
18,231	11,724	1.5:1

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

DMA # 2.02

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
34,496	510,422	1:14.8

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

DMA # Large Lot

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
13,200	15,954	1:1.2

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

DMA # 2.04

A. Minimum Sizing Requirements

Verify that minimum standards are satisfied for the applicable dispersion area type below[2].

Native Soil (Pollutant Control Only) Select one and provide calculations below.

☒ Soil Group A: Ratio I:P is 2:1 or less ☐ Soil Group B: Ratio I:P is 1:1 or less

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*
47,575	830,343	1:17.5

Amended Soil (Pollutant Control plus Hydromodification Management)

Must satisfy both conditions and provide calculations below.

☐ Ratio I:P is 1:1 or less, AND

☐ 11 inches or more of the top of the pervious area consists of amended soils (Fact Sheet SD-F)

Impervious Area (ft^2)	*Permeable Dispersion Area (ft^2)*	*Ratio I:P*

Permeable Pavement (Pollutant Control Only) Provide calculations below.

☐ Ratio DMA area to area of permeable pavement is 1.5:1 or less

DMA Area[3] (ft^2)	*Permeable Pavement Area (ft^2)*	*Ratio DMA:Pavement*

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

B. Minimum Design Criteria

Check the boxes below to confirm that each design criterion has been satisfied for the DMA.

Impervious Areas:

☒ Are graded to ensure area that the full DCV drains to the dispersion area before the runoff discharges from the DMA.

Pervious Dispersion Areas:

☒ Are less than 5% slope and sheet flow over a distance of at least 10 feet from inflow to overflow route.

☒ Have inflow velocities of 3 ft/s or less OR use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.

☒ Are densely and robustly vegetated with drought tolerant species.

☒ Consist of soil types capable of supporting or being amended to support vegetation (e.g., with sand or compost). If applicable, media amendments have been tested to verify that they are not a source of pollutants.

☒ Are owned by the project owner and will be dedicated to exclude future uses that might reduce their effectiveness.

Copy and Paste table here for additional DMAs

[2]Applicants wishing to utilize parameters less conservative than listed here must submit modeling to support their proposal. Consult your project manager for more information.

[3]Including the permeable pavement.

6.3.2 Self-retaining DMAs with Tree Wells

Trees wells can provide a variety of benefits such as interception and increased infiltration of rainfall, reduced erosion, energy conservation, air quality improvement, and aesthetic enhancement. They can also be used to satisfy both pollutant control and hydromodification management performance standards for a DMA.

- Each self-retaining DMA with tree wells must fully satisfy all design requirements and restrictions described in BMPDM Section 5.2.3, Fact Sheet SD-A: Tree Wells, and any other guidance or instruction identified by the County.
- For pollutant control only, the DMA must retain the entire DCV. For hydromodification management, an additional volume must be retained in accordance with the sizing requirements presented in the DCV multiplier table in Fact Sheet SD-A.
- Documentation of compliance with applicable conditions must be submitted using the ***Summary Sheet for Self-retaining DMAs with Tree Wells*** on the next page. One version of this Summary Sheet must be completed for each applicable DMA.
- If both pollutant control and hydromodification standards apply, the soil depth of all tree wells in the DMA must be selected before determining the Required Retention Volume (RRV). Each tree well must be constructed to the selected depth. For pollutant control only, tree wells within a DMA may be constructed to different soil depths.
- In most cases tree wells must use Amended Soil per Fact Sheet SD-F. However, Structural Soil is required in some cases (e.g., placing the tree well next to a curb). See ***Structural Requirements for Confined Tree Well Soil Volume*** in Fact Sheet SD-A for additional explanation. If applicable, list the DMAs and Tree Well #s below for all tree wells requiring Structural Soil.

DMA #	**Tree Wells Requiring Structural Soil (list Tree Well #s)**

- The Design Capture Volume (DCV) must be known for each DMA in order to determine the volume to be mitigated by the tree wells. Instructions for DCV calculation are provided in BMPDM Appendix B.1. An automated version of Worksheet B.1 (Calculation of Design Capture Volume) is available at www.sandiegocounty.gov/stormwater under the Development Resources tab.

Summary Sheet for Self-retaining DMAs with Tree Wells (complete one sheet per DMA)

DMA #: 10.15	**DMA Area (ft²): 33,879**

Required Retention Volume (RRV)

a. Design Capture Volume (DCV; ft³): 1,321

b. DCV Multiplier (Fact Sheet SD-A)

Applicable Structural Performance Standards (select one)	Tree well soil depth (inches)	Underlying soil type (A, B, C, or D)	DCV Multiplier
☐ Pollutant control only	Any	All	1.0
☒ Pollutant control plus hydromodification	36	A	1.8

c. Required Retention Volume (ft³) [DCV * DCV Multiplier]	**2,378**

Tree Well Credit Volume (add records or copy this sheet as needed for additional tree wells)

Provide the information below for each tree well or group of tree wells within the DMA. A single entry can be used for any group of tree wells of the same species and soil depth.

Tree species or name	Existing Mature Orchards	**No. tree wells**	25*
Mature Canopy Diameter (ft)	15	**Credit Volume per tree well (ft³)**	100
Tree well ID #(s)	IMP-10.15	**Combined Volume (ft³)**	**2,500**
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	

Total Credit Volume (ft3) Add the combined volumes above. Total credit volume must equal or exceed the RRV.	**2,500**
*** Minimum number of trees needed to satisfy required retention volume. Existing trees may be greater than this amount.**	

DMA #: 10.18	DMA Area (ft²): 61,029

Required Retention Volume (RRV)

a. Design Capture Volume (DCV; ft³): 955

b. DCV Multiplier (Fact Sheet SD-A)

Applicable Structural Performance Standards (select one)	Tree well soil depth (inches)	Underlying soil type (A, B, C, or D)	DCV Multiplier
☐ Pollutant control only	Any	All	1.0
☒ Pollutant control plus hydromodification	36	A	1.8

c. Required Retention Volume (ft³) [DCV * DCV Multiplier] **1,719**

Tree Well Credit Volume (add records or copy this sheet as needed for additional tree wells)

Provide the information below for each tree well or group of tree wells within the DMA. A single entry can be used for any group of tree wells of the same species and soil depth.

Tree species or name	Existing Mature Orchards	**No. tree wells**	10
Mature Canopy Diameter (ft)	15	**Credit Volume per tree well (ft³)**	100
Tree well ID #(s)	IMP-10.18	**Combined Volume (ft³)**	**1,000**
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	

Total Credit Volume (ft3) Add the combined volumes above. Total credit volume must equal or exceed the RRV.	**1,000***

*** Dispersion area also used to satisfy design capture volume. Please reference Worksheet B.1 for DCV calculation.**

DMA #: 10.21	DMA Area (ft²): 29,955

Required Retention Volume (RRV)

a. Design Capture Volume (DCV; ft³): 1,326

b. DCV Multiplier (Fact Sheet SD-A)

Applicable Structural Performance Standards (select one)	Tree well soil depth (inches)	Underlying soil type (A, B, C, or D)	DCV Multiplier
☐ Pollutant control only	Any	All	1.0
☒ Pollutant control plus hydromodification	36	A	1.8

c. Required Retention Volume (ft³) [DCV * DCV Multiplier] **2,387**

Tree Well Credit Volume (add records or copy this sheet as needed for additional tree wells)

Provide the information below for each tree well or group of tree wells within the DMA. A single entry can be used for any group of tree wells of the same species and soil depth.

Tree species or name	Existing Mature Orchards	**No. tree wells**	14
Mature Canopy Diameter (ft)	15	**Credit Volume per tree well (ft³)**	100
Tree well ID #(s)	IMP-10.21	**Combined Volume (ft³)**	**1,400**
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	

Total Credit Volume (ft3) **1,400***

Add the combined volumes above. Total credit volume must equal or exceed the RRV.

*** Dispersion area also used to satisfy design capture volume. Please reference Worksheet B.1 for DCV calculation.**

DMA #: 2.01	DMA Area (ft²): 230,263

Required Retention Volume (RRV)

a. Design Capture Volume (DCV; ft³): 4,663

b. DCV Multiplier (Fact Sheet SD-A)

Applicable Structural Performance Standards (select one)	Tree well soil depth (inches)	Underlying soil type (A, B, C, or D)	DCV Multiplier
☐ Pollutant control only	Any	All	1.0
☒ Pollutant control plus hydromodification	36	C	2.83

c. Required Retention Volume (ft³) [DCV * DCV Multiplier] **13,196**

Tree Well Credit Volume (add records or copy this sheet as needed for additional tree wells)

Provide the information below for each tree well or group of tree wells within the DMA. A single entry can be used for any group of tree wells of the same species and soil depth.

Tree species or name	Existing Mature Orchards	**No. tree wells**	18*
Mature Canopy Diameter (ft)	15	**Credit Volume per tree well (ft³)**	100
Tree well ID #(s)	IMP-2.01	**Combined Volume (ft³)**	**1,800**
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft³)**	
Tree well ID #(s)		**Combined Volume (ft³)**	

Total Credit Volume (ft3) **1,800***

Add the combined volumes above. Total credit volume must equal or exceed the RRV.

*** Additional Retention Volume requirement is being satisfied by IMP 2.01.**

DMA #: Large Lot	DMA Area (ft^2): 39,768

Required Retention Volume (RRV)

a. Design Capture Volume (DCV; ft^3): 1,104

b. DCV Multiplier (Fact Sheet SD-A)

Applicable Structural Performance Standards (select one)	Tree well soil depth (inches)	Underlying soil type (A, B, C, or D)	DCV Multiplier
☐ Pollutant control only	Any	All	1.0
☒ Pollutant control plus hydromodification	36	A	1.8

c. Required Retention Volume (ft^3) [DCV * DCV Multiplier]	**1,987**

Tree Well Credit Volume (add records or copy this sheet as needed for additional tree wells)

Provide the information below for each tree well or group of tree wells within the DMA. A single entry can be used for any group of tree wells of the same species and soil depth.

Tree species or name	Existing Mature Orchards	**No. tree wells**	5
Mature Canopy Diameter (ft)	15	**Credit Volume per tree well (ft^3)**	100
Tree well ID #(s)	IMP-2.01	**Combined Volume (ft^3)**	**500**
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft^3)**	
Tree well ID #(s)		**Combined Volume (ft^3)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft^3)**	
Tree well ID #(s)		**Combined Volume (ft^3)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft^3)**	
Tree well ID #(s)		**Combined Volume (ft^3)**	
Tree species or name		**No. tree wells**	
Mature Canopy Diameter (ft)		**Credit Volume per tree well (ft^3)**	
Tree well ID #(s)		**Combined Volume (ft^3)**	

Total Credit Volume (ft3) Add the combined volumes above. Total credit volume must equal or exceed the RRV.	**500***

*** Dispersion area and basin also used to satisfy design capture volume. Please reference Worksheet B.1 for DCV calculation.**

Copy and Paste table here for additional DMAs

7.0 General Requirements

- Submit this cover page and all required Sub-attachments for all structural BMPs proposed for the project.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" in the table below for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management. Completion of SWQMP Attachment 8 is also required for these BMPs.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural BMPs documented this attachment and in Attachment 8 must be certified by a registered engineer in Sub-attachment 7.1.
- Structural BMP Verification. Structural BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)	**Requirement**	**BMPDM Design Resources**
☒ **7.1: Preparer's Certification**	Required	• N/A
☒ **7.2: Structural BMP Strategy**	Required	• BMPDM Sections 5.1., 5.3, 5.4, and Chapter 6 • BMPDM Appendix E (pages E-78 through E-210)
☒ **7.3: Structural BMP Checklist(s)**	Required	
☒ **7.4: Stormwater Pollutant Control Worksheet Calculations**	Required	• BMPDM Appendix B
☐ **7.5: Identification and Narrative of Receiving Water and Pollutants of Concern**	Required if flow-thru BMPs are proposed	• N/A

7.1 Engineer of Work Certification for Structural BMPs

Project Name Shadow Run Ranch TM 5223
Permit Application Number PDS2001-3100-5223

CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of structural 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 structural storm water BMPs for this project, of my responsibilities for their design.

☒ In addition to the structural pollutant control BMPs described in this attachment, this certification applies to the Structural Hydromodification Management BMPs described in Attachment 8 (check if applicable).

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

Robert D'Amaro

Print Name

Masson & Associates, Inc.

Company

12/20/2019

Date

Engineer's Seal:



7.2 Structural BMP Strategy

7.2.1 Narrative Strategy (Continue description on subsequent pages as necessary)

Describe the general strategy for structural BMP implementation at the project site. For pollutant control BMPs, your description must address the key points outlined in Section 5.1 of the BMP Design Manual, and the type of BMPs selected. For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

Unlined biofiltration structural BMPs are being used to treat the runoff that could not be routed effectively through the dispersion and tree wells to satisfy pollutant control. These BMPS are sized to treat the design capture volume and attenuate the flows from the 100-year storm. For the purposes of hydromodification all the structural BMPs are integrated for both pollutant control and flow control. Upon being treated the runoff is then released piped to the next DMA, running along pervious areas and through tree wells, until it eventually leaves the site to the south.

7.2.2 Structural BMP Summary Table (Complete for all proposed structural BMPs)

- List and provide the information requested below for all pollutant control and hydromodification management BMPs proposed for the project.
- For each BMP listed, complete the Structural BMP Checklist on the next page. Copy the Checklist as many times as needed.

BMP ID #	DMA #	DMA Area (ft²)	Structural BMP Type							Permit # and Sheet #
			Harvest and Use	Infiltration	Unlined Biofiltration	Lined Biofiltration	Flow-thru Treatment	Hydromodification Management[1]	Other	
1.14	1.14	130,569	☐	☐	☒	☐	☐	☐	☐	
10.10	10.10	18,378	☐	☐	☒	☐	☐	☐	☐	
10.11,12,14	10.11,12,14	68,168	☐	☒	☐	☐	☐	☐	☐	
10.13	10.13	27,921	☐	☐	☒	☐	☐	☐	☐	
10.16	10.16	88,898	☐	☐	☒	☐	☐	☐	☐	
10.17	10.17	21,601	☐	☒	☐	☐	☐	☐	☐	
10.19	10.19	23,612	☐	☐	☒	☐	☐	☐	☐	
10.22	10.22	142,029	☐	☐	☒	☐	☐	☐	☐	
2.01	2.01	230,263	☐	☐	☒	☐	☐	☐	☐	
2.06	2.06	777,290	☐	☐	☒	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	
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			☐	☐	☐	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	

Copy and Paste table here for additional BMPs

[1] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.3 Structural BMP Checklist (Complete once for each proposed structural BMP)

Structural BMP ID # 1.14	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 2.06	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.10	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.11,12,14	**Permit # and Sheet #**

BMP Type

Infiltration

☐ Infiltration basin (INF-1)
☒ Bioretention (INF-2)
☐ Permeable pavement (INF-3)

Unlined Biofiltration

☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration

☐ Biofiltration (BF-1)
☐ Nutrient Sensitive Media Design (BF-2)
☐ Proprietary Biofiltration (BF-3)

Harvest and Use

☐ Cistern (HU-1)

Flow-thru Treatment (describe below)

☐ With prior lawful approval to meet earlier PDP requirements
☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
☐ With alternative compliance

Hydromodification Management[3]

☐ Detention pond or vault

☐ **Other** (describe below)

BMP Purpose

☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification
☐ Pre-treatment/forebay for another BMP
☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.13	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.16	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.17	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☒ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☐ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.19	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 10.22	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

Structural BMP ID # 2.01	**Permit # and Sheet #**

BMP Type

Infiltration
- ☐ Infiltration basin (INF-1)
- ☐ Bioretention (INF-2)
- ☐ Permeable pavement (INF-3)

Unlined Biofiltration
- ☒ Biofiltration with partial retention (PR-1)

Lined Biofiltration
- ☐ Biofiltration (BF-1)
- ☐ Nutrient Sensitive Media Design (BF-2)
- ☐ Proprietary Biofiltration (BF-3)

Harvest and Use
- ☐ Cistern (HU-1)

Flow-thru Treatment (describe below)
- ☐ With prior lawful approval to meet earlier PDP requirements
- ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
- ☐ With alternative compliance

Hydromodification Management[3]
- ☐ Detention pond or vault
- ☐ **Other** (describe below)

BMP Purpose
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☒ Combined pollutant control and hydromodification
- ☐ Pre-treatment/forebay for another BMP
- ☐ Other (describe below)

BMP Verification (See BMPDM Section 8.3)

Provide name and contact information for the party responsible to sign BMP verification forms	Shadow Run Ranch, LLC - Ron Deutschendorf / Sherrill Schoepe <wpvr101@yahoo.com>

BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)

BMP Maintenance Category	Cat. 1 ☐	Cat. 2 ☒	Cat. 3 ☐	Cat. 4 ☐
Final owner of BMP	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA	☐ Property Owner	☐ County	☐ Other (describe):

Discussion (As needed; Continue on subsequent pages as necessary)

Copy and Paste table here for additional BMPs

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.4 Storm Water Pollutant Control Worksheet Calculations

- Use this page as a cover sheet for the submittal of any required worksheets below.
- Complete the checklist to identify which BMPDM Appendix B (Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods) worksheets are included with this attachment.
- See BMPDM Appendix B for an explanation of the applicability of individual worksheets and detailed guidance on their completion.

Worksheet	Requirement
☒ Worksheet B.1 Calculation of Design Capture Volume (DCV)	Required
☒ Worksheet B.2 Retention Requirements	Required
☒ Worksheet B.3 BMP Performance	Required
☐ Worksheet B.4 Major Maintenance Intervals for Reduced-sized BMPs	If applicable
☐ Other worksheets	As required

7.5 Identification and Narrative of Receiving Water and Pollutants of Concern

- Complete this sub-attachment *only if flow-thru treatment BMPs are implemented onsite* in lieu of retention or biofiltration BMPs. Unless excepted because of a Prior Lawful Approval[4], PDPs must also participate in an alternative compliance program[5].

A. General Description

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).

B. Water Body Impairments and Priorities

List any 303(d) impaired water bodies[6] 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

C. Identification of Project Site Pollutants

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

[4] See BMPDM Appendix L: Prior Lawful Approval Requirements and Guidance.
[5] See SWQMP Attachment 12 (Alternative Compliance Projects) and BMPDM Appendix J (Offsite Alternative Compliance Requirements and Guidance).
[6] The current list of Section 303(d) impaired water bodies can be found at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	IMP 10.10	IMP 10.11,12,14	IMP 10.13	IMP 10.15	IMP 10.19						unitless
	2	85th Percentile 24-hr Storm Depth	0.90	0.90	0.90	0.90	0.90						inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	15,194	43,830	22,677	17,607	14,464						sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)				16,272	9,148						sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			5,244								sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	3,184	24,338									sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	Yes							yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A				25							#
	19	Average Mature Tree Canopy Diameter				15							ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	18,378	68,168	27,921	33,879	23,612	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.78	0.66	0.76	0.52	0.59	0.00	0.00	0.00	0.00	0.00	unitless
	24	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
	25	Initial Weighted Runoff Factor	0.78	0.66	0.76	0.52	0.59	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	1,075	3,374	1,591	1,321	1,045	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	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
	30	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
	31	Runoff Factor After Dispersion Techniques	0.78	0.66	0.76	0.52	0.59	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	1,075	3,374	1,591	1,321	1,045	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	2,500	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.78	0.66	0.76	0.00	0.59	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	14,335	44,991	21,220	0	13,931	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	2,500	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	1,075	3,374	1,591	0	1,045	0	0	0	0	0	cubic-feet

No Warning Messages

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	IMP 10.10	IMP 10.11,12,14	IMP 10.13	IMP 10.15	IMP 10.19	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.90	0.90	0.90	0.90	0.90	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	C	A	B	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	unitless
	5	Nature of Restriction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	No	No	No	No	No	No	No	No	No	No	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer											in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.100	0.300	0.200	0.300	0.300	0.300	0.300	0.300	0.300	0.300	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	12.7%	27.9%	20.3%	27.9%	27.9%	24.3%	24.3%	24.3%	24.3%	24.3%	percentage
	12	Fraction of DCV Requiring Retention	0.08	0.20	0.14	0.20	0.20	0.17	0.17	0.17	0.17	0.17	ratio
	13	Required Retention Volume	86	675	223	0	209	0	0	0	0	0	cubic-feet

No Warning Messages

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	1	Drainage Basin ID or Name	IMP 10.10	IMP 10.11,12,14	IMP 10.13	IMP 10.15	IMP 10.19	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.100	0.300	0.200	0.300	0.300	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	1,075	3,374	1,591	0	1,045	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated		Vegetated						unitless
	5	Is BMP Impermeably Lined or Unlined?	Unlined	Unlined	Unlined		Unlined						unitless
	6	Does BMP Have an Underdrain?	Underdrain	No Underdrain	Underdrain		Underdrain						unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard		Standard						unitless
	8	Provided Surface Area	1,220	4,020	1,320		1,245						sq-ft
	9	Provided Surface Ponding Depth	6	6	12		12						inches
	10	Provided Soil Media Thickness	21	21	21		21						inches
	11	Provided Gravel Thickness (Total Thickness)	12	12	16		12						inches
	12	Underdrain Offset	3		3		3						inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.50		0.50		0.60						inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	61	603	132	0	187	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.40	0.00	0.40	0.00	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.25	16.05	2.25	0.00	2.25	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.27	1.77	0.24	0.00	0.40	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	23	54	11	0	8	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.52	1.00	0.64	0.00	0.98	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	554	3,374	1,021	0	1,023	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	521	0	570	0	22	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0113	0.0000	0.0128	0.0000	0.0176	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.40	0.00	0.42	0.00	0.61	0.00	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.40	0.00	0.42	0.00	0.61	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	2.41	0.00	2.52	0.00	3.67	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	13.80	0.00	21.40	0.00	19.80	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	12	20	19	0	13	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	28	0	35	0	22	0	0	0	0	0	hours
	40	Total Depth Biofiltered	16.21	0.00	23.92	0.00	23.47	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	782	0	855	0	33	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	782	0	855	0	33	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	391	0	428	0	17	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	391	0	428	0	17	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**n/a**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*ii*	*iii*	*iv*	*vi*	*vii*	*viii*	*ix*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DB 1.12	DB 1.13	IMP 1.14					unitless
	2	85th Percentile 24-hr Storm Depth	0.90	0.90	0.90					inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			14,566					sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)								sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)								sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			116,003					sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)								sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)								sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)								sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	Yes	Yes						yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	34,922	7,304						sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)								sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)								sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)	547,307	91,132						sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)								sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)								sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)								sq-ft
	18	Number of Tree Wells Proposed per SD-A								#
	19	Average Mature Tree Canopy Diameter								ft
	20	Number of Rain Barrels Proposed per SD-E								#
	21	Average Rain Barrel Size								gal
Initial Runoff Factor Calculation	22	Total Tributary Area	582,229	98,437	130,569	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	0.19	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.15	0.16	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.15	0.16	0.19	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	6,550	1,181	1,861	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	34,922	7,304	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	547,307	91,132	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	0.10	0.10	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	0.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	0.00	0.19	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	0	0	1,861	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.00	0.00	0.19	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	0	0	24,808	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	6,550	1,181	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	0	0	1,861	0	0	0	0	cubic-feet

No Warning Messages

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	ii	iii	iv	vi	vii	viii	ix	Units
Basic Analysis	1	Drainage Basin ID or Name	DB 1.12	DB 1.13	IMP 1.14	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.90	0.90	0.90	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	unitless
	5	Nature of Restriction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	No	No	No	No	No	No	No	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer								in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.300	0.300	0.300	0.300	0.300	0.300	0.300	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	27.9%	27.9%	27.9%	24.3%	24.3%	24.3%	24.3%	percentage
	12	Fraction of DCV Requiring Retention	0.20	0.20	0.20	0.17	0.17	0.17	0.17	ratio
	13	Required Retention Volume	0	0	372	0	0	0	0	cubic-feet

No Warning Messages

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	*ii*	*iii*	*iv*	*vi*	*vii*	*viii*	*ix*	Units
BMP Inputs	1	Drainage Basin ID or Name	DB 1.12	DB 1.13	IMP 1.14	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.300	0.300	0.300	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	0	0	1,861	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Unvegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	5	Is BMP Impermeably Lined or Unlined?	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	unitless
	6	Does BMP Have an Underdrain?	No Underdrain	No Underdrain	Underdrain	No Underdrain	No Underdrain	No Underdrain	No Underdrain	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless
	8	Provided Surface Area			3,125					sq-ft
	9	Provided Surface Ponding Depth			6					inches
	10	Provided Soil Media Thickness			21					inches
	11	Provided Gravel Thickness (Total Thickness)			12					inches
	12	Underdrain Offset			3					inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)			1.00					inches
	14	Specialized Soil Media Filtration Rate								in/hr
	15	Specialized Soil Media Pore Space for Retention								unitless
	16	Specialized Soil Media Pore Space for Biofiltration								unitless
	17	Specialized Gravel Media Pore Space								unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	469	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	1.00	1.00	0.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.40	0.25	0.05	0.25	0.25	0.25	0.25	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.40	0.40	0.00	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	0.00	0.00	2.25	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.00	0.00	0.57	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	0	0	8	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.00	0.00	1.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	0	0	1,861	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0000	0.0000	0.0452	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.00	0.00	0.62	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.00	0.00	0.62	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	0.00	0.00	3.75	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	0.00	0.00	1.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.00	0.00	0.20	0.00	0.00	0.00	0.00	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.00	0.00	0.40	0.00	0.00	0.00	0.00	unitless
	37	Effective Depth of Biofiltration Storage	0.00	0.00	13.80	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	0	0	6	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	0	0	15	0	0	0	0	hours
	40	Total Depth Biofiltered	0.00	0.00	17.55	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	0	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	0	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	0	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	0	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	0.00	0.00	1.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**n/a**	**n/a**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DB 2.04	IMP-10.21	IMP-10.16	IMP-10.17	IMP-10.18	IMP-10.22	DB 2.01	DB 2.02	IMP 2.06	Large Lot	unitless
	2	85th Percentile 24-hr Storm Depth	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			34,002	12,975		82,749	13,230		63,786		sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			54,896	8,626		59,280			713,504	10,632	sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)							217,033				sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	47,575	18,231			12,921			34,496		13,200	sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)	830,343	11,724			10,669			510,422		15,954	sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A		14			10		18			5	#
	19	Average Mature Tree Canopy Diameter		15			15		15			15	ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	877,918	29,955	88,898	21,601	23,590	142,029	230,263	544,918	777,290	39,786	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	0.41	0.58	0.00	0.57	0.27	0.00	0.17	0.10	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.14	0.59	0.00	0.00	0.54	0.00	0.00	0.15	0.00	0.46	unitless
	25	Initial Weighted Runoff Factor	0.14	0.59	0.41	0.58	0.54	0.57	0.27	0.15	0.17	0.36	unitless
	26	Initial Design Capture Volume	9,218	1,326	2,734	940	955	6,072	4,663	6,130	9,910	1,074	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	47,575	18,231	0	0	12,921	0	0	34,496	0	13,200	sq-ft
	28	Total Pervious Dispersion Area	830,343	11,724	0	0	10,669	0	0	510,422	0	15,954	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	0.10	1.60	n/a	n/a	1.20	n/a	n/a	0.10	n/a	0.80	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	0.00	0.41	0.58	0.00	0.57	0.27	0.00	0.17	0.03	unitless
	32	Design Capture Volume After Dispersion Techniques	0	0	2,734	940	0	6,072	4,663	0	9,910	90	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	1,400	0	0	1,000	0	1,800	0	0	500	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.00	0.00	0.41	0.58	0.00	0.57	0.17	0.00	0.17	0.00	unitless
	36	Final Effective Tributary Area	0	0	36,448	12,529	0	80,957	39,145	0	132,139	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	9,218	2,726	0	0	1,955	0	1,800	6,130	0	1,484	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	0	0	2,734	940	0	6,072	2,863	0	9,910	0	cubic-feet

No Warning Messages

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	DB 2.04	IMP-10.21	IMP-10.16	IMP-10.17	IMP-10.18	IMP-10.22	DB 2.01	DB 2.02	IMP 2.06	Large Lot	unitless
	2	85th Percentile Rainfall Depth	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	unitless
	5	Nature of Restriction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	No	No	No	No	No	No	No	No	No	No	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer											in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	percentage
	12	Fraction of DCV Requiring Retention	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	ratio
	13	Required Retention Volume	0	0	547	188	0	1214	573	0	1982	0	cubic-feet

No Warning Messages

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	1	Drainage Basin ID or Name	DB 2.04	IMP-10.21	IMP-10.16	IMP-10.17	IMP-10.18	IMP-10.22	DB 2.01	DB 2.02	IMP 2.06	Large Lot	sq-ft
	2	Design Infiltration Rate Recommended	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	in/hr
	3	Design Capture Volume Tributary to BMP	0	0	2,734	940	0	6,072	2,863	0	9,910	0	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Unvegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	5	Is BMP Impermeably Lined or Unlined?	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	Unlined	unitless
	6	Does BMP Have an Underdrain?	No Underdrain	No Underdrain	Underdrain	No Underdrain	No Underdrain	Underdrain	Underdrain	No Underdrain	No Underdrain	No Underdrain	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless
	8	Provided Surface Area			3,500	1,100		6,960	1,740		10,344	400	sq-ft
	9	Provided Surface Ponding Depth			9	6		18	12		6	6	inches
	10	Provided Soil Media Thickness			21	21		21	21		21		inches
	11	Provided Gravel Thickness (Total Thickness)			12	12		12	30		12		inches
	12	Underdrain Offset			3			3	3				inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)			1.10			1.30	1.00				inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	525	165	0	1,044	261	0	1,552	0	cubic-feet
	19	Ponding Pore Space Available for Retention	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.25	0.40	0.05	0.25	0.25	0.05	0.05	0.25	0.25	0.25	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.40	0.40	0.00	0.40	0.40	0.00	0.00	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	0.00	0.00	2.25	16.05	0.00	2.25	2.25	0.00	16.05	6.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.00	0.00	0.43	1.74	0.00	0.39	0.21	0.00	1.55	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	0	0	8	54	0	8	8	0	54	20	hours
	26	Efficacy of Retention Processes	0.00	0.00	1.00	1.00	0.00	0.96	0.69	0.00	1.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	0	0	2,733	940	0	5,851	1,972	0	9,910	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	0	0	1	0	0	221	891	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0000	0.0000	0.0569	0.0000	0.0000	0.0882	0.0585	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.00	0.00	0.70	0.00	0.00	0.55	1.45	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.00	0.00	0.70	0.00	0.00	0.55	1.45	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	0.00	0.00	4.21	0.00	0.00	3.28	8.71	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.00	0.00	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.00	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.00	0.00	0.40	0.00	0.00	0.40	0.40	0.00	0.00	0.00	unitless
	37	Effective Depth of Biofiltration Storage	0.00	0.00	16.80	0.00	0.00	25.80	27.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	0	0	9	20	0	21	7	0	20	20	hours
	39	Drawdown Time for Effective Biofiltration Depth	0	0	17	0	0	30	15	0	0	0	hours
	40	Total Depth Biofiltered	0.00	0.00	21.01	0.00	0.00	29.08	35.71	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	0	0	1	0	0	332	1,336	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	0	0	1	0	0	332	1,336	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	0	0	0	0	0	166	668	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	0	0	0	0	0	166	668	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**n/a**	**n/a**	**0**	**0**	**n/a**	**0**	**0**	**n/a**	**0**	**n/a**	cubic-feet

No Warning Messages

7.5 Identification and Narrative of Receiving Water and Pollutants of Concern

- Complete this sub-attachment *only if flow-thru treatment BMPs are implemented onsite* in lieu of retention or biofiltration BMPs. Unless excepted because of a Prior Lawful Approval[4], PDPs must also participate in an alternative compliance program[5].

A. General Description

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).

B. Water Body Impairments and Priorities

List any 303(d) impaired water bodies[6] 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

C. Identification of Project Site Pollutants

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

[4] See BMPDM Appendix L: Prior Lawful Approval Requirements and Guidance.
[5] See SWQMP Attachment 12 (Alternative Compliance Projects) and BMPDM Appendix J (Offsite Alternative Compliance Requirements and Guidance).
[6] The current list of Section 303(d) impaired water bodies can be found at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml

8.0 General Requirements

- Completion of this attachment is required for all PDPs subject to hydromodification management requirements (see PDP SWQMP Form Table 5). Do not submit this attachment if exempt from Hydromodification Management requirements. Document the PDP exemption in Attachment 9.
- Submit this cover page and all required Sub-attachments for all structural hydromodification management BMPs proposed for the project.
- Constructed features must fully satisfy the requirements described in applicable BMPDM sections and appendices, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural hydromodification management BMPs documented this attachment must be certified by a registered engineer in Attachment 7, Sub-attachment 7.1.
- Structural BMP Verification. BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)
☒ **8.1: Flow Control Facility Design** (required)[1] Submit using ☒ the Sub-attachment 8.1 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.1.
☒ **8.2: Hydromodification Management Points of Compliance** (required) Complete the table provided in Sub-attachment 8.2.
8.3: Geomorphic Assessment of Receiving Channels 1. Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold)
☐ Yes (provide the information below): Low flow threshold: ☐ 0.1Q2 ☐ 0.3Q2 ☐ 0.5Q2
Title: Date: Preparer: .
Submit using ☐ the Sub-attachment 8.3 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.3.
8.4: Vector Control Plan (required if BMPs will not drain in less than 96 hours) ☐ Included with this attachment ☒ Not required

[1] Including Structural BMP Drawdown Calculations and Overflow Design Summary. See BMPDM Chapter 6 and Appendix G for additional design guidance.

8.1 Flow Control Facility Design

Insert Flow Control Facility Design behind this cover page or submit as a separate stand-alone document labeled Sub-attachment 8.1.
See attached SDHM continuous modeling

SDHM 3.1

PROJECT REPORT

IMP 1.14

General Model Information

Project Name:	4201-SDHM-1.14 dwys and grove lots 43-44
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

1.14 - Existing Area

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	2.5
A,NatVeg,Steep	0.5
Pervious Total	3

Impervious Land Use	acre
Impervious Total	0
Basin Total	3

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

1.14 - dwys - grove

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	2.17
A,NatVeg,Steep	0.5
Pervious Total	2.67

Impervious Land Use	acre
IMPERVIOUS-MOD	0.33
Impervious Total	0.33
Basin Total	3

Element Flows To:

Surface	Interflow	Groundwater
Surface ration 1.14	Surface ration 1.14	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 1.14

Bottom Length:	156.25 ft.
Bottom Width:	20.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	27.086
Total Volume Through Riser (ac-ft.):	8.502
Total Volume Through Facility (ac-ft.):	44.377
Percent Infiltrated:	61.04
Total Precip Applied to Facility:	3.754
Total Evap From Facility:	2.826
Underdrain used	
Underdrain Diameter (feet):	0.25
Orifice Diameter (in.):	1
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	8.789
Total Outflow (ac-ft.):	44.377
Percent Through Underdrain:	19.81
Discharge Structure	
Riser Height:	2 ft.
Riser Diameter:	6 in.
Orifice 1 Diameter:	0.9 in. Elevation:0.5 ft.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
895.25	0.0717	0.0000	0.0000	0.0000
895.32	0.0717	0.0016	0.0000	0.0000
895.40	0.0717	0.0032	0.0000	0.0000
895.47	0.0717	0.0048	0.0000	0.0000
895.55	0.0717	0.0064	0.0000	0.0000
895.62	0.0717	0.0080	0.0000	0.0000
895.70	0.0717	0.0096	0.0000	0.0053
895.77	0.0717	0.0112	0.0000	0.0089
895.84	0.0717	0.0128	0.0000	0.0113
895.92	0.0717	0.0144	0.0000	0.0171
895.99	0.0717	0.0160	0.0000	0.0207
896.07	0.0717	0.0176	0.0000	0.0217
896.14	0.0717	0.0192	0.0000	0.0217
896.21	0.0717	0.0208	0.0000	0.0217
896.29	0.0717	0.0223	0.0000	0.0217
896.36	0.0717	0.0239	0.0000	0.0217
896.44	0.0717	0.0255	0.0000	0.0217
896.51	0.0717	0.0271	0.0000	0.0217

896.59	0.0717	0.0287	0.0014	0.0217
896.66	0.0717	0.0303	0.0021	0.0217
896.73	0.0717	0.0319	0.0040	0.0217
896.81	0.0717	0.0335	0.0050	0.0217
896.88	0.0717	0.0351	0.0065	0.0217
896.96	0.0717	0.0367	0.0072	0.0217
897.03	0.0717	0.0389	0.0084	0.0217
897.10	0.0717	0.0411	0.0089	0.0217
897.18	0.0717	0.0433	0.0099	0.0217
897.25	0.0717	0.0456	0.0104	0.0217
897.33	0.0717	0.0478	0.0112	0.0217
897.40	0.0717	0.0500	0.0112	0.0217
897.48	0.0717	0.0522	0.0116	0.0217
897.55	0.0717	0.0544	0.0128	0.0217
897.62	0.0717	0.0566	0.0143	0.0217
897.70	0.0717	0.0588	0.0159	0.0217
897.77	0.0717	0.0610	0.0175	0.0217
897.85	0.0717	0.0632	0.0190	0.0217
897.92	0.0717	0.0654	0.0204	0.0217
897.99	0.0717	0.0676	0.0217	0.0217
898.00	0.0717	0.0678	0.0429	0.0217

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0717	0.0678	0.0000	0.3678	0.0004
2.8242	0.0729	0.0732	0.0000	0.3678	0.0007
2.8984	0.0741	0.0786	0.0000	0.4577	0.0011
2.9725	0.0754	0.0842	0.0000	0.4756	0.0015
3.0467	0.0766	0.0898	0.0000	0.4935	0.0018
3.1209	0.0778	0.0955	0.0000	0.5114	0.0022
3.1951	0.0790	0.1013	0.0000	0.5293	0.0026
3.2692	0.0802	0.1072	0.0030	0.5472	0.0029
3.3434	0.0815	0.1132	0.0067	0.5651	0.0033
3.4176	0.0827	0.1193	0.0090	0.5829	0.0037
3.4918	0.0839	0.1255	0.0108	0.6008	0.0041
3.5659	0.0852	0.1318	0.0124	0.6187	0.0044
3.6401	0.0864	0.1382	0.0137	0.6366	0.0048
3.7143	0.0877	0.1446	0.0150	0.6545	0.0052
3.7885	0.0889	0.1512	0.0161	0.6724	0.0056
3.8626	0.0902	0.1578	0.0172	0.6903	0.0060
3.9368	0.0915	0.1645	0.0182	0.7081	0.0064
4.0110	0.0927	0.1714	0.0192	0.7260	0.0067
4.0852	0.0940	0.1783	0.0201	0.7439	0.0071
4.1593	0.0953	0.1853	0.0210	0.7618	0.0075
4.2335	0.0966	0.1924	0.0218	0.7797	0.0079
4.3077	0.0978	0.1996	0.0226	0.7976	0.0083
4.3819	0.0991	0.2070	0.0234	0.8155	0.0087
4.4560	0.1004	0.2144	0.0241	0.8333	0.0091
4.5302	0.1017	0.2218	0.0249	0.8512	0.0095
4.6044	0.1030	0.2294	0.0256	0.8691	0.0099
4.6786	0.1043	0.2371	0.0263	0.8870	0.0103
4.7527	0.1056	0.2449	0.0277	0.9049	0.0106
4.8269	0.1069	0.2528	0.1385	0.9228	0.0110
4.9011	0.1083	0.2608	0.2973	0.9407	0.0114
4.9753	0.1096	0.2689	0.4006	0.9585	0.0118
5.0495	0.1109	0.2770	0.4604	0.9764	0.0122
5.1236	0.1122	0.2853	0.5114	0.9943	0.0126
5.1978	0.1136	0.2937	0.5576	1.0122	0.0131

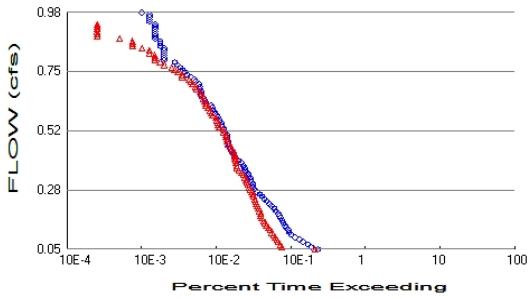
5.2720	0.1149	0.3022	0.6001	1.0301	0.0135
5.3462	0.1162	0.3107	0.6398	1.0480	0.0139
5.4203	0.1176	0.3194	0.6771	1.0659	0.0143
5.4945	0.1189	0.3282	0.7123	1.0837	0.0147
5.5687	0.1203	0.3370	0.7459	1.1016	0.0151
5.6429	0.1216	0.3460	0.7780	1.1195	0.0155
5.7170	0.1230	0.3551	0.8088	1.1374	0.0159
5.7912	0.1244	0.3643	0.8385	1.1553	0.0163
5.8654	0.1257	0.3735	0.8671	1.1732	0.0167
5.9396	0.1271	0.3829	0.8948	1.1911	0.0172
6.0137	0.1285	0.3924	0.9217	1.2089	0.0176
6.0879	0.1299	0.4020	0.9478	1.2268	0.0180
6.1621	0.1312	0.4117	0.9732	1.2447	0.0184
6.2363	0.1326	0.4214	0.9979	1.2626	0.0188
6.3104	0.1340	0.4313	1.0221	1.2805	0.0193
6.3846	0.1354	0.4413	1.0456	1.2984	0.0197
6.4588	0.1368	0.4514	1.0687	1.3163	0.0201
6.5330	0.1382	0.4616	1.0912	1.3341	0.0205
6.6071	0.1396	0.4719	1.1133	1.3520	0.0210
6.6813	0.1410	0.4823	1.1350	1.3699	0.0214
6.7500	0.1424	0.4921	1.1562	1.3865	0.0021

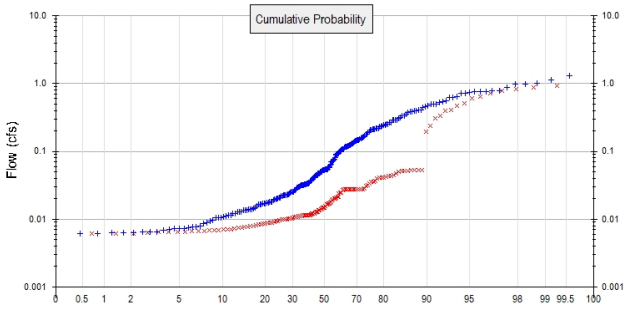
Surface ration 1.14

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 1.14

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 2.67
Total Impervious Area: 0.33

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.501416
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.049646
5 year	0.456721
10 year	0.741646
25 year	0.878465

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0501	909	832	91	Pass
0.0596	746	300	40	Pass
0.0690	668	285	42	Pass
0.0784	576	267	46	Pass
0.0879	523	258	49	Pass
0.0973	449	243	54	Pass
0.1067	401	232	57	Pass
0.1161	378	221	58	Pass
0.1256	362	209	57	Pass
0.1350	344	198	57	Pass
0.1444	332	186	56	Pass
0.1539	314	179	57	Pass
0.1633	302	171	56	Pass
0.1727	289	161	55	Pass
0.1821	278	155	55	Pass
0.1916	267	155	58	Pass
0.2010	251	151	60	Pass
0.2104	237	147	62	Pass
0.2199	220	141	64	Pass
0.2293	205	137	66	Pass
0.2387	191	134	70	Pass
0.2481	175	130	74	Pass
0.2576	162	125	77	Pass
0.2670	151	122	80	Pass
0.2764	139	119	85	Pass
0.2859	131	115	87	Pass
0.2953	123	109	88	Pass
0.3047	123	105	85	Pass
0.3141	117	101	86	Pass
0.3236	115	99	86	Pass
0.3330	112	97	86	Pass
0.3424	107	91	85	Pass
0.3519	101	86	85	Pass
0.3613	97	80	82	Pass
0.3707	96	76	79	Pass
0.3801	92	74	80	Pass
0.3896	86	73	84	Pass
0.3990	79	72	91	Pass
0.4084	72	71	98	Pass
0.4178	70	71	101	Pass
0.4273	67	70	104	Pass
0.4367	64	66	103	Pass
0.4461	62	64	103	Pass
0.4556	59	62	105	Pass
0.4650	58	58	100	Pass
0.4744	57	55	96	Pass
0.4838	56	55	98	Pass
0.4933	56	53	94	Pass
0.5027	55	53	96	Pass
0.5121	52	50	96	Pass
0.5216	50	49	98	Pass
0.5310	48	44	91	Pass
0.5404	47	42	89	Pass

0.5498	46	42	91	Pass
0.5593	44	40	90	Pass
0.5687	42	39	92	Pass
0.5781	40	35	87	Pass
0.5876	38	34	89	Pass
0.5970	36	33	91	Pass
0.6064	35	31	88	Pass
0.6158	34	29	85	Pass
0.6253	29	29	100	Pass
0.6347	28	28	100	Pass
0.6441	27	27	100	Pass
0.6536	25	26	104	Pass
0.6630	25	25	100	Pass
0.6724	25	24	96	Pass
0.6818	24	22	91	Pass
0.6913	24	21	87	Pass
0.7007	23	19	82	Pass
0.7101	21	18	85	Pass
0.7196	20	17	85	Pass
0.7290	18	14	77	Pass
0.7384	16	14	87	Pass
0.7478	15	12	80	Pass
0.7573	14	11	78	Pass
0.7667	13	10	76	Pass
0.7761	12	8	66	Pass
0.7856	11	7	63	Pass
0.7950	8	6	75	Pass
0.8044	8	6	75	Pass
0.8138	8	6	75	Pass
0.8233	8	5	62	Pass
0.8327	8	5	62	Pass
0.8421	8	4	50	Pass
0.8516	7	3	42	Pass
0.8610	7	3	42	Pass
0.8704	7	3	42	Pass
0.8798	6	2	33	Pass
0.8893	6	1	16	Pass
0.8987	6	1	16	Pass
0.9081	6	1	16	Pass
0.9176	6	1	16	Pass
0.9270	6	1	16	Pass
0.9364	6	1	16	Pass
0.9458	5	0	0	Pass
0.9553	5	0	0	Pass
0.9647	5	0	0	Pass
0.9741	5	0	0	Pass
0.9836	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

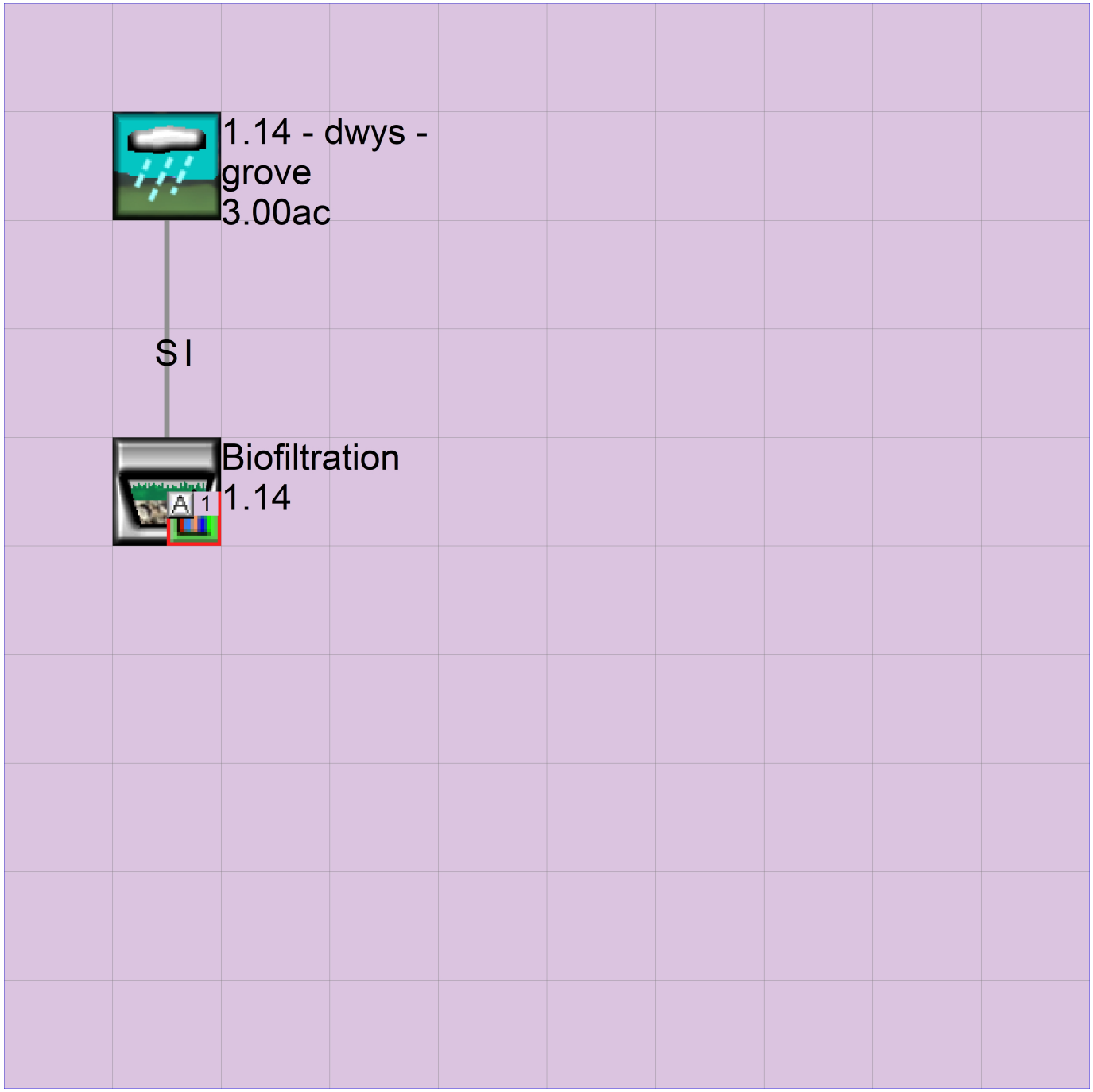
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



1.14 -
Existing Area
3.00ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-1.14 dwys and grove lots 43-44.wdm
MESSU       25   Mit4201-SDHM-1.14 dwys and grove lots 43-44.MES
            27   Mit4201-SDHM-1.14 dwys and grove lots 43-44.L61
            28   Mit4201-SDHM-1.14 dwys and grove lots 43-44.L62
            30   POC4201-SDHM-1.14 dwys and grove lots 43-441.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      PERLND       3
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ration  1.14        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
    3      A,NatVeg,Steep         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
```

```
    2         0    0    1    0    0    0    0    0    0    0    0    0
    3         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
    3         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
    3         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
    2              0       3.8      0.07        80       0.1        2.5      0.915
    3              0       3.5     0.045        75      0.15        2.5      0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
    3              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                          ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
    3              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
    3       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
    3       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS      GWVS
    2              0         0      0.01         0       0.4       0.01         0
    3              0         0      0.01         0       0.4       0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
1.14 - dwys - grove***
PERLND   2                        2.17     RCHRES   1      2
PERLND   2                        2.17     RCHRES   1      3
PERLND   3                         0.5     RCHRES   1      2
PERLND   3                         0.5     RCHRES   1      3
IMPLND   2                        0.33     RCHRES   1      5

******Routing******
RCHRES   1                           1     RCHRES   2      8
PERLND   2                        2.17     COPY     1     12
PERLND   3                         0.5     COPY     1     12
IMPLND   2                        0.33     COPY     1     15
PERLND   2                        2.17     COPY     1     13
PERLND   3                         0.5     COPY     1     13
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK
```

```
RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<-----------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                             ***
    1     Surface ration  -017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0    895.25       0.0       0.0
    2             2      0.03       0.0    895.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  3185.89
```

```
*** Compute remaining available pore space
  GENER   2                                 vpo2            =  v2m2
  GENER   2                                 vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                                 vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                                 v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   39    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.071740  0.000000  0.000000  0.000000
  0.074176  0.071740  0.001596  0.000000  0.000000
  0.148352  0.071740  0.003193  0.000000  0.000000
  0.222527  0.071740  0.004789  0.000000  0.000000
  0.296703  0.071740  0.006386  0.000000  0.000000
  0.370879  0.071740  0.007982  0.000000  0.000000
  0.445055  0.071740  0.009578  0.000000  0.005252
  0.519231  0.071740  0.011175  0.000000  0.008916
  0.593407  0.071740  0.012771  0.000000  0.011268
  0.667582  0.071740  0.014368  0.000000  0.017132
  0.741758  0.071740  0.015964  0.000000  0.020685
  0.815934  0.071740  0.017561  0.000000  0.021701
  0.890110  0.071740  0.019157  0.000000  0.021701
  0.964286  0.071740  0.020753  0.000000  0.021701
  1.038462  0.071740  0.022350  0.000000  0.021701
  1.112637  0.071740  0.023946  0.000000  0.021701
  1.186813  0.071740  0.025543  0.000000  0.021701
  1.260989  0.071740  0.027139  0.000000  0.021701
  1.335165  0.071740  0.028735  0.001375  0.021701
  1.409341  0.071740  0.030332  0.002062  0.021701
  1.483516  0.071740  0.031928  0.004004  0.021701
  1.557692  0.071740  0.033525  0.004975  0.021701
  1.631868  0.071740  0.035121  0.006459  0.021701
  1.706044  0.071740  0.036718  0.007202  0.021701
  1.780220  0.071740  0.038926  0.008366  0.021701
  1.854396  0.071740  0.041134  0.008949  0.021701
  1.928571  0.071740  0.043343  0.009918  0.021701
  2.002747  0.071740  0.045551  0.010403  0.021701
  2.076923  0.071740  0.047759  0.011248  0.021701
  2.151099  0.071740  0.049968  0.011248  0.021701
  2.225275  0.071740  0.052176  0.011564  0.021701
  2.299451  0.071740  0.054385  0.012791  0.021701
  2.373626  0.071740  0.056593  0.014330  0.021701
  2.447802  0.071740  0.058801  0.015930  0.021701
  2.521978  0.071740  0.061010  0.017488  0.021701
  2.596154  0.071740  0.063218  0.018971  0.021701
  2.670330  0.071740  0.065426  0.020377  0.021701
  2.744505  0.071740  0.067635  0.021740  0.021701
  2.750000  0.071740  0.073138  0.042907  0.021701
  END FTABLE  2
  FTABLE      1
   55    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.071740  0.000000  0.000000  0.000000  0.000364
  0.074176  0.072943  0.005366  0.000000  0.367753  0.000364
  0.148352  0.074149  0.010821  0.000000  0.457743  0.000729
  0.222527  0.075360  0.016366  0.000000  0.475629  0.001095
  0.296703  0.076574  0.022001  0.000000  0.493515  0.001462
  0.370879  0.077793  0.027726  0.000000  0.511401  0.001831
  0.445055  0.079016  0.033542  0.000000  0.529286  0.002201
  0.519231  0.080243  0.039449  0.003048  0.547172  0.002572
  0.593407  0.081474  0.045446  0.006718  0.565058  0.002944
```

```
  0.667582  0.082708  0.051536  0.008998  0.582944  0.003318
  0.741758  0.083947  0.057716  0.010808  0.600830  0.003693
  0.815934  0.085190  0.063989  0.012355  0.618715  0.004069
  0.890110  0.086437  0.070355  0.013729  0.636601  0.004446
  0.964286  0.087688  0.076813  0.014977  0.654487  0.004824
  1.038462  0.088943  0.083364  0.016130  0.672373  0.005204
  1.112637  0.090202  0.090008  0.017205  0.690258  0.005585
  1.186813  0.091466  0.096745  0.018216  0.708144  0.005967
  1.260989  0.092733  0.103577  0.019175  0.726030  0.006350
  1.335165  0.094004  0.110503  0.020088  0.743916  0.006735
  1.409341  0.095279  0.117523  0.020961  0.761802  0.007121
  1.483516  0.096559  0.124638  0.021799  0.779687  0.007508
  1.557692  0.097842  0.131847  0.022606  0.797573  0.007896
  1.631868  0.099129  0.139153  0.023385  0.815459  0.008285
  1.706044  0.100421  0.146554  0.024139  0.833345  0.008676
  1.780220  0.101716  0.154050  0.024871  0.851230  0.009068
  1.854396  0.103016  0.161644  0.025581  0.869116  0.009461
  1.928571  0.104319  0.169333  0.026272  0.887002  0.009855
  2.002747  0.105627  0.177120  0.027710  0.904888  0.010251
  2.076923  0.106939  0.185003  0.138489  0.922773  0.010648
  2.151099  0.108254  0.192984  0.297253  0.940659  0.011046
  2.225275  0.109574  0.201063  0.400592  0.958545  0.011445
  2.299451  0.110898  0.209240  0.460372  0.976431  0.011845
  2.373626  0.112226  0.217515  0.511390  0.994317  0.012247
  2.447802  0.113558  0.225889  0.557595  1.012202  0.012650
  2.521978  0.114893  0.234362  0.600142  1.030088  0.013054
  2.596154  0.116233  0.242934  0.639789  1.047974  0.013459
  2.670330  0.117577  0.251605  0.677062  1.065860  0.013866
  2.744505  0.118925  0.260377  0.712343  1.083745  0.014274
  2.818681  0.120278  0.269248  0.745925  1.101631  0.014683
  2.892857  0.121634  0.278220  0.778032  1.119517  0.015093
  2.967033  0.122994  0.287293  0.808844  1.137403  0.015504
  3.041209  0.124358  0.296467  0.838508  1.155289  0.015917
  3.115385  0.125726  0.305742  0.867143  1.173174  0.016331
  3.189560  0.127099  0.315119  0.894850  1.191060  0.016746
  3.263736  0.128475  0.324597  0.921714  1.208946  0.017162
  3.337912  0.129855  0.334178  0.947809  1.226832  0.017580
  3.412088  0.131240  0.343862  0.973197  1.244717  0.017999
  3.486264  0.132628  0.353648  0.997932  1.262603  0.018419
  3.560440  0.134021  0.363537  1.022064  1.280489  0.018840
  3.634615  0.135417  0.373530  1.045634  1.298375  0.019262
  3.708791  0.136818  0.383627  1.068679  1.316261  0.019686
  3.782967  0.138222  0.393828  1.091235  1.334146  0.020111
  3.857143  0.139631  0.404133  1.113330  1.352032  0.020537
  3.931319  0.141044  0.414542  1.134992  1.369918  0.020964
  4.000000  0.142355  0.424274  1.156246  1.386479  0.021361
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
```

```
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 2.01 &
18 Tree Wells

General Model Information

Project Name:	4201-SDHM-2.01 Trees and basin
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	12/17/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

2.01 - Existing

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Steep	1
C,NatVeg,Steep	4.29
Pervious Total	5.29
Impervious Land Use	acre
Impervious Total	0
Basin Total	5.29

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.18 - Streets

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Steep	1
C,NatVeg,Steep	3.986
Pervious Total	4.986
Impervious Land Use	acre
IMPERVIOUS-MOD	0.304
Impervious Total	0.304
Basin Total	5.29

Element Flows To:

Surface	Interflow	Groundwater
Surface 8 Tree Wells	Surface 8 Tree Wells	

Mitigated Routing

18 Tree Wells

Bottom Length:	18.00 ft.
Bottom Width:	100.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2.75
Material type for second layer:	ESM
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	38.964
Total Volume Through Riser (ac-ft.):	49.016
Total Volume Through Facility (ac-ft.):	87.98
Percent Infiltrated:	44.29
Total Precip Applied to Facility:	3.611
Total Evap From Facility:	2.403
Underdrain not used	
Discharge Structure	
Riser Height:	0.167 ft.
Riser Diameter:	60 in.
Element Flows To:	
Outlet 1	Outlet 2
Surface IMP 2.01	

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0975	0.0000	0.0000	0.0000
0.0403	0.0971	0.0005	0.0000	0.0000
0.0806	0.0963	0.0010	0.0000	0.0000
0.1209	0.0954	0.0015	0.0000	0.0000
0.1612	0.0946	0.0021	0.0000	0.0000
0.2015	0.0937	0.0026	0.0000	0.0000
0.2418	0.0929	0.0031	0.0000	0.0000
0.2821	0.0921	0.0037	0.0000	0.0000
0.3224	0.0912	0.0043	0.0000	0.0000
0.3627	0.0904	0.0048	0.0014	0.0014
0.4030	0.0896	0.0054	0.0018	0.0018
0.4433	0.0887	0.0060	0.0023	0.0023
0.4836	0.0879	0.0066	0.0029	0.0029
0.5239	0.0871	0.0072	0.0035	0.0035
0.5642	0.0863	0.0078	0.0043	0.0043
0.6045	0.0855	0.0084	0.0051	0.0051
0.6447	0.0846	0.0090	0.0061	0.0061
0.6850	0.0838	0.0097	0.0072	0.0072
0.7253	0.0830	0.0103	0.0084	0.0084
0.7656	0.0822	0.0110	0.0097	0.0097
0.8059	0.0814	0.0116	0.0112	0.0112
0.8462	0.0806	0.0123	0.0128	0.0128
0.8865	0.0798	0.0130	0.0146	0.0146
0.9268	0.0790	0.0136	0.0166	0.0166
0.9671	0.0782	0.0143	0.0175	0.0175

1.0074	0.0774	0.0150	0.0177	0.0177
1.0477	0.0766	0.0158	0.0179	0.0179
1.0880	0.0759	0.0165	0.0181	0.0181
1.1283	0.0751	0.0172	0.0184	0.0184
1.1686	0.0743	0.0179	0.0186	0.0186
1.2089	0.0735	0.0187	0.0188	0.0188
1.2492	0.0727	0.0195	0.0190	0.0190
1.2895	0.0720	0.0202	0.0193	0.0193
1.3298	0.0712	0.0210	0.0195	0.0195
1.3701	0.0704	0.0218	0.0197	0.0197
1.4104	0.0697	0.0226	0.0199	0.0199
1.4507	0.0689	0.0234	0.0202	0.0202
1.4910	0.0681	0.0242	0.0204	0.0204
1.5313	0.0674	0.0250	0.0206	0.0206
1.5716	0.0666	0.0258	0.0208	0.0208
1.6119	0.0659	0.0267	0.0211	0.0211
1.6522	0.0651	0.0275	0.0213	0.0213
1.6925	0.0644	0.0284	0.0215	0.0215
1.7328	0.0637	0.0292	0.0218	0.0218
1.7731	0.0629	0.0301	0.0220	0.0220
1.8134	0.0622	0.0310	0.0222	0.0222
1.8536	0.0614	0.0319	0.0225	0.0225
1.8939	0.0607	0.0328	0.0227	0.0227
1.9342	0.0600	0.0337	0.0229	0.0229
1.9745	0.0593	0.0346	0.0232	0.0232
2.0148	0.0585	0.0356	0.0234	0.0234
2.0551	0.0578	0.0365	0.0237	0.0237
2.0954	0.0571	0.0374	0.0239	0.0239
2.1357	0.0564	0.0384	0.0241	0.0241
2.1760	0.0557	0.0394	0.0244	0.0244
2.2163	0.0550	0.0404	0.0246	0.0246
2.2566	0.0543	0.0413	0.0249	0.0249
2.2969	0.0535	0.0423	0.0251	0.0251
2.3372	0.0528	0.0433	0.0254	0.0254
2.3775	0.0521	0.0444	0.0256	0.0256
2.4178	0.0514	0.0454	0.0258	0.0258
2.4581	0.0508	0.0464	0.0261	0.0261
2.4984	0.0501	0.0475	0.0263	0.0263
2.5387	0.0494	0.0485	0.0266	0.0266
2.5790	0.0487	0.0496	0.0268	0.0268
2.6193	0.0480	0.0507	0.0271	0.0271
2.6596	0.0473	0.0518	0.0273	0.0273
2.6999	0.0466	0.0529	0.0276	0.0276
2.7402	0.0460	0.0540	0.0278	0.0278
2.7805	0.0453	0.0551	0.0281	0.0281
2.8208	0.0446	0.0562	0.0284	0.0284
2.8611	0.0440	0.0574	0.0286	0.0286
2.9014	0.0433	0.0585	0.0289	0.0289
2.9417	0.0426	0.0597	0.0291	0.0291
2.9820	0.0420	0.0608	0.0294	0.0294
3.0000	0.0413	0.0614	0.0295	0.0295

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0975	0.0614	0.0000	0.2303	0.0003
3.0403	0.0984	0.0653	0.0000	0.2303	0.0005
3.0806	0.0992	0.0693	0.0000	0.2334	0.0008
3.1209	0.1001	0.0733	0.0000	0.2364	0.0010

3.1612	0.1010	0.0774	0.0000	0.2395	0.0013
3.2015	0.1018	0.0814	0.0000	0.2425	0.0016
3.2418	0.1027	0.0856	0.0000	0.2456	0.0018
3.2821	0.1036	0.0897	0.0000	0.2486	0.0021
3.3224	0.1044	0.0939	0.0000	0.2517	0.0024
3.3627	0.1053	0.0981	0.0000	0.2547	0.0026
3.4030	0.1062	0.1024	0.0000	0.2578	0.0029
3.4433	0.1071	0.1067	0.0000	0.2609	0.0032
3.4836	0.1080	0.1110	0.0000	0.2639	0.0034
3.5239	0.1089	0.1154	0.0000	0.2670	0.0037
3.5642	0.1098	0.1198	0.0000	0.2700	0.0040
3.6045	0.1106	0.1242	0.0000	0.2731	0.0042
3.6447	0.1115	0.1287	0.0000	0.2761	0.0044
3.6670	0.1120	0.1312	0.0000	0.2778	0.0019

Surface 8 Tree Wells

Element Flows To:

Outlet 1	Outlet 2
Surface IMP 2.01	18 Tree Wells

IMP 2.01

Bottom Length:	20.00 ft.
Bottom Width:	28.30 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.75
Material type for second layer:	ESM
Material thickness of third layer:	2.5
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	8.552
Total Volume Through Riser (ac-ft.):	27.716
Total Volume Through Facility (ac-ft.):	49.809
Percent Infiltrated:	17.17
Total Precip Applied to Facility:	1.045
Total Evap From Facility:	0.243
Underdrain used	
Underdrain Diameter (feet):	0.33
Orifice Diameter (in.):	1
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	13.541
Total Outflow (ac-ft.):	49.809
Percent Through Underdrain:	27.19
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	12 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
1015.5	0.0597	0.0000	0.0000	0.0000
1015.5	0.0591	0.0003	0.0000	0.0000
1015.6	0.0581	0.0006	0.0000	0.0000
1015.7	0.0570	0.0010	0.0000	0.0000
1015.8	0.0559	0.0013	0.0000	0.0000
1015.8	0.0549	0.0017	0.0000	0.0000
1015.9	0.0539	0.0020	0.0000	0.0009
1016.0	0.0528	0.0024	0.0000	0.0016
1016.1	0.0518	0.0028	0.0000	0.0021
1016.1	0.0508	0.0032	0.0000	0.0032
1016.2	0.0498	0.0036	0.0000	0.0040
1016.3	0.0488	0.0041	0.0000	0.0058
1016.4	0.0478	0.0045	0.0000	0.0060
1016.5	0.0469	0.0050	0.0000	0.0062
1016.5	0.0459	0.0055	0.0000	0.0064
1016.6	0.0450	0.0060	0.0000	0.0066
1016.7	0.0440	0.0065	0.0000	0.0068
1016.8	0.0431	0.0070	0.0000	0.0070
1016.8	0.0422	0.0075	0.0018	0.0072
1016.9	0.0413	0.0081	0.0026	0.0074
1017.0	0.0404	0.0087	0.0045	0.0076

1017.1	0.0395	0.0092	0.0055	0.0078
1017.1	0.0386	0.0099	0.0069	0.0081
1017.2	0.0378	0.0105	0.0076	0.0083
1017.3	0.0369	0.0111	0.0088	0.0085
1017.4	0.0360	0.0118	0.0093	0.0087
1017.5	0.0352	0.0124	0.0103	0.0090
1017.5	0.0344	0.0134	0.0108	0.0092
1017.6	0.0336	0.0144	0.0116	0.0094
1017.7	0.0327	0.0154	0.0121	0.0097
1017.8	0.0319	0.0164	0.0128	0.0099
1017.8	0.0312	0.0175	0.0132	0.0102
1017.9	0.0304	0.0186	0.0139	0.0104
1018.0	0.0296	0.0197	0.0140	0.0107
1018.1	0.0288	0.0208	0.0148	0.0109
1018.1	0.0281	0.0220	0.0160	0.0112
1018.2	0.0274	0.0232	0.0174	0.0114
1018.3	0.0266	0.0244	0.0189	0.0117
1018.4	0.0259	0.0256	0.0203	0.0119
1018.5	0.0252	0.0269	0.0216	0.0122
1018.5	0.0245	0.0282	0.0229	0.0125
1018.6	0.0238	0.0296	0.0241	0.0128
1018.7	0.0231	0.0309	0.0253	0.0130
1018.8	0.0224	0.0323	0.0264	0.0133
1018.8	0.0218	0.0337	0.0274	0.0136
1018.9	0.0211	0.0352	0.0284	0.0139
1019.0	0.0205	0.0367	0.0294	0.0142
1019.1	0.0198	0.0382	0.0304	0.0145
1019.1	0.0192	0.0397	0.0313	0.0148
1019.2	0.0186	0.0413	0.0322	0.0151
1019.3	0.0180	0.0429	0.0331	0.0154
1019.4	0.0174	0.0445	0.0339	0.0157
1019.5	0.0168	0.0462	0.0348	0.0160
1019.5	0.0162	0.0479	0.0356	0.0163
1019.6	0.0157	0.0496	0.0364	0.0166
1019.7	0.0151	0.0514	0.0372	0.0169
1019.8	0.0146	0.0532	0.0379	0.0172
1019.8	0.0140	0.0550	0.0387	0.0176
1019.9	0.0135	0.0569	0.0394	0.0179
1020	0.0130	0.0579	0.0559	0.0180

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
4.5000	0.0597	0.0579	0.0000	0.0777	0.0003
4.5769	0.0608	0.0625	0.0000	0.0777	0.0007
4.6538	0.0619	0.0672	0.0000	0.0806	0.0010
4.7308	0.0630	0.0720	0.0000	0.0835	0.0013
4.8077	0.0641	0.0769	0.0000	0.0864	0.0017
4.8846	0.0652	0.0819	0.0000	0.0893	0.0020
4.9615	0.0663	0.0869	0.0000	0.0921	0.0024
5.0385	0.0675	0.0921	0.0000	0.0950	0.0027
5.1154	0.0687	0.0973	0.0000	0.0979	0.0031
5.1923	0.0698	0.1026	0.0000	0.1008	0.0034
5.2692	0.0710	0.1081	0.0000	0.1037	0.0038
5.3462	0.0722	0.1136	0.0000	0.1065	0.0041
5.4231	0.0734	0.1192	0.0000	0.1094	0.0045
5.5000	0.0746	0.1249	0.0000	0.1123	0.0049
5.5769	0.0758	0.1306	0.2257	0.1152	0.0053
5.6538	0.0770	0.1365	0.6273	0.1181	0.0056

5.7308	0.0783	0.1425	1.0991	0.1209	0.0060
5.8077	0.0795	0.1486	1.5516	0.1238	0.0064
5.8846	0.0808	0.1547	1.9054	0.1267	0.0068
5.9615	0.0820	0.1610	2.1274	0.1296	0.0071
6.0385	0.0833	0.1673	2.3112	0.1325	0.0075
6.1154	0.0846	0.1738	2.4708	0.1353	0.0079
6.1923	0.0859	0.1804	2.6207	0.1382	0.0083
6.2692	0.0872	0.1870	2.7624	0.1411	0.0087
6.3462	0.0885	0.1938	2.8972	0.1440	0.0091
6.4231	0.0898	0.2006	3.0261	0.1469	0.0095
6.5000	0.0912	0.2076	3.1496	0.1497	0.0099
6.5769	0.0925	0.2147	3.2685	0.1526	0.0103
6.6538	0.0939	0.2218	3.3832	0.1555	0.0108
6.7308	0.0952	0.2291	3.4942	0.1584	0.0112
6.8077	0.0966	0.2365	3.6017	0.1613	0.0116
6.8846	0.0980	0.2440	3.7062	0.1641	0.0120
6.9615	0.0994	0.2515	3.8077	0.1670	0.0122
7.0000	0.1001	0.2554	3.9066	0.1685	0.0000

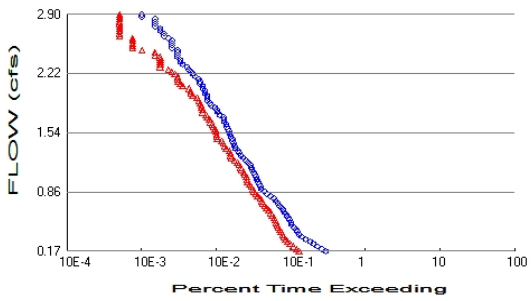
Surface IMP 2.01

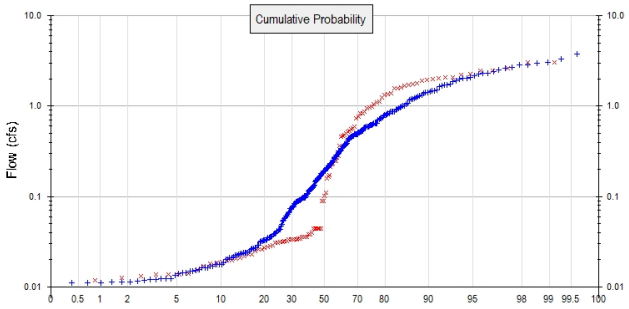
Element Flows To:

Outlet 1	Outlet 2
	IMP 2.01

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 5.29
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 4.986
Total Impervious Area: 0.304

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.730457
5 year	2.483053
10 year	2.902214
25 year	3.337407

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	1.333017
5 year	2.051947
10 year	2.472948
25 year	3.029105

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1730	1166	511	43	Pass
0.2006	1039	469	45	Pass
0.2282	895	429	47	Pass
0.2557	794	387	48	Pass
0.2833	714	357	50	Pass
0.3109	627	337	53	Pass
0.3384	559	318	56	Pass
0.3660	511	305	59	Pass
0.3936	484	291	60	Pass
0.4212	462	279	60	Pass
0.4487	437	268	61	Pass
0.4763	409	261	63	Pass
0.5039	399	252	63	Pass
0.5314	379	244	64	Pass
0.5590	364	234	64	Pass
0.5866	348	222	63	Pass
0.6141	330	214	64	Pass
0.6417	314	201	64	Pass
0.6693	297	187	62	Pass
0.6968	280	177	63	Pass
0.7244	265	166	62	Pass
0.7520	250	161	64	Pass
0.7795	232	154	66	Pass
0.8071	209	141	67	Pass
0.8347	190	133	70	Pass
0.8622	174	128	73	Pass
0.8898	159	120	75	Pass
0.9174	155	117	75	Pass
0.9449	149	110	73	Pass
0.9725	144	104	72	Pass
1.0001	140	102	72	Pass
1.0276	135	100	74	Pass
1.0552	129	95	73	Pass
1.0828	125	92	73	Pass
1.1103	119	87	73	Pass
1.1379	117	84	71	Pass
1.1655	113	80	70	Pass
1.1930	106	76	71	Pass
1.2206	98	69	70	Pass
1.2482	92	63	68	Pass
1.2757	84	61	72	Pass
1.3033	80	61	76	Pass
1.3309	77	59	76	Pass
1.3584	71	54	76	Pass
1.3860	70	51	72	Pass
1.4136	68	49	72	Pass
1.4411	65	47	72	Pass
1.4687	65	41	63	Pass
1.4963	62	40	64	Pass
1.5238	60	40	66	Pass
1.5514	59	39	66	Pass
1.5790	57	38	66	Pass
1.6065	55	36	65	Pass

1.6341	54	35	64	Pass
1.6617	51	33	64	Pass
1.6893	50	32	64	Pass
1.7168	49	30	61	Pass
1.7444	44	29	65	Pass
1.7720	42	26	61	Pass
1.7995	40	26	65	Pass
1.8271	38	25	65	Pass
1.8547	34	25	73	Pass
1.8822	33	24	72	Pass
1.9098	30	23	76	Pass
1.9374	30	22	73	Pass
1.9649	30	19	63	Pass
1.9925	28	18	64	Pass
2.0201	28	18	64	Pass
2.0476	26	17	65	Pass
2.0752	26	14	53	Pass
2.1028	24	13	54	Pass
2.1303	24	12	50	Pass
2.1579	23	12	52	Pass
2.1855	21	12	57	Pass
2.2130	19	11	57	Pass
2.2406	18	10	55	Pass
2.2682	17	9	52	Pass
2.2957	16	7	43	Pass
2.3233	14	7	50	Pass
2.3509	13	7	53	Pass
2.3784	13	7	53	Pass
2.4060	12	7	58	Pass
2.4336	12	6	50	Pass
2.4611	12	6	50	Pass
2.4887	12	4	33	Pass
2.5163	10	3	30	Pass
2.5438	10	3	30	Pass
2.5714	10	3	30	Pass
2.5990	10	3	30	Pass
2.6265	9	3	33	Pass
2.6541	8	2	25	Pass
2.6817	8	2	25	Pass
2.7092	7	2	28	Pass
2.7368	7	2	28	Pass
2.7644	6	2	33	Pass
2.7919	6	2	33	Pass
2.8195	6	2	33	Pass
2.8471	6	2	33	Pass
2.8746	4	2	50	Pass
2.9022	4	2	50	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

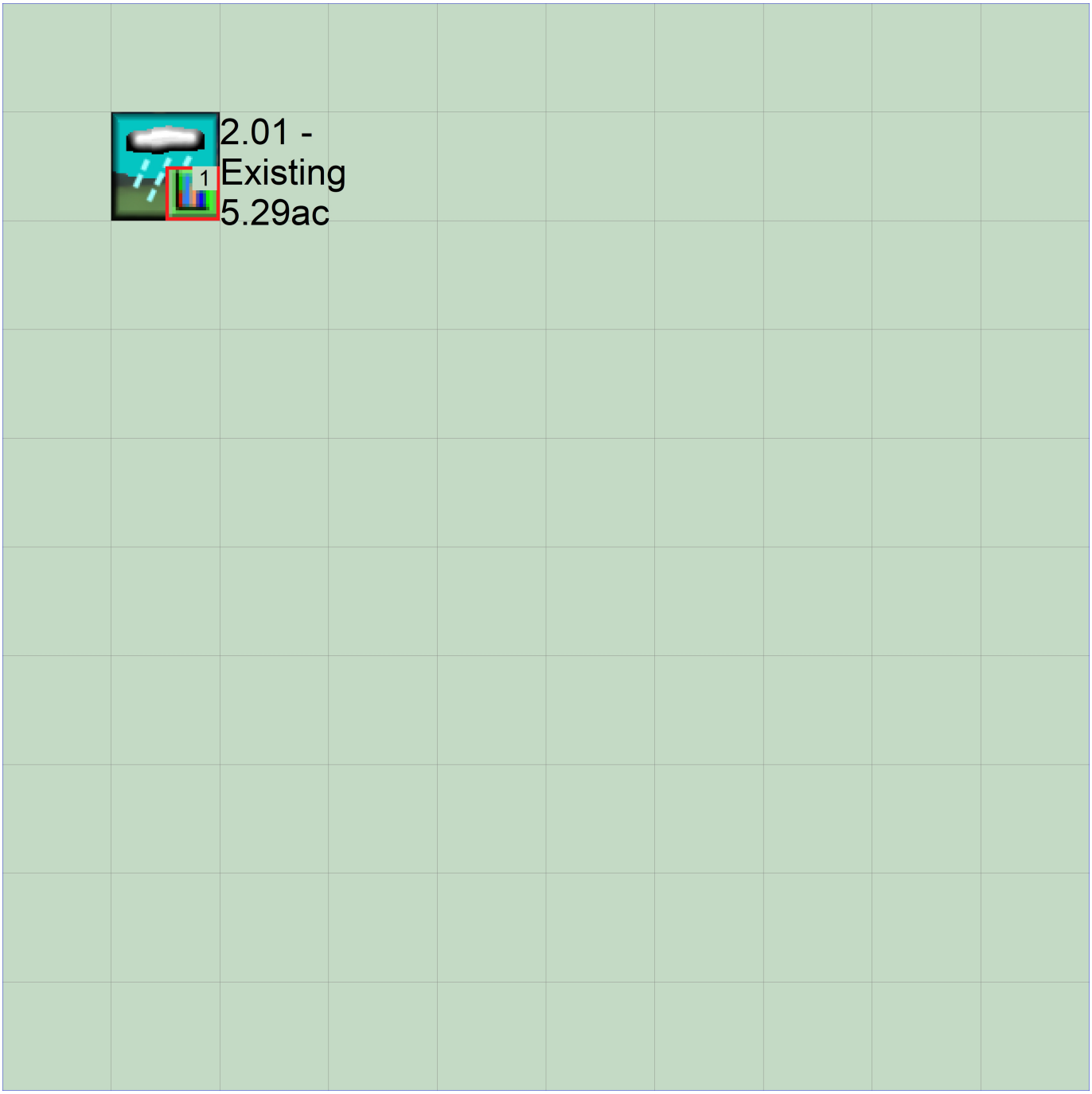
PERLND Changes

No PERLND changes have been made.

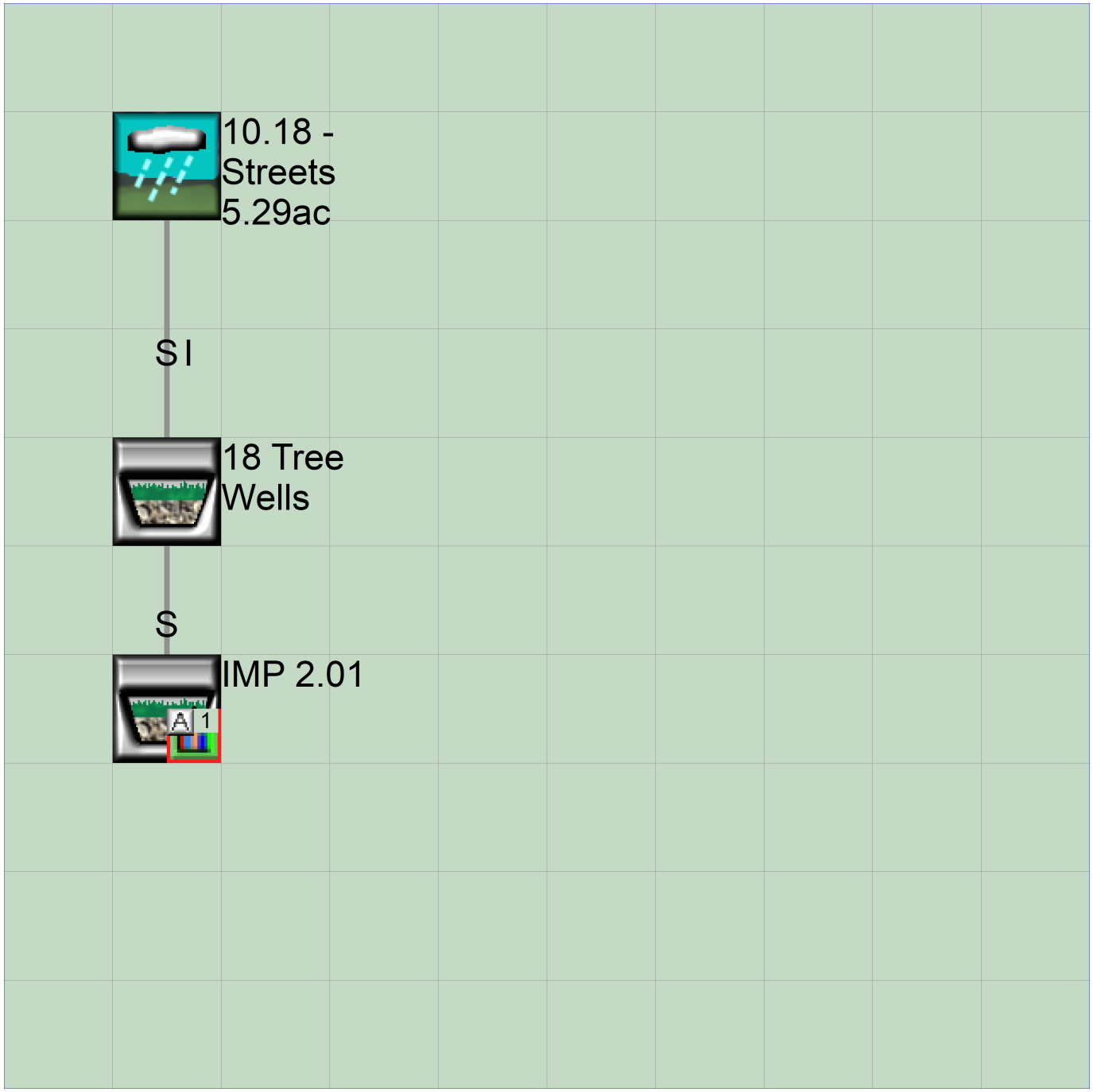
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-2.01 Trees and basin.wdm
MESSU       25   Mit4201-SDHM-2.01 Trees and basin.MES
            27   Mit4201-SDHM-2.01 Trees and basin.L61
            28   Mit4201-SDHM-2.01 Trees and basin.L62
            30   POC4201-SDHM-2.01 Trees and basin1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND       3
      PERLND      21
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface IMP 2.01            MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    3      A,NatVeg,Steep         1    1    1    1   27    0
   21      C,NatVeg,Steep         1    1    1    1   27    0
  END GEN-INFO
```

```
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    3         0    0    1    0    0    0    0    0    0    0    0    0
   21         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    3         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   21         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    3         0    1    1    1    0    0    0    0    1    1    0
   21         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
    3              0       3.5     0.045        75      0.15        2.5     0.915
   21              0       3.2      0.03        75      0.15        2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    3              0         0         2         2         0      0.05      0.05
   21              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    3              0       0.6      0.04         1       0.3         0
   21              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
   21       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
   21       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    3              0         0      0.01         0       0.4      0.01         0
   21              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
```

```
  2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
10.18 - Streets***
PERLND   3                        1     RCHRES   1      2
PERLND   3                        1     RCHRES   1      3
PERLND  21                    3.986     RCHRES   1      2
PERLND  21                    3.986     RCHRES   1      3
IMPLND   2                    0.304     RCHRES   1      5

******Routing******
RCHRES   2                        1     RCHRES   3      7
RCHRES   2                              COPY     1     17
RCHRES   1                        1     RCHRES   3      7
RCHRES   1                              COPY     1     17
RCHRES   1                        1     RCHRES   2      8
RCHRES   3                        1     RCHRES   4      8
RCHRES   4                        1     COPY   501     17
RCHRES   3                        1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     EXTNL  OUTDGT 1
```

```
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                         in  out                            ***
    1     Surface 8 Tree W-017    3    1    1    1   28    0    1
    2     18 Tree Wells           2    1    1    1   28    0    1
    3     Surface IMP 2.01-021    3    1    1    1   28    0    1
    4     IMP 2.01                2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    4        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><       ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.01       0.0       0.0       0.0       0.0
    3              3      0.01       0.0    1015.5       0.0       0.0
    4              4      0.01       0.0    1015.5       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                         addr
```

```
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL              4
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  2779.21
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2            =  vpo2
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                               v2m4            =  2787.07
*** Compute remaining available pore space
  GENER   4                               vpo4            =  v2m4
  GENER   4                               vpo4           -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                               vpo4            =  0.0
END IF
*** Infiltration volume
  GENER   4                               v2d4            =  vpo4
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   76    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.097521  0.000000  0.000000  0.000000
  0.040297  0.097138  0.000504  0.000000  0.000000
  0.080593  0.096286  0.001015  0.000000  0.000000
  0.120890  0.095436  0.001534  0.000000  0.000000
  0.161187  0.094590  0.002062  0.000000  0.000000
  0.201484  0.093745  0.002597  0.000000  0.000000
  0.241780  0.092904  0.003141  0.000000  0.000000
  0.282077  0.092065  0.003693  0.000000  0.000000
```

```
0.322374  0.091229  0.004253  0.000000  0.000000
0.362670  0.090395  0.004821  0.000000  0.001423
0.402967  0.089565  0.005397  0.000000  0.001824
0.443264  0.088737  0.005981  0.000000  0.002301
0.483560  0.087911  0.006574  0.000000  0.002860
0.523857  0.087089  0.007175  0.000000  0.003510
0.564154  0.086268  0.007784  0.000000  0.004258
0.604451  0.085451  0.008402  0.000000  0.005110
0.644747  0.084636  0.009028  0.000000  0.006075
0.685044  0.083825  0.009663  0.000000  0.007159
0.725341  0.083015  0.010306  0.000000  0.008370
0.765637  0.082209  0.010958  0.000000  0.009716
0.805934  0.081405  0.011618  0.000000  0.011204
0.846231  0.080603  0.012286  0.000000  0.012843
0.886527  0.079805  0.012964  0.000000  0.014639
0.926824  0.079009  0.013650  0.000000  0.016601
0.967121  0.078216  0.014344  0.000000  0.017489
1.007418  0.077425  0.015048  0.000000  0.017707
1.047714  0.076638  0.015760  0.000000  0.017926
1.088011  0.075852  0.016480  0.000000  0.018145
1.128308  0.075070  0.017210  0.000000  0.018366
1.168604  0.074290  0.017948  0.000000  0.018587
1.208901  0.073513  0.018695  0.000000  0.018809
1.249198  0.072739  0.019452  0.000000  0.019032
1.289495  0.071967  0.020217  0.000000  0.019256
1.329791  0.071198  0.020991  0.000000  0.019480
1.370088  0.070432  0.021774  0.000000  0.019706
1.410385  0.069668  0.022566  0.000000  0.019932
1.450681  0.068907  0.023367  0.000000  0.020159
1.490978  0.068149  0.024177  0.000000  0.020386
1.531275  0.067393  0.024996  0.000000  0.020615
1.571571  0.066640  0.025825  0.000000  0.020844
1.611868  0.065890  0.026662  0.000000  0.021075
1.652165  0.065142  0.027509  0.000000  0.021306
1.692462  0.064397  0.028365  0.000000  0.021537
1.732758  0.063655  0.029231  0.000000  0.021770
1.773055  0.062916  0.030105  0.000000  0.022003
1.813352  0.062179  0.030989  0.000000  0.022238
1.853648  0.061445  0.031883  0.000000  0.022473
1.893945  0.060713  0.032785  0.000000  0.022709
1.934242  0.059985  0.033698  0.000000  0.022945
1.974538  0.059258  0.034619  0.000000  0.023183
2.014835  0.058535  0.035551  0.000000  0.023421
2.055132  0.057814  0.036491  0.000000  0.023660
2.095429  0.057096  0.037442  0.000000  0.023900
2.135725  0.056381  0.038402  0.000000  0.024141
2.176022  0.055668  0.039371  0.000000  0.024383
2.216319  0.054958  0.040351  0.000000  0.024625
2.256615  0.054251  0.041340  0.000000  0.024868
2.296912  0.053546  0.042338  0.000000  0.025112
2.337209  0.052844  0.043347  0.000000  0.025357
2.377505  0.052145  0.044365  0.000000  0.025603
2.417802  0.051449  0.045393  0.000000  0.025849
2.458099  0.050755  0.046431  0.000000  0.026096
2.498396  0.050064  0.047479  0.000000  0.026344
2.538692  0.049375  0.048537  0.000000  0.026593
2.578989  0.048689  0.049604  0.000000  0.026843
2.619286  0.048006  0.050682  0.000000  0.027093
2.659582  0.047326  0.051770  0.000000  0.027345
2.699879  0.046648  0.052868  0.000000  0.027597
2.740176  0.045973  0.053976  0.000000  0.027850
2.780473  0.045300  0.055094  0.000000  0.028103
2.820769  0.044631  0.056222  0.000000  0.028358
2.861066  0.043964  0.057360  0.000000  0.028613
2.901363  0.043299  0.058509  0.000000  0.028870
2.941659  0.042638  0.059668  0.000000  0.029126
2.981956  0.041979  0.060837  0.000000  0.029384
3.000000  0.041322  0.063802  0.000000  0.029500
END FTABLE  2
FTABLE      1
```

```
   18    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.041322  0.000000  0.000000  0.000000  0.000259
  0.040297  0.098377  0.003947  0.000000  0.230326  0.000259
  0.080593  0.099236  0.007929  0.000000  0.233378  0.000519
  0.120890  0.100097  0.011945  0.000000  0.236431  0.000779
  0.161187  0.100961  0.015996  0.000000  0.239484  0.001041
  0.201484  0.101828  0.020082  0.339944  0.242537  0.001303
  0.241780  0.102698  0.024203  1.085151  0.245590  0.001566
  0.282077  0.103570  0.028358  2.070808  0.248642  0.001830
  0.322374  0.104445  0.032550  3.247767  0.251695  0.002095
  0.362670  0.105322  0.036776  4.588471  0.254748  0.002360
  0.402967  0.106203  0.041038  6.074441  0.257801  0.002626
  0.443264  0.107086  0.045335  7.691989  0.260854  0.002893
  0.483560  0.107971  0.049668  9.430269  0.263906  0.003161
  0.523857  0.108860  0.054037  11.28024  0.266959  0.003430
  0.564154  0.109751  0.058442  13.23405  0.270012  0.003700
  0.604451  0.110644  0.062882  15.28467  0.273065  0.003970
  0.644747  0.111541  0.067359  17.42562  0.276117  0.004241
  0.667000  0.112037  0.069847  19.65077  0.277803  0.004391
  END FTABLE  1
  FTABLE      4
   60    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.059667  0.000000  0.000000  0.000000
  0.076923  0.059126  0.000306  0.000000  0.000000
  0.153846  0.058052  0.000624  0.000000  0.000000
  0.230769  0.056988  0.000954  0.000000  0.000000
  0.307692  0.055933  0.001296  0.000000  0.000000
  0.384615  0.054889  0.001652  0.000000  0.000000
  0.461538  0.053854  0.002020  0.000000  0.000910
  0.538462  0.052828  0.002401  0.000000  0.001588
  0.615385  0.051813  0.002796  0.000000  0.002072
  0.692308  0.050807  0.003205  0.000000  0.003245
  0.769231  0.049811  0.003627  0.000000  0.004044
  0.846154  0.048825  0.004063  0.000000  0.005812
  0.923077  0.047849  0.004514  0.000000  0.006001
  1.000000  0.046882  0.004979  0.000000  0.006193
  1.076923  0.045926  0.005459  0.000000  0.006388
  1.153846  0.044979  0.005954  0.000000  0.006586
  1.230769  0.044041  0.006464  0.000000  0.006786
  1.307692  0.043114  0.006989  0.000000  0.006990
  1.384615  0.042196  0.007530  0.001754  0.007196
  1.461538  0.041288  0.008087  0.002631  0.007406
  1.538462  0.040390  0.008660  0.004519  0.007618
  1.615385  0.039502  0.009250  0.005464  0.007834
  1.692308  0.038623  0.009856  0.006909  0.008052
  1.769231  0.037755  0.010478  0.007631  0.008274
  1.846154  0.036896  0.011118  0.008777  0.008498
  1.923077  0.036047  0.011775  0.009350  0.008725
  2.000000  0.035207  0.012450  0.010312  0.008956
  2.076923  0.034378  0.013407  0.010793  0.009189
  2.153846  0.033558  0.014389  0.011636  0.009425
  2.230769  0.032748  0.015396  0.012058  0.009664
  2.307692  0.031947  0.016429  0.012817  0.009906
  2.384615  0.031157  0.017487  0.013197  0.010151
  2.461538  0.030376  0.018572  0.013895  0.010399
  2.538462  0.029605  0.019682  0.013994  0.010650
  2.615385  0.028844  0.020820  0.014767  0.010904
  2.692308  0.028093  0.021984  0.016024  0.011161
  2.769231  0.027351  0.023175  0.017442  0.011421
  2.846154  0.026619  0.024395  0.018878  0.011684
  2.923077  0.025897  0.025642  0.020276  0.011949
  3.000000  0.025185  0.026917  0.021613  0.012218
  3.076923  0.024482  0.028220  0.022887  0.012490
  3.153846  0.023790  0.029553  0.024099  0.012764
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  3.230769  0.023107  0.030915  0.025256  0.013042
  3.307692  0.022434  0.032306  0.026363  0.013322
  3.384615  0.021770  0.033727  0.027425  0.013606
  3.461538  0.021117  0.035178  0.028448  0.013892
  3.538462  0.020473  0.036659  0.029435  0.014182
  3.615385  0.019839  0.038171  0.030389  0.014474
  3.692308  0.019215  0.039714  0.031314  0.014770
  3.769231  0.018600  0.041289  0.032213  0.015068
  3.846154  0.017996  0.042895  0.033087  0.015369
  3.923077  0.017401  0.044533  0.033939  0.015673
  4.000000  0.016816  0.046203  0.034770  0.015981
  4.076923  0.016240  0.047906  0.035582  0.016291
  4.153846  0.015675  0.049641  0.036376  0.016604
  4.230769  0.015119  0.051410  0.037154  0.016920
  4.307692  0.014573  0.053213  0.037918  0.017239
  4.384615  0.014037  0.055049  0.038669  0.017561
  4.461538  0.013510  0.056919  0.039412  0.017886
  4.500000  0.012994  0.063982  0.055944  0.018049
  END FTABLE  4
  FTABLE      3
   34    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.012994  0.000000  0.000000  0.000000  0.000329
  0.076923  0.060756  0.004632  0.000000  0.077747  0.000329
  0.153846  0.061855  0.009347  0.000000  0.080627  0.000662
  0.230769  0.062963  0.014148  0.000000  0.083506  0.000997
  0.307692  0.064081  0.019034  0.000000  0.086386  0.001335
  0.384615  0.065209  0.024007  0.000000  0.089265  0.001676
  0.461538  0.066347  0.029067  0.000000  0.092145  0.002021
  0.538462  0.067494  0.034215  0.000000  0.095024  0.002368
  0.615385  0.068651  0.039451  0.000000  0.097904  0.002718
  0.692308  0.069818  0.044777  0.000000  0.100784  0.003071
  0.769231  0.070995  0.050193  0.000000  0.103663  0.003427
  0.846154  0.072182  0.055700  0.000000  0.106543  0.003786
  0.923077  0.073378  0.061298  0.000000  0.109422  0.004148
  1.000000  0.074584  0.066989  0.000000  0.112302  0.004512
  1.076923  0.075800  0.072773  0.225672  0.115181  0.004880
  1.153846  0.077026  0.078651  0.627270  0.118061  0.005251
  1.230769  0.078262  0.084623  1.099144  0.120940  0.005625
  1.307692  0.079507  0.090691  1.551565  0.123820  0.006002
  1.384615  0.080762  0.096856  1.905359  0.126699  0.006381
  1.461538  0.082027  0.103117  2.127417  0.129579  0.006764
  1.538462  0.083302  0.109476  2.311197  0.132458  0.007149
  1.615385  0.084586  0.115933  2.470773  0.135338  0.007538
  1.692308  0.085880  0.122489  2.620651  0.138217  0.007929
  1.769231  0.087184  0.129146  2.762408  0.141097  0.008324
  1.846154  0.088498  0.135903  2.897238  0.143977  0.008721
  1.923077  0.089821  0.142761  3.026067  0.146856  0.009122
  2.000000  0.091155  0.149722  3.149630  0.149736  0.009525
  2.076923  0.092498  0.156785  3.268526  0.152615  0.009931
  2.153846  0.093851  0.163952  3.383245  0.155495  0.010341
  2.230769  0.095213  0.171224  3.494201  0.158374  0.010753
  2.307692  0.096586  0.178601  3.601740  0.161254  0.011168
  2.384615  0.097968  0.186084  3.706160  0.164133  0.011586
  2.461538  0.099360  0.193673  3.807717  0.167013  0.012007
  2.500000  0.100060  0.197508  3.906635  0.168453  0.012219
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
```

```
WDM      2 PREC     ENGL    1              RCHRES   3     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   4     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   4 HYDR   RO     1 1        1      WDM   1016 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      1 1        1      WDM   1017 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      2 1        1      WDM   1018 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1019 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1020 STAG     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1021 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
  END MASS-LINK    7

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 2.06

General Model Information

Project Name:	4201-SDHM-2.06
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Existing - 2.06

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	17.27
Pervious Total	17.27

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.57
Impervious Total	0.57
Basin Total	17.84

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Post - 2.06

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	16.38
Pervious Total	16.38

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.74
IMPERVIOUS-MOD	0.72
Impervious Total	1.46
Basin Total	17.84

Element Flows To:

Surface	Interflow	Groundwater
Surface IMP 2.06	Surface IMP 2.06	

Routing Elements
Predeveloped Routing

Mitigated Routing

IMP 2.06

Bottom Length:	100.00 ft.
Bottom Width:	103.44 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	120.239
Total Volume Through Riser (ac-ft.):	109.132
Total Volume Through Facility (ac-ft.):	229.371
Percent Infiltrated:	52.42
Total Precip Applied to Facility:	12.746
Total Evap From Facility:	9.565
Underdrain not used	
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	24 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
735.75	0.2375	0.0000	0.0000	0.0000
735.81	0.2375	0.0041	0.0000	0.0000
735.87	0.2375	0.0082	0.0000	0.0000
735.92	0.2375	0.0123	0.0000	0.0000
735.98	0.2375	0.0164	0.0000	0.0000
736.04	0.2375	0.0205	0.0000	0.0000
736.10	0.2375	0.0247	0.0000	0.0000
736.15	0.2375	0.0288	0.0000	0.0185
736.21	0.2375	0.0329	0.0000	0.0279
736.27	0.2375	0.0370	0.0000	0.0402
736.33	0.2375	0.0411	0.0000	0.0555
736.38	0.2375	0.0452	0.0000	0.0718
736.44	0.2375	0.0493	0.0000	0.0718
736.50	0.2375	0.0534	0.0000	0.0718
736.56	0.2375	0.0575	0.0000	0.0718
736.62	0.2375	0.0616	0.0000	0.0718
736.67	0.2375	0.0658	0.0000	0.0718
736.73	0.2375	0.0699	0.0000	0.0718
736.79	0.2375	0.0740	0.0000	0.0718
736.85	0.2375	0.0781	0.0000	0.0718
736.90	0.2375	0.0822	0.0000	0.0718
736.96	0.2375	0.0863	0.0000	0.0718
737.02	0.2375	0.0904	0.0000	0.0718
737.08	0.2375	0.0945	0.0000	0.0718
737.13	0.2375	0.0986	0.0000	0.0718
737.19	0.2375	0.1027	0.0000	0.0718

737.25	0.2375	0.1069	0.0000	0.0718
737.31	0.2375	0.1110	0.0000	0.0718
737.37	0.2375	0.1151	0.0000	0.0718
737.42	0.2375	0.1192	0.0000	0.0718
737.48	0.2375	0.1233	0.0000	0.0718
737.54	0.2375	0.1290	0.0000	0.0718
737.60	0.2375	0.1347	0.0000	0.0718
737.65	0.2375	0.1404	0.0000	0.0718
737.71	0.2375	0.1460	0.0000	0.0718
737.77	0.2375	0.1517	0.0000	0.0718
737.83	0.2375	0.1574	0.0000	0.0718
737.88	0.2375	0.1631	0.0000	0.0718
737.94	0.2375	0.1688	0.0000	0.0718
738.00	0.2375	0.1745	0.0000	0.0718
738.06	0.2375	0.1802	0.0000	0.0718
738.12	0.2375	0.1858	0.0000	0.0718
738.17	0.2375	0.1915	0.0000	0.0718
738.23	0.2375	0.1972	0.0000	0.0718
738.29	0.2375	0.2029	0.0000	0.0718
738.35	0.2375	0.2086	0.0000	0.0718
738.40	0.2375	0.2143	0.0000	0.0718
738.46	0.2375	0.2200	0.0000	0.0718
738.50	0.2375	0.2237	0.0000	0.0718

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.2375	0.2237	0.0000	1.1972	0.0000
2.8077	0.2375	0.2374	0.0000	1.1972	0.0000
2.8654	0.2375	0.2511	0.0000	1.4889	0.0000
2.9231	0.2375	0.2648	0.0000	1.5349	0.0000
2.9808	0.2375	0.2785	0.0000	1.5809	0.0000
3.0385	0.2375	0.2922	0.0000	1.6270	0.0000
3.0962	0.2375	0.3059	0.0000	1.6730	0.0000
3.1538	0.2375	0.3196	0.0000	1.7191	0.0000
3.2115	0.2375	0.3333	0.0000	1.7651	0.0000
3.2692	0.2375	0.3470	0.0566	1.8112	0.0000
3.3269	0.2375	0.3607	0.4524	1.8572	0.0000
3.3846	0.2375	0.3744	1.0457	1.9033	0.0000
3.4423	0.2375	0.3881	1.7799	1.9493	0.0000
3.5000	0.2375	0.4018	2.6231	1.9954	0.0000
3.5577	0.2375	0.4155	3.5484	2.0414	0.0000
3.6154	0.2375	0.4292	4.5298	2.0875	0.0000
3.6731	0.2375	0.4429	5.5408	2.1335	0.0000
3.7308	0.2375	0.4566	6.5540	2.1796	0.0000
3.7885	0.2375	0.4703	7.5423	2.2256	0.0000
3.8462	0.2375	0.4840	8.4799	2.2717	0.0000
3.9038	0.2375	0.4977	9.3433	2.3177	0.0000
3.9615	0.2375	0.5114	10.114	2.3637	0.0000
4.0192	0.2375	0.5251	10.778	2.4098	0.0000
4.0769	0.2375	0.5388	11.333	2.4558	0.0000
4.1346	0.2375	0.5525	11.783	2.5019	0.0000
4.1923	0.2375	0.5662	12.149	2.5479	0.0000
4.2500	0.2375	0.5799	12.599	2.5940	0.0000
4.3077	0.2375	0.5936	12.957	2.6400	0.0000
4.3654	0.2375	0.6073	13.306	2.6861	0.0000
4.4231	0.2375	0.6210	13.645	2.7321	0.0000
4.4808	0.2375	0.6347	13.977	2.7782	0.0000
4.5385	0.2375	0.6484	14.301	2.8242	0.0000

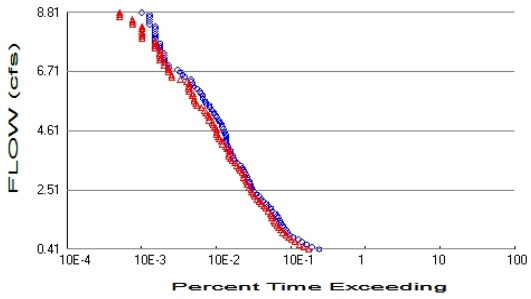
4.5962	0.2375	0.6621	14.617	2.8703	0.0000
4.6538	0.2375	0.6758	14.927	2.9163	0.0000
4.7115	0.2375	0.6895	15.231	2.9624	0.0000
4.7692	0.2375	0.7032	15.529	3.0084	0.0000
4.8269	0.2375	0.7169	15.821	3.0545	0.0000
4.8846	0.2375	0.7306	16.107	3.1005	0.0000
4.9423	0.2375	0.7443	16.389	3.1465	0.0000
5.0000	0.2375	0.7580	16.666	3.1926	0.0000
5.0577	0.2375	0.7717	16.939	3.2386	0.0000
5.1154	0.2375	0.7854	17.207	3.2847	0.0000
5.1731	0.2375	0.7991	17.471	3.3307	0.0000
5.2308	0.2375	0.8128	17.731	3.3768	0.0000
5.2500	0.2375	0.8174	17.987	3.3921	0.0000

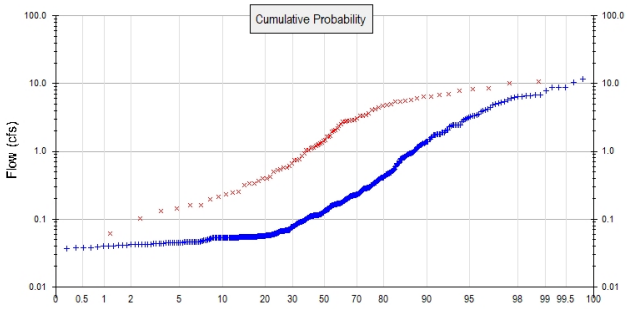
Surface IMP 2.06

Element Flows To:

Outlet 1	Outlet 2
	IMP 2.06

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 17.27
Total Impervious Area: 0.57

Mitigated Landuse Totals for POC #1
Total Pervious Area: 16.38
Total Impervious Area: 1.46

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	4.131376
5 year	6.683099
10 year	8.807112
25 year	10.43678

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	3.375639
5 year	6.361184
10 year	8.021533
25 year	10.132045

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.4131	945	688	72	Pass
0.4979	755	587	77	Pass
0.5827	645	517	80	Pass
0.6675	559	447	79	Pass
0.7523	501	406	81	Pass
0.8371	428	372	86	Pass
0.9219	383	338	88	Pass
1.0067	358	313	87	Pass
1.0914	340	290	85	Pass
1.1762	322	272	84	Pass
1.2610	305	257	84	Pass
1.3458	291	244	83	Pass
1.4306	281	237	84	Pass
1.5154	271	223	82	Pass
1.6002	261	218	83	Pass
1.6850	246	211	85	Pass
1.7697	227	196	86	Pass
1.8545	215	183	85	Pass
1.9393	198	173	87	Pass
2.0241	186	159	85	Pass
2.1089	168	149	88	Pass
2.1937	158	138	87	Pass
2.2785	149	129	86	Pass
2.3633	137	125	91	Pass
2.4480	126	119	94	Pass
2.5328	120	116	96	Pass
2.6176	118	110	93	Pass
2.7024	112	104	92	Pass
2.7872	111	101	90	Pass
2.8720	105	98	93	Pass
2.9568	104	93	89	Pass
3.0416	99	93	93	Pass
3.1263	96	88	91	Pass
3.2111	92	82	89	Pass
3.2959	88	80	90	Pass
3.3807	84	74	88	Pass
3.4655	75	71	94	Pass
3.5503	70	65	92	Pass
3.6351	68	62	91	Pass
3.7199	66	60	90	Pass
3.8046	63	59	93	Pass
3.8894	62	59	95	Pass
3.9742	58	56	96	Pass
4.0590	57	53	92	Pass
4.1438	55	48	87	Pass
4.2286	54	47	87	Pass
4.3134	54	44	81	Pass
4.3982	54	42	77	Pass
4.4829	53	40	75	Pass
4.5677	51	40	78	Pass
4.6525	49	40	81	Pass
4.7373	48	38	79	Pass
4.8221	47	36	76	Pass

4.9069	45	35	77	Pass
4.9917	43	32	74	Pass
5.0765	40	32	80	Pass
5.1612	39	31	79	Pass
5.2460	37	29	78	Pass
5.3308	35	28	80	Pass
5.4156	33	25	75	Pass
5.5004	32	22	68	Pass
5.5852	29	21	72	Pass
5.6700	28	20	71	Pass
5.7548	26	20	76	Pass
5.8395	26	19	73	Pass
5.9243	25	19	76	Pass
6.0091	24	17	70	Pass
6.0939	22	17	77	Pass
6.1787	20	17	85	Pass
6.2635	19	17	89	Pass
6.3483	18	16	88	Pass
6.4331	18	13	72	Pass
6.5178	15	10	66	Pass
6.6026	14	10	71	Pass
6.6874	13	9	69	Pass
6.7722	12	9	75	Pass
6.8570	9	9	100	Pass
6.9418	9	8	88	Pass
7.0266	8	8	100	Pass
7.1114	8	7	87	Pass
7.1961	8	7	87	Pass
7.2809	8	7	87	Pass
7.3657	8	7	87	Pass
7.4505	7	7	100	Pass
7.5353	7	6	85	Pass
7.6201	7	6	85	Pass
7.7049	7	6	85	Pass
7.7897	6	6	100	Pass
7.8744	6	4	66	Pass
7.9592	6	4	66	Pass
8.0440	6	4	66	Pass
8.1288	6	4	66	Pass
8.2136	6	4	66	Pass
8.2984	6	4	66	Pass
8.3832	5	3	60	Pass
8.4680	5	3	60	Pass
8.5527	5	3	60	Pass
8.6375	5	2	40	Pass
8.7223	5	2	40	Pass
8.8071	4	2	50	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-2.06.wdm
MESSU       25   Pre4201-SDHM-2.06.MES
            27   Pre4201-SDHM-2.06.L61
            28   Pre4201-SDHM-2.06.L62
            30   POC4201-SDHM-2.061.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Existing - 2.06             MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Existing - 2.06***
PERLND   2                       17.27     COPY   501     12
PERLND   2                       17.27     COPY   501     13
IMPLND   1                        0.57     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-2.06.wdm
MESSU       25   Mit4201-SDHM-2.06.MES
            27   Mit4201-SDHM-2.06.L61
            28   Mit4201-SDHM-2.06.L62
            30   POC4201-SDHM-2.061.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       1
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface IMP 2.06           MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out            ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
```

```
    1         0    0    4    0    0    0    1    9
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
    2            100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Post - 2.06***
PERLND   2                       16.38     RCHRES   1      2
PERLND   2                       16.38     RCHRES   1      3
IMPLND   1                        0.74     RCHRES   1      5
IMPLND   2                        0.72     RCHRES   1      5

******Routing******
RCHRES   1                           1     RCHRES   2      8
PERLND   2                       16.38     COPY     1     12
IMPLND   1                        0.74     COPY     1     15
IMPLND   2                        0.72     COPY     1     15
PERLND   2                       16.38     COPY     1     13
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
```

```
    1     Surface IMP 2.06-018    2    1    1    1   28    0    1
    2     IMP 2.06                2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  1  0  0  0        2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------->      ***
    1              1      0.01       0.0    735.75       0.0       0.0
    2              2      0.02       0.0    735.75       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  10004.84
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
```

```
  GENER   2                                 vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                                 v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   49    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.237466  0.000000  0.000000  0.000000
  0.057692  0.237466  0.004110  0.000000  0.000000
  0.115385  0.237466  0.008220  0.000000  0.000000
  0.173077  0.237466  0.012330  0.000000  0.000000
  0.230769  0.237466  0.016440  0.000000  0.000000
  0.288462  0.237466  0.020550  0.000000  0.000000
  0.346154  0.237466  0.024660  0.000000  0.000000
  0.403846  0.237466  0.028770  0.000000  0.018521
  0.461538  0.237466  0.032880  0.000000  0.027945
  0.519231  0.237466  0.036990  0.000000  0.040170
  0.576923  0.237466  0.041100  0.000000  0.055487
  0.634615  0.237466  0.045210  0.000000  0.071833
  0.692308  0.237466  0.049320  0.000000  0.071833
  0.750000  0.237466  0.053430  0.000000  0.071833
  0.807692  0.237466  0.057540  0.000000  0.071833
  0.865385  0.237466  0.061650  0.000000  0.071833
  0.923077  0.237466  0.065760  0.000000  0.071833
  0.980769  0.237466  0.069870  0.000000  0.071833
  1.038462  0.237466  0.073980  0.000000  0.071833
  1.096154  0.237466  0.078090  0.000000  0.071833
  1.153846  0.237466  0.082200  0.000000  0.071833
  1.211538  0.237466  0.086310  0.000000  0.071833
  1.269231  0.237466  0.090420  0.000000  0.071833
  1.326923  0.237466  0.094530  0.000000  0.071833
  1.384615  0.237466  0.098640  0.000000  0.071833
  1.442308  0.237466  0.102750  0.000000  0.071833
  1.500000  0.237466  0.106860  0.000000  0.071833
  1.557692  0.237466  0.110969  0.000000  0.071833
  1.615385  0.237466  0.115079  0.000000  0.071833
  1.673077  0.237466  0.119189  0.000000  0.071833
  1.730769  0.237466  0.123299  0.000000  0.071833
  1.788462  0.237466  0.128985  0.000000  0.071833
  1.846154  0.237466  0.134670  0.000000  0.071833
  1.903846  0.237466  0.140356  0.000000  0.071833
  1.961538  0.237466  0.146041  0.000000  0.071833
  2.019231  0.237466  0.151727  0.000000  0.071833
  2.076923  0.237466  0.157412  0.000000  0.071833
  2.134615  0.237466  0.163098  0.000000  0.071833
  2.192308  0.237466  0.168783  0.000000  0.071833
  2.250000  0.237466  0.174469  0.000000  0.071833
  2.307692  0.237466  0.180154  0.000000  0.071833
  2.365385  0.237466  0.185840  0.000000  0.071833
  2.423077  0.237466  0.191525  0.000000  0.071833
  2.480769  0.237466  0.197211  0.000000  0.071833
  2.538462  0.237466  0.202896  0.000000  0.071833
  2.596154  0.237466  0.208582  0.000000  0.071833
  2.653846  0.237466  0.214267  0.000000  0.071833
  2.711538  0.237466  0.219952  0.000000  0.071833
  2.750000  0.237466  0.229679  0.000000  0.071833
  END FTABLE  2
  FTABLE      1
   45    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.237466  0.000000  0.000000  0.000000
  0.057692  0.237466  0.013700  0.000000  1.197223
  0.115385  0.237466  0.027400  0.000000  1.488854
  0.173077  0.237466  0.041100  0.000000  1.534902
  0.230769  0.237466  0.054800  0.000000  1.580949
  0.288462  0.237466  0.068500  0.000000  1.626996
```

```
  0.346154  0.237466  0.082200  0.000000  1.673043
  0.403846  0.237466  0.095900  0.000000  1.719090
  0.461538  0.237466  0.109599  0.000000  1.765137
  0.519231  0.237466  0.123299  0.056621  1.811184
  0.576923  0.237466  0.136999  0.452415  1.857231
  0.634615  0.237466  0.150699  1.045726  1.903278
  0.692308  0.237466  0.164399  1.779946  1.949325
  0.750000  0.237466  0.178099  2.623072  1.995372
  0.807692  0.237466  0.191799  3.548378  2.041419
  0.865385  0.237466  0.205499  4.529826  2.087466
  0.923077  0.237466  0.219199  5.540778  2.133513
  0.980769  0.237466  0.232899  6.554000  2.179560
  1.038462  0.237466  0.246599  7.542349  2.225607
  1.096154  0.237466  0.260299  8.479889  2.271654
  1.153846  0.237466  0.273999  9.343333  2.317701
  1.211538  0.237466  0.287699  10.11373  2.363748
  1.269231  0.237466  0.301399  10.77834  2.409795
  1.326923  0.237466  0.315099  11.33277  2.455842
  1.384615  0.237466  0.328798  11.78317  2.501889
  1.442308  0.237466  0.342498  12.14868  2.547937
  1.500000  0.237466  0.356198  12.59852  2.593984
  1.557692  0.237466  0.369898  12.95684  2.640031
  1.615385  0.237466  0.383598  13.30552  2.686078
  1.673077  0.237466  0.397298  13.64529  2.732125
  1.730769  0.237466  0.410998  13.97680  2.778172
  1.788462  0.237466  0.424698  14.30063  2.824219
  1.846154  0.237466  0.438398  14.61729  2.870266
  1.903846  0.237466  0.452098  14.92723  2.916313
  1.961538  0.237466  0.465798  15.23087  2.962360
  2.019231  0.237466  0.479498  15.52857  3.008407
  2.076923  0.237466  0.493198  15.82067  3.054454
  2.134615  0.237466  0.506898  16.10747  3.100501
  2.192308  0.237466  0.520598  16.38925  3.146548
  2.250000  0.237466  0.534298  16.66628  3.192595
  2.307692  0.237466  0.547997  16.93877  3.238642
  2.365385  0.237466  0.561697  17.20694  3.284689
  2.423077  0.237466  0.575397  17.47100  3.330736
  2.480769  0.237466  0.589097  17.73113  3.376783
  2.500000  0.237466  0.593664  17.98750  3.392132
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1009 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1011 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1012 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1013 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
```

```
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.10

General Model Information

Project Name:	4201-SDHM-10.10 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.10 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	0.42
Pervious Total	0.42
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.42

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.10 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,NatVeg,Moderate	0.07
Pervious Total	0.07

Impervious Land Use	acre
IMPERVIOUS-MOD	0.35
Impervious Total	0.35
Basin Total	0.42

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.10	Surface ation 10.10	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.10

Bottom Length:	20.00 ft.
Bottom Width:	61.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.1
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	13.875
Total Volume Through Riser (ac-ft.):	1.8
Total Volume Through Facility (ac-ft.):	20.355
Percent Infiltrated:	68.17
Total Precip Applied to Facility:	2.218
Total Evap From Facility:	1.63
Underdrain used	
Underdrain Diameter (feet):	0.25
Orifice Diameter (in.):	0.5
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	4.68
Total Outflow (ac-ft.):	20.355
Percent Through Underdrain:	22.99
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	24 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
1083.7	0.0649	0.0000	0.0000	0.0000
1083.8	0.0644	0.0004	0.0000	0.0000
1083.8	0.0636	0.0009	0.0000	0.0000
1083.9	0.0628	0.0014	0.0000	0.0000
1083.9	0.0620	0.0018	0.0000	0.0000
1084.0	0.0611	0.0023	0.0000	0.0000
1084.0	0.0604	0.0028	0.0000	0.0000
1084.1	0.0596	0.0033	0.0000	0.0021
1084.1	0.0588	0.0038	0.0000	0.0032
1084.2	0.0580	0.0043	0.0000	0.0034
1084.2	0.0572	0.0049	0.0000	0.0034
1084.3	0.0564	0.0054	0.0000	0.0035
1084.3	0.0557	0.0059	0.0000	0.0036
1084.4	0.0549	0.0065	0.0000	0.0036
1084.4	0.0541	0.0071	0.0000	0.0037
1084.5	0.0534	0.0076	0.0000	0.0038
1084.5	0.0526	0.0082	0.0000	0.0038
1084.6	0.0519	0.0088	0.0000	0.0039
1084.6	0.0511	0.0094	0.0000	0.0040

1084.7	0.0504	0.0101	0.0000	0.0040
1084.7	0.0497	0.0107	0.0000	0.0041
1084.8	0.0489	0.0113	0.0000	0.0042
1084.8	0.0482	0.0120	0.0000	0.0042
1084.9	0.0475	0.0126	0.0000	0.0043
1085.0	0.0468	0.0133	0.0000	0.0044
1085.0	0.0461	0.0140	0.0001	0.0044
1085.1	0.0454	0.0147	0.0001	0.0045
1085.1	0.0447	0.0154	0.0006	0.0046
1085.2	0.0440	0.0161	0.0009	0.0046
1085.2	0.0433	0.0168	0.0012	0.0047
1085.3	0.0426	0.0176	0.0014	0.0048
1085.3	0.0419	0.0183	0.0017	0.0049
1085.4	0.0412	0.0191	0.0018	0.0049
1085.4	0.0406	0.0199	0.0020	0.0050
1085.5	0.0399	0.0209	0.0021	0.0051
1085.5	0.0392	0.0220	0.0023	0.0052
1085.6	0.0386	0.0232	0.0024	0.0052
1085.6	0.0379	0.0243	0.0025	0.0053
1085.7	0.0372	0.0254	0.0026	0.0054
1085.7	0.0366	0.0266	0.0028	0.0055
1085.8	0.0360	0.0278	0.0029	0.0055
1085.8	0.0353	0.0290	0.0030	0.0056
1085.9	0.0347	0.0302	0.0031	0.0057
1085.9	0.0341	0.0314	0.0031	0.0058
1086.0	0.0334	0.0327	0.0033	0.0058
1086.0	0.0328	0.0339	0.0036	0.0059
1086.1	0.0322	0.0352	0.0038	0.0060
1086.2	0.0316	0.0365	0.0041	0.0061
1086.2	0.0310	0.0378	0.0044	0.0062
1086.3	0.0304	0.0392	0.0047	0.0062
1086.3	0.0298	0.0405	0.0049	0.0063
1086.4	0.0292	0.0419	0.0052	0.0064
1086.4	0.0286	0.0433	0.0054	0.0065
1086.5	0.0280	0.0442	0.0107	0.0065

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0649	0.0442	0.0000	0.1697	0.0001
2.8022	0.0658	0.0476	0.0000	0.1697	0.0002
2.8544	0.0666	0.0511	0.0000	0.1746	0.0002
2.9066	0.0674	0.0546	0.0000	0.1795	0.0003
2.9588	0.0683	0.0581	0.0000	0.1844	0.0004
3.0110	0.0691	0.0617	0.0000	0.1893	0.0005
3.0632	0.0699	0.0654	0.0000	0.1942	0.0006
3.1154	0.0708	0.0690	0.0000	0.1991	0.0007
3.1676	0.0716	0.0727	0.0000	0.2040	0.0008
3.2198	0.0725	0.0765	0.0000	0.2090	0.0008
3.2720	0.0734	0.0803	0.0692	0.2139	0.0009
3.3242	0.0742	0.0842	0.4284	0.2188	0.0010
3.3764	0.0751	0.0881	0.9515	0.2237	0.0011
3.4286	0.0760	0.0920	1.5942	0.2286	0.0012
3.4808	0.0769	0.0960	2.3316	0.2335	0.0013
3.5330	0.0777	0.1000	3.1434	0.2384	0.0014
3.5852	0.0786	0.1041	4.0103	0.2434	0.0015
3.6374	0.0795	0.1082	4.9129	0.2483	0.0016
3.6896	0.0804	0.1124	5.8312	0.2532	0.0017
3.7418	0.0813	0.1166	6.7450	0.2581	0.0017

3.7940	0.0822	0.1209	7.6342	0.2630	0.0018
3.8462	0.0831	0.1252	8.4799	0.2679	0.0019
3.8984	0.0841	0.1296	9.2649	0.2728	0.0020
3.9505	0.0850	0.1340	9.9749	0.2778	0.0021
4.0027	0.0859	0.1385	10.600	0.2827	0.0022
4.0549	0.0868	0.1430	11.134	0.2876	0.0023
4.1071	0.0878	0.1475	11.581	0.2925	0.0024
4.1593	0.0887	0.1521	11.949	0.2974	0.0025
4.2115	0.0897	0.1568	12.257	0.3023	0.0026
4.2637	0.0906	0.1615	12.685	0.3072	0.0027
4.3159	0.0916	0.1662	13.007	0.3121	0.0028
4.3681	0.0925	0.1710	13.322	0.3171	0.0029
4.4203	0.0935	0.1759	13.629	0.3220	0.0030
4.4725	0.0944	0.1808	13.930	0.3269	0.0031
4.5247	0.0954	0.1858	14.224	0.3318	0.0032
4.5769	0.0964	0.1908	14.513	0.3367	0.0033
4.6291	0.0974	0.1958	14.795	0.3416	0.0034
4.6813	0.0983	0.2009	15.073	0.3465	0.0035
4.7335	0.0993	0.2061	15.345	0.3515	0.0035
4.7500	0.0996	0.2077	15.613	0.3530	0.0000

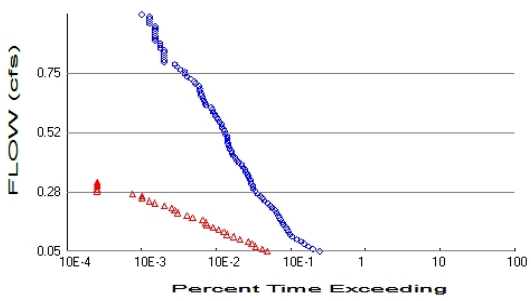
Surface ation 10.10

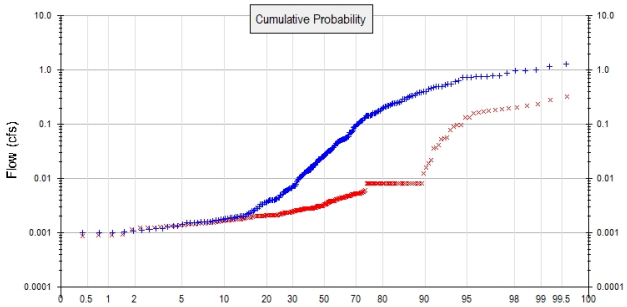
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.10

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.42
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.07
Total Impervious Area: 0.35

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.470647
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.036607
5 year	0.177162
10 year	0.207425
25 year	0.28518

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0471	959	190	19	Pass
0.0565	787	164	20	Pass
0.0660	688	134	19	Pass
0.0754	599	119	19	Pass
0.0849	542	106	19	Pass
0.0944	473	82	17	Pass
0.1038	412	68	16	Pass
0.1133	384	55	14	Pass
0.1227	364	50	13	Pass
0.1322	350	43	12	Pass
0.1417	338	36	10	Pass
0.1511	315	30	9	Pass
0.1606	308	29	9	Pass
0.1700	290	26	8	Pass
0.1795	280	19	6	Pass
0.1890	271	16	5	Pass
0.1984	254	12	4	Pass
0.2079	242	11	4	Pass
0.2173	223	10	4	Pass
0.2268	213	8	3	Pass
0.2363	194	6	3	Pass
0.2457	177	5	2	Pass
0.2552	164	4	2	Pass
0.2646	156	4	2	Pass
0.2741	141	3	2	Pass
0.2836	132	1	0	Pass
0.2930	125	1	0	Pass
0.3025	123	1	0	Pass
0.3119	117	1	0	Pass
0.3214	115	1	0	Pass
0.3308	114	0	0	Pass
0.3403	108	0	0	Pass
0.3498	104	0	0	Pass
0.3592	99	0	0	Pass
0.3687	97	0	0	Pass
0.3781	93	0	0	Pass
0.3876	87	0	0	Pass
0.3971	79	0	0	Pass
0.4065	74	0	0	Pass
0.4160	71	0	0	Pass
0.4254	68	0	0	Pass
0.4349	64	0	0	Pass
0.4444	63	0	0	Pass
0.4538	60	0	0	Pass
0.4633	58	0	0	Pass
0.4727	57	0	0	Pass
0.4822	56	0	0	Pass
0.4917	56	0	0	Pass
0.5011	56	0	0	Pass
0.5106	52	0	0	Pass
0.5200	51	0	0	Pass
0.5295	49	0	0	Pass
0.5390	47	0	0	Pass

0.5484	47	0	0	Pass
0.5579	44	0	0	Pass
0.5673	42	0	0	Pass
0.5768	40	0	0	Pass
0.5863	38	0	0	Pass
0.5957	36	0	0	Pass
0.6052	35	0	0	Pass
0.6146	34	0	0	Pass
0.6241	29	0	0	Pass
0.6336	28	0	0	Pass
0.6430	27	0	0	Pass
0.6525	26	0	0	Pass
0.6619	25	0	0	Pass
0.6714	25	0	0	Pass
0.6808	24	0	0	Pass
0.6903	24	0	0	Pass
0.6998	23	0	0	Pass
0.7092	21	0	0	Pass
0.7187	20	0	0	Pass
0.7281	18	0	0	Pass
0.7376	16	0	0	Pass
0.7471	15	0	0	Pass
0.7565	15	0	0	Pass
0.7660	13	0	0	Pass
0.7754	12	0	0	Pass
0.7849	11	0	0	Pass
0.7944	8	0	0	Pass
0.8038	8	0	0	Pass
0.8133	8	0	0	Pass
0.8227	8	0	0	Pass
0.8322	8	0	0	Pass
0.8417	8	0	0	Pass
0.8511	7	0	0	Pass
0.8606	7	0	0	Pass
0.8700	7	0	0	Pass
0.8795	6	0	0	Pass
0.8890	6	0	0	Pass
0.8984	6	0	0	Pass
0.9079	6	0	0	Pass
0.9173	6	0	0	Pass
0.9268	6	0	0	Pass
0.9363	6	0	0	Pass
0.9457	5	0	0	Pass
0.9552	5	0	0	Pass
0.9646	5	0	0	Pass
0.9741	5	0	0	Pass
0.9836	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

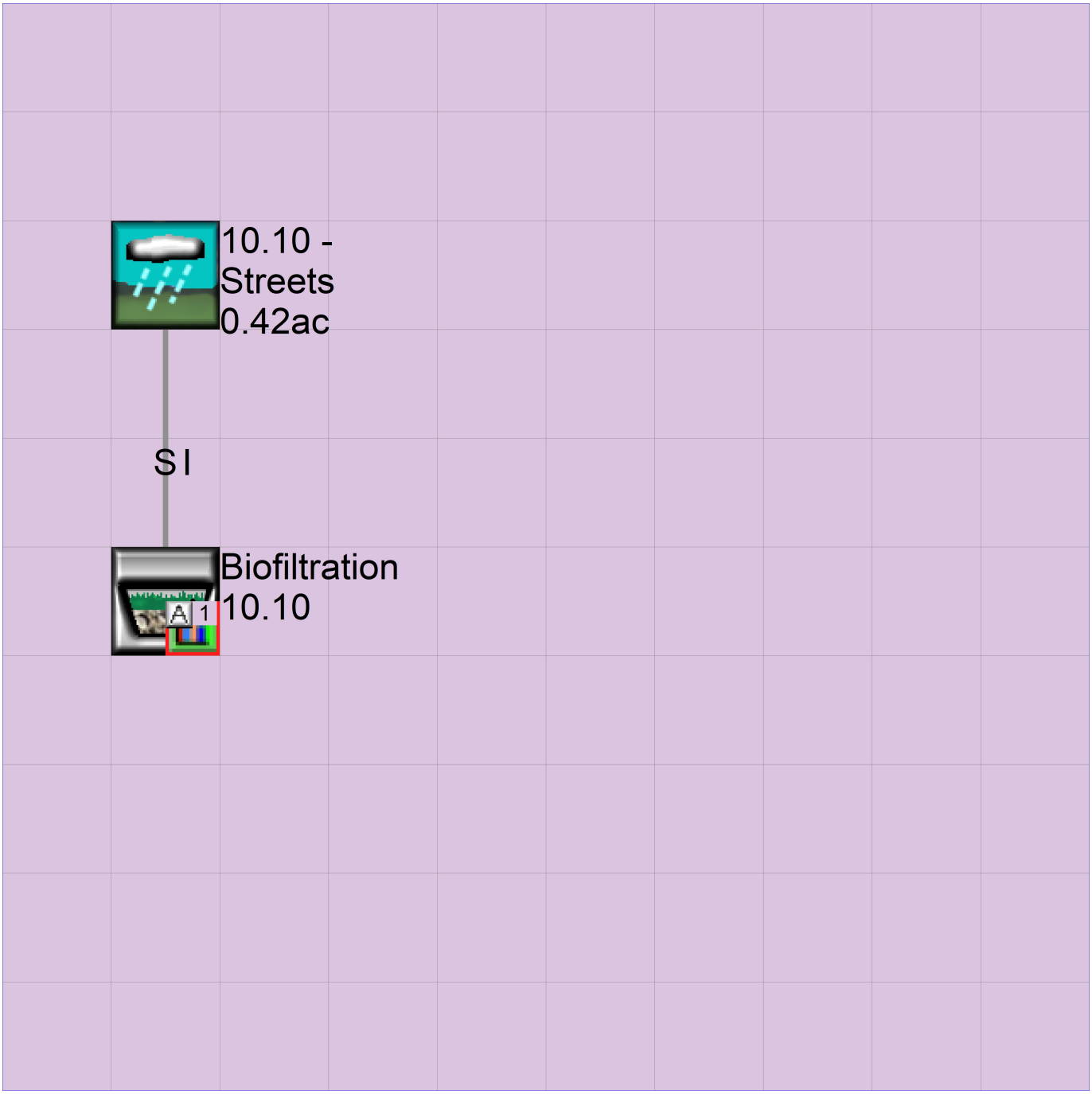
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.10 - Existing Street Areas 0.42ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.10 Streets.wdm
MESSU       25   Mit4201-SDHM-10.10 Streets.MES
            27   Mit4201-SDHM-10.10 Streets.L61
            28   Mit4201-SDHM-10.10 Streets.L62
            30   POC4201-SDHM-10.10 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      20
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.10        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   20      C,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   20         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   20         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   20         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   20              0       3.5     0.033        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   20               0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   20              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   20              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.10 - Streets***
PERLND  20                       0.07     RCHRES   1      2
PERLND  20                       0.07     RCHRES   1      3
IMPLND   2                       0.35     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND  20                       0.07     COPY     1     12
IMPLND   2                       0.35     COPY     1     15
PERLND  20                       0.07     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                             ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0   1083.75       0.0       0.0
    2              2      0.01       0.0   1083.75       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  1989.1
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   54    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.064939  0.000000  0.000000  0.000000
  0.052198  0.064379  0.000443  0.000000  0.000000
  0.104396  0.063565  0.000895  0.000000  0.000000
  0.156593  0.062755  0.001357  0.000000  0.000000
  0.208791  0.061950  0.001828  0.000000  0.000000
  0.260989  0.061149  0.002308  0.000000  0.000000
  0.313187  0.060353  0.002798  0.000000  0.000000
  0.365385  0.059561  0.003298  0.000000  0.002115
  0.417582  0.058774  0.003807  0.000000  0.003196
  0.469780  0.057991  0.004325  0.000000  0.003371
  0.521978  0.057213  0.004854  0.000000  0.003434
  0.574176  0.056439  0.005392  0.000000  0.003497
  0.626374  0.055670  0.005940  0.000000  0.003561
  0.678571  0.054905  0.006498  0.000000  0.003626
  0.730769  0.054145  0.007066  0.000000  0.003691
  0.782967  0.053389  0.007644  0.000000  0.003756
  0.835165  0.052638  0.008233  0.000000  0.003822
  0.887363  0.051891  0.008831  0.000000  0.003888
  0.939560  0.051149  0.009440  0.000000  0.003955
  0.991758  0.050411  0.010060  0.000000  0.004022
  1.043956  0.049678  0.010690  0.000000  0.004089
  1.096154  0.048949  0.011330  0.000000  0.004157
  1.148352  0.048225  0.011981  0.000000  0.004226
  1.200549  0.047505  0.012643  0.000000  0.004295
  1.252747  0.046790  0.013315  0.000000  0.004364
  1.304945  0.046079  0.013998  0.000073  0.004434
  1.357143  0.045373  0.014692  0.000110  0.004504
  1.409341  0.044671  0.015397  0.000613  0.004575
  1.461538  0.043974  0.016113  0.000864  0.004646
  1.513736  0.043281  0.016840  0.001217  0.004718
  1.565934  0.042593  0.017579  0.001394  0.004790
  1.618132  0.041909  0.018328  0.001657  0.004863
  1.670330  0.041230  0.019089  0.001789  0.004936
  1.722527  0.040555  0.019861  0.002002  0.005009
  1.774725  0.039885  0.020945  0.002109  0.005083
  1.826923  0.039220  0.022045  0.002292  0.005157
  1.879121  0.038558  0.023161  0.002384  0.005232
  1.931319  0.037902  0.024293  0.002547  0.005308
  1.983516  0.037250  0.025442  0.002629  0.005383
  2.035714  0.036602  0.026607  0.002777  0.005460
  2.087912  0.035959  0.027788  0.002852  0.005536
  2.140110  0.035320  0.028985  0.002990  0.005613
  2.192308  0.034686  0.030200  0.003059  0.005691
  2.244505  0.034056  0.031431  0.003134  0.005769
  2.296703  0.033431  0.032678  0.003310  0.005847
  2.348901  0.032810  0.033943  0.003565  0.005926
  2.401099  0.032194  0.035225  0.003845  0.006006
  2.453297  0.031583  0.036523  0.004128  0.006086
  2.505495  0.030976  0.037839  0.004404  0.006166
  2.557692  0.030373  0.039173  0.004669  0.006247
  2.609890  0.029775  0.040523  0.004923  0.006328
  2.662088  0.029181  0.041892  0.005166  0.006409
  2.714286  0.028592  0.043277  0.005402  0.006492
  2.750000  0.028007  0.045663  0.010727  0.006548
  END FTABLE  2
  FTABLE      1
   40    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.028007  0.000000  0.000000  0.000000  0.000083
  0.052198  0.065761  0.003411  0.000000  0.169651  0.000083
  0.104396  0.066587  0.006865  0.000000  0.174565  0.000166
  0.156593  0.067418  0.010363  0.000000  0.179479  0.000250
  0.208791  0.068254  0.013904  0.000000  0.184393  0.000334
  0.260989  0.069094  0.017488  0.000000  0.189306  0.000419
  0.313187  0.069938  0.021117  0.000000  0.194220  0.000504
  0.365385  0.070787  0.024790  0.000000  0.199134  0.000590
  0.417582  0.071640  0.028507  0.000000  0.204047  0.000676
```

```
  0.469780  0.072498  0.032269  0.000000  0.208961  0.000762
  0.521978  0.073361  0.036075  0.069173  0.213875  0.000849
  0.574176  0.074228  0.039927  0.428420  0.218788  0.000937
  0.626374  0.075099  0.043825  0.951453  0.223702  0.001024
  0.678571  0.075975  0.047767  1.594200  0.228616  0.001113
  0.730769  0.076855  0.051756  2.331616  0.233529  0.001202
  0.782967  0.077740  0.055791  3.143418  0.238443  0.001291
  0.835165  0.078630  0.059872  4.010349  0.243357  0.001380
  0.887363  0.079524  0.064000  4.912942  0.248270  0.001471
  0.939560  0.080422  0.068174  5.831235  0.253184  0.001561
  0.991758  0.081325  0.072395  6.744993  0.258098  0.001652
  1.043956  0.082233  0.076664  7.634218  0.263012  0.001744
  1.096154  0.083145  0.080980  8.479889  0.267925  0.001836
  1.148352  0.084061  0.085344  9.264852  0.272839  0.001928
  1.200549  0.084982  0.089756  9.974852  0.277753  0.002021
  1.252747  0.085907  0.094216  10.59968  0.282666  0.002114
  1.304945  0.086837  0.098724  11.13442  0.287580  0.002208
  1.357143  0.087772  0.103282  11.58079  0.292494  0.002302
  1.409341  0.088711  0.107888  11.94858  0.297407  0.002397
  1.461538  0.089654  0.112543  12.25714  0.302321  0.002492
  1.513736  0.090602  0.117247  12.68475  0.307235  0.002588
  1.565934  0.091555  0.122001  13.00723  0.312148  0.002684
  1.618132  0.092512  0.126805  13.32190  0.317062  0.002780
  1.670330  0.093473  0.131659  13.62930  0.321976  0.002877
  1.722527  0.094439  0.136564  13.92993  0.326889  0.002975
  1.774725  0.095410  0.141518  14.22420  0.331803  0.003072
  1.826923  0.096385  0.146524  14.51251  0.336717  0.003171
  1.879121  0.097364  0.151581  14.79520  0.341630  0.003270
  1.931319  0.098348  0.156689  15.07258  0.346544  0.003369
  1.983516  0.099337  0.161848  15.34496  0.351458  0.003468
  2.000000  0.099650  0.163488  15.61258  0.353010  0.003500
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.11,12,14

General Model Information

Project Name:	4201-SDHM-10.11,12,14 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.11,12,14 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	1
C,NatVeg,Steep	0.57
Pervious Total	1.57
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.57

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.11,12,14 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.5
C,NatVeg,Steep	0.06
Pervious Total	0.56

Impervious Land Use	acre
IMPERVIOUS-MOD	1.01
Impervious Total	1.01
Basin Total	1.57

Element Flows To:

Surface	Interflow	Groundwater
Surface filtration	Surface filtration	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration

Bottom Length:	120.00 ft.
Bottom Width:	33.50 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	50.056
Total Volume Through Riser (ac-ft.):	10.441
Total Volume Through Facility (ac-ft.):	60.497
Percent Infiltrated:	82.74
Total Precip Applied to Facility:	4.668
Total Evap From Facility:	3.877
Underdrain not used	
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	12 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
999.25	0.0923	0.0000	0.0000	0.0000
999.30	0.0923	0.0016	0.0000	0.0000
999.36	0.0923	0.0032	0.0000	0.0000
999.42	0.0923	0.0048	0.0000	0.0000
999.48	0.0923	0.0064	0.0000	0.0000
999.53	0.0923	0.0080	0.0000	0.0000
999.59	0.0923	0.0096	0.0000	0.0000
999.65	0.0923	0.0112	0.0000	0.0072
999.71	0.0923	0.0128	0.0000	0.0109
999.76	0.0923	0.0144	0.0000	0.0156
999.82	0.0923	0.0160	0.0000	0.0216
999.88	0.0923	0.0176	0.0000	0.0279
999.94	0.0923	0.0192	0.0000	0.0279
1000	0.0923	0.0208	0.0000	0.0279
1000.0	0.0923	0.0224	0.0000	0.0279
1000.1	0.0923	0.0240	0.0000	0.0279
1000.1	0.0923	0.0256	0.0000	0.0279
1000.2	0.0923	0.0272	0.0000	0.0279
1000.2	0.0923	0.0288	0.0000	0.0279
1000.3	0.0923	0.0303	0.0000	0.0279
1000.4	0.0923	0.0319	0.0000	0.0279
1000.4	0.0923	0.0335	0.0000	0.0279
1000.5	0.0923	0.0351	0.0000	0.0279
1000.5	0.0923	0.0367	0.0000	0.0279
1000.6	0.0923	0.0383	0.0000	0.0279

1000.6	0.0923	0.0399	0.0000	0.0279
1000.7	0.0923	0.0415	0.0000	0.0279
1000.8	0.0923	0.0431	0.0000	0.0279
1000.8	0.0923	0.0447	0.0000	0.0279
1000.9	0.0923	0.0463	0.0000	0.0279
1000.9	0.0923	0.0479	0.0000	0.0279
1001.0	0.0923	0.0501	0.0000	0.0279
1001.0	0.0923	0.0523	0.0000	0.0279
1001.1	0.0923	0.0545	0.0000	0.0279
1001.2	0.0923	0.0568	0.0000	0.0279
1001.2	0.0923	0.0590	0.0000	0.0279
1001.3	0.0923	0.0612	0.0000	0.0279
1001.3	0.0923	0.0634	0.0000	0.0279
1001.4	0.0923	0.0656	0.0000	0.0279
1001.5	0.0923	0.0678	0.0000	0.0279
1001.5	0.0923	0.0700	0.0000	0.0279
1001.6	0.0923	0.0722	0.0000	0.0279
1001.6	0.0923	0.0744	0.0000	0.0279
1001.7	0.0923	0.0766	0.0000	0.0279
1001.7	0.0923	0.0789	0.0000	0.0279
1001.8	0.0923	0.0811	0.0000	0.0279
1001.9	0.0923	0.0833	0.0000	0.0279
1001.9	0.0923	0.0855	0.0000	0.0279
1002	0.0923	0.0870	0.0000	0.0279

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0923	0.0870	0.0000	0.4694	0.0002
2.8077	0.0931	0.0923	0.0000	0.4694	0.0005
2.8654	0.0939	0.0977	0.0000	0.5786	0.0007
2.9231	0.0947	0.1031	0.0000	0.5965	0.0010
2.9808	0.0956	0.1086	0.0000	0.6144	0.0012
3.0385	0.0964	0.1142	0.0000	0.6323	0.0015
3.0962	0.0972	0.1197	0.0000	0.6502	0.0017
3.1538	0.0980	0.1254	0.0000	0.6681	0.0020
3.2115	0.0989	0.1311	0.0000	0.6860	0.0022
3.2692	0.0997	0.1368	0.0283	0.7039	0.0025
3.3269	0.1005	0.1426	0.2257	0.7218	0.0028
3.3846	0.1014	0.1484	0.5168	0.7397	0.0030
3.4423	0.1022	0.1543	0.8600	0.7576	0.0033
3.5000	0.1031	0.1602	1.2176	0.7755	0.0035
3.5577	0.1039	0.1662	1.5516	0.7934	0.0038
3.6154	0.1048	0.1722	1.8292	0.8113	0.0040
3.6731	0.1056	0.1782	2.0318	0.8291	0.0043
3.7308	0.1065	0.1844	2.1668	0.8470	0.0045
3.7885	0.1073	0.1905	2.3112	0.8649	0.0048
3.8462	0.1082	0.1967	2.4319	0.8828	0.0051
3.9038	0.1090	0.2030	2.5468	0.9007	0.0053
3.9615	0.1099	0.2093	2.6568	0.9186	0.0056
4.0192	0.1108	0.2157	2.7624	0.9365	0.0059
4.0769	0.1116	0.2221	2.8641	0.9544	0.0061
4.1346	0.1125	0.2286	2.9624	0.9723	0.0064
4.1923	0.1134	0.2351	3.0574	0.9902	0.0066
4.2500	0.1143	0.2417	3.1496	1.0081	0.0069
4.3077	0.1151	0.2483	3.2392	1.0260	0.0072
4.3654	0.1160	0.2549	3.3264	1.0439	0.0074
4.4231	0.1169	0.2617	3.4113	1.0618	0.0077
4.4808	0.1178	0.2684	3.4942	1.0797	0.0080

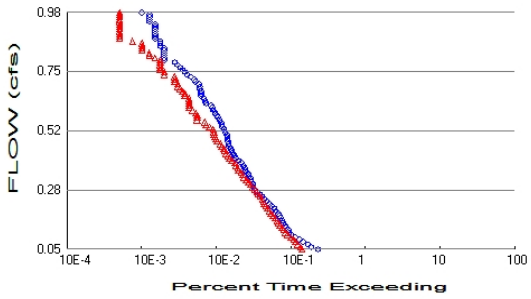
4.5385	0.1187	0.2752	3.5752	1.0976	0.0083
4.5962	0.1196	0.2821	3.6543	1.1155	0.0085
4.6538	0.1205	0.2890	3.7318	1.1334	0.0088
4.7115	0.1213	0.2960	3.8077	1.1513	0.0091
4.7692	0.1222	0.3030	3.8821	1.1692	0.0093
4.8269	0.1231	0.3101	3.9552	1.1871	0.0096
4.8846	0.1240	0.3173	4.0269	1.2050	0.0099
4.9423	0.1250	0.3244	4.0973	1.2228	0.0102
5.0000	0.1259	0.3317	4.1666	1.2407	0.0104
5.0577	0.1268	0.3390	4.2347	1.2586	0.0107
5.1154	0.1277	0.3463	4.3017	1.2765	0.0110
5.1731	0.1286	0.3537	4.3678	1.2944	0.0113
5.2308	0.1295	0.3611	4.4328	1.3123	0.0114
5.2500	0.1298	0.3636	4.4969	1.3183	0.0021

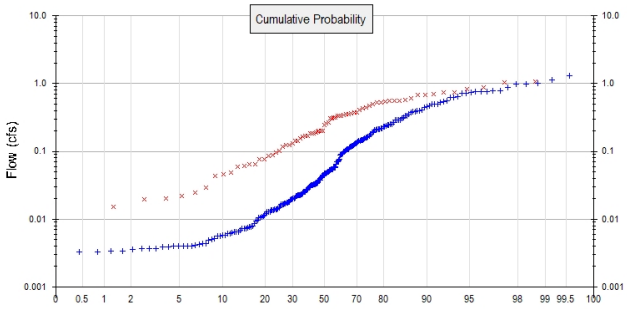
Surface filtration

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.57
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.56
Total Impervious Area: 1.01

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.501416
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.37992
5 year	0.655098
10 year	0.766106
25 year	1.034605

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0501	909	558	61	Pass
0.0596	746	533	71	Pass
0.0690	668	490	73	Pass
0.0784	576	455	78	Pass
0.0879	523	433	82	Pass
0.0973	449	395	87	Pass
0.1067	401	361	90	Pass
0.1161	378	335	88	Pass
0.1256	362	318	87	Pass
0.1350	344	302	87	Pass
0.1444	332	284	85	Pass
0.1539	314	269	85	Pass
0.1633	302	257	85	Pass
0.1727	289	244	84	Pass
0.1821	278	226	81	Pass
0.1916	267	214	80	Pass
0.2010	251	203	80	Pass
0.2104	237	193	81	Pass
0.2199	220	183	83	Pass
0.2293	205	175	85	Pass
0.2387	191	171	89	Pass
0.2481	175	165	94	Pass
0.2576	162	154	95	Pass
0.2670	151	144	95	Pass
0.2764	139	138	99	Pass
0.2859	131	131	100	Pass
0.2953	123	121	98	Pass
0.3047	123	114	92	Pass
0.3141	117	108	92	Pass
0.3236	115	100	86	Pass
0.3330	112	94	83	Pass
0.3424	107	89	83	Pass
0.3519	101	85	84	Pass
0.3613	97	79	81	Pass
0.3707	96	77	80	Pass
0.3801	92	72	78	Pass
0.3896	86	71	82	Pass
0.3990	79	64	81	Pass
0.4084	72	60	83	Pass
0.4178	70	57	81	Pass
0.4273	67	53	79	Pass
0.4367	64	51	79	Pass
0.4461	62	50	80	Pass
0.4556	59	47	79	Pass
0.4650	58	45	77	Pass
0.4744	57	41	71	Pass
0.4838	56	39	69	Pass
0.4933	56	38	67	Pass
0.5027	55	37	67	Pass
0.5121	52	37	71	Pass
0.5216	50	36	72	Pass
0.5310	48	32	66	Pass
0.5404	47	29	61	Pass

0.5498	46	28	60	Pass
0.5593	44	22	50	Pass
0.5687	42	22	52	Pass
0.5781	40	22	55	Pass
0.5876	38	21	55	Pass
0.5970	36	19	52	Pass
0.6064	35	17	48	Pass
0.6158	34	17	50	Pass
0.6253	29	17	58	Pass
0.6347	28	17	60	Pass
0.6441	27	17	62	Pass
0.6536	25	15	60	Pass
0.6630	25	15	60	Pass
0.6724	25	14	56	Pass
0.6818	24	13	54	Pass
0.6913	24	12	50	Pass
0.7007	23	12	52	Pass
0.7101	21	11	52	Pass
0.7196	20	11	55	Pass
0.7290	18	11	61	Pass
0.7384	16	8	50	Pass
0.7478	15	8	53	Pass
0.7573	14	7	50	Pass
0.7667	13	7	53	Pass
0.7761	12	7	58	Pass
0.7856	11	7	63	Pass
0.7950	8	7	87	Pass
0.8044	8	6	75	Pass
0.8138	8	5	62	Pass
0.8233	8	5	62	Pass
0.8327	8	4	50	Pass
0.8421	8	4	50	Pass
0.8516	7	4	57	Pass
0.8610	7	4	57	Pass
0.8704	7	3	42	Pass
0.8798	6	2	33	Pass
0.8893	6	2	33	Pass
0.8987	6	2	33	Pass
0.9081	6	2	33	Pass
0.9176	6	2	33	Pass
0.9270	6	2	33	Pass
0.9364	6	2	33	Pass
0.9458	5	2	40	Pass
0.9553	5	2	40	Pass
0.9647	5	2	40	Pass
0.9741	5	2	40	Pass
0.9836	4	2	50	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.11,12,14 - Existing Street Areas 1.57ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.11,12,14 Streets.wdm
MESSU       25   Mit4201-SDHM-10.11,12,14 Streets.MES
            27   Mit4201-SDHM-10.11,12,14 Streets.L61
            28   Mit4201-SDHM-10.11,12,14 Streets.L62
            30   POC4201-SDHM-10.11,12,14 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      PERLND      21
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface filtration          MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
   21      C,NatVeg,Steep         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
```

```
    2         0    0    1    0    0    0    0    0    0    0    0    0
   21         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   21         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
   21         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
    2              0       3.8      0.07        80       0.1        2.5      0.915
   21              0       3.2      0.03        75      0.15        2.5      0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
   21              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                          ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
   21              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
   21       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
   21       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
   21              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.11,12,14 - Streets***
PERLND   2                        0.5     RCHRES   1      2
PERLND   2                        0.5     RCHRES   1      3
PERLND  21                       0.06     RCHRES   1      2
PERLND  21                       0.06     RCHRES   1      3
IMPLND   2                       1.01     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   2                        0.5     COPY     1     12
PERLND  21                       0.06     COPY     1     12
IMPLND   2                       1.01     COPY     1     15
PERLND   2                        0.5     COPY     1     13
PERLND  21                       0.06     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK
```

```
RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<-----------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
    1     Surface filtrati-017    3    1    1    1   28    0    1
    2     Biofiltration           2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1             1      0.01       0.0    999.25       0.0       0.0
    2             2      0.02       0.0    999.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  3888.19
```

```
*** Compute remaining available pore space
  GENER   2                                 vpo2            =  v2m2
  GENER   2                                 vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                                 vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                                 v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   49    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.092287  0.000000  0.000000  0.000000
  0.057692  0.092287  0.001597  0.000000  0.000000
  0.115385  0.092287  0.003195  0.000000  0.000000
  0.173077  0.092287  0.004792  0.000000  0.000000
  0.230769  0.092287  0.006389  0.000000  0.000000
  0.288462  0.092287  0.007986  0.000000  0.000000
  0.346154  0.092287  0.009584  0.000000  0.000000
  0.403846  0.092287  0.011181  0.000000  0.007198
  0.461538  0.092287  0.012778  0.000000  0.010860
  0.519231  0.092287  0.014375  0.000000  0.015611
  0.576923  0.092287  0.015973  0.000000  0.021564
  0.634615  0.092287  0.017570  0.000000  0.027917
  0.692308  0.092287  0.019167  0.000000  0.027917
  0.750000  0.092287  0.020764  0.000000  0.027917
  0.807692  0.092287  0.022362  0.000000  0.027917
  0.865385  0.092287  0.023959  0.000000  0.027917
  0.923077  0.092287  0.025556  0.000000  0.027917
  0.980769  0.092287  0.027154  0.000000  0.027917
  1.038462  0.092287  0.028751  0.000000  0.027917
  1.096154  0.092287  0.030348  0.000000  0.027917
  1.153846  0.092287  0.031945  0.000000  0.027917
  1.211538  0.092287  0.033543  0.000000  0.027917
  1.269231  0.092287  0.035140  0.000000  0.027917
  1.326923  0.092287  0.036737  0.000000  0.027917
  1.384615  0.092287  0.038334  0.000000  0.027917
  1.442308  0.092287  0.039932  0.000000  0.027917
  1.500000  0.092287  0.041529  0.000000  0.027917
  1.557692  0.092287  0.043126  0.000000  0.027917
  1.615385  0.092287  0.044723  0.000000  0.027917
  1.673077  0.092287  0.046321  0.000000  0.027917
  1.730769  0.092287  0.047918  0.000000  0.027917
  1.788462  0.092287  0.050128  0.000000  0.027917
  1.846154  0.092287  0.052337  0.000000  0.027917
  1.903846  0.092287  0.054547  0.000000  0.027917
  1.961538  0.092287  0.056756  0.000000  0.027917
  2.019231  0.092287  0.058966  0.000000  0.027917
  2.076923  0.092287  0.061175  0.000000  0.027917
  2.134615  0.092287  0.063385  0.000000  0.027917
  2.192308  0.092287  0.065594  0.000000  0.027917
  2.250000  0.092287  0.067804  0.000000  0.027917
  2.307692  0.092287  0.070014  0.000000  0.027917
  2.365385  0.092287  0.072223  0.000000  0.027917
  2.423077  0.092287  0.074433  0.000000  0.027917
  2.480769  0.092287  0.076642  0.000000  0.027917
  2.538462  0.092287  0.078852  0.000000  0.027917
  2.596154  0.092287  0.081061  0.000000  0.027917
  2.653846  0.092287  0.083271  0.000000  0.027917
  2.711538  0.092287  0.085480  0.000000  0.027917
  2.750000  0.092287  0.089261  0.000000  0.027917
  END FTABLE  2
  FTABLE      1
   45    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
```

```
(Minutes)***
  0.000000  0.092287  0.000000  0.000000  0.000000  0.000246
  0.057692  0.093101  0.005348  0.000000  0.469384  0.000246
  0.115385  0.093918  0.010742  0.000000  0.578615  0.000493
  0.173077  0.094737  0.016184  0.000000  0.596510  0.000741
  0.230769  0.095559  0.021674  0.000000  0.614406  0.000990
  0.288462  0.096383  0.027211  0.000000  0.632301  0.001239
  0.346154  0.097210  0.032795  0.000000  0.650196  0.001489
  0.403846  0.098039  0.038427  0.000000  0.668092  0.001740
  0.461538  0.098870  0.044107  0.000000  0.685987  0.001992
  0.519231  0.099704  0.049835  0.028298  0.703882  0.002244
  0.576923  0.100541  0.055612  0.225672  0.721778  0.002497
  0.634615  0.101380  0.061436  0.516834  0.739673  0.002751
  0.692308  0.102221  0.067309  0.859995  0.757568  0.003005
  0.750000  0.103065  0.073231  1.217555  0.775464  0.003260
  0.807692  0.103911  0.079201  1.551565  0.793359  0.003516
  0.865385  0.104760  0.085221  1.829184  0.811254  0.003773
  0.923077  0.105611  0.091289  2.031838  0.829150  0.004031
  0.980769  0.106464  0.097407  2.166777  0.847045  0.004289
  1.038462  0.107320  0.103574  2.311197  0.864940  0.004548
  1.096154  0.108179  0.109790  2.431861  0.882835  0.004807
  1.153846  0.109040  0.116056  2.546815  0.900731  0.005068
  1.211538  0.109903  0.122371  2.656799  0.918626  0.005329
  1.269231  0.110769  0.128737  2.762408  0.936521  0.005591
  1.326923  0.111637  0.135153  2.864126  0.954417  0.005853
  1.384615  0.112508  0.141618  2.962353  0.972312  0.006117
  1.442308  0.113381  0.148134  3.057426  0.990207  0.006381
  1.500000  0.114256  0.154701  3.149630  1.008103  0.006646
  1.557692  0.115134  0.161318  3.239211  1.025998  0.006911
  1.615385  0.116015  0.167986  3.326380  1.043893  0.007178
  1.673077  0.116898  0.174704  3.411323  1.061789  0.007445
  1.730769  0.117783  0.181474  3.494201  1.079684  0.007713
  1.788462  0.118671  0.188295  3.575158  1.097579  0.007981
  1.846154  0.119561  0.195167  3.654323  1.115475  0.008250
  1.903846  0.120454  0.202090  3.731808  1.133370  0.008521
  1.961538  0.121349  0.209065  3.807717  1.151265  0.008791
  2.019231  0.122246  0.216092  3.882142  1.169160  0.009063
  2.076923  0.123146  0.223171  3.955167  1.187056  0.009335
  2.134615  0.124049  0.230301  4.026867  1.204951  0.009608
  2.192308  0.124954  0.237484  4.097314  1.222846  0.009882
  2.250000  0.125861  0.244719  4.166569  1.240742  0.010156
  2.307692  0.126771  0.252006  4.234692  1.258637  0.010431
  2.365385  0.127683  0.259346  4.301736  1.276532  0.010707
  2.423077  0.128598  0.266739  4.367751  1.294428  0.010984
  2.480769  0.129515  0.274185  4.432783  1.312323  0.011262
  2.500000  0.129821  0.276678  4.496875  1.318288  0.011354
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
```

```
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.13

General Model Information

Project Name:	4201-SDHM-10.13 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.13 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
B,NatVeg,Moderate	0.64
Pervious Total	0.64
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.64

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.13 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
B,NatVeg,Moderate	0.12
Pervious Total	0.12

Impervious Land Use	acre
IMPERVIOUS-MOD	0.52
Impervious Total	0.52
Basin Total	0.64

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.13	Surface ation 10.13	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.13

Bottom Length:	20.00 ft.
Bottom Width:	66.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1.33
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	23.756
Total Volume Through Riser (ac-ft.):	1.623
Total Volume Through Facility (ac-ft.):	29.866
Percent Infiltrated:	79.54
Total Precip Applied to Facility:	2.624
Total Evap From Facility:	1.974
Underdrain used	
Underdrain Diameter (feet):	0.33
Orifice Diameter (in.):	0.5
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	4.487
Total Outflow (ac-ft.):	29.866
Percent Through Underdrain:	15.02
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	12 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
961.92	0.0746	0.0000	0.0000	0.0000
961.98	0.0744	0.0006	0.0000	0.0000
962.04	0.0734	0.0011	0.0000	0.0000
962.10	0.0723	0.0017	0.0000	0.0000
962.17	0.0713	0.0023	0.0000	0.0000
962.23	0.0703	0.0030	0.0000	0.0000
962.29	0.0693	0.0036	0.0000	0.0000
962.35	0.0683	0.0042	0.0000	0.0031
962.41	0.0673	0.0049	0.0000	0.0048
962.47	0.0663	0.0056	0.0000	0.0059
962.53	0.0653	0.0063	0.0000	0.0076
962.59	0.0643	0.0070	0.0000	0.0078
962.66	0.0634	0.0077	0.0000	0.0080
962.72	0.0624	0.0084	0.0000	0.0081
962.78	0.0614	0.0092	0.0000	0.0083
962.84	0.0605	0.0099	0.0000	0.0084
962.90	0.0595	0.0107	0.0000	0.0086
962.96	0.0586	0.0115	0.0000	0.0088
963.02	0.0577	0.0123	0.0000	0.0090

963.09	0.0567	0.0131	0.0000	0.0091
963.15	0.0558	0.0140	0.0000	0.0093
963.21	0.0549	0.0148	0.0000	0.0095
963.27	0.0540	0.0157	0.0000	0.0096
963.33	0.0531	0.0166	0.0005	0.0098
963.39	0.0522	0.0175	0.0007	0.0100
963.45	0.0513	0.0184	0.0011	0.0102
963.51	0.0504	0.0193	0.0013	0.0103
963.58	0.0495	0.0203	0.0016	0.0105
963.64	0.0487	0.0213	0.0018	0.0107
963.70	0.0478	0.0226	0.0020	0.0109
963.76	0.0469	0.0240	0.0021	0.0111
963.82	0.0461	0.0254	0.0024	0.0113
963.88	0.0452	0.0269	0.0025	0.0114
963.94	0.0444	0.0283	0.0026	0.0116
964.00	0.0435	0.0298	0.0026	0.0118
964.07	0.0427	0.0313	0.0026	0.0120
964.13	0.0419	0.0328	0.0027	0.0122
964.19	0.0411	0.0344	0.0030	0.0124
964.25	0.0403	0.0359	0.0033	0.0126
964.31	0.0395	0.0375	0.0037	0.0128
964.37	0.0387	0.0392	0.0040	0.0130
964.43	0.0379	0.0408	0.0044	0.0132
964.50	0.0371	0.0425	0.0047	0.0134
964.56	0.0363	0.0442	0.0050	0.0136
964.62	0.0355	0.0459	0.0053	0.0138
964.68	0.0348	0.0477	0.0055	0.0140
964.74	0.0340	0.0494	0.0058	0.0142
964.80	0.0333	0.0512	0.0060	0.0144
964.86	0.0325	0.0531	0.0063	0.0146
964.92	0.0318	0.0549	0.0065	0.0148
964.99	0.0310	0.0568	0.0067	0.0150
965.00	0.0303	0.0572	0.0114	0.0150

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0800	0.0746	0.0572	0.0000	0.1845	0.0002
3.1413	0.0757	0.0618	0.0000	0.1845	0.0004
3.2026	0.0767	0.0665	0.0000	0.1907	0.0006
3.2640	0.0778	0.0713	0.0000	0.1970	0.0008
3.3253	0.0788	0.0761	0.0000	0.2032	0.0011
3.3866	0.0799	0.0809	0.0000	0.2095	0.0013
3.4479	0.0810	0.0859	0.0000	0.2157	0.0015
3.5092	0.0820	0.0909	0.0000	0.2220	0.0017
3.5705	0.0831	0.0959	0.0000	0.2282	0.0019
3.6319	0.0842	0.1011	0.0000	0.2344	0.0022
3.6932	0.0853	0.1062	0.0000	0.2407	0.0024
3.7545	0.0864	0.1115	0.0000	0.2469	0.0026
3.8158	0.0875	0.1168	0.0000	0.2532	0.0028
3.8771	0.0887	0.1223	0.0000	0.2594	0.0031
3.9385	0.0898	0.1277	0.0000	0.2657	0.0033
3.9998	0.0909	0.1333	0.0000	0.2719	0.0035
4.0611	0.0920	0.1389	0.0000	0.2782	0.0037
4.1224	0.0932	0.1445	0.0926	0.2844	0.0040
4.1837	0.0943	0.1503	0.3522	0.2907	0.0042
4.2451	0.0955	0.1561	0.6938	0.2969	0.0044
4.3064	0.0966	0.1620	1.0719	0.3031	0.0047
4.3677	0.0978	0.1680	1.4407	0.3094	0.0049

4.4290	0.0990	0.1740	1.7576	0.3156	0.0051
4.4903	0.1002	0.1801	1.9937	0.3219	0.0054
4.5516	0.1013	0.1863	2.1486	0.3281	0.0056
4.6130	0.1025	0.1925	2.2994	0.3344	0.0059
4.6743	0.1037	0.1989	2.4280	0.3406	0.0061
4.7356	0.1049	0.2053	2.5502	0.3469	0.0064
4.7969	0.1061	0.2117	2.6668	0.3531	0.0066
4.8582	0.1074	0.2183	2.7785	0.3594	0.0068
4.9196	0.1086	0.2249	2.8859	0.3656	0.0071
4.9809	0.1098	0.2316	2.9895	0.3718	0.0073
5.0422	0.1110	0.2384	3.0895	0.3781	0.0076
5.1035	0.1123	0.2452	3.1864	0.3843	0.0078
5.1648	0.1135	0.2521	3.2805	0.3906	0.0081
5.2262	0.1148	0.2591	3.3719	0.3968	0.0084
5.2875	0.1160	0.2662	3.4610	0.4031	0.0086
5.3488	0.1173	0.2734	3.5478	0.4093	0.0089
5.4101	0.1186	0.2806	3.6325	0.4156	0.0091
5.4714	0.1199	0.2879	3.7153	0.4218	0.0094
5.5327	0.1211	0.2953	3.7962	0.4281	0.0096
5.5800	0.1221	0.3010	3.8755	0.4329	0.0000

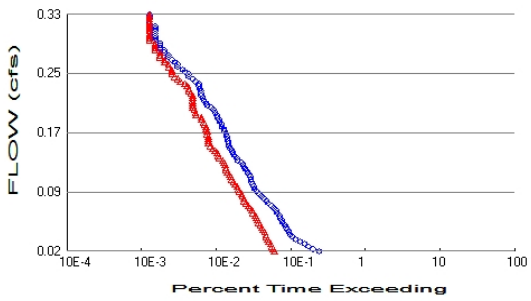
Surface ation 10.13

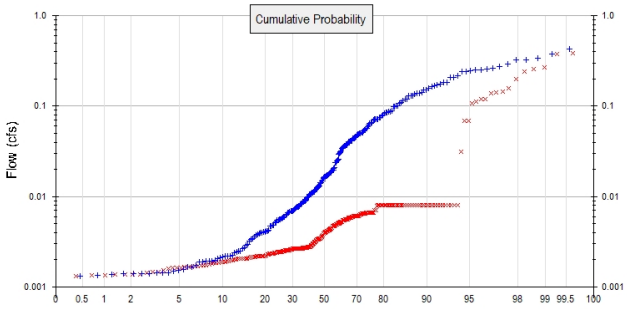
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.13

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.64
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.12
Total Impervious Area: 0.52

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.165535
5 year	0.255153
10 year	0.32591
25 year	0.384147

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.008004
5 year	0.141069
10 year	0.246966
25 year	0.38067

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0166	948	239	25	Pass
0.0197	777	230	29	Pass
0.0228	685	221	32	Pass
0.0259	602	211	35	Pass
0.0291	524	198	37	Pass
0.0322	457	190	41	Pass
0.0353	411	187	45	Pass
0.0384	386	182	47	Pass
0.0416	372	176	47	Pass
0.0447	352	166	47	Pass
0.0478	342	160	46	Pass
0.0509	329	153	46	Pass
0.0541	310	147	47	Pass
0.0572	300	142	47	Pass
0.0603	284	137	48	Pass
0.0634	279	132	47	Pass
0.0666	260	124	47	Pass
0.0697	249	119	47	Pass
0.0728	236	112	47	Pass
0.0759	219	106	48	Pass
0.0790	198	99	50	Pass
0.0822	186	94	50	Pass
0.0853	171	92	53	Pass
0.0884	159	88	55	Pass
0.0915	149	86	57	Pass
0.0947	137	81	59	Pass
0.0978	130	77	59	Pass
0.1009	125	75	60	Pass
0.1040	121	70	57	Pass
0.1072	118	67	56	Pass
0.1103	115	63	54	Pass
0.1134	112	62	55	Pass
0.1165	109	59	54	Pass
0.1197	104	56	53	Pass
0.1228	98	54	55	Pass
0.1259	96	53	55	Pass
0.1290	90	52	57	Pass
0.1322	85	50	58	Pass
0.1353	76	48	63	Pass
0.1384	74	44	59	Pass
0.1415	69	42	60	Pass
0.1447	66	41	62	Pass
0.1478	64	38	59	Pass
0.1509	61	35	57	Pass
0.1540	59	33	55	Pass
0.1572	58	31	53	Pass
0.1603	57	31	54	Pass
0.1634	56	31	55	Pass
0.1665	55	31	56	Pass
0.1697	54	30	55	Pass
0.1728	51	30	58	Pass
0.1759	50	29	58	Pass
0.1790	47	29	61	Pass

0.1822	47	28	59	Pass
0.1853	45	27	60	Pass
0.1884	43	25	58	Pass
0.1915	41	25	60	Pass
0.1947	40	21	52	Pass
0.1978	38	21	55	Pass
0.2009	36	20	55	Pass
0.2040	34	19	55	Pass
0.2072	30	19	63	Pass
0.2103	29	19	65	Pass
0.2134	27	19	70	Pass
0.2165	26	19	73	Pass
0.2197	25	19	76	Pass
0.2228	25	18	72	Pass
0.2259	25	17	68	Pass
0.2290	24	17	70	Pass
0.2322	23	16	69	Pass
0.2353	23	15	65	Pass
0.2384	21	13	61	Pass
0.2415	19	12	63	Pass
0.2447	17	11	64	Pass
0.2478	17	10	58	Pass
0.2509	15	10	66	Pass
0.2540	14	10	71	Pass
0.2572	12	9	75	Pass
0.2603	12	9	75	Pass
0.2634	11	8	72	Pass
0.2665	10	8	80	Pass
0.2697	9	7	77	Pass
0.2728	9	7	77	Pass
0.2759	8	7	87	Pass
0.2790	8	6	75	Pass
0.2822	7	6	85	Pass
0.2853	7	6	85	Pass
0.2884	7	6	85	Pass
0.2915	6	5	83	Pass
0.2947	6	5	83	Pass
0.2978	6	5	83	Pass
0.3009	6	5	83	Pass
0.3040	6	5	83	Pass
0.3072	6	5	83	Pass
0.3103	6	5	83	Pass
0.3134	5	5	100	Pass
0.3165	5	5	100	Pass
0.3197	5	5	100	Pass
0.3228	5	5	100	Pass
0.3259	5	5	100	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

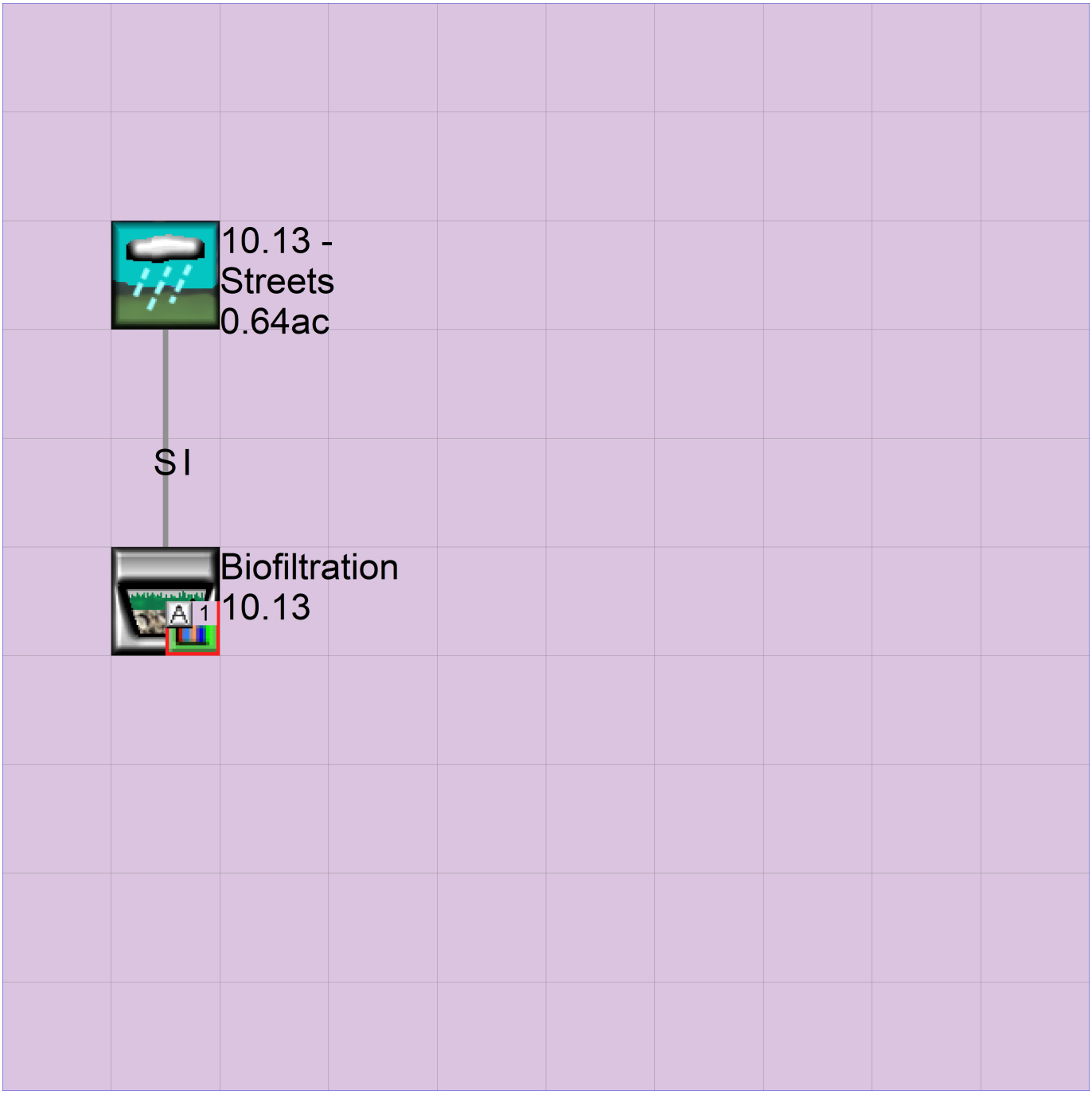
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.13 - Existing Street Areas 0.64ac

Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.13 Streets.wdm
MESSU       25   Pre4201-SDHM-10.13 Streets.MES
            27   Pre4201-SDHM-10.13 Streets.L61
            28   Pre4201-SDHM-10.13 Streets.L62
            30   POC4201-SDHM-10.13 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        10.13 - Existing Street A   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   11      B,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   11         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   11              0       3.7     0.055        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   11       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   11       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   11              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.13 - Existing Street Areas***
PERLND  11                        0.64     COPY   501     12
PERLND  11                        0.64     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.13 Streets.wdm
MESSU       25   Mit4201-SDHM-10.13 Streets.MES
            27   Mit4201-SDHM-10.13 Streets.L61
            28   Mit4201-SDHM-10.13 Streets.L62
            30   POC4201-SDHM-10.13 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      11
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.13        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   11      B,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   11         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   11              0       3.7     0.055        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11               0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   11       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   11       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   11              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.13 - Streets***
PERLND  11                       0.12     RCHRES   1      2
PERLND  11                       0.12     RCHRES   1      3
IMPLND   2                       0.52     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND  11                       0.12     COPY     1     12
IMPLND   2                       0.52     COPY     1     15
PERLND  11                       0.12     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0    961.92       0.0       0.0
    2             2      0.01       0.0    961.92       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                              v2m2            =  2588.65
*** Compute remaining available pore space
  GENER   2                              vpo2            =  v2m2
  GENER   2                              vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                              vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                              v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   52    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.074628  0.000000  0.000000  0.000000
  0.061319  0.074390  0.000564  0.000000  0.000000
  0.122637  0.073356  0.001142  0.000000  0.000000
  0.183956  0.072328  0.001733  0.000000  0.000000
  0.245275  0.071306  0.002338  0.000000  0.000000
  0.306593  0.070291  0.002957  0.000000  0.000000
  0.367912  0.069282  0.003589  0.000000  0.000000
  0.429231  0.068279  0.004236  0.000000  0.003090
  0.490549  0.067282  0.004897  0.000000  0.004812
  0.551868  0.066292  0.005572  0.000000  0.005949
  0.613187  0.065308  0.006262  0.000000  0.007639
  0.674505  0.064329  0.006966  0.000000  0.007798
  0.735824  0.063358  0.007684  0.000000  0.007959
  0.797143  0.062392  0.008418  0.000000  0.008121
  0.858462  0.061433  0.009166  0.000000  0.008285
  0.919780  0.060479  0.009929  0.000000  0.008449
  0.981099  0.059532  0.010708  0.000000  0.008615
  1.042418  0.058592  0.011501  0.000000  0.008782
  1.103736  0.057657  0.012310  0.000000  0.008951
  1.165055  0.056729  0.013134  0.000000  0.009121
  1.226374  0.055807  0.013974  0.000000  0.009291
  1.287692  0.054891  0.014829  0.000000  0.009464
  1.349011  0.053981  0.015700  0.000000  0.009637
  1.410330  0.053077  0.016587  0.000465  0.009812
  1.471648  0.052180  0.017490  0.000698  0.009988
  1.532967  0.051289  0.018410  0.001107  0.010165
  1.594286  0.050404  0.019345  0.001312  0.010343
  1.655604  0.049526  0.020297  0.001622  0.010523
  1.716923  0.048653  0.021265  0.001777  0.010704
  1.778242  0.047787  0.022627  0.002025  0.010886
  1.839560  0.046927  0.024012  0.002148  0.011070
  1.900879  0.046073  0.025421  0.002358  0.011254
  1.962198  0.045226  0.026853  0.002463  0.011440
  2.023516  0.044384  0.028308  0.002648  0.011628
  2.084835  0.043549  0.029787  0.002648  0.011816
  2.146154  0.042720  0.031290  0.002648  0.012006
  2.207473  0.041898  0.032817  0.002730  0.012197
  2.268791  0.041081  0.034368  0.003006  0.012389
  2.330110  0.040271  0.035944  0.003348  0.012582
  2.391429  0.039467  0.037544  0.003703  0.012777
  2.452747  0.038669  0.039168  0.004050  0.012973
  2.514066  0.037877  0.040818  0.004379  0.013170
  2.575385  0.037092  0.042492  0.004691  0.013369
  2.636703  0.036313  0.044192  0.004985  0.013569
  2.698022  0.035540  0.045917  0.005264  0.013770
  2.759341  0.034773  0.047667  0.005530  0.013972
  2.820659  0.034013  0.049443  0.005783  0.014175
  2.881978  0.033258  0.051244  0.006027  0.014380
  2.943297  0.032510  0.053072  0.006261  0.014586
  3.004615  0.031768  0.054926  0.006488  0.014793
  3.065934  0.031033  0.056805  0.006711  0.015002
  3.080000  0.030303  0.059427  0.011413  0.015050
  END FTABLE  2
  FTABLE      1
   42    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.030303  0.000000  0.000000  0.000000  0.000210
  0.061319  0.075670  0.004608  0.000000  0.184486  0.000210
  0.122637  0.076717  0.009280  0.000000  0.190732  0.000421
  0.183956  0.077771  0.014017  0.000000  0.196977  0.000634
  0.245275  0.078832  0.018818  0.000000  0.203223  0.000848
  0.306593  0.079898  0.023685  0.000000  0.209468  0.001063
  0.367912  0.080971  0.028617  0.000000  0.215713  0.001279
  0.429231  0.082050  0.033615  0.000000  0.221959  0.001497
  0.490549  0.083135  0.038679  0.000000  0.228204  0.001716
  0.551868  0.084226  0.043810  0.000000  0.234450  0.001936
  0.613187  0.085324  0.049009  0.000000  0.240695  0.002157
```

```
  0.674505  0.086428  0.054275  0.000000  0.246941  0.002380
  0.735824  0.087538  0.059608  0.000000  0.253186  0.002603
  0.797143  0.088654  0.065010  0.000000  0.259431  0.002829
  0.858462  0.089776  0.070481  0.000000  0.265677  0.003055
  0.919780  0.090905  0.076020  0.000000  0.271922  0.003283
  0.981099  0.092040  0.081629  0.000000  0.278168  0.003511
  1.042418  0.093181  0.087308  0.092613  0.284413  0.003742
  1.103736  0.094328  0.093057  0.352165  0.290659  0.003973
  1.165055  0.095482  0.098876  0.693763  0.296904  0.004206
  1.226374  0.096641  0.104767  1.071851  0.303149  0.004439
  1.287692  0.097807  0.110728  1.440689  0.309395  0.004675
  1.349011  0.098980  0.116762  1.757580  0.315640  0.004911
  1.410330  0.100158  0.122867  1.993656  0.321886  0.005149
  1.471648  0.101343  0.129045  2.148612  0.328131  0.005387
  1.532967  0.102533  0.135296  2.299375  0.334377  0.005628
  1.594286  0.103730  0.141620  2.428048  0.340622  0.005869
  1.655604  0.104934  0.148017  2.550237  0.346867  0.006112
  1.716923  0.106143  0.154489  2.666833  0.353113  0.006356
  1.778242  0.107359  0.161034  2.778541  0.359358  0.006601
  1.839560  0.108581  0.167655  2.885928  0.365604  0.006847
  1.900879  0.109809  0.174351  2.989460  0.371849  0.007095
  1.962198  0.111043  0.181122  3.089525  0.378095  0.007344
  2.023516  0.112283  0.187969  3.186449  0.384340  0.007594
  2.084835  0.113530  0.194892  3.280510  0.390585  0.007845
  2.146154  0.114783  0.201892  3.371949  0.396831  0.008098
  2.207473  0.116042  0.208969  3.460973  0.403076  0.008352
  2.268791  0.117308  0.216123  3.547763  0.409322  0.008607
  2.330110  0.118579  0.223356  3.632481  0.415567  0.008864
  2.391429  0.119857  0.230666  3.715267  0.421813  0.009121
  2.452747  0.121141  0.238055  3.796248  0.428058  0.009380
  2.500000  0.122135  0.243802  3.875537  0.432871  0.009581
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.15

General Model Information

Project Name:	4201-SDHM-10.15 Streets to Trees
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/08/22

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.15 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.78
Pervious Total	0.78
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.78

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.15 - Perv Slopes Streets

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.38
Pervious Total	0.38
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.38

Element Flows To:

Surface	Interflow	Groundwater
Natural Channel Trees	Natural Channel Trees	

Impervious Area Streets

Bypass:	No
Impervious Land Use	acre
IMPERVIOUS-FLAT LAT	0.4
Element Flows To:	
Outlet 1	Outlet 2
Surface 5 TREE WELLS	

Routing Elements
Predeveloped Routing

Mitigated Routing

Natural Channel Trees

Bottom Length: 50.00 ft.
Bottom Width: 1.00 ft.
Manning's n: 0.03
Channel bottom slope 1: 10 To 1
Channel Left side slope 0: 1 To 1
Channel right side slope 2: 1 To 1
Infiltration On
Infiltration rate: 0.3
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 0.013
Total Volume Through Riser (ac-ft.): 5.169
Total Volume Through Facility (ac-ft.): 5.182
Percent Infiltrated: 0.25
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.
Element Flows To:
Outlet 1 Outlet 2

Channel Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.001148	0.000000	0.000	0.000
0.0111	0.001179	0.000013	0.086	0.000
0.0222	0.001210	0.000026	0.274	0.000
0.0333	0.001241	0.000040	0.539	0.000
0.0444	0.001272	0.000054	0.870	0.000
0.0556	0.001304	0.000068	1.261	0.000
0.0667	0.001336	0.000083	1.708	0.000
0.0778	0.001368	0.000098	2.208	0.000
0.0889	0.001400	0.000113	2.759	0.000
0.1000	0.001433	0.000129	3.359	0.000
0.1111	0.001465	0.000145	4.006	0.000
0.1222	0.001498	0.000161	4.700	0.000
0.1333	0.001531	0.000178	5.439	0.000
0.1444	0.001565	0.000195	6.223	0.000
0.1556	0.001599	0.000213	7.051	0.000
0.1667	0.001632	0.000231	7.923	0.000
0.1778	0.001667	0.000249	8.838	0.000
0.1889	0.001701	0.000268	9.795	0.000
0.2000	0.001736	0.000287	10.79	0.000
0.2111	0.001770	0.000307	11.83	0.000
0.2222	0.001805	0.000326	12.92	0.000
0.2333	0.001841	0.000347	14.05	0.000
0.2444	0.001876	0.000367	15.22	0.000
0.2556	0.001912	0.000388	16.43	0.000
0.2667	0.001948	0.000410	17.69	0.000
0.2778	0.001984	0.000432	18.98	0.000
0.2889	0.002020	0.000454	20.32	0.000
0.3000	0.002057	0.000477	21.70	0.000
0.3111	0.002094	0.000500	23.13	0.000

0.3222	0.002131	0.000523	24.60	0.000
0.3333	0.002168	0.000547	26.11	0.000
0.3444	0.002206	0.000571	27.66	0.000
0.3556	0.002243	0.000596	29.26	0.000
0.3667	0.002281	0.000621	30.89	0.000
0.3778	0.002320	0.000647	32.58	0.000
0.3889	0.002358	0.000673	34.31	0.000
0.4000	0.002397	0.000699	36.08	0.000
0.4111	0.002436	0.000726	37.89	0.000
0.4222	0.002475	0.000753	39.75	0.000
0.4333	0.002514	0.000781	41.65	0.000
0.4444	0.002554	0.000809	43.60	0.000
0.4556	0.002593	0.000838	45.60	0.000
0.4667	0.002633	0.000867	47.64	0.000
0.4778	0.002674	0.000896	49.72	0.000
0.4889	0.002714	0.000926	51.85	0.000
0.5000	0.002755	0.000957	54.03	0.000
0.5111	0.002796	0.000987	56.25	0.000
0.5222	0.002837	0.001019	58.52	0.000
0.5333	0.002878	0.001050	60.83	0.000
0.5444	0.002920	0.001083	63.20	0.000
0.5556	0.002962	0.001115	65.61	0.000
0.5667	0.003004	0.001148	68.06	0.000
0.5778	0.003046	0.001182	70.57	0.000
0.5889	0.003089	0.001216	73.12	0.000
0.6000	0.003131	0.001251	75.72	0.000
0.6111	0.003174	0.001286	78.37	0.000
0.6222	0.003217	0.001321	81.07	0.000
0.6333	0.003261	0.001357	83.82	0.000
0.6444	0.003305	0.001394	86.62	0.000
0.6556	0.003348	0.001431	89.46	0.000
0.6667	0.003393	0.001468	92.36	0.000
0.6778	0.003437	0.001506	95.31	0.000
0.6889	0.003481	0.001544	98.30	0.000
0.7000	0.003526	0.001583	101.3	0.000
0.7111	0.003571	0.001623	104.4	0.000
0.7222	0.003616	0.001663	107.6	0.000
0.7333	0.003662	0.001703	110.8	0.000
0.7444	0.003708	0.001744	114.0	0.000
0.7556	0.003753	0.001786	117.3	0.000
0.7667	0.003800	0.001828	120.7	0.000
0.7778	0.003846	0.001870	124.1	0.000
0.7889	0.003893	0.001913	127.5	0.000
0.8000	0.003939	0.001957	131.1	0.000
0.8111	0.003986	0.002001	134.6	0.000
0.8222	0.004034	0.002045	138.2	0.000
0.8333	0.004081	0.002090	141.9	0.000
0.8444	0.004129	0.002136	145.7	0.000
0.8556	0.004177	0.002182	149.4	0.000
0.8667	0.004225	0.002229	153.3	0.000
0.8778	0.004273	0.002276	157.2	0.000
0.8889	0.004322	0.002324	161.1	0.000
0.9000	0.004371	0.002372	165.1	0.000
0.9111	0.004420	0.002421	169.2	0.000
0.9222	0.004469	0.002470	173.3	0.000
0.9333	0.004519	0.002520	177.5	0.000
0.9444	0.004569	0.002571	181.7	0.000
0.9556	0.004619	0.002622	186.0	0.000

0.9667	0.004669	0.002673	190.3	0.000
0.9778	0.004719	0.002725	194.7	0.000
0.9889	0.004770	0.002778	199.2	0.000
1.0000	0.004821	0.002831	203.7	0.000
1.0111	0.004872	0.002885	208.3	0.000

25 TREE WELLS

Bottom Length:	100.00 ft.
Bottom Width:	25.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2.75
Material type for second layer:	ESM
Material thickness of third layer:	0
Material type for third layer:	GRAVEL

Infiltration On

Infiltration rate:	0.3
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	19.535
Total Volume Through Riser (ac-ft.):	1.994
Total Volume Through Facility (ac-ft.):	21.529
Percent Infiltrated:	90.74
Total Precip Applied to Facility:	2.696
Total Evap From Facility:	2.079

Underdrain not used

Discharge Structure

Riser Height:	0.167 ft.
Riser Diameter:	60 in.

Element Flows To:

Outlet 1 Outlet 2

Natural Channel Trees

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0574	0.0000	0.0000	0.0000
0.0403	0.0574	0.0007	0.0000	0.0000
0.0806	0.0574	0.0014	0.0000	0.0000
0.1209	0.0574	0.0021	0.0000	0.0000
0.1612	0.0574	0.0028	0.0000	0.0000
0.2015	0.0574	0.0035	0.0000	0.0000
0.2418	0.0574	0.0042	0.0000	0.0000
0.2821	0.0574	0.0049	0.0000	0.0000
0.3224	0.0574	0.0056	0.0000	0.0000
0.3627	0.0574	0.0062	0.0000	0.0017
0.4030	0.0574	0.0069	0.0000	0.0022
0.4433	0.0574	0.0076	0.0000	0.0027
0.4836	0.0574	0.0083	0.0000	0.0033
0.5239	0.0574	0.0090	0.0000	0.0040
0.5642	0.0574	0.0097	0.0000	0.0048
0.6045	0.0574	0.0104	0.0000	0.0057
0.6447	0.0574	0.0111	0.0000	0.0067
0.6850	0.0574	0.0118	0.0000	0.0078
0.7253	0.0574	0.0125	0.0000	0.0090
0.7656	0.0574	0.0132	0.0000	0.0103
0.8059	0.0574	0.0139	0.0000	0.0117
0.8462	0.0574	0.0146	0.0000	0.0132
0.8865	0.0574	0.0153	0.0000	0.0149
0.9268	0.0574	0.0160	0.0000	0.0167
0.9671	0.0574	0.0167	0.0000	0.0174
1.0074	0.0574	0.0173	0.0000	0.0174
1.0477	0.0574	0.0180	0.0000	0.0174
1.0880	0.0574	0.0187	0.0000	0.0174

1.1283	0.0574	0.0194	0.0000	0.0174
1.1686	0.0574	0.0201	0.0000	0.0174
1.2089	0.0574	0.0208	0.0000	0.0174
1.2492	0.0574	0.0215	0.0000	0.0174
1.2895	0.0574	0.0222	0.0000	0.0174
1.3298	0.0574	0.0229	0.0000	0.0174
1.3701	0.0574	0.0236	0.0000	0.0174
1.4104	0.0574	0.0243	0.0000	0.0174
1.4507	0.0574	0.0250	0.0000	0.0174
1.4910	0.0574	0.0257	0.0000	0.0174
1.5313	0.0574	0.0264	0.0000	0.0174
1.5716	0.0574	0.0271	0.0000	0.0174
1.6119	0.0574	0.0278	0.0000	0.0174
1.6522	0.0574	0.0284	0.0000	0.0174
1.6925	0.0574	0.0291	0.0000	0.0174
1.7328	0.0574	0.0298	0.0000	0.0174
1.7731	0.0574	0.0305	0.0000	0.0174
1.8134	0.0574	0.0312	0.0000	0.0174
1.8536	0.0574	0.0319	0.0000	0.0174
1.8939	0.0574	0.0326	0.0000	0.0174
1.9342	0.0574	0.0333	0.0000	0.0174
1.9745	0.0574	0.0340	0.0000	0.0174
2.0148	0.0574	0.0347	0.0000	0.0174
2.0551	0.0574	0.0354	0.0000	0.0174
2.0954	0.0574	0.0361	0.0000	0.0174
2.1357	0.0574	0.0368	0.0000	0.0174
2.1760	0.0574	0.0375	0.0000	0.0174
2.2163	0.0574	0.0382	0.0000	0.0174
2.2566	0.0574	0.0389	0.0000	0.0174
2.2969	0.0574	0.0395	0.0000	0.0174
2.3372	0.0574	0.0402	0.0000	0.0174
2.3775	0.0574	0.0409	0.0000	0.0174
2.4178	0.0574	0.0416	0.0000	0.0174
2.4581	0.0574	0.0423	0.0000	0.0174
2.4984	0.0574	0.0430	0.0000	0.0174
2.5387	0.0574	0.0437	0.0000	0.0174
2.5790	0.0574	0.0444	0.0000	0.0174
2.6193	0.0574	0.0451	0.0000	0.0174
2.6596	0.0574	0.0458	0.0000	0.0174
2.6999	0.0574	0.0465	0.0000	0.0174
2.7402	0.0574	0.0472	0.0000	0.0174
2.7805	0.0574	0.0479	0.0000	0.0174
2.8208	0.0574	0.0486	0.0000	0.0174
2.8611	0.0574	0.0493	0.0000	0.0174
2.9014	0.0574	0.0500	0.0000	0.0174
2.9417	0.0574	0.0506	0.0000	0.0174
2.9820	0.0574	0.0513	0.0000	0.0174
3.0000	0.0574	0.0517	0.0000	0.0174

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0574	0.0517	0.0000	0.2894	0.0000
3.0403	0.0574	0.0540	0.0000	0.2894	0.0000
3.0806	0.0574	0.0563	0.0000	0.3241	0.0000
3.1209	0.0574	0.0586	0.0000	0.3284	0.0000
3.1612	0.0574	0.0609	0.0000	0.3326	0.0000
3.2015	0.0574	0.0632	0.3399	0.3369	0.0000
3.2418	0.0574	0.0655	1.0852	0.3411	0.0000

3.2821	0.0574	0.0678	2.0708	0.3453	0.0000
3.3224	0.0574	0.0702	3.2478	0.3496	0.0000
3.3627	0.0574	0.0725	4.5885	0.3538	0.0000
3.4030	0.0574	0.0748	6.0744	0.3581	0.0000
3.4433	0.0574	0.0771	7.6920	0.3623	0.0000
3.4836	0.0574	0.0794	9.4303	0.3665	0.0000
3.5239	0.0574	0.0817	11.280	0.3708	0.0000
3.5642	0.0574	0.0840	13.234	0.3750	0.0000
3.6045	0.0574	0.0863	15.285	0.3793	0.0000
3.6447	0.0574	0.0887	17.426	0.3835	0.0000
3.6670	0.0574	0.0899	19.651	0.3858	0.0000

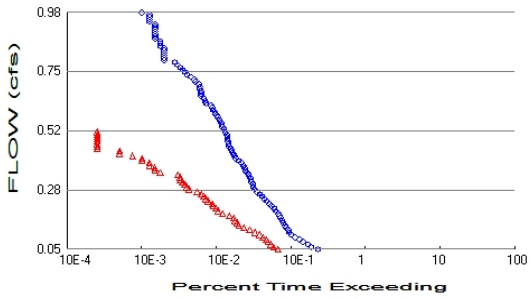
Surface 5 TREE WELLS

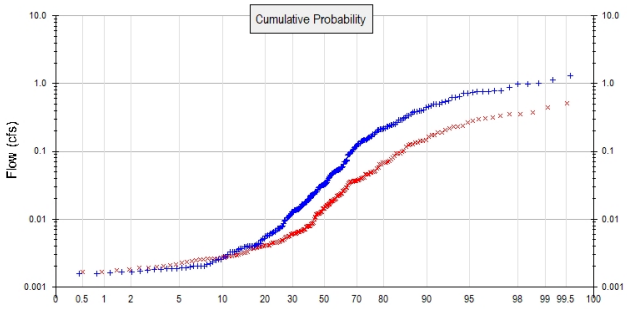
Element Flows To:

Outlet 1	Outlet 2
Natural Channel Trees	25 TREE WELLS

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.78
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.38
Total Impervious Area: 0.4

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.501416
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.142628
5 year	0.296935
10 year	0.351903
25 year	0.44681

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0501	909	268	29	Pass
0.0596	746	232	31	Pass
0.0690	668	214	32	Pass
0.0784	576	195	33	Pass
0.0879	523	184	35	Pass
0.0973	449	166	36	Pass
0.1067	401	152	37	Pass
0.1161	378	131	34	Pass
0.1256	362	111	30	Pass
0.1350	344	93	27	Pass
0.1444	332	80	24	Pass
0.1539	314	76	24	Pass
0.1633	302	71	23	Pass
0.1727	289	68	23	Pass
0.1821	278	59	21	Pass
0.1916	267	48	17	Pass
0.2010	251	42	16	Pass
0.2104	237	39	16	Pass
0.2199	220	36	16	Pass
0.2293	205	35	17	Pass
0.2387	191	31	16	Pass
0.2481	175	29	16	Pass
0.2576	162	27	16	Pass
0.2670	151	25	16	Pass
0.2764	139	22	15	Pass
0.2859	131	17	12	Pass
0.2953	123	16	13	Pass
0.3047	123	15	12	Pass
0.3141	117	14	11	Pass
0.3236	115	13	11	Pass
0.3330	112	13	11	Pass
0.3424	107	12	11	Pass
0.3519	101	7	6	Pass
0.3613	97	6	6	Pass
0.3707	96	6	6	Pass
0.3801	92	5	5	Pass
0.3896	86	5	5	Pass
0.3990	79	4	5	Pass
0.4084	72	4	5	Pass
0.4178	70	3	4	Pass
0.4273	67	2	2	Pass
0.4367	64	2	3	Pass
0.4461	62	1	1	Pass
0.4556	59	1	1	Pass
0.4650	58	1	1	Pass
0.4744	57	1	1	Pass
0.4838	56	1	1	Pass
0.4933	56	1	1	Pass
0.5027	55	1	1	Pass
0.5121	52	1	1	Pass
0.5216	50	0	0	Pass
0.5310	48	0	0	Pass
0.5404	47	0	0	Pass

0.5498	46	0	0	Pass
0.5593	44	0	0	Pass
0.5687	42	0	0	Pass
0.5781	40	0	0	Pass
0.5876	38	0	0	Pass
0.5970	36	0	0	Pass
0.6064	35	0	0	Pass
0.6158	34	0	0	Pass
0.6253	29	0	0	Pass
0.6347	28	0	0	Pass
0.6441	27	0	0	Pass
0.6536	25	0	0	Pass
0.6630	25	0	0	Pass
0.6724	25	0	0	Pass
0.6818	24	0	0	Pass
0.6913	24	0	0	Pass
0.7007	23	0	0	Pass
0.7101	21	0	0	Pass
0.7196	20	0	0	Pass
0.7290	18	0	0	Pass
0.7384	16	0	0	Pass
0.7478	15	0	0	Pass
0.7573	14	0	0	Pass
0.7667	13	0	0	Pass
0.7761	12	0	0	Pass
0.7856	11	0	0	Pass
0.7950	8	0	0	Pass
0.8044	8	0	0	Pass
0.8138	8	0	0	Pass
0.8233	8	0	0	Pass
0.8327	8	0	0	Pass
0.8421	8	0	0	Pass
0.8516	7	0	0	Pass
0.8610	7	0	0	Pass
0.8704	7	0	0	Pass
0.8798	6	0	0	Pass
0.8893	6	0	0	Pass
0.8987	6	0	0	Pass
0.9081	6	0	0	Pass
0.9176	6	0	0	Pass
0.9270	6	0	0	Pass
0.9364	6	0	0	Pass
0.9458	5	0	0	Pass
0.9553	5	0	0	Pass
0.9647	5	0	0	Pass
0.9741	5	0	0	Pass
0.9836	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

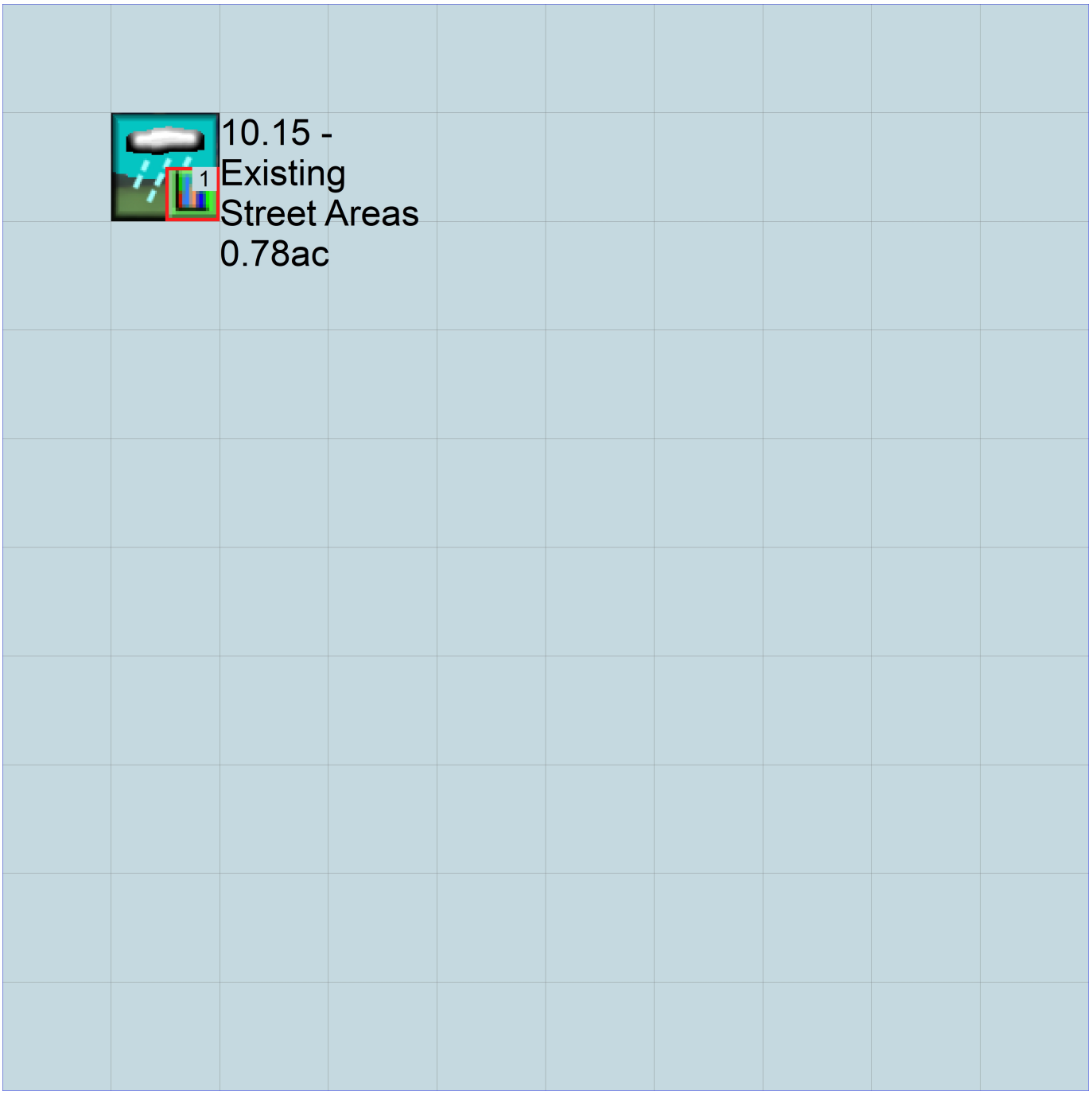
PERLND Changes

No PERLND changes have been made.

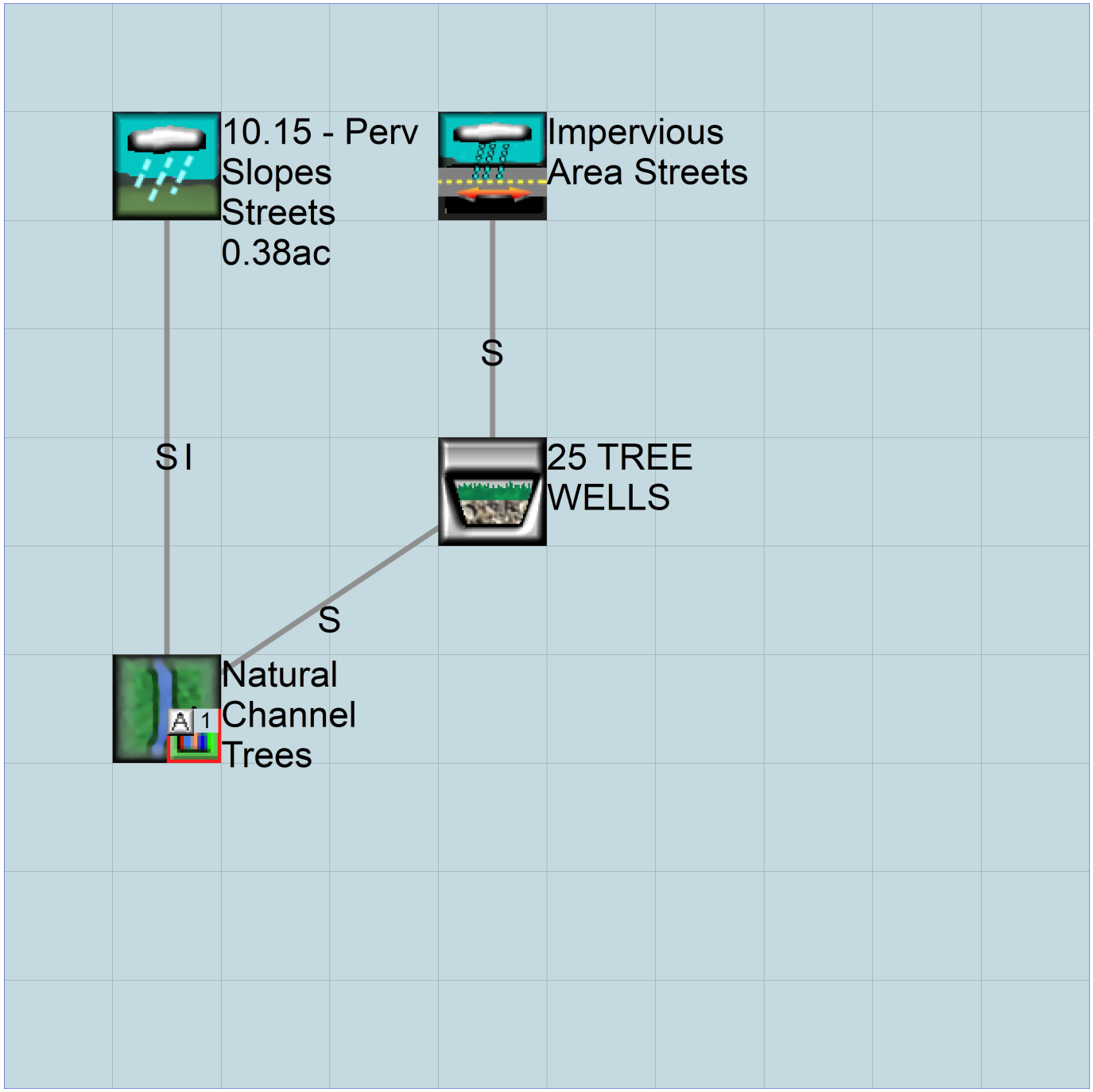
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.15 Streets to Trees.wdm
MESSU       25   Mit4201-SDHM-10.15 Streets to Trees.MES
            27   Mit4201-SDHM-10.15 Streets to Trees.L61
            28   Mit4201-SDHM-10.15 Streets to Trees.L62
            30   POC4201-SDHM-10.15 Streets to Trees1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       6
      GENER        2
      RCHRES       1
      RCHRES       2
      RCHRES       3
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Natural Channel Trees       MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    6     IMPERVIOUS-FLAT LAT     1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    6         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    6         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    6         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    6            100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    6              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    6              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.15 - Perv Slopes Streets***
PERLND   2                        0.38     RCHRES   3      2
PERLND   2                        0.38     RCHRES   3      3
Impervious Area Streets***
IMPLND   6                         0.4     RCHRES   1      5

******Routing******
PERLND   2                        0.38     COPY     1     12
PERLND   2                        0.38     COPY     1     13
RCHRES   2                           1     RCHRES   3      7
RCHRES   2                                 COPY     1     17
RCHRES   1                           1     RCHRES   3      7
RCHRES   1                                 COPY     1     17
RCHRES   1                           1     RCHRES   2      8
RCHRES   3                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                             ***
    1     Surface 5 TREE W-036    2    1    1    1   28    0    1
    2     25 TREE WELLS           2    1    1    1   28    0    1
    3     Natural Channel -033    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***
```

```
  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><------>
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.02       0.0       0.0       0.0       0.0
    3              3      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  2312.5
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
```

```
  GENER   2                                 vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                                 v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      3
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.001148  0.000000  0.000000  0.000000
  0.011111  0.001179  0.000013  0.086703  0.000347
  0.022222  0.001210  0.000026  0.274771  0.000347
  0.033333  0.001241  0.000040  0.539317  0.000347
  0.044444  0.001272  0.000054  0.870200  0.000347
  0.055556  0.001304  0.000068  1.261314  0.000347
  0.066667  0.001336  0.000083  1.708492  0.000347
  0.077778  0.001368  0.000098  2.208695  0.000347
  0.088889  0.001400  0.000113  2.759618  0.000347
  0.100000  0.001433  0.000129  3.359468  0.000347
  0.111111  0.001465  0.000145  4.006825  0.000347
  0.122222  0.001498  0.000161  4.700550  0.000347
  0.133333  0.001531  0.000178  5.439726  0.000347
  0.144444  0.001565  0.000195  6.223614  0.000347
  0.155556  0.001599  0.000213  7.051613  0.000347
  0.166667  0.001632  0.000231  7.923241  0.000347
  0.177778  0.001667  0.000249  8.838113  0.000347
  0.188889  0.001701  0.000268  9.795925  0.000347
  0.200000  0.001736  0.000287  10.79644  0.000347
  0.211111  0.001770  0.000307  11.83949  0.000347
  0.222222  0.001805  0.000326  12.92495  0.000347
  0.233333  0.001841  0.000347  14.05274  0.000347
  0.244444  0.001876  0.000367  15.22281  0.000347
  0.255556  0.001912  0.000388  16.43515  0.000347
  0.266667  0.001948  0.000410  17.68980  0.000347
  0.277778  0.001984  0.000432  18.98679  0.000347
  0.288889  0.002020  0.000454  20.32620  0.000347
  0.300000  0.002057  0.000477  21.70811  0.000347
  0.311111  0.002094  0.000500  23.13263  0.000347
  0.322222  0.002131  0.000523  24.59989  0.000347
  0.333333  0.002168  0.000547  26.11003  0.000347
  0.344444  0.002206  0.000571  27.66320  0.000347
  0.355556  0.002243  0.000596  29.25955  0.000347
  0.366667  0.002281  0.000621  30.89927  0.000347
  0.377778  0.002320  0.000647  32.58254  0.000347
  0.388889  0.002358  0.000673  34.30954  0.000347
  0.400000  0.002397  0.000699  36.08049  0.000347
  0.411111  0.002436  0.000726  37.89557  0.000347
  0.422222  0.002475  0.000753  39.75501  0.000347
  0.433333  0.002514  0.000781  41.65902  0.000347
  0.444444  0.002554  0.000809  43.60782  0.000347
  0.455556  0.002593  0.000838  45.60165  0.000347
  0.466667  0.002633  0.000867  47.64073  0.000347
  0.477778  0.002674  0.000896  49.72530  0.000347
  0.488889  0.002714  0.000926  51.85560  0.000347
  0.500000  0.002755  0.000957  54.03187  0.000347
  0.511111  0.002796  0.000987  56.25435  0.000347
  0.522222  0.002837  0.001019  58.52330  0.000347
  0.533333  0.002878  0.001050  60.83896  0.000347
  0.544444  0.002920  0.001083  63.20158  0.000347
  0.555556  0.002962  0.001115  65.61142  0.000347
  0.566667  0.003004  0.001148  68.06873  0.000347
  0.577778  0.003046  0.001182  70.57378  0.000347
  0.588889  0.003089  0.001216  73.12681  0.000347
  0.600000  0.003131  0.001251  75.72810  0.000347
  0.611111  0.003174  0.001286  78.37790  0.000347
  0.622222  0.003217  0.001321  81.07647  0.000347
  0.633333  0.003261  0.001357  83.82407  0.000347
  0.644444  0.003305  0.001394  86.62098  0.000347
  0.655556  0.003348  0.001431  89.46745  0.000347
```

```
0.666667  0.003393  0.001468  92.36376  0.000347
0.677778  0.003437  0.001506  95.31016  0.000347
0.688889  0.003481  0.001544  98.30692  0.000347
0.700000  0.003526  0.001583  101.3543  0.000347
0.711111  0.003571  0.001623  104.4526  0.000347
0.722222  0.003616  0.001663  107.6021  0.000347
0.733333  0.003662  0.001703  110.8030  0.000347
0.744444  0.003708  0.001744  114.0555  0.000347
0.755556  0.003753  0.001786  117.3601  0.000347
0.766667  0.003800  0.001828  120.7169  0.000347
0.777778  0.003846  0.001870  124.1262  0.000347
0.788889  0.003893  0.001913  127.5883  0.000347
0.800000  0.003939  0.001957  131.1034  0.000347
0.811111  0.003986  0.002001  134.6719  0.000347
0.822222  0.004034  0.002045  138.2939  0.000347
0.833333  0.004081  0.002090  141.9698  0.000347
0.844444  0.004129  0.002136  145.6997  0.000347
0.855556  0.004177  0.002182  149.4841  0.000347
0.866667  0.004225  0.002229  153.3231  0.000347
0.877778  0.004273  0.002276  157.2171  0.000347
0.888889  0.004322  0.002324  161.1662  0.000347
0.900000  0.004371  0.002372  165.1708  0.000347
0.911111  0.004420  0.002421  169.2311  0.000347
0.922222  0.004469  0.002470  173.3474  0.000347
0.933333  0.004519  0.002520  177.5200  0.000347
0.944444  0.004569  0.002571  181.7491  0.000347
0.955556  0.004619  0.002622  186.0350  0.000347
0.966667  0.004669  0.002673  190.3779  0.000347
0.977778  0.004719  0.002725  194.7782  0.000347
0.988889  0.004770  0.002778  199.2361  0.000347
1.000000  0.004821  0.002831  203.7518  0.000347
END FTABLE  3
FTABLE      2
 76    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.057392  0.000000  0.000000  0.000000
0.040297  0.057392  0.000694  0.000000  0.000000
0.080593  0.057392  0.001388  0.000000  0.000000
0.120890  0.057392  0.002081  0.000000  0.000000
0.161187  0.057392  0.002775  0.000000  0.000000
0.201484  0.057392  0.003469  0.000000  0.000000
0.241780  0.057392  0.004163  0.000000  0.000000
0.282077  0.057392  0.004857  0.000000  0.000000
0.322374  0.057392  0.005551  0.000000  0.000000
0.362670  0.057392  0.006244  0.000000  0.001726
0.402967  0.057392  0.006938  0.000000  0.002181
0.443264  0.057392  0.007632  0.000000  0.002712
0.483560  0.057392  0.008326  0.000000  0.003325
0.523857  0.057392  0.009020  0.000000  0.004024
0.564154  0.057392  0.009713  0.000000  0.004815
0.604451  0.057392  0.010407  0.000000  0.005700
0.644747  0.057392  0.011101  0.000000  0.006686
0.685044  0.057392  0.011795  0.000000  0.007775
0.725341  0.057392  0.012489  0.000000  0.008971
0.765637  0.057392  0.013182  0.000000  0.010279
0.805934  0.057392  0.013876  0.000000  0.011701
0.846231  0.057392  0.014570  0.000000  0.013241
0.886527  0.057392  0.015264  0.000000  0.014902
0.926824  0.057392  0.015958  0.000000  0.016687
0.967121  0.057392  0.016652  0.000000  0.017361
1.007418  0.057392  0.017345  0.000000  0.017361
1.047714  0.057392  0.018039  0.000000  0.017361
1.088011  0.057392  0.018733  0.000000  0.017361
1.128308  0.057392  0.019427  0.000000  0.017361
1.168604  0.057392  0.020121  0.000000  0.017361
1.208901  0.057392  0.020814  0.000000  0.017361
1.249198  0.057392  0.021508  0.000000  0.017361
1.289495  0.057392  0.022202  0.000000  0.017361
1.329791  0.057392  0.022896  0.000000  0.017361
```

```
  1.370088  0.057392  0.023590  0.000000  0.017361
  1.410385  0.057392  0.024283  0.000000  0.017361
  1.450681  0.057392  0.024977  0.000000  0.017361
  1.490978  0.057392  0.025671  0.000000  0.017361
  1.531275  0.057392  0.026365  0.000000  0.017361
  1.571571  0.057392  0.027059  0.000000  0.017361
  1.611868  0.057392  0.027753  0.000000  0.017361
  1.652165  0.057392  0.028446  0.000000  0.017361
  1.692462  0.057392  0.029140  0.000000  0.017361
  1.732758  0.057392  0.029834  0.000000  0.017361
  1.773055  0.057392  0.030528  0.000000  0.017361
  1.813352  0.057392  0.031222  0.000000  0.017361
  1.853648  0.057392  0.031915  0.000000  0.017361
  1.893945  0.057392  0.032609  0.000000  0.017361
  1.934242  0.057392  0.033303  0.000000  0.017361
  1.974538  0.057392  0.033997  0.000000  0.017361
  2.014835  0.057392  0.034691  0.000000  0.017361
  2.055132  0.057392  0.035385  0.000000  0.017361
  2.095429  0.057392  0.036078  0.000000  0.017361
  2.135725  0.057392  0.036772  0.000000  0.017361
  2.176022  0.057392  0.037466  0.000000  0.017361
  2.216319  0.057392  0.038160  0.000000  0.017361
  2.256615  0.057392  0.038854  0.000000  0.017361
  2.296912  0.057392  0.039547  0.000000  0.017361
  2.337209  0.057392  0.040241  0.000000  0.017361
  2.377505  0.057392  0.040935  0.000000  0.017361
  2.417802  0.057392  0.041629  0.000000  0.017361
  2.458099  0.057392  0.042323  0.000000  0.017361
  2.498396  0.057392  0.043016  0.000000  0.017361
  2.538692  0.057392  0.043710  0.000000  0.017361
  2.578989  0.057392  0.044404  0.000000  0.017361
  2.619286  0.057392  0.045098  0.000000  0.017361
  2.659582  0.057392  0.045792  0.000000  0.017361
  2.699879  0.057392  0.046486  0.000000  0.017361
  2.740176  0.057392  0.047179  0.000000  0.017361
  2.780473  0.057392  0.047873  0.000000  0.017361
  2.820769  0.057392  0.048567  0.000000  0.017361
  2.861066  0.057392  0.049261  0.000000  0.017361
  2.901363  0.057392  0.049955  0.000000  0.017361
  2.941659  0.057392  0.050648  0.000000  0.017361
  2.981956  0.057392  0.051342  0.000000  0.017361
  3.000000  0.057392  0.053088  0.000000  0.017361
  END FTABLE  2
  FTABLE      1
   18    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.057392  0.000000  0.000000  0.000000
  0.040297  0.057392  0.002313  0.000000  0.289352
  0.080593  0.057392  0.004625  0.000000  0.324137
  0.120890  0.057392  0.006938  0.000000  0.328377
  0.161187  0.057392  0.009251  0.000000  0.332617
  0.201484  0.057392  0.011564  0.339944  0.336857
  0.241780  0.057392  0.013876  1.085151  0.341097
  0.282077  0.057392  0.016189  2.070808  0.345337
  0.322374  0.057392  0.018502  3.247767  0.349577
  0.362670  0.057392  0.020814  4.588471  0.353817
  0.402967  0.057392  0.023127  6.074441  0.358057
  0.443264  0.057392  0.025440  7.691989  0.362297
  0.483560  0.057392  0.027753  9.430269  0.366537
  0.523857  0.057392  0.030065  11.28024  0.370777
  0.564154  0.057392  0.032378  13.23405  0.375016
  0.604451  0.057392  0.034691  15.28467  0.379256
  0.644747  0.057392  0.037003  17.42562  0.383496
  0.667000  0.057392  0.038281  19.65077  0.385838
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
```

```
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   3 HYDR   RO     1 1        1      WDM   1016 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1017 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      2 1        1      WDM   1018 FLOW     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1019 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
  END MASS-LINK    7

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1963/ 9/30 24: 0

RCHRES :    3

RELERR       STORS        STOR       MATIN      MATDIF
-1.490E-03     0.00000  0.0000E+00     0.00000  1.3114E-11

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1969/ 9/30 24: 0

RCHRES :    3

RELERR       STORS        STOR       MATIN      MATDIF
-1.000E+00     0.00000  0.0000E+00     0.00000  3.3411E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
```

DATE/TIME: 1985/ 9/30 24: 0

RCHRES :   3

RELERR	STORS	STOR	MATIN	MATDIF
-3.718E-03	0.00000	0.0000E+00	0.00000	3.3947E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1987/ 7/31 24: 0

RCHRES :   3

RELERR	STORS	STOR	MATIN	MATDIF
-3.816E-01	0.00000	0.0000E+00	0.00000	3.5325E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1988/ 5/31 24: 0

RCHRES :   3

RELERR	STORS	STOR	MATIN	MATDIF
-5.759E-02	0.00000	0.0000E+00	0.00000	3.5635E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.

REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

The count for the WARNING printed above has reached its maximum.

If the condition is encountered again the message will not be repeated.

Disclaimer

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.16

General Model Information

Project Name:	4201-SDHM-10.16 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.16 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	2.04
Pervious Total	2.04
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.04

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.16 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Steep	0.67
A,NatVeg,Moderate	0.59
Pervious Total	1.26

Impervious Land Use	acre
IMPERVIOUS-MOD	0.78
Impervious Total	0.78
Basin Total	2.04

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.16	Surface ation 10.16	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.16

Bottom Length:	50.00 ft.
Bottom Width:	70.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	37.238
Total Volume Through Riser (ac-ft.):	6.012
Total Volume Through Facility (ac-ft.):	56.196
Percent Infiltrated:	66.26
Total Precip Applied to Facility:	4.147
Total Evap From Facility:	3.261
Underdrain used	
Underdrain Diameter (feet):	0.33
Orifice Diameter (in.):	1.1
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	12.946
Total Outflow (ac-ft.):	56.196
Percent Through Underdrain:	23.04
Discharge Structure	
Riser Height:	2 ft.
Riser Diameter:	12 in.
Orifice 2 Diameter:	3 in. Elevation:1.3 ft.
Orifice 3 Diameter:	1 in. Elevation:0.75 ft.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
908.25	0.0803	0.0000	0.0000	0.0000
908.31	0.0803	0.0015	0.0000	0.0000
908.38	0.0803	0.0030	0.0000	0.0000
908.44	0.0803	0.0046	0.0000	0.0000
908.50	0.0803	0.0061	0.0000	0.0000
908.57	0.0803	0.0076	0.0000	0.0000
908.63	0.0803	0.0091	0.0000	0.0045
908.69	0.0803	0.0107	0.0000	0.0074
908.76	0.0803	0.0122	0.0000	0.0092
908.82	0.0803	0.0137	0.0000	0.0137
908.88	0.0803	0.0152	0.0000	0.0164
908.95	0.0803	0.0168	0.0000	0.0229
909.01	0.0803	0.0183	0.0000	0.0243
909.07	0.0803	0.0198	0.0000	0.0243
909.13	0.0803	0.0213	0.0000	0.0243
909.20	0.0803	0.0228	0.0000	0.0243
909.26	0.0803	0.0244	0.0000	0.0243

909.32	0.0803	0.0259	0.0000	0.0243
909.39	0.0803	0.0274	0.0000	0.0243
909.45	0.0803	0.0289	0.0000	0.0243
909.51	0.0803	0.0305	0.0000	0.0243
909.58	0.0803	0.0320	0.0000	0.0243
909.64	0.0803	0.0335	0.0028	0.0243
909.70	0.0803	0.0350	0.0043	0.0243
909.77	0.0803	0.0366	0.0062	0.0243
909.83	0.0803	0.0381	0.0072	0.0243
909.89	0.0803	0.0396	0.0086	0.0243
909.96	0.0803	0.0411	0.0094	0.0243
910.02	0.0803	0.0432	0.0105	0.0243
910.08	0.0803	0.0453	0.0111	0.0243
910.15	0.0803	0.0474	0.0121	0.0243
910.21	0.0803	0.0496	0.0126	0.0243
910.27	0.0803	0.0517	0.0134	0.0243
910.34	0.0803	0.0538	0.0139	0.0243
910.40	0.0803	0.0559	0.0142	0.0243
910.46	0.0803	0.0580	0.0143	0.0243
910.52	0.0803	0.0601	0.0152	0.0243
910.59	0.0803	0.0622	0.0167	0.0243
910.65	0.0803	0.0643	0.0183	0.0243
910.71	0.0803	0.0664	0.0200	0.0243
910.78	0.0803	0.0685	0.0216	0.0243
910.84	0.0803	0.0706	0.0231	0.0243
910.90	0.0803	0.0727	0.0246	0.0243
910.97	0.0803	0.0748	0.0259	0.0243
911.00	0.0803	0.0759	0.0519	0.0243

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0803	0.0759	0.0000	0.4086	0.0002
2.8132	0.0810	0.0810	0.0000	0.4086	0.0004
2.8764	0.0817	0.0862	0.0000	0.5067	0.0006
2.9396	0.0825	0.0914	0.0000	0.5238	0.0008
3.0027	0.0832	0.0966	0.0000	0.5409	0.0011
3.0659	0.0839	0.1019	0.0000	0.5579	0.0013
3.1291	0.0846	0.1072	0.0000	0.5750	0.0015
3.1923	0.0853	0.1126	0.0000	0.5921	0.0017
3.2555	0.0860	0.1180	0.0000	0.6091	0.0019
3.3187	0.0867	0.1234	0.0000	0.6262	0.0022
3.3819	0.0875	0.1289	0.0000	0.6433	0.0024
3.4451	0.0882	0.1345	0.0000	0.6603	0.0026
3.5082	0.0889	0.1401	0.0025	0.6774	0.0028
3.5714	0.0896	0.1457	0.0073	0.6944	0.0030
3.6346	0.0904	0.1514	0.0100	0.7115	0.0033
3.6978	0.0911	0.1571	0.0121	0.7286	0.0035
3.7610	0.0919	0.1629	0.0139	0.7456	0.0037
3.8242	0.0926	0.1688	0.0155	0.7627	0.0039
3.8874	0.0934	0.1746	0.0169	0.7798	0.0042
3.9505	0.0941	0.1806	0.0182	0.7968	0.0044
4.0137	0.0949	0.1865	0.0195	0.8139	0.0046
4.0769	0.0956	0.1925	0.0607	0.8310	0.0048
4.1401	0.0964	0.1986	0.0950	0.8480	0.0051
4.2033	0.0971	0.2047	0.1184	0.8651	0.0053
4.2665	0.0979	0.2109	0.1374	0.8822	0.0055
4.3297	0.0987	0.2171	0.1539	0.8992	0.0058
4.3929	0.0994	0.2233	0.1686	0.9163	0.0060

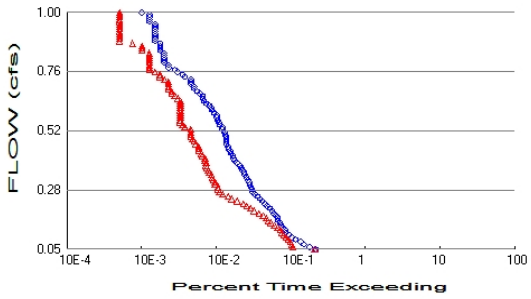
4.4560	0.1002	0.2297	0.1822	0.9333	0.0062
4.5192	0.1010	0.2360	0.1947	0.9504	0.0065
4.5824	0.1018	0.2424	0.2064	0.9675	0.0067
4.6456	0.1026	0.2489	0.2175	0.9845	0.0070
4.7088	0.1033	0.2554	0.2281	1.0016	0.0072
4.7720	0.1041	0.2619	0.2727	1.0187	0.0074
4.8352	0.1049	0.2685	0.5104	1.0357	0.0077
4.8984	0.1057	0.2752	0.8522	1.0528	0.0079
4.9615	0.1065	0.2819	1.2455	1.0699	0.0082
5.0247	0.1073	0.2887	1.6403	1.0869	0.0084
5.0879	0.1081	0.2955	1.9887	1.1040	0.0086
5.1511	0.1089	0.3023	2.2549	1.1211	0.0089
5.2143	0.1097	0.3092	2.4324	1.1381	0.0091
5.2775	0.1105	0.3162	2.5943	1.1552	0.0094
5.3407	0.1114	0.3232	2.7349	1.1722	0.0096
5.4038	0.1122	0.3303	2.8684	1.1893	0.0099
5.4670	0.1130	0.3374	2.9958	1.2064	0.0101
5.5302	0.1138	0.3445	3.1179	1.2234	0.0104
5.5934	0.1147	0.3518	3.2352	1.2405	0.0106
5.6566	0.1155	0.3590	3.3483	1.2576	0.0109
5.7198	0.1163	0.3664	3.4577	1.2746	0.0110
5.7500	0.1167	0.3699	3.5636	1.2828	0.0000

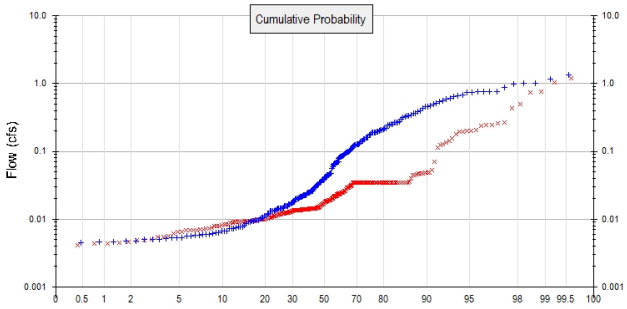
Surface ation 10.16

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.16

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.04
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.26
Total Impervious Area: 0.78

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.461418
5 year	0.754196
10 year	0.99509
25 year	1.184908

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.113442
5 year	0.245093
10 year	0.580801
25 year	1.040118

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0461	853	827	96	Pass
0.0557	704	423	60	Pass
0.0653	594	406	68	Pass
0.0749	531	391	73	Pass
0.0845	459	365	79	Pass
0.0941	403	341	84	Pass
0.1037	372	318	85	Pass
0.1132	344	299	86	Pass
0.1228	330	287	86	Pass
0.1324	305	265	86	Pass
0.1420	294	238	80	Pass
0.1516	283	215	75	Pass
0.1612	271	196	72	Pass
0.1708	265	185	69	Pass
0.1803	251	169	67	Pass
0.1899	234	149	63	Pass
0.1995	221	128	57	Pass
0.2091	208	114	54	Pass
0.2187	191	101	52	Pass
0.2283	178	91	51	Pass
0.2378	167	76	45	Pass
0.2474	155	64	41	Pass
0.2570	142	57	40	Pass
0.2666	131	48	36	Pass
0.2762	121	44	36	Pass
0.2858	119	42	35	Pass
0.2954	115	42	36	Pass
0.3049	111	38	34	Pass
0.3145	109	38	34	Pass
0.3241	105	36	34	Pass
0.3337	100	35	35	Pass
0.3433	95	34	35	Pass
0.3529	94	32	34	Pass
0.3625	89	31	34	Pass
0.3720	86	30	34	Pass
0.3816	83	29	34	Pass
0.3912	75	29	38	Pass
0.4008	70	28	40	Pass
0.4104	68	28	41	Pass
0.4200	66	26	39	Pass
0.4296	63	25	39	Pass
0.4391	61	23	37	Pass
0.4487	58	23	39	Pass
0.4583	57	23	40	Pass
0.4679	54	21	38	Pass
0.4775	54	20	37	Pass
0.4871	54	19	35	Pass
0.4967	54	18	33	Pass
0.5062	52	18	34	Pass
0.5158	51	18	35	Pass
0.5254	48	18	37	Pass
0.5350	48	15	31	Pass
0.5446	44	14	31	Pass

0.5542	43	13	30	Pass
0.5637	42	13	30	Pass
0.5733	40	13	32	Pass
0.5829	40	13	32	Pass
0.5925	37	13	35	Pass
0.6021	35	13	37	Pass
0.6117	34	13	38	Pass
0.6213	32	13	40	Pass
0.6308	29	13	44	Pass
0.6404	27	13	48	Pass
0.6500	26	12	46	Pass
0.6596	26	11	42	Pass
0.6692	24	10	41	Pass
0.6788	22	10	45	Pass
0.6884	20	9	45	Pass
0.6979	20	9	45	Pass
0.7075	18	9	50	Pass
0.7171	18	9	50	Pass
0.7267	18	8	44	Pass
0.7363	15	7	46	Pass
0.7459	14	7	50	Pass
0.7555	12	6	50	Pass
0.7650	11	5	45	Pass
0.7746	9	5	55	Pass
0.7842	9	5	55	Pass
0.7938	8	5	62	Pass
0.8034	8	5	62	Pass
0.8130	8	5	62	Pass
0.8226	8	5	62	Pass
0.8321	8	5	62	Pass
0.8417	7	4	57	Pass
0.8513	7	4	57	Pass
0.8609	7	4	57	Pass
0.8705	7	3	42	Pass
0.8801	6	2	33	Pass
0.8897	6	2	33	Pass
0.8992	6	2	33	Pass
0.9088	6	2	33	Pass
0.9184	6	2	33	Pass
0.9280	6	2	33	Pass
0.9376	6	2	33	Pass
0.9472	6	2	33	Pass
0.9567	5	2	40	Pass
0.9663	5	2	40	Pass
0.9759	5	2	40	Pass
0.9855	5	2	40	Pass
0.9951	4	2	50	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

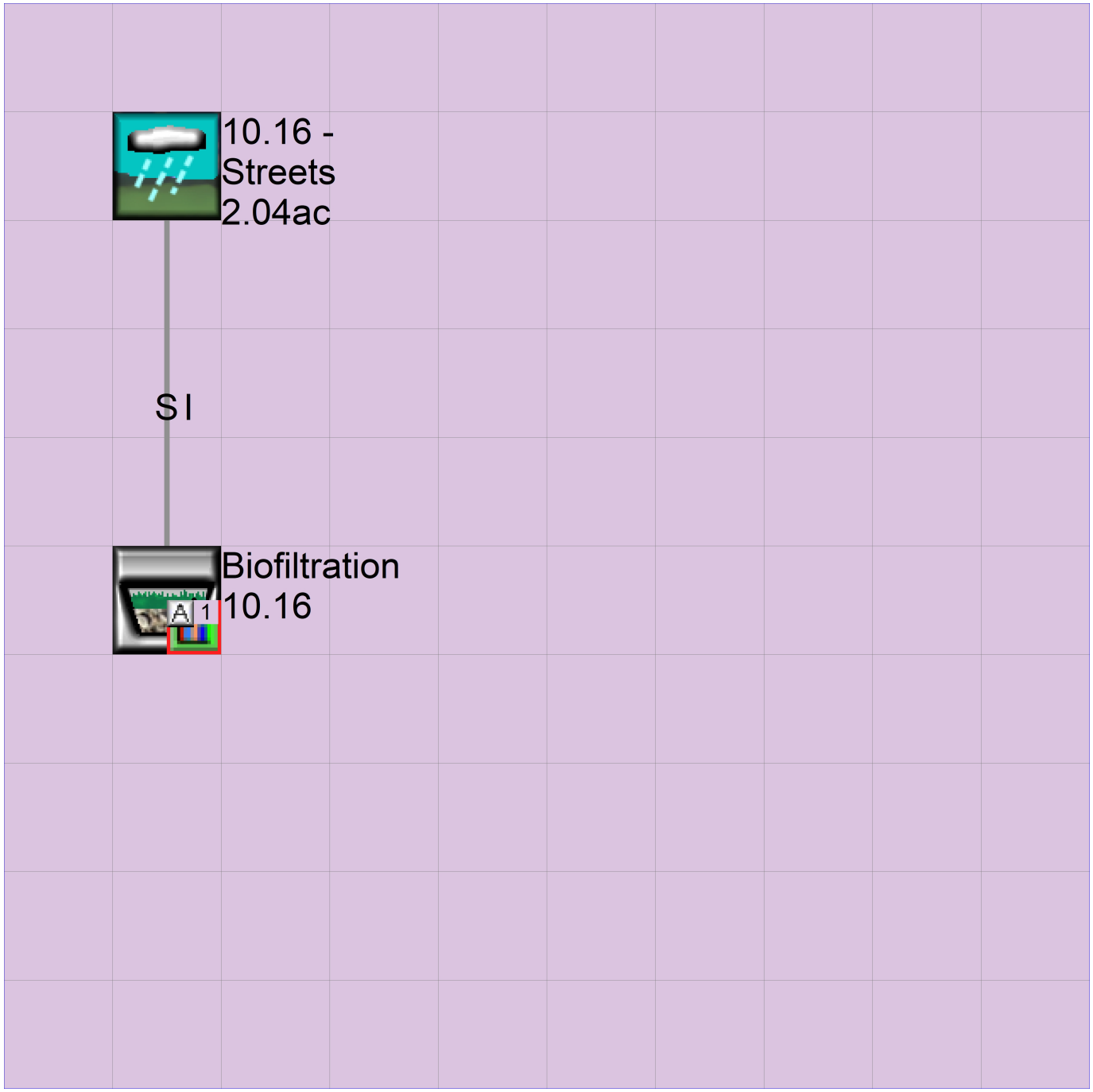
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.16 - Existing Street Areas 2.04ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.16 Streets.wdm
MESSU       25   Mit4201-SDHM-10.16 Streets.MES
            27   Mit4201-SDHM-10.16 Streets.L61
            28   Mit4201-SDHM-10.16 Streets.L62
            30   POC4201-SDHM-10.16 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       3
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.16        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    3      A,NatVeg,Steep         1    1    1    1   27    0
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
```

```
    3         0    0    1    0    0    0    0    0    0    0    0    0
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    3         0    0    4    0    0    0    0    0    0    0    0    0    1    9
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    3         0    1    1    1    0    0    0    0    1    1    0
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
    3              0       3.5     0.045        75      0.15        2.5     0.915
    2              0       3.8      0.07        80       0.1        2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    3              0         0         2         2         0      0.05      0.05
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                          ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    3              0       0.6      0.04         1       0.3         0
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    3              0         0      0.01         0       0.4      0.01         0
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.16 - Streets***
PERLND   3                       0.67     RCHRES   1      2
PERLND   3                       0.67     RCHRES   1      3
PERLND   2                       0.59     RCHRES   1      2
PERLND   2                       0.59     RCHRES   1      3
IMPLND   2                       0.78     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   3                       0.67     COPY     1     12
PERLND   2                       0.59     COPY     1     12
IMPLND   2                       0.78     COPY     1     15
PERLND   3                       0.67     COPY     1     13
PERLND   2                       0.59     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK
```

```
RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<-----------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                            ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1             1      0.01       0.0    908.25       0.0       0.0
    2             2      0.01       0.0    908.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  3582.1
```

```
*** Compute remaining available pore space
  GENER   2                                 vpo2            =  v2m2
  GENER   2                                 vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                                 vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                                 v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   45    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.080349  0.000000  0.000000  0.000000
  0.063187  0.080349  0.001523  0.000000  0.000000
  0.126374  0.080349  0.003046  0.000000  0.000000
  0.189560  0.080349  0.004569  0.000000  0.000000
  0.252747  0.080349  0.006092  0.000000  0.000000
  0.315934  0.080349  0.007615  0.000000  0.000000
  0.379121  0.080349  0.009139  0.000000  0.004508
  0.442308  0.080349  0.010662  0.000000  0.007377
  0.505495  0.080349  0.012185  0.000000  0.009198
  0.568681  0.080349  0.013708  0.000000  0.013703
  0.631868  0.080349  0.015231  0.000000  0.016419
  0.695055  0.080349  0.016754  0.000000  0.022856
  0.758242  0.080349  0.018277  0.000000  0.024306
  0.821429  0.080349  0.019800  0.000000  0.024306
  0.884615  0.080349  0.021323  0.000000  0.024306
  0.947802  0.080349  0.022846  0.000000  0.024306
  1.010989  0.080349  0.024370  0.000000  0.024306
  1.074176  0.080349  0.025893  0.000000  0.024306
  1.137363  0.080349  0.027416  0.000000  0.024306
  1.200549  0.080349  0.028939  0.000000  0.024306
  1.263736  0.080349  0.030462  0.000000  0.024306
  1.326923  0.080349  0.031985  0.000000  0.024306
  1.390110  0.080349  0.033508  0.002836  0.024306
  1.453297  0.080349  0.035031  0.004254  0.024306
  1.516484  0.080349  0.036554  0.006214  0.024306
  1.579670  0.080349  0.038077  0.007194  0.024306
  1.642857  0.080349  0.039601  0.008632  0.024306
  1.706044  0.080349  0.041124  0.009352  0.024306
  1.769231  0.080349  0.043231  0.010507  0.024306
  1.832418  0.080349  0.045338  0.011084  0.024306
  1.895604  0.080349  0.047445  0.012072  0.024306
  1.958791  0.080349  0.049551  0.012566  0.024306
  2.021978  0.080349  0.051658  0.013444  0.024306
  2.085165  0.080349  0.053765  0.013883  0.024306
  2.148352  0.080349  0.055872  0.014154  0.024306
  2.211538  0.080349  0.057979  0.014290  0.024306
  2.274725  0.080349  0.060086  0.015218  0.024306
  2.337912  0.080349  0.062193  0.016688  0.024306
  2.401099  0.080349  0.064300  0.018329  0.024306
  2.464286  0.080349  0.066407  0.019980  0.024306
  2.527473  0.080349  0.068514  0.021578  0.024306
  2.590659  0.080349  0.070621  0.023103  0.024306
  2.653846  0.080349  0.072728  0.024555  0.024306
  2.717033  0.080349  0.074835  0.025948  0.024306
  2.750000  0.080349  0.082234  0.051918  0.024306
  END FTABLE  2
  FTABLE      1
   49    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.080349  0.000000  0.000000  0.000000  0.000211
  0.063187  0.081047  0.005099  0.000000  0.408611  0.000211
  0.126374  0.081747  0.010242  0.000000  0.506737  0.000423
```

```
  0.189560  0.082451  0.015430  0.000000  0.523801  0.000636
  0.252747  0.083158  0.020662  0.000000  0.540866  0.000850
  0.315934  0.083867  0.025939  0.000000  0.557930  0.001064
  0.379121  0.084579  0.031261  0.000000  0.574995  0.001280
  0.442308  0.085295  0.036628  0.000000  0.592059  0.001496
  0.505495  0.086013  0.042040  0.000000  0.609123  0.001713
  0.568681  0.086734  0.047497  0.000000  0.626188  0.001932
  0.631868  0.087458  0.053001  0.000000  0.643252  0.002151
  0.695055  0.088185  0.058550  0.000000  0.660316  0.002371
  0.758242  0.088915  0.064145  0.002464  0.677381  0.002591
  0.821429  0.089648  0.069787  0.007253  0.694445  0.002813
  0.884615  0.090384  0.075474  0.009956  0.711509  0.003036
  0.947802  0.091123  0.081209  0.012069  0.728574  0.003259
  1.010989  0.091865  0.086990  0.013863  0.745638  0.003484
  1.074176  0.092609  0.092818  0.015451  0.762702  0.003709
  1.137363  0.093357  0.098694  0.016890  0.779767  0.003935
  1.200549  0.094108  0.104616  0.018215  0.796831  0.004162
  1.263736  0.094861  0.110586  0.019450  0.813895  0.004390
  1.326923  0.095617  0.116604  0.060686  0.830960  0.004619
  1.390110  0.096377  0.122670  0.095025  0.848024  0.004848
  1.453297  0.097139  0.128784  0.118382  0.865089  0.005079
  1.516484  0.097904  0.134946  0.137393  0.882153  0.005310
  1.579670  0.098672  0.141156  0.153877  0.899217  0.005543
  1.642857  0.099443  0.147416  0.168649  0.916282  0.005776
  1.706044  0.100217  0.153724  0.182162  0.933346  0.006010
  1.769231  0.100994  0.160080  0.194696  0.950410  0.006245
  1.832418  0.101774  0.166487  0.206441  0.967475  0.006481
  1.895604  0.102557  0.172942  0.217532  0.984539  0.006718
  1.958791  0.103343  0.179447  0.228068  1.001603  0.006956
  2.021978  0.104131  0.186002  0.272696  1.018668  0.007194
  2.085165  0.104923  0.192607  0.510435  1.035732  0.007434
  2.148352  0.105718  0.199262  0.852248  1.052796  0.007674
  2.211538  0.106515  0.205967  1.245466  1.069861  0.007915
  2.274725  0.107315  0.212722  1.640340  1.086925  0.008157
  2.337912  0.108119  0.219529  1.988668  1.103989  0.008400
  2.401099  0.108925  0.226386  2.254877  1.121054  0.008644
  2.464286  0.109734  0.233294  2.432365  1.138118  0.008889
  2.527473  0.110546  0.240253  2.594258  1.155183  0.009135
  2.590659  0.111361  0.247264  2.734909  1.172247  0.009381
  2.653846  0.112179  0.254327  2.868433  1.189311  0.009629
  2.717033  0.113000  0.261441  2.995828  1.206376  0.009877
  2.780220  0.113824  0.268607  3.117878  1.223440  0.010126
  2.843407  0.114651  0.275825  3.235212  1.240504  0.010376
  2.906593  0.115481  0.283096  3.348345  1.257569  0.010627
  2.969780  0.116313  0.290419  3.457701  1.274633  0.010879
  3.000000  0.116713  0.293940  3.563640  1.282794  0.011000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
```

```
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.17

General Model Information

Project Name:	4201-SDHM-10.17 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.17 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.5
Pervious Total	0.5
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.5

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.17 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.2
Pervious Total	0.2

Impervious Land Use	acre
IMPERVIOUS-MOD	0.3
Impervious Total	0.3
Basin Total	0.5

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.17	Surface ation 10.17	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.17

Bottom Length:	50.00 ft.
Bottom Width:	22.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	14.687
Total Volume Through Riser (ac-ft.):	3.516
Total Volume Through Facility (ac-ft.):	18.203
Percent Infiltrated:	80.68
Total Precip Applied to Facility:	1.29
Total Evap From Facility:	1.029
Underdrain not used	
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	12 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
875.25	0.0253	0.0000	0.0000	0.0000
875.30	0.0253	0.0004	0.0000	0.0000
875.35	0.0253	0.0008	0.0000	0.0000
875.41	0.0253	0.0012	0.0000	0.0000
875.46	0.0253	0.0016	0.0000	0.0000
875.51	0.0253	0.0020	0.0000	0.0000
875.56	0.0253	0.0024	0.0000	0.0000
875.62	0.0253	0.0028	0.0000	0.0017
875.67	0.0253	0.0032	0.0000	0.0025
875.72	0.0253	0.0036	0.0000	0.0035
875.77	0.0253	0.0040	0.0000	0.0048
875.82	0.0253	0.0043	0.0000	0.0063
875.88	0.0253	0.0047	0.0000	0.0076
875.93	0.0253	0.0051	0.0000	0.0076
875.98	0.0253	0.0055	0.0000	0.0076
876.03	0.0253	0.0059	0.0000	0.0076
876.09	0.0253	0.0063	0.0000	0.0076
876.14	0.0253	0.0067	0.0000	0.0076
876.19	0.0253	0.0071	0.0000	0.0076
876.24	0.0253	0.0075	0.0000	0.0076
876.29	0.0253	0.0079	0.0000	0.0076
876.35	0.0253	0.0083	0.0000	0.0076
876.40	0.0253	0.0087	0.0000	0.0076
876.45	0.0253	0.0091	0.0000	0.0076
876.50	0.0253	0.0095	0.0000	0.0076

876.55	0.0253	0.0099	0.0000	0.0076
876.61	0.0253	0.0103	0.0000	0.0076
876.66	0.0253	0.0107	0.0000	0.0076
876.71	0.0253	0.0111	0.0000	0.0076
876.76	0.0253	0.0115	0.0000	0.0076
876.82	0.0253	0.0119	0.0000	0.0076
876.87	0.0253	0.0123	0.0000	0.0076
876.92	0.0253	0.0127	0.0000	0.0076
876.97	0.0253	0.0130	0.0000	0.0076
877.02	0.0253	0.0136	0.0000	0.0076
877.08	0.0253	0.0141	0.0000	0.0076
877.13	0.0253	0.0147	0.0000	0.0076
877.18	0.0253	0.0152	0.0000	0.0076
877.23	0.0253	0.0158	0.0000	0.0076
877.29	0.0253	0.0163	0.0000	0.0076
877.34	0.0253	0.0169	0.0000	0.0076
877.39	0.0253	0.0174	0.0000	0.0076
877.44	0.0253	0.0180	0.0000	0.0076
877.49	0.0253	0.0185	0.0000	0.0076
877.55	0.0253	0.0191	0.0000	0.0076
877.60	0.0253	0.0196	0.0000	0.0076
877.65	0.0253	0.0202	0.0000	0.0076
877.70	0.0253	0.0207	0.0000	0.0076
877.76	0.0253	0.0213	0.0000	0.0076
877.81	0.0253	0.0218	0.0000	0.0076
877.86	0.0253	0.0223	0.0000	0.0076
877.91	0.0253	0.0229	0.0000	0.0076
877.96	0.0253	0.0234	0.0000	0.0076
878.00	0.0253	0.0238	0.0000	0.0076

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0253	0.0238	0.0000	0.1291	0.0001
2.8022	0.0256	0.0251	0.0000	0.1291	0.0002
2.8544	0.0259	0.0265	0.0000	0.1574	0.0003
2.9066	0.0263	0.0279	0.0000	0.1618	0.0004
2.9588	0.0266	0.0292	0.0000	0.1663	0.0005
3.0110	0.0270	0.0306	0.0000	0.1707	0.0006
3.0632	0.0274	0.0321	0.0000	0.1751	0.0007
3.1154	0.0277	0.0335	0.0000	0.1795	0.0009
3.1676	0.0281	0.0349	0.0000	0.1840	0.0010
3.2198	0.0284	0.0364	0.0000	0.1884	0.0011
3.2720	0.0288	0.0379	0.0346	0.1928	0.0012
3.3242	0.0292	0.0394	0.2137	0.1973	0.0013
3.3764	0.0295	0.0410	0.4712	0.2017	0.0014
3.4286	0.0299	0.0425	0.7756	0.2061	0.0015
3.4808	0.0303	0.0441	1.0991	0.2106	0.0016
3.5330	0.0307	0.0457	1.4136	0.2150	0.0017
3.5852	0.0310	0.0473	1.6924	0.2194	0.0019
3.6374	0.0314	0.0489	1.9155	0.2239	0.0020
3.6896	0.0318	0.0506	2.0761	0.2283	0.0021
3.7418	0.0322	0.0522	2.1878	0.2327	0.0022
3.7940	0.0326	0.0539	2.3230	0.2371	0.0023
3.8462	0.0329	0.0556	2.4319	0.2416	0.0024
3.8984	0.0333	0.0574	2.5361	0.2460	0.0026
3.9505	0.0337	0.0591	2.6362	0.2504	0.0027
4.0027	0.0341	0.0609	2.7327	0.2549	0.0028
4.0549	0.0345	0.0627	2.8258	0.2593	0.0029

4.1071	0.0349	0.0645	2.9160	0.2637	0.0030
4.1593	0.0353	0.0663	3.0035	0.2682	0.0032
4.2115	0.0357	0.0682	3.0885	0.2726	0.0033
4.2637	0.0361	0.0700	3.1712	0.2770	0.0034
4.3159	0.0365	0.0719	3.2518	0.2814	0.0035
4.3681	0.0369	0.0739	3.3305	0.2859	0.0037
4.4203	0.0373	0.0758	3.4073	0.2903	0.0038
4.4725	0.0377	0.0777	3.4825	0.2947	0.0039
4.5247	0.0381	0.0797	3.5560	0.2992	0.0040
4.5769	0.0386	0.0817	3.6281	0.3036	0.0042
4.6291	0.0390	0.0838	3.6988	0.3080	0.0043
4.6813	0.0394	0.0858	3.7681	0.3125	0.0044
4.7335	0.0398	0.0879	3.8362	0.3169	0.0044
4.7500	0.0399	0.0885	3.9031	0.3183	0.0021

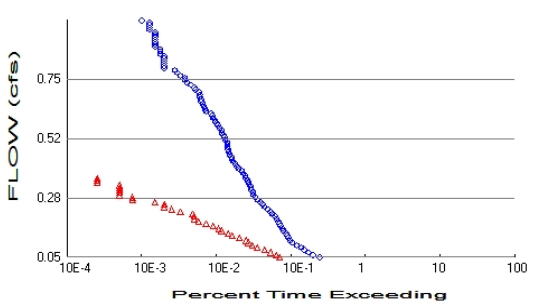
Surface ation 10.17

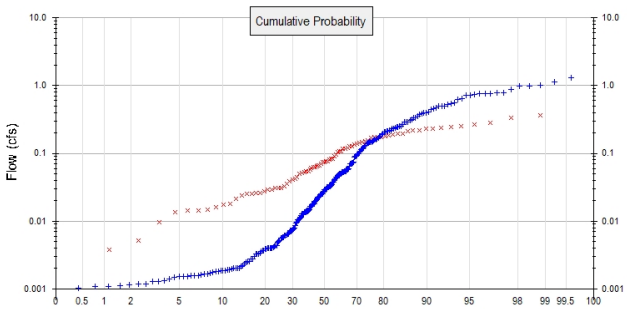
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.17

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.5
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.2
Total Impervious Area: 0.3

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.470647
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.152167
5 year	0.226858
10 year	0.258499
25 year	0.335796

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0471	959	278	28	Pass
0.0565	787	252	32	Pass
0.0660	688	213	30	Pass
0.0754	599	177	29	Pass
0.0849	542	140	25	Pass
0.0944	473	120	25	Pass
0.1038	412	108	26	Pass
0.1133	384	99	25	Pass
0.1227	364	81	22	Pass
0.1322	350	65	18	Pass
0.1417	338	57	16	Pass
0.1511	315	47	14	Pass
0.1606	308	43	13	Pass
0.1700	290	36	12	Pass
0.1795	280	29	10	Pass
0.1890	271	23	8	Pass
0.1984	254	20	7	Pass
0.2079	242	20	8	Pass
0.2173	223	19	8	Pass
0.2268	213	13	6	Pass
0.2363	194	10	5	Pass
0.2457	177	8	4	Pass
0.2552	164	8	4	Pass
0.2646	156	6	3	Pass
0.2741	141	3	2	Pass
0.2836	132	3	2	Pass
0.2930	125	2	1	Pass
0.3025	123	2	1	Pass
0.3119	117	2	1	Pass
0.3214	115	2	1	Pass
0.3308	114	2	1	Pass
0.3403	108	1	0	Pass
0.3498	104	1	0	Pass
0.3592	99	1	1	Pass
0.3687	97	0	0	Pass
0.3781	93	0	0	Pass
0.3876	87	0	0	Pass
0.3971	79	0	0	Pass
0.4065	74	0	0	Pass
0.4160	71	0	0	Pass
0.4254	68	0	0	Pass
0.4349	64	0	0	Pass
0.4444	63	0	0	Pass
0.4538	60	0	0	Pass
0.4633	58	0	0	Pass
0.4727	57	0	0	Pass
0.4822	56	0	0	Pass
0.4917	56	0	0	Pass
0.5011	56	0	0	Pass
0.5106	52	0	0	Pass
0.5200	51	0	0	Pass
0.5295	49	0	0	Pass
0.5390	47	0	0	Pass

0.5484	47	0	0	Pass
0.5579	44	0	0	Pass
0.5673	42	0	0	Pass
0.5768	40	0	0	Pass
0.5863	38	0	0	Pass
0.5957	36	0	0	Pass
0.6052	35	0	0	Pass
0.6146	34	0	0	Pass
0.6241	29	0	0	Pass
0.6336	28	0	0	Pass
0.6430	27	0	0	Pass
0.6525	26	0	0	Pass
0.6619	25	0	0	Pass
0.6714	25	0	0	Pass
0.6808	24	0	0	Pass
0.6903	24	0	0	Pass
0.6998	23	0	0	Pass
0.7092	21	0	0	Pass
0.7187	20	0	0	Pass
0.7281	18	0	0	Pass
0.7376	16	0	0	Pass
0.7471	15	0	0	Pass
0.7565	15	0	0	Pass
0.7660	13	0	0	Pass
0.7754	12	0	0	Pass
0.7849	11	0	0	Pass
0.7944	8	0	0	Pass
0.8038	8	0	0	Pass
0.8133	8	0	0	Pass
0.8227	8	0	0	Pass
0.8322	8	0	0	Pass
0.8417	8	0	0	Pass
0.8511	7	0	0	Pass
0.8606	7	0	0	Pass
0.8700	7	0	0	Pass
0.8795	6	0	0	Pass
0.8890	6	0	0	Pass
0.8984	6	0	0	Pass
0.9079	6	0	0	Pass
0.9173	6	0	0	Pass
0.9268	6	0	0	Pass
0.9363	6	0	0	Pass
0.9457	5	0	0	Pass
0.9552	5	0	0	Pass
0.9646	5	0	0	Pass
0.9741	5	0	0	Pass
0.9836	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

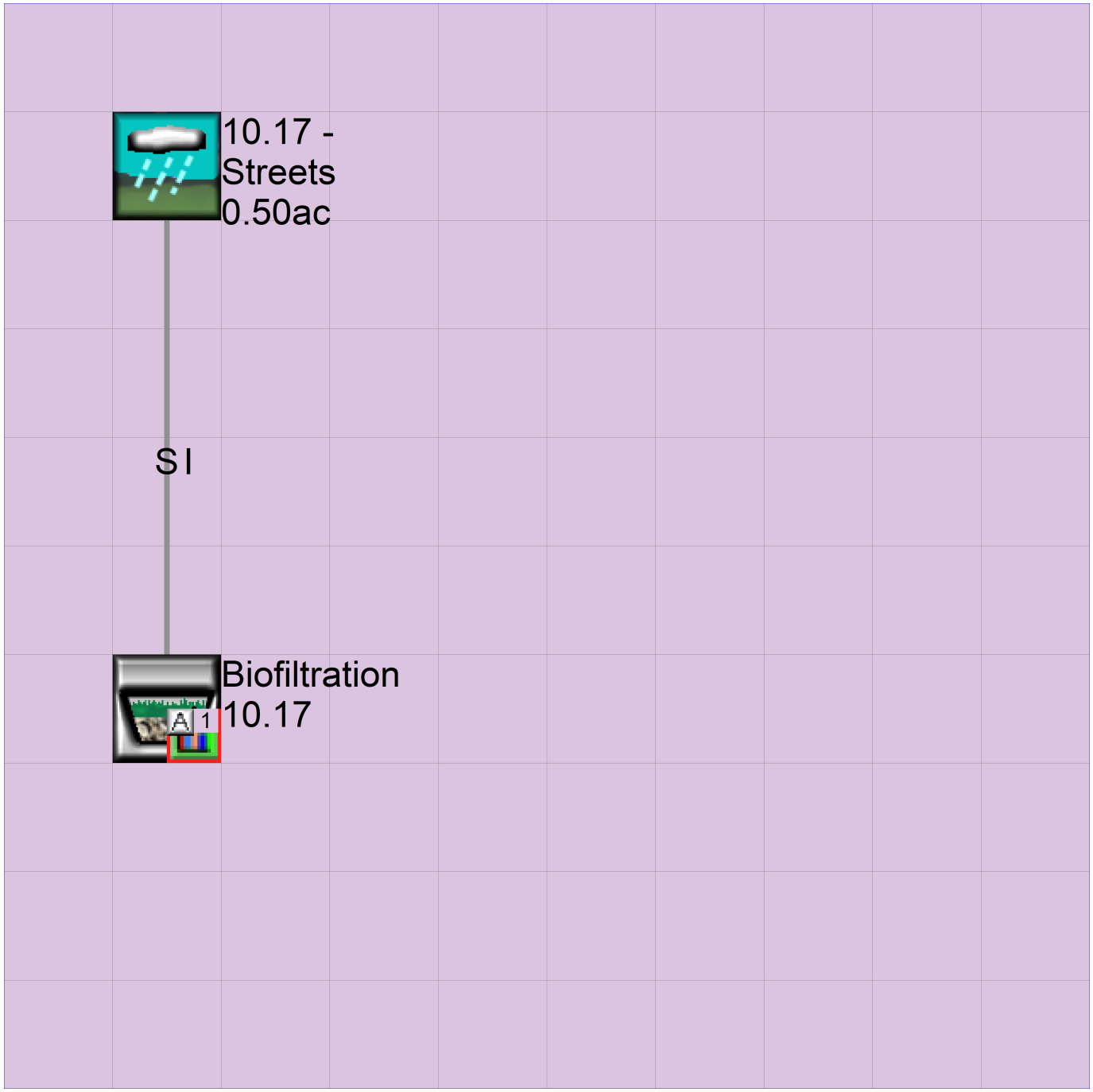
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.17 - Existing Street Areas 0.50ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.17 Streets.wdm
MESSU       25   Mit4201-SDHM-10.17 Streets.MES
            27   Mit4201-SDHM-10.17 Streets.L61
            28   Mit4201-SDHM-10.17 Streets.L62
            30   POC4201-SDHM-10.17 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.17        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.17 - Streets***
PERLND   2                        0.2     RCHRES   1      2
PERLND   2                        0.2     RCHRES   1      3
IMPLND   2                        0.3     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   2                        0.2     COPY     1     12
IMPLND   2                        0.3     COPY     1     15
PERLND   2                        0.2     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------->      ***
    1              1      0.01       0.0    875.25       0.0       0.0
    2              2      0.01       0.0    875.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1           0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  1064.98
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   54    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.025253  0.000000  0.000000  0.000000
  0.052198  0.025253  0.000395  0.000000  0.000000
  0.104396  0.025253  0.000791  0.000000  0.000000
  0.156593  0.025253  0.001186  0.000000  0.000000
  0.208791  0.025253  0.001582  0.000000  0.000000
  0.260989  0.025253  0.001977  0.000000  0.000000
  0.313187  0.025253  0.002373  0.000000  0.000000
  0.365385  0.025253  0.002768  0.000000  0.001659
  0.417582  0.025253  0.003164  0.000000  0.002459
  0.469780  0.025253  0.003559  0.000000  0.003490
  0.521978  0.025253  0.003954  0.000000  0.004777
  0.574176  0.025253  0.004350  0.000000  0.006340
  0.626374  0.025253  0.004745  0.000000  0.007639
  0.678571  0.025253  0.005141  0.000000  0.007639
  0.730769  0.025253  0.005536  0.000000  0.007639
  0.782967  0.025253  0.005932  0.000000  0.007639
  0.835165  0.025253  0.006327  0.000000  0.007639
  0.887363  0.025253  0.006722  0.000000  0.007639
  0.939560  0.025253  0.007118  0.000000  0.007639
  0.991758  0.025253  0.007513  0.000000  0.007639
  1.043956  0.025253  0.007909  0.000000  0.007639
  1.096154  0.025253  0.008304  0.000000  0.007639
  1.148352  0.025253  0.008700  0.000000  0.007639
  1.200549  0.025253  0.009095  0.000000  0.007639
  1.252747  0.025253  0.009491  0.000000  0.007639
  1.304945  0.025253  0.009886  0.000000  0.007639
  1.357143  0.025253  0.010281  0.000000  0.007639
  1.409341  0.025253  0.010677  0.000000  0.007639
  1.461538  0.025253  0.011072  0.000000  0.007639
  1.513736  0.025253  0.011468  0.000000  0.007639
  1.565934  0.025253  0.011863  0.000000  0.007639
  1.618132  0.025253  0.012259  0.000000  0.007639
  1.670330  0.025253  0.012654  0.000000  0.007639
  1.722527  0.025253  0.013049  0.000000  0.007639
  1.774725  0.025253  0.013596  0.000000  0.007639
  1.826923  0.025253  0.014143  0.000000  0.007639
  1.879121  0.025253  0.014691  0.000000  0.007639
  1.931319  0.025253  0.015238  0.000000  0.007639
  1.983516  0.025253  0.015785  0.000000  0.007639
  2.035714  0.025253  0.016332  0.000000  0.007639
  2.087912  0.025253  0.016879  0.000000  0.007639
  2.140110  0.025253  0.017426  0.000000  0.007639
  2.192308  0.025253  0.017973  0.000000  0.007639
  2.244505  0.025253  0.018520  0.000000  0.007639
  2.296703  0.025253  0.019067  0.000000  0.007639
  2.348901  0.025253  0.019614  0.000000  0.007639
  2.401099  0.025253  0.020161  0.000000  0.007639
  2.453297  0.025253  0.020708  0.000000  0.007639
  2.505495  0.025253  0.021255  0.000000  0.007639
  2.557692  0.025253  0.021802  0.000000  0.007639
  2.609890  0.025253  0.022349  0.000000  0.007639
  2.662088  0.025253  0.022896  0.000000  0.007639
  2.714286  0.025253  0.023443  0.000000  0.007639
  2.750000  0.025253  0.024448  0.000000  0.007639
  END FTABLE  2
  FTABLE      1
   40    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.025253  0.000000  0.000000  0.000000  0.000105
  0.052198  0.025599  0.001327  0.000000  0.129060  0.000105
  0.104396  0.025947  0.002672  0.000000  0.157395  0.000210
  0.156593  0.026297  0.004036  0.000000  0.161825  0.000316
  0.208791  0.026649  0.005418  0.000000  0.166256  0.000422
  0.260989  0.027003  0.006818  0.000000  0.170686  0.000530
  0.313187  0.027359  0.008237  0.000000  0.175116  0.000637
  0.365385  0.027717  0.009674  0.000000  0.179547  0.000746
  0.417582  0.028077  0.011130  0.000000  0.183977  0.000855
```

```
  0.469780  0.028440  0.012605  0.000000  0.188407  0.000964
  0.521978  0.028804  0.014099  0.034569  0.192838  0.001074
  0.574176  0.029170  0.015613  0.213745  0.197268  0.001185
  0.626374  0.029538  0.017145  0.471194  0.201699  0.001296
  0.678571  0.029908  0.018696  0.775552  0.206129  0.001408
  0.730769  0.030280  0.020267  1.099144  0.210559  0.001521
  0.782967  0.030654  0.021857  1.413620  0.214990  0.001634
  0.835165  0.031030  0.023467  1.692395  0.219420  0.001748
  0.887363  0.031409  0.025097  1.915531  0.223850  0.001862
  0.939560  0.031789  0.026746  2.076126  0.228281  0.001977
  0.991758  0.032171  0.028416  2.187838  0.232711  0.002093
  1.043956  0.032555  0.030105  2.322958  0.237142  0.002209
  1.096154  0.032941  0.031814  2.431861  0.241572  0.002326
  1.148352  0.033329  0.033544  2.536091  0.246002  0.002443
  1.200549  0.033719  0.035294  2.636204  0.250433  0.002561
  1.252747  0.034112  0.037064  2.732651  0.254863  0.002680
  1.304945  0.034506  0.038855  2.825808  0.259293  0.002799
  1.357143  0.034902  0.040666  2.915991  0.263724  0.002919
  1.409341  0.035300  0.042498  3.003467  0.268154  0.003039
  1.461538  0.035700  0.044351  3.088466  0.272585  0.003160
  1.513736  0.036102  0.046225  3.171188  0.277015  0.003282
  1.565934  0.036507  0.048120  3.251807  0.281445  0.003404
  1.618132  0.036913  0.050037  3.330474  0.285876  0.003527
  1.670330  0.037321  0.051974  3.407326  0.290306  0.003651
  1.722527  0.037731  0.053933  3.482482  0.294736  0.003775
  1.774725  0.038143  0.055913  3.556050  0.299167  0.003899
  1.826923  0.038557  0.057915  3.628126  0.303597  0.004025
  1.879121  0.038973  0.059938  3.698799  0.308027  0.004151
  1.931319  0.039392  0.061984  3.768146  0.312458  0.004277
  1.983516  0.039812  0.064051  3.836240  0.316888  0.004404
  2.000000  0.039945  0.064708  3.903146  0.318287  0.004444
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO      1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE   1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE   1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O       1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN    1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN    1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.18

General Model Information

Project Name:	4201-SDHM-10.18 Streets-rev
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	12/16/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.18 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.542
Pervious Total	0.542
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.542

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.18 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.245
Pervious Total	0.245

Impervious Land Use	acre
IMPERVIOUS-MOD	0.297
Impervious Total	0.297
Basin Total	0.542

Element Flows To:

Surface	Interflow	Groundwater
Surface 0 Tree Wells	Surface 0 Tree Wells	

Routing Elements
Predeveloped Routing

Mitigated Routing

10 Tree Wells

Bottom Length:	100.00 ft.
Bottom Width:	10.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2.75
Material type for second layer:	ESM
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	16.229
Total Volume Through Riser (ac-ft.):	2.373
Total Volume Through Facility (ac-ft.):	18.602
Percent Infiltrated:	87.24
Total Precip Applied to Facility:	1.822
Total Evap From Facility:	1.411
Underdrain not used	
Discharge Structure	
Riser Height:	0.167 ft.
Riser Diameter:	60 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0566	0.0000	0.0000	0.0000
0.0403	0.0563	0.0003	0.0000	0.0000
0.0806	0.0558	0.0006	0.0000	0.0000
0.1209	0.0554	0.0009	0.0000	0.0000
0.1612	0.0549	0.0011	0.0000	0.0000
0.2015	0.0544	0.0014	0.0000	0.0000
0.2418	0.0539	0.0018	0.0000	0.0000
0.2821	0.0534	0.0021	0.0000	0.0000
0.3224	0.0529	0.0024	0.0000	0.0000
0.3627	0.0524	0.0027	0.0000	0.0008
0.4030	0.0519	0.0030	0.0000	0.0010
0.4433	0.0515	0.0034	0.0000	0.0013
0.4836	0.0510	0.0037	0.0000	0.0016
0.5239	0.0505	0.0040	0.0000	0.0020
0.5642	0.0500	0.0044	0.0000	0.0024
0.6045	0.0495	0.0047	0.0000	0.0029
0.6447	0.0490	0.0051	0.0000	0.0035
0.6850	0.0486	0.0054	0.0000	0.0041
0.7253	0.0481	0.0058	0.0000	0.0048
0.7656	0.0476	0.0062	0.0000	0.0055
0.8059	0.0471	0.0066	0.0000	0.0064
0.8462	0.0467	0.0069	0.0000	0.0073
0.8865	0.0462	0.0073	0.0000	0.0084
0.9268	0.0457	0.0077	0.0000	0.0095
0.9671	0.0453	0.0081	0.0000	0.0100

1.0074	0.0448	0.0085	0.0000	0.0101
1.0477	0.0443	0.0089	0.0000	0.0103
1.0880	0.0439	0.0093	0.0000	0.0104
1.1283	0.0434	0.0098	0.0000	0.0105
1.1686	0.0429	0.0102	0.0000	0.0107
1.2089	0.0425	0.0106	0.0000	0.0108
1.2492	0.0420	0.0110	0.0000	0.0109
1.2895	0.0416	0.0115	0.0000	0.0111
1.3298	0.0411	0.0119	0.0000	0.0112
1.3701	0.0406	0.0124	0.0000	0.0113
1.4104	0.0402	0.0128	0.0000	0.0115
1.4507	0.0397	0.0133	0.0000	0.0116
1.4910	0.0393	0.0138	0.0000	0.0117
1.5313	0.0388	0.0142	0.0000	0.0119
1.5716	0.0384	0.0147	0.0000	0.0120
1.6119	0.0379	0.0152	0.0000	0.0122
1.6522	0.0375	0.0157	0.0000	0.0123
1.6925	0.0370	0.0162	0.0000	0.0124
1.7328	0.0366	0.0167	0.0000	0.0126
1.7731	0.0361	0.0172	0.0000	0.0127
1.8134	0.0357	0.0177	0.0000	0.0129
1.8536	0.0353	0.0182	0.0000	0.0130
1.8939	0.0348	0.0187	0.0000	0.0131
1.9342	0.0344	0.0193	0.0000	0.0133
1.9745	0.0339	0.0198	0.0000	0.0134
2.0148	0.0335	0.0203	0.0000	0.0136
2.0551	0.0331	0.0209	0.0000	0.0137
2.0954	0.0326	0.0214	0.0000	0.0138
2.1357	0.0322	0.0220	0.0000	0.0140
2.1760	0.0318	0.0225	0.0000	0.0141
2.2163	0.0313	0.0231	0.0000	0.0143
2.2566	0.0309	0.0237	0.0000	0.0144
2.2969	0.0305	0.0243	0.0000	0.0145
2.3372	0.0300	0.0248	0.0000	0.0147
2.3775	0.0296	0.0254	0.0000	0.0148
2.4178	0.0292	0.0260	0.0000	0.0150
2.4581	0.0288	0.0266	0.0000	0.0151
2.4984	0.0283	0.0272	0.0000	0.0153
2.5387	0.0279	0.0279	0.0000	0.0154
2.5790	0.0275	0.0285	0.0000	0.0156
2.6193	0.0271	0.0291	0.0000	0.0157
2.6596	0.0267	0.0297	0.0000	0.0159
2.6999	0.0263	0.0304	0.0000	0.0160
2.7402	0.0258	0.0310	0.0000	0.0162
2.7805	0.0254	0.0317	0.0000	0.0163
2.8208	0.0250	0.0323	0.0000	0.0164
2.8611	0.0246	0.0330	0.0000	0.0166
2.9014	0.0242	0.0336	0.0000	0.0167
2.9417	0.0238	0.0343	0.0000	0.0169
2.9820	0.0234	0.0350	0.0000	0.0170
3.0000	0.0230	0.0353	0.0000	0.0171

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0566	0.0353	0.0000	0.1280	0.0002
3.0403	0.0571	0.0376	0.0000	0.1280	0.0003
3.0806	0.0576	0.0399	0.0000	0.1297	0.0005
3.1209	0.0581	0.0422	0.0000	0.1314	0.0006

3.1612	0.0586	0.0446	0.0000	0.1330	0.0008
3.2015	0.0591	0.0469	0.3399	0.1347	0.0009
3.2418	0.0596	0.0493	1.0852	0.1364	0.0011
3.2821	0.0601	0.0517	2.0708	0.1381	0.0012
3.3224	0.0606	0.0542	3.2478	0.1398	0.0014
3.3627	0.0611	0.0566	4.5885	0.1415	0.0015
3.4030	0.0616	0.0591	6.0744	0.1432	0.0017
3.4433	0.0621	0.0616	7.6920	0.1449	0.0018
3.4836	0.0626	0.0641	9.4303	0.1466	0.0020
3.5239	0.0631	0.0666	11.280	0.1483	0.0021
3.5642	0.0636	0.0692	13.234	0.1500	0.0023
3.6045	0.0641	0.0718	15.285	0.1517	0.0024
3.6447	0.0647	0.0744	17.426	0.1534	0.0025
3.6670	0.0649	0.0758	19.651	0.1543	0.0019

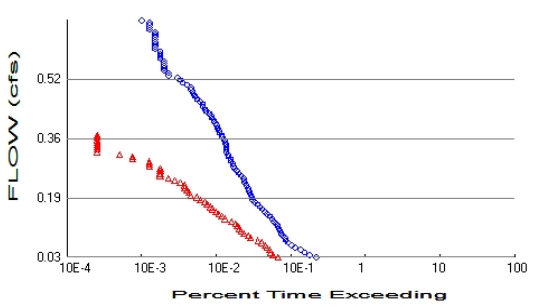
Surface 0 Tree Wells

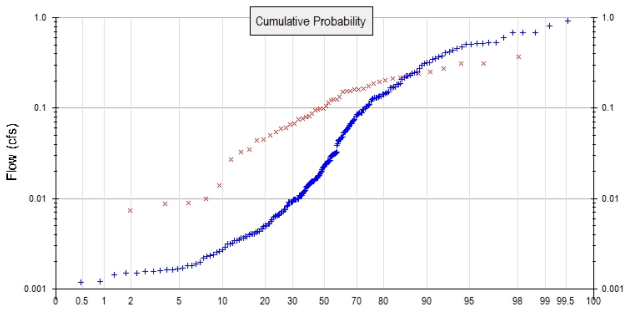
Element Flows To:

Outlet 1	Outlet 2
	10 Tree Wells

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.542
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.245
Total Impervious Area: 0.297

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.316886
5 year	0.517955
10 year	0.683393
25 year	0.813753

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.122563
5 year	0.209524
10 year	0.260846
25 year	0.319058

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0317	868	266	30	Pass
0.0383	704	228	32	Pass
0.0449	602	215	35	Pass
0.0514	530	205	38	Pass
0.0580	455	189	41	Pass
0.0646	406	179	44	Pass
0.0712	369	160	43	Pass
0.0778	345	143	41	Pass
0.0844	330	114	34	Pass
0.0909	309	106	34	Pass
0.0975	294	93	31	Pass
0.1041	283	85	30	Pass
0.1107	274	81	29	Pass
0.1173	265	76	28	Pass
0.1238	253	72	28	Pass
0.1304	233	63	27	Pass
0.1370	221	52	23	Pass
0.1436	208	47	22	Pass
0.1502	190	43	22	Pass
0.1568	179	39	21	Pass
0.1633	166	35	21	Pass
0.1699	155	33	21	Pass
0.1765	142	30	21	Pass
0.1831	130	28	21	Pass
0.1897	121	24	19	Pass
0.1963	119	22	18	Pass
0.2028	115	18	15	Pass
0.2094	111	17	15	Pass
0.2160	107	16	14	Pass
0.2226	105	15	14	Pass
0.2292	100	15	15	Pass
0.2358	96	13	13	Pass
0.2423	94	11	11	Pass
0.2489	91	9	9	Pass
0.2555	86	7	8	Pass
0.2621	81	7	8	Pass
0.2687	75	7	9	Pass
0.2753	70	7	10	Pass
0.2818	68	5	7	Pass
0.2884	66	5	7	Pass
0.2950	63	5	7	Pass
0.3016	62	3	4	Pass
0.3082	58	3	5	Pass
0.3148	57	2	3	Pass
0.3213	54	1	1	Pass
0.3279	54	1	1	Pass
0.3345	54	1	1	Pass
0.3411	54	1	1	Pass
0.3477	52	1	1	Pass
0.3542	51	1	1	Pass
0.3608	48	1	2	Pass
0.3674	47	1	2	Pass
0.3740	44	0	0	Pass

0.3806	43	0	0	Pass
0.3872	42	0	0	Pass
0.3937	40	0	0	Pass
0.4003	39	0	0	Pass
0.4069	37	0	0	Pass
0.4135	35	0	0	Pass
0.4201	34	0	0	Pass
0.4267	32	0	0	Pass
0.4332	29	0	0	Pass
0.4398	28	0	0	Pass
0.4464	26	0	0	Pass
0.4530	26	0	0	Pass
0.4596	24	0	0	Pass
0.4662	22	0	0	Pass
0.4727	21	0	0	Pass
0.4793	20	0	0	Pass
0.4859	19	0	0	Pass
0.4925	18	0	0	Pass
0.4991	18	0	0	Pass
0.5057	16	0	0	Pass
0.5122	14	0	0	Pass
0.5188	13	0	0	Pass
0.5254	12	0	0	Pass
0.5320	9	0	0	Pass
0.5386	9	0	0	Pass
0.5452	8	0	0	Pass
0.5517	8	0	0	Pass
0.5583	8	0	0	Pass
0.5649	8	0	0	Pass
0.5715	8	0	0	Pass
0.5781	7	0	0	Pass
0.5846	7	0	0	Pass
0.5912	7	0	0	Pass
0.5978	7	0	0	Pass
0.6044	6	0	0	Pass
0.6110	6	0	0	Pass
0.6176	6	0	0	Pass
0.6241	6	0	0	Pass
0.6307	6	0	0	Pass
0.6373	6	0	0	Pass
0.6439	6	0	0	Pass
0.6505	6	0	0	Pass
0.6571	5	0	0	Pass
0.6636	5	0	0	Pass
0.6702	5	0	0	Pass
0.6768	5	0	0	Pass
0.6834	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

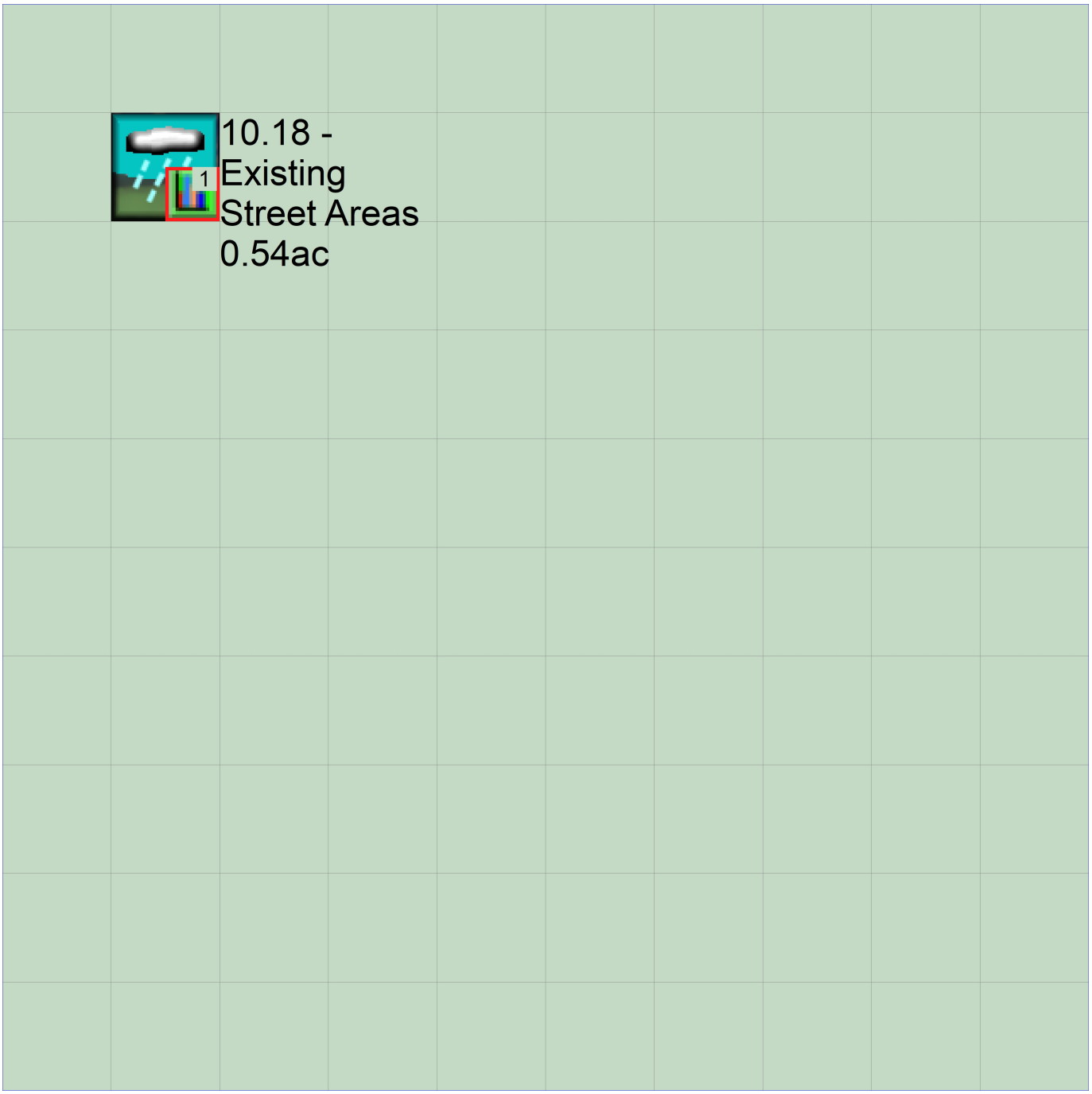
PERLND Changes

No PERLND changes have been made.

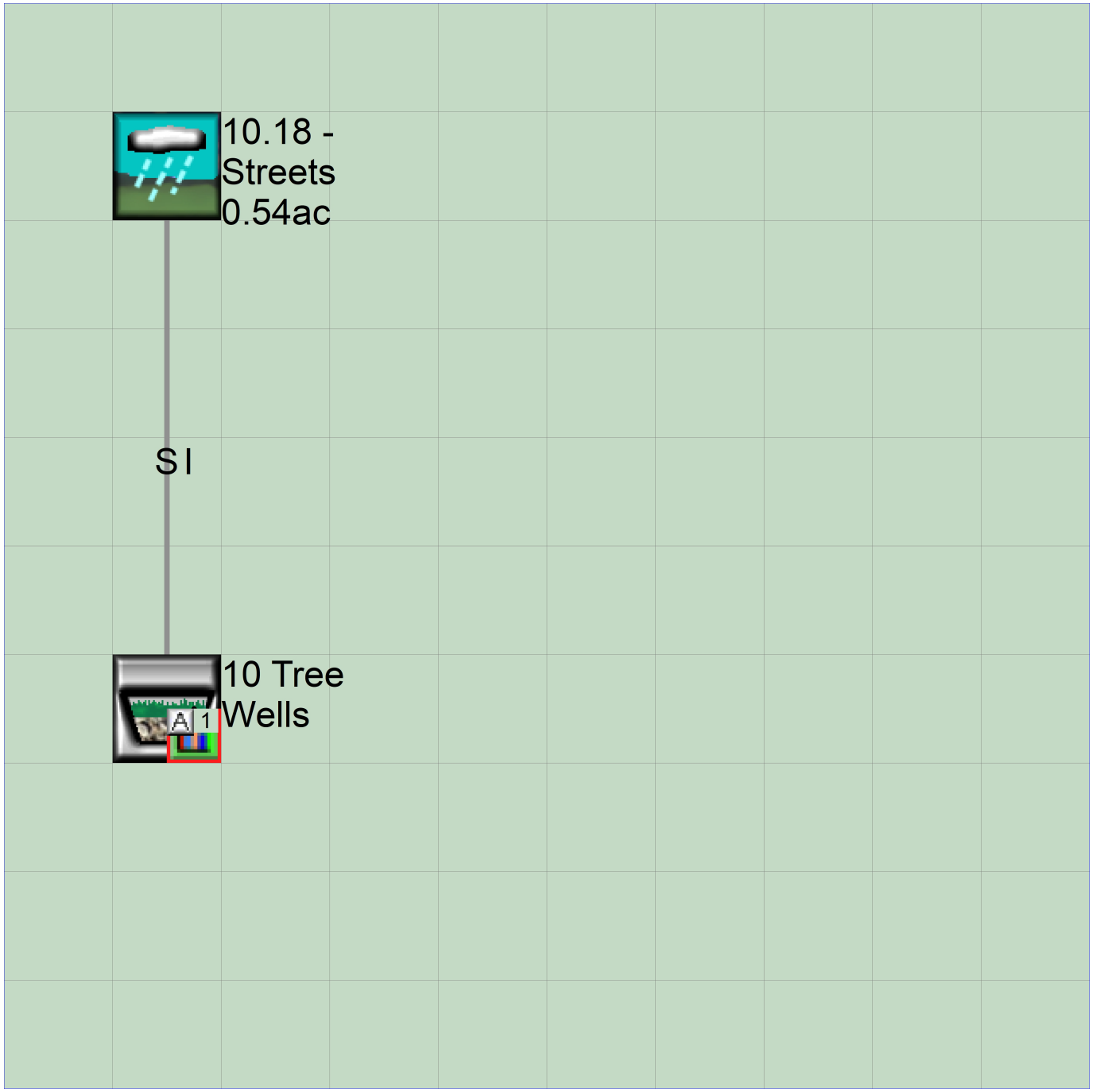
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.18 Streets-rev.wdm
MESSU       25   Mit4201-SDHM-10.18 Streets-rev.MES
            27   Mit4201-SDHM-10.18 Streets-rev.L61
            28   Mit4201-SDHM-10.18 Streets-rev.L62
            30   POC4201-SDHM-10.18 Streets-rev1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface 0 Tree Wells        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.18 - Streets***
PERLND   2                      0.245     RCHRES   1      2
PERLND   2                      0.245     RCHRES   1      3
IMPLND   2                      0.297     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   2                      0.245     COPY     1     12
IMPLND   2                      0.297     COPY     1     15
PERLND   2                      0.245     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface 0 Tree W-017    3    1    1    1   28    0    1
    2     10 Tree Wells           2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.02       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1           0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  1598.8
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   76    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

0.000000	0.056566	0.000000	0.000000	0.000000
0.040297	0.056344	0.000280	0.000000	0.000000
0.080593	0.055849	0.000565	0.000000	0.000000
0.120890	0.055356	0.000855	0.000000	0.000000
0.161187	0.054863	0.001150	0.000000	0.000000
0.201484	0.054372	0.001449	0.000000	0.000000
0.241780	0.053882	0.001754	0.000000	0.000000
0.282077	0.053393	0.002064	0.000000	0.000000
0.322374	0.052906	0.002379	0.000000	0.000000
0.362670	0.052419	0.002699	0.000000	0.000802
0.402967	0.051934	0.003024	0.000000	0.001029
0.443264	0.051450	0.003354	0.000000	0.001300
0.483560	0.050967	0.003689	0.000000	0.001618
0.523857	0.050486	0.004029	0.000000	0.001988
0.564154	0.050005	0.004374	0.000000	0.002414
0.604451	0.049526	0.004725	0.000000	0.002900
0.644747	0.049048	0.005080	0.000000	0.003451
0.685044	0.048571	0.005441	0.000000	0.004071
0.725341	0.048096	0.005807	0.000000	0.004764
0.765637	0.047621	0.006178	0.000000	0.005535
0.805934	0.047148	0.006554	0.000000	0.006389
0.846231	0.046676	0.006935	0.000000	0.007329
0.886527	0.046205	0.007322	0.000000	0.008361
0.926824	0.045736	0.007714	0.000000	0.009489
0.967121	0.045267	0.008111	0.000000	0.010003
1.007418	0.044800	0.008513	0.000000	0.010135
1.047714	0.044334	0.008921	0.000000	0.010268
1.088011	0.043869	0.009334	0.000000	0.010400
1.128308	0.043405	0.009752	0.000000	0.010534
1.168604	0.042943	0.010176	0.000000	0.010667
1.208901	0.042481	0.010605	0.000000	0.010801
1.249198	0.042021	0.011039	0.000000	0.010935
1.289495	0.041562	0.011479	0.000000	0.011069
1.329791	0.041105	0.011924	0.000000	0.011204
1.370088	0.040648	0.012375	0.000000	0.011339
1.410385	0.040193	0.012830	0.000000	0.011475
1.450681	0.039738	0.013292	0.000000	0.011611
1.490978	0.039286	0.013758	0.000000	0.011747
1.531275	0.038834	0.014231	0.000000	0.011884
1.571571	0.038383	0.014708	0.000000	0.012021
1.611868	0.037934	0.015191	0.000000	0.012158
1.652165	0.037486	0.015680	0.000000	0.012296
1.692462	0.037039	0.016174	0.000000	0.012434
1.732758	0.036593	0.016674	0.000000	0.012573
1.773055	0.036148	0.017179	0.000000	0.012711
1.813352	0.035705	0.017690	0.000000	0.012851
1.853648	0.035263	0.018206	0.000000	0.012990
1.893945	0.034822	0.018728	0.000000	0.013130
1.934242	0.034382	0.019256	0.000000	0.013270
1.974538	0.033943	0.019789	0.000000	0.013411
2.014835	0.033506	0.020328	0.000000	0.013552
2.055132	0.033069	0.020872	0.000000	0.013693
2.095429	0.032634	0.021422	0.000000	0.013835
2.135725	0.032200	0.021978	0.000000	0.013977
2.176022	0.031768	0.022539	0.000000	0.014120
2.216319	0.031336	0.023106	0.000000	0.014262
2.256615	0.030906	0.023679	0.000000	0.014405
2.296912	0.030477	0.024258	0.000000	0.014549
2.337209	0.030049	0.024842	0.000000	0.014693
2.377505	0.029622	0.025432	0.000000	0.014837
2.417802	0.029197	0.026028	0.000000	0.014982
2.458099	0.028772	0.026630	0.000000	0.015127
2.498396	0.028349	0.027237	0.000000	0.015272
2.538692	0.027927	0.027850	0.000000	0.015418
2.578989	0.027506	0.028469	0.000000	0.015564
2.619286	0.027087	0.029094	0.000000	0.015710
2.659582	0.026668	0.029725	0.000000	0.015857
2.699879	0.026251	0.030362	0.000000	0.016004
2.740176	0.025835	0.031004	0.000000	0.016151
2.780473	0.025421	0.031653	0.000000	0.016299

```
  2.820769  0.025007  0.032307  0.000000  0.016448
  2.861066  0.024595  0.032967  0.000000  0.016596
  2.901363  0.024183  0.033633  0.000000  0.016745
  2.941659  0.023773  0.034306  0.000000  0.016894
  2.981956  0.023364  0.034984  0.000000  0.017044
  3.000000  0.022957  0.036703  0.000000  0.017111
  END FTABLE  2
  FTABLE      1
   18    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.022957  0.000000  0.000000  0.000000  0.000150
  0.040297  0.057062  0.002289  0.000000  0.127959  0.000150
  0.080593  0.057560  0.004599  0.000000  0.129655  0.000301
  0.120890  0.058059  0.006928  0.000000  0.131351  0.000452
  0.161187  0.058559  0.009278  0.000000  0.133047  0.000603
  0.201484  0.059060  0.011648  0.339944  0.134743  0.000754
  0.241780  0.059562  0.014038  1.085151  0.136439  0.000906
  0.282077  0.060066  0.016448  2.070808  0.138135  0.001059
  0.322374  0.060571  0.018879  3.247767  0.139831  0.001211
  0.362670  0.061077  0.021330  4.588471  0.141527  0.001365
  0.402967  0.061584  0.023801  6.074441  0.143223  0.001518
  0.443264  0.062092  0.026293  7.691989  0.144919  0.001672
  0.483560  0.062602  0.028805  9.430269  0.146615  0.001826
  0.523857  0.063112  0.031338  11.28024  0.148311  0.001980
  0.564154  0.063624  0.033892  13.23405  0.150007  0.002135
  0.604451  0.064138  0.036466  15.28467  0.151703  0.002290
  0.644747  0.064652  0.039061  17.42562  0.153399  0.002446
  0.667000  0.064936  0.040503  19.65077  0.154335  0.002532
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.19

General Model Information

Project Name:	4201-SDHM-10.19 street
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.19 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.54
Pervious Total	0.54
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.54

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.19 - Street

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.21
Pervious Total	0.21

Impervious Land Use	acre
IMPERVIOUS-MOD	0.33
Impervious Total	0.33
Basin Total	0.54

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.19	Surface ation 10.19	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.19

Bottom Length:	35.00 ft.
Bottom Width:	35.57 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	14.072
Total Volume Through Riser (ac-ft.):	1.588
Total Volume Through Facility (ac-ft.):	19.94
Percent Infiltrated:	70.57
Total Precip Applied to Facility:	1.462
Total Evap From Facility:	1.162
Underdrain used	
Underdrain Diameter (feet):	0.25
Orifice Diameter (in.):	0.6
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	4.28
Total Outflow (ac-ft.):	19.94
Percent Through Underdrain:	21.46
Discharge Structure	
Riser Height:	1.5 ft.
Riser Diameter:	6 in.
Orifice 1 Diameter:	2 in. Elevation:1 ft.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
879.25	0.0286	0.0000	0.0000	0.0000
879.31	0.0286	0.0005	0.0000	0.0000
879.38	0.0286	0.0011	0.0000	0.0000
879.44	0.0286	0.0016	0.0000	0.0000
879.50	0.0286	0.0022	0.0000	0.0000
879.57	0.0286	0.0027	0.0000	0.0000
879.63	0.0286	0.0033	0.0000	0.0016
879.69	0.0286	0.0038	0.0000	0.0026
879.76	0.0286	0.0043	0.0000	0.0033
879.82	0.0286	0.0049	0.0000	0.0049
879.88	0.0286	0.0054	0.0000	0.0058
879.95	0.0286	0.0060	0.0000	0.0081
880.01	0.0286	0.0065	0.0000	0.0086
880.07	0.0286	0.0070	0.0000	0.0086
880.13	0.0286	0.0076	0.0000	0.0086
880.20	0.0286	0.0081	0.0000	0.0086
880.26	0.0286	0.0087	0.0000	0.0086
880.32	0.0286	0.0092	0.0000	0.0086

880.39	0.0286	0.0098	0.0000	0.0086
880.45	0.0286	0.0103	0.0000	0.0086
880.51	0.0286	0.0108	0.0000	0.0086
880.58	0.0286	0.0114	0.0000	0.0086
880.64	0.0286	0.0119	0.0008	0.0086
880.70	0.0286	0.0125	0.0013	0.0086
880.77	0.0286	0.0130	0.0018	0.0086
880.83	0.0286	0.0135	0.0021	0.0086
880.89	0.0286	0.0141	0.0026	0.0086
880.96	0.0286	0.0146	0.0028	0.0086
881.02	0.0286	0.0154	0.0031	0.0086
881.08	0.0286	0.0161	0.0033	0.0086
881.15	0.0286	0.0169	0.0036	0.0086
881.21	0.0286	0.0176	0.0037	0.0086
881.27	0.0286	0.0184	0.0040	0.0086
881.34	0.0286	0.0191	0.0041	0.0086
881.40	0.0286	0.0199	0.0042	0.0086
881.46	0.0286	0.0206	0.0043	0.0086
881.52	0.0286	0.0214	0.0045	0.0086
881.59	0.0286	0.0221	0.0050	0.0086
881.65	0.0286	0.0229	0.0055	0.0086
881.71	0.0286	0.0236	0.0059	0.0086
881.78	0.0286	0.0244	0.0064	0.0086
881.84	0.0286	0.0251	0.0069	0.0086
881.90	0.0286	0.0259	0.0073	0.0086
881.97	0.0286	0.0266	0.0077	0.0086
882.00	0.0286	0.0270	0.0154	0.0086

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0286	0.0270	0.0000	0.1462	0.0001
2.8132	0.0290	0.0288	0.0000	0.1462	0.0002
2.8764	0.0294	0.0307	0.0000	0.1802	0.0004
2.9396	0.0298	0.0325	0.0000	0.1863	0.0005
3.0027	0.0302	0.0344	0.0000	0.1924	0.0006
3.0659	0.0307	0.0364	0.0000	0.1985	0.0008
3.1291	0.0311	0.0383	0.0000	0.2045	0.0009
3.1923	0.0315	0.0403	0.0000	0.2106	0.0010
3.2555	0.0319	0.0423	0.0000	0.2167	0.0012
3.3187	0.0324	0.0443	0.0000	0.2227	0.0013
3.3819	0.0328	0.0464	0.0000	0.2288	0.0014
3.4451	0.0333	0.0485	0.0000	0.2349	0.0016
3.5082	0.0337	0.0506	0.0000	0.2409	0.0017
3.5714	0.0342	0.0527	0.0000	0.2470	0.0018
3.6346	0.0346	0.0549	0.0000	0.2531	0.0020
3.6978	0.0351	0.0571	0.0000	0.2592	0.0021
3.7610	0.0355	0.0593	0.0114	0.2652	0.0022
3.8242	0.0360	0.0616	0.0296	0.2713	0.0024
3.8874	0.0364	0.0639	0.0402	0.2774	0.0025
3.9505	0.0369	0.0662	0.0486	0.2834	0.0027
4.0137	0.0374	0.0685	0.0557	0.2895	0.0028
4.0769	0.0378	0.0709	0.0621	0.2956	0.0029
4.1401	0.0383	0.0733	0.0678	0.3016	0.0031
4.2033	0.0388	0.0758	0.0731	0.3077	0.0032
4.2665	0.0393	0.0782	0.0892	0.3138	0.0034
4.3297	0.0397	0.0807	0.1993	0.3199	0.0035
4.3929	0.0402	0.0833	0.3397	0.3259	0.0037
4.4560	0.0407	0.0858	0.4446	0.3320	0.0038

4.5192	0.0412	0.0884	0.5038	0.3381	0.0040
4.5824	0.0417	0.0910	0.5530	0.3441	0.0041
4.6456	0.0422	0.0937	0.5980	0.3502	0.0043
4.7088	0.0427	0.0963	0.6396	0.3563	0.0044
4.7720	0.0432	0.0991	0.6786	0.3623	0.0046
4.8352	0.0437	0.1018	0.7154	0.3684	0.0047
4.8984	0.0442	0.1046	0.7503	0.3745	0.0049
4.9615	0.0447	0.1074	0.7837	0.3805	0.0050
5.0247	0.0452	0.1102	0.8156	0.3866	0.0052
5.0879	0.0457	0.1131	0.8463	0.3927	0.0053
5.1511	0.0463	0.1160	0.8759	0.3988	0.0055
5.2143	0.0468	0.1189	0.9046	0.4048	0.0057
5.2775	0.0473	0.1219	0.9323	0.4109	0.0058
5.3407	0.0478	0.1249	0.9592	0.4170	0.0060
5.4038	0.0484	0.1280	0.9854	0.4230	0.0061
5.4670	0.0489	0.1310	1.0109	0.4291	0.0063
5.5302	0.0494	0.1341	1.0358	0.4352	0.0065
5.5934	0.0500	0.1373	1.0600	0.4412	0.0066
5.6566	0.0505	0.1405	1.0837	0.4473	0.0068
5.7198	0.0511	0.1437	1.1070	0.4534	0.0069
5.7500	0.0513	0.1452	1.1297	0.4563	0.0021

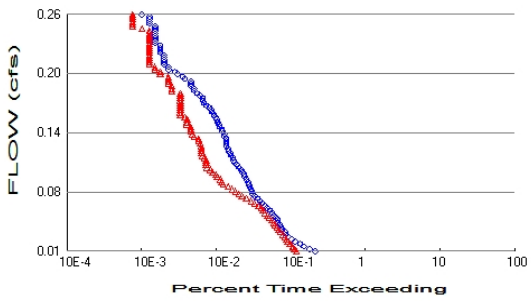
Surface ation 10.19

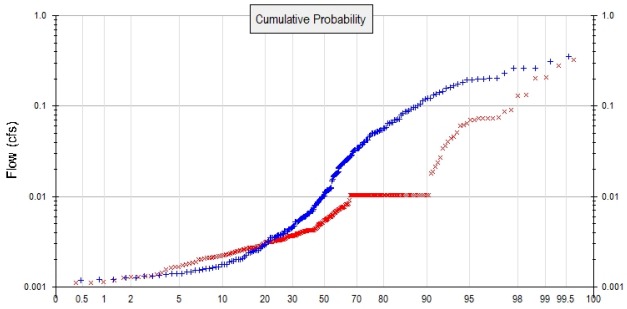
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.19

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.54
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.21
Total Impervious Area: 0.33

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.12214
5 year	0.19964
10 year	0.263406
25 year	0.313652

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.036151
5 year	0.074465
10 year	0.15725
25 year	0.282554

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0122	847	470	55	Pass
0.0148	702	441	62	Pass
0.0173	591	418	70	Pass
0.0198	528	387	73	Pass
0.0224	455	361	79	Pass
0.0249	403	344	85	Pass
0.0274	369	328	88	Pass
0.0300	344	313	90	Pass
0.0325	329	286	86	Pass
0.0350	304	270	88	Pass
0.0376	293	257	87	Pass
0.0401	283	243	85	Pass
0.0427	271	233	85	Pass
0.0452	264	219	82	Pass
0.0477	251	203	80	Pass
0.0503	232	193	83	Pass
0.0528	221	176	79	Pass
0.0553	208	168	80	Pass
0.0579	190	159	83	Pass
0.0604	177	145	81	Pass
0.0630	166	129	77	Pass
0.0655	155	117	75	Pass
0.0680	142	100	70	Pass
0.0706	130	87	66	Pass
0.0731	121	80	66	Pass
0.0756	119	72	60	Pass
0.0782	115	65	56	Pass
0.0807	111	57	51	Pass
0.0833	107	49	45	Pass
0.0858	105	47	44	Pass
0.0883	100	45	45	Pass
0.0909	95	41	43	Pass
0.0934	94	39	41	Pass
0.0959	89	35	39	Pass
0.0985	86	33	38	Pass
0.1010	81	30	37	Pass
0.1036	75	29	38	Pass
0.1061	70	29	41	Pass
0.1086	68	29	42	Pass
0.1112	66	28	42	Pass
0.1137	63	26	41	Pass
0.1162	61	25	40	Pass
0.1188	58	25	43	Pass
0.1213	57	25	43	Pass
0.1239	54	25	46	Pass
0.1264	54	24	44	Pass
0.1289	54	23	42	Pass
0.1315	54	23	42	Pass
0.1340	51	20	39	Pass
0.1365	51	19	37	Pass
0.1391	48	18	37	Pass
0.1416	47	18	38	Pass
0.1442	44	18	40	Pass

0.1467	43	16	37	Pass
0.1492	42	16	38	Pass
0.1518	40	16	40	Pass
0.1543	39	15	38	Pass
0.1568	37	13	35	Pass
0.1594	35	13	37	Pass
0.1619	34	13	38	Pass
0.1645	32	13	40	Pass
0.1670	29	13	44	Pass
0.1695	27	13	48	Pass
0.1721	26	13	50	Pass
0.1746	26	13	50	Pass
0.1771	24	13	54	Pass
0.1797	22	13	59	Pass
0.1822	20	10	50	Pass
0.1847	20	10	50	Pass
0.1873	18	10	55	Pass
0.1898	18	9	50	Pass
0.1924	18	9	50	Pass
0.1949	15	9	60	Pass
0.1974	14	9	64	Pass
0.2000	12	7	58	Pass
0.2025	11	7	63	Pass
0.2050	9	6	66	Pass
0.2076	9	6	66	Pass
0.2101	8	5	62	Pass
0.2127	8	5	62	Pass
0.2152	8	5	62	Pass
0.2177	8	5	62	Pass
0.2203	8	5	62	Pass
0.2228	7	5	71	Pass
0.2253	7	5	71	Pass
0.2279	7	5	71	Pass
0.2304	7	5	71	Pass
0.2330	6	5	83	Pass
0.2355	6	5	83	Pass
0.2380	6	5	83	Pass
0.2406	6	5	83	Pass
0.2431	6	5	83	Pass
0.2456	6	5	83	Pass
0.2482	6	4	66	Pass
0.2507	6	3	50	Pass
0.2533	5	3	60	Pass
0.2558	5	3	60	Pass
0.2583	5	3	60	Pass
0.2609	5	3	60	Pass
0.2634	4	3	75	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

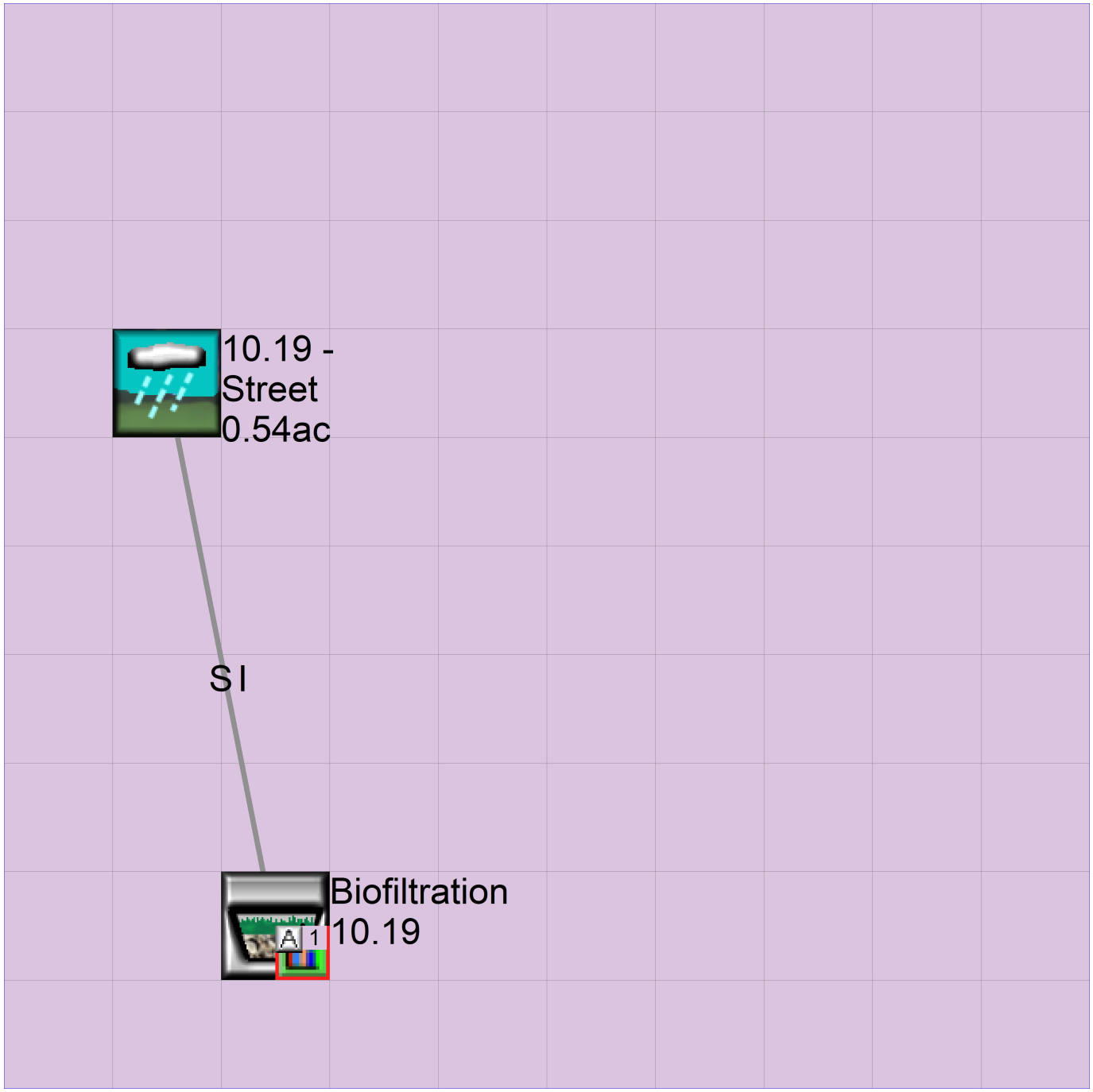
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



10.19 - Existing Street Areas 0.54ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.19 street.wdm
MESSU       25   Mit4201-SDHM-10.19 street.MES
            27   Mit4201-SDHM-10.19 street.L61
            28   Mit4201-SDHM-10.19 street.L62
            30   POC4201-SDHM-10.19 street1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.19        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.19 - Street***
PERLND   2                       0.21     RCHRES   1      2
PERLND   2                       0.21     RCHRES   1      3
IMPLND   2                       0.33     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   2                       0.21     COPY     1     12
IMPLND   2                       0.33     COPY     1     15
PERLND   2                       0.21     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0    879.25       0.0       0.0
    2              2      0.01       0.0    879.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><-->
    1           0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  1263.28
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   45    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.028580  0.000000  0.000000  0.000000
  0.063187  0.028580  0.000542  0.000000  0.000000
  0.126374  0.028580  0.001084  0.000000  0.000000
  0.189560  0.028580  0.001625  0.000000  0.000000
  0.252747  0.028580  0.002167  0.000000  0.000000
  0.315934  0.028580  0.002709  0.000000  0.000000
  0.379121  0.028580  0.003251  0.000000  0.001604
  0.442308  0.028580  0.003792  0.000000  0.002624
  0.505495  0.028580  0.004334  0.000000  0.003272
  0.568681  0.028580  0.004876  0.000000  0.004874
  0.631868  0.028580  0.005418  0.000000  0.005840
  0.695055  0.028580  0.005959  0.000000  0.008130
  0.758242  0.028580  0.006501  0.000000  0.008645
  0.821429  0.028580  0.007043  0.000000  0.008645
  0.884615  0.028580  0.007585  0.000000  0.008645
  0.947802  0.028580  0.008126  0.000000  0.008645
  1.010989  0.028580  0.008668  0.000000  0.008645
  1.074176  0.028580  0.009210  0.000000  0.008645
  1.137363  0.028580  0.009752  0.000000  0.008645
  1.200549  0.028580  0.010294  0.000000  0.008645
  1.263736  0.028580  0.010835  0.000000  0.008645
  1.326923  0.028580  0.011377  0.000000  0.008645
  1.390110  0.028580  0.011919  0.000844  0.008645
  1.453297  0.028580  0.012461  0.001266  0.008645
  1.516484  0.028580  0.013002  0.001849  0.008645
  1.579670  0.028580  0.013544  0.002140  0.008645
  1.642857  0.028580  0.014086  0.002568  0.008645
  1.706044  0.028580  0.014628  0.002782  0.008645
  1.769231  0.028580  0.015377  0.003126  0.008645
  1.832418  0.028580  0.016127  0.003298  0.008645
  1.895604  0.028580  0.016876  0.003592  0.008645
  1.958791  0.028580  0.017625  0.003739  0.008645
  2.021978  0.028580  0.018375  0.004000  0.008645
  2.085165  0.028580  0.019124  0.004130  0.008645
  2.148352  0.028580  0.019874  0.004211  0.008645
  2.211538  0.028580  0.020623  0.004252  0.008645
  2.274725  0.028580  0.021373  0.004528  0.008645
  2.337912  0.028580  0.022122  0.004965  0.008645
  2.401099  0.028580  0.022872  0.005453  0.008645
  2.464286  0.028580  0.023621  0.005944  0.008645
  2.527473  0.028580  0.024370  0.006420  0.008645
  2.590659  0.028580  0.025120  0.006874  0.008645
  2.653846  0.028580  0.025869  0.007306  0.008645
  2.717033  0.028580  0.026619  0.007720  0.008645
  2.750000  0.028580  0.029001  0.015447  0.008645
  END FTABLE  2
  FTABLE      1
   49    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.028580  0.000000  0.000000  0.000000  0.000124
  0.063187  0.028991  0.001819  0.000000  0.146163  0.000124
  0.126374  0.029405  0.003664  0.000000  0.180246  0.000250
  0.189560  0.029822  0.005535  0.000000  0.186316  0.000376
  0.252747  0.030241  0.007433  0.000000  0.192386  0.000503
  0.315934  0.030664  0.009357  0.000000  0.198456  0.000630
  0.379121  0.031090  0.011308  0.000000  0.204526  0.000759
  0.442308  0.031518  0.013286  0.000000  0.210595  0.000889
  0.505495  0.031950  0.015291  0.000000  0.216665  0.001019
  0.568681  0.032384  0.017323  0.000000  0.222735  0.001151
  0.631868  0.032821  0.019384  0.000000  0.228805  0.001283
  0.695055  0.033262  0.021471  0.000000  0.234875  0.001416
  0.758242  0.033705  0.023587  0.000000  0.240944  0.001550
  0.821429  0.034151  0.025731  0.000000  0.247014  0.001685
  0.884615  0.034600  0.027903  0.000000  0.253084  0.001821
  0.947802  0.035052  0.030103  0.000000  0.259154  0.001958
  1.010989  0.035507  0.032333  0.011379  0.265223  0.002095
  1.074176  0.035965  0.034591  0.029563  0.271293  0.002234
```

```
  1.137363  0.036426  0.036878  0.040230  0.277363  0.002373
  1.200549  0.036889  0.039194  0.048610  0.283433  0.002514
  1.263736  0.037356  0.041540  0.055745  0.289503  0.002655
  1.326923  0.037826  0.043915  0.062064  0.295572  0.002797
  1.390110  0.038298  0.046320  0.067797  0.301642  0.002940
  1.453297  0.038774  0.048755  0.073082  0.307712  0.003084
  1.516484  0.039252  0.051220  0.089231  0.313782  0.003228
  1.579670  0.039733  0.053715  0.199262  0.319852  0.003374
  1.642857  0.040218  0.056241  0.339715  0.325921  0.003520
  1.706044  0.040705  0.058798  0.444609  0.331991  0.003668
  1.769231  0.041195  0.061385  0.503768  0.338061  0.003816
  1.832418  0.041688  0.064004  0.553020  0.344131  0.003965
  1.895604  0.042184  0.066654  0.597982  0.350201  0.004115
  1.958791  0.042683  0.069335  0.639631  0.356270  0.004266
  2.021978  0.043185  0.072048  0.678620  0.362340  0.004418
  2.085165  0.043690  0.074793  0.715411  0.368410  0.004571
  2.148352  0.044197  0.077569  0.750343  0.374480  0.004724
  2.211538  0.044708  0.080378  0.783678  0.380549  0.004879
  2.274725  0.045222  0.083219  0.815618  0.386619  0.005034
  2.337912  0.045738  0.086093  0.846328  0.392689  0.005190
  2.401099  0.046257  0.088999  0.875941  0.398759  0.005347
  2.464286  0.046780  0.091939  0.904569  0.404829  0.005505
  2.527473  0.047305  0.094911  0.932305  0.410898  0.005664
  2.590659  0.047833  0.097917  0.959227  0.416968  0.005824
  2.653846  0.048365  0.100956  0.985405  0.423038  0.005985
  2.717033  0.048899  0.104029  1.010897  0.429108  0.006146
  2.780220  0.049436  0.107136  1.035755  0.435178  0.006309
  2.843407  0.049976  0.110277  1.060025  0.441247  0.006472
  2.906593  0.050519  0.113452  1.083746  0.447317  0.006636
  2.969780  0.051065  0.116661  1.106954  0.453387  0.006802
  3.000000  0.051327  0.118208  1.129682  0.456290  0.006881
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO      1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE   1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE   1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O       1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN    1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN    1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.21

General Model Information

Project Name:	4201-SDHM-10.21 Streets-rev
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	12/16/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.18 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	0.687
Pervious Total	0.687
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.687

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.18 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.269
Pervious Total	0.269

Impervious Land Use	acre
IMPERVIOUS-MOD	0.418
Impervious Total	0.418
Basin Total	0.687

Element Flows To:

Surface	Interflow	Groundwater
Surface 14 Trees	Surface 14 Trees	

Routing Elements
Predeveloped Routing

Mitigated Routing

14 Trees

Bottom Length:	100.00 ft.
Bottom Width:	14.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2.75
Material type for second layer:	ESM
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	21.788
Total Volume Through Riser (ac-ft.):	3.598
Total Volume Through Facility (ac-ft.):	25.386
Percent Infiltrated:	85.83
Total Precip Applied to Facility:	2.313
Total Evap From Facility:	1.837
Underdrain not used	
Discharge Structure	
Riser Height:	0.167 ft.
Riser Diameter:	60 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0669	0.0000	0.0000	0.0000
0.0403	0.0666	0.0004	0.0000	0.0000
0.0806	0.0661	0.0008	0.0000	0.0000
0.1209	0.0656	0.0012	0.0000	0.0000
0.1612	0.0651	0.0016	0.0000	0.0000
0.2015	0.0646	0.0020	0.0000	0.0000
0.2418	0.0641	0.0024	0.0000	0.0000
0.2821	0.0636	0.0028	0.0000	0.0000
0.3224	0.0631	0.0033	0.0000	0.0000
0.3627	0.0626	0.0037	0.0011	0.0011
0.4030	0.0621	0.0041	0.0014	0.0014
0.4433	0.0616	0.0046	0.0017	0.0017
0.4836	0.0611	0.0050	0.0022	0.0022
0.5239	0.0606	0.0055	0.0026	0.0026
0.5642	0.0601	0.0059	0.0032	0.0032
0.6045	0.0596	0.0064	0.0038	0.0038
0.6447	0.0591	0.0069	0.0045	0.0045
0.6850	0.0586	0.0074	0.0053	0.0053
0.7253	0.0581	0.0078	0.0062	0.0062
0.7656	0.0576	0.0083	0.0072	0.0072
0.8059	0.0571	0.0088	0.0083	0.0083
0.8462	0.0567	0.0093	0.0095	0.0095
0.8865	0.0562	0.0098	0.0108	0.0108
0.9268	0.0557	0.0103	0.0123	0.0123
0.9671	0.0552	0.0108	0.0129	0.0129

1.0074	0.0547	0.0113	0.0130	0.0130
1.0477	0.0542	0.0119	0.0132	0.0132
1.0880	0.0538	0.0124	0.0133	0.0133
1.1283	0.0533	0.0129	0.0134	0.0134
1.1686	0.0528	0.0135	0.0136	0.0136
1.2089	0.0523	0.0140	0.0137	0.0137
1.2492	0.0519	0.0146	0.0139	0.0139
1.2895	0.0514	0.0151	0.0140	0.0140
1.3298	0.0509	0.0157	0.0141	0.0141
1.3701	0.0504	0.0163	0.0143	0.0143
1.4104	0.0500	0.0168	0.0144	0.0144
1.4507	0.0495	0.0174	0.0145	0.0145
1.4910	0.0490	0.0180	0.0147	0.0147
1.5313	0.0486	0.0186	0.0148	0.0148
1.5716	0.0481	0.0192	0.0150	0.0150
1.6119	0.0476	0.0198	0.0151	0.0151
1.6522	0.0472	0.0204	0.0153	0.0153
1.6925	0.0467	0.0210	0.0154	0.0154
1.7328	0.0462	0.0216	0.0155	0.0155
1.7731	0.0458	0.0222	0.0157	0.0157
1.8134	0.0453	0.0229	0.0158	0.0158
1.8536	0.0449	0.0235	0.0160	0.0160
1.8939	0.0444	0.0241	0.0161	0.0161
1.9342	0.0440	0.0248	0.0163	0.0163
1.9745	0.0435	0.0254	0.0164	0.0164
2.0148	0.0431	0.0261	0.0166	0.0166
2.0551	0.0426	0.0268	0.0167	0.0167
2.0954	0.0422	0.0274	0.0168	0.0168
2.1357	0.0417	0.0281	0.0170	0.0170
2.1760	0.0413	0.0288	0.0171	0.0171
2.2163	0.0408	0.0295	0.0173	0.0173
2.2566	0.0404	0.0302	0.0174	0.0174
2.2969	0.0399	0.0309	0.0176	0.0176
2.3372	0.0395	0.0316	0.0177	0.0177
2.3775	0.0390	0.0323	0.0179	0.0179
2.4178	0.0386	0.0330	0.0180	0.0180
2.4581	0.0382	0.0337	0.0182	0.0182
2.4984	0.0377	0.0345	0.0183	0.0183
2.5387	0.0373	0.0352	0.0185	0.0185
2.5790	0.0369	0.0359	0.0186	0.0186
2.6193	0.0364	0.0367	0.0188	0.0188
2.6596	0.0360	0.0374	0.0189	0.0189
2.6999	0.0356	0.0382	0.0191	0.0191
2.7402	0.0351	0.0390	0.0192	0.0192
2.7805	0.0347	0.0397	0.0194	0.0194
2.8208	0.0343	0.0405	0.0195	0.0195
2.8611	0.0338	0.0413	0.0197	0.0197
2.9014	0.0334	0.0421	0.0198	0.0198
2.9417	0.0330	0.0429	0.0200	0.0200
2.9820	0.0326	0.0437	0.0202	0.0202
3.0000	0.0321	0.0440	0.0202	0.0202

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0669	0.0440	0.0000	0.1791	0.0002
3.0403	0.0674	0.0468	0.0000	0.1791	0.0003
3.0806	0.0679	0.0495	0.0000	0.1815	0.0005
3.1209	0.0684	0.0522	0.0000	0.1839	0.0006

3.1612	0.0689	0.0550	0.0000	0.1863	0.0008
3.2015	0.0694	0.0578	0.0000	0.1886	0.0009
3.2418	0.0699	0.0606	0.0000	0.1910	0.0011
3.2821	0.0705	0.0634	0.0000	0.1934	0.0012
3.3224	0.0710	0.0663	0.0000	0.1958	0.0014
3.3627	0.0715	0.0691	0.0000	0.1981	0.0016
3.4030	0.0720	0.0720	0.0000	0.2005	0.0017
3.4433	0.0725	0.0749	0.0000	0.2029	0.0019
3.4836	0.0731	0.0779	0.0000	0.2053	0.0020
3.5239	0.0736	0.0808	0.0000	0.2076	0.0022
3.5642	0.0741	0.0838	0.0000	0.2100	0.0024
3.6045	0.0746	0.0868	0.0000	0.2124	0.0025
3.6447	0.0752	0.0898	0.0000	0.2148	0.0026
3.6670	0.0755	0.0915	0.0000	0.2161	0.0019

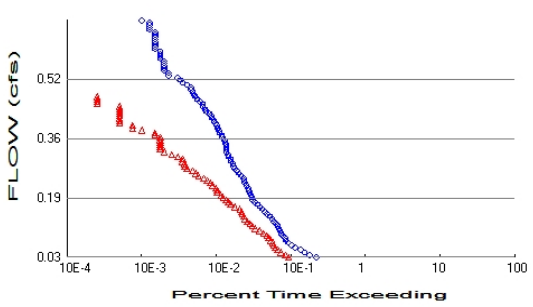
Surface 14 Trees

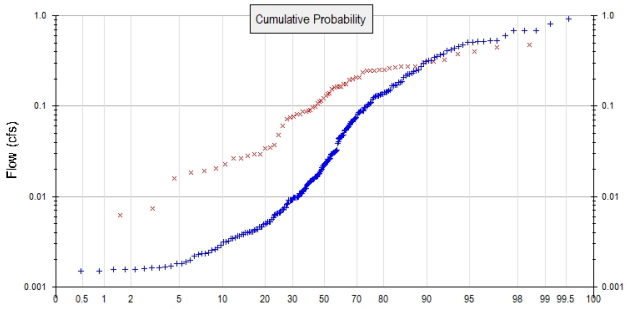
Element Flows To:

Outlet 1	Outlet 2
	14 Trees

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.687
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.269
Total Impervious Area: 0.418

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.316886
5 year	0.517955
10 year	0.683393
25 year	0.813753

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.175672
5 year	0.274099
10 year	0.342544
25 year	0.450541

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0317	868	370	42	Pass
0.0383	704	334	47	Pass
0.0449	602	292	48	Pass
0.0514	530	264	49	Pass
0.0580	455	243	53	Pass
0.0646	406	233	57	Pass
0.0712	369	226	61	Pass
0.0778	345	211	61	Pass
0.0844	330	201	60	Pass
0.0909	309	188	60	Pass
0.0975	294	171	58	Pass
0.1041	283	151	53	Pass
0.1107	274	132	48	Pass
0.1173	265	120	45	Pass
0.1238	253	112	44	Pass
0.1304	233	103	44	Pass
0.1370	221	97	43	Pass
0.1436	208	92	44	Pass
0.1502	190	88	46	Pass
0.1568	179	86	48	Pass
0.1633	166	82	49	Pass
0.1699	155	70	45	Pass
0.1765	142	62	43	Pass
0.1831	130	58	44	Pass
0.1897	121	54	44	Pass
0.1963	119	49	41	Pass
0.2028	115	46	40	Pass
0.2094	111	41	36	Pass
0.2160	107	41	38	Pass
0.2226	105	39	37	Pass
0.2292	100	35	35	Pass
0.2358	96	33	34	Pass
0.2423	94	30	31	Pass
0.2489	91	27	29	Pass
0.2555	86	23	26	Pass
0.2621	81	21	25	Pass
0.2687	75	19	25	Pass
0.2753	70	16	22	Pass
0.2818	68	15	22	Pass
0.2884	66	15	22	Pass
0.2950	63	14	22	Pass
0.3016	62	14	22	Pass
0.3082	58	12	20	Pass
0.3148	57	10	17	Pass
0.3213	54	8	14	Pass
0.3279	54	7	12	Pass
0.3345	54	7	12	Pass
0.3411	54	7	12	Pass
0.3477	52	7	13	Pass
0.3542	51	7	13	Pass
0.3608	48	7	14	Pass
0.3674	47	6	12	Pass
0.3740	44	6	13	Pass

0.3806	43	4	9	Pass
0.3872	42	3	7	Pass
0.3937	40	3	7	Pass
0.4003	39	2	5	Pass
0.4069	37	2	5	Pass
0.4135	35	2	5	Pass
0.4201	34	2	5	Pass
0.4267	32	2	6	Pass
0.4332	29	2	6	Pass
0.4398	28	2	7	Pass
0.4464	26	2	7	Pass
0.4530	26	1	3	Pass
0.4596	24	1	4	Pass
0.4662	22	1	4	Pass
0.4727	21	1	4	Pass
0.4793	20	0	0	Pass
0.4859	19	0	0	Pass
0.4925	18	0	0	Pass
0.4991	18	0	0	Pass
0.5057	16	0	0	Pass
0.5122	14	0	0	Pass
0.5188	13	0	0	Pass
0.5254	12	0	0	Pass
0.5320	9	0	0	Pass
0.5386	9	0	0	Pass
0.5452	8	0	0	Pass
0.5517	8	0	0	Pass
0.5583	8	0	0	Pass
0.5649	8	0	0	Pass
0.5715	8	0	0	Pass
0.5781	7	0	0	Pass
0.5846	7	0	0	Pass
0.5912	7	0	0	Pass
0.5978	7	0	0	Pass
0.6044	6	0	0	Pass
0.6110	6	0	0	Pass
0.6176	6	0	0	Pass
0.6241	6	0	0	Pass
0.6307	6	0	0	Pass
0.6373	6	0	0	Pass
0.6439	6	0	0	Pass
0.6505	6	0	0	Pass
0.6571	5	0	0	Pass
0.6636	5	0	0	Pass
0.6702	5	0	0	Pass
0.6768	5	0	0	Pass
0.6834	4	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

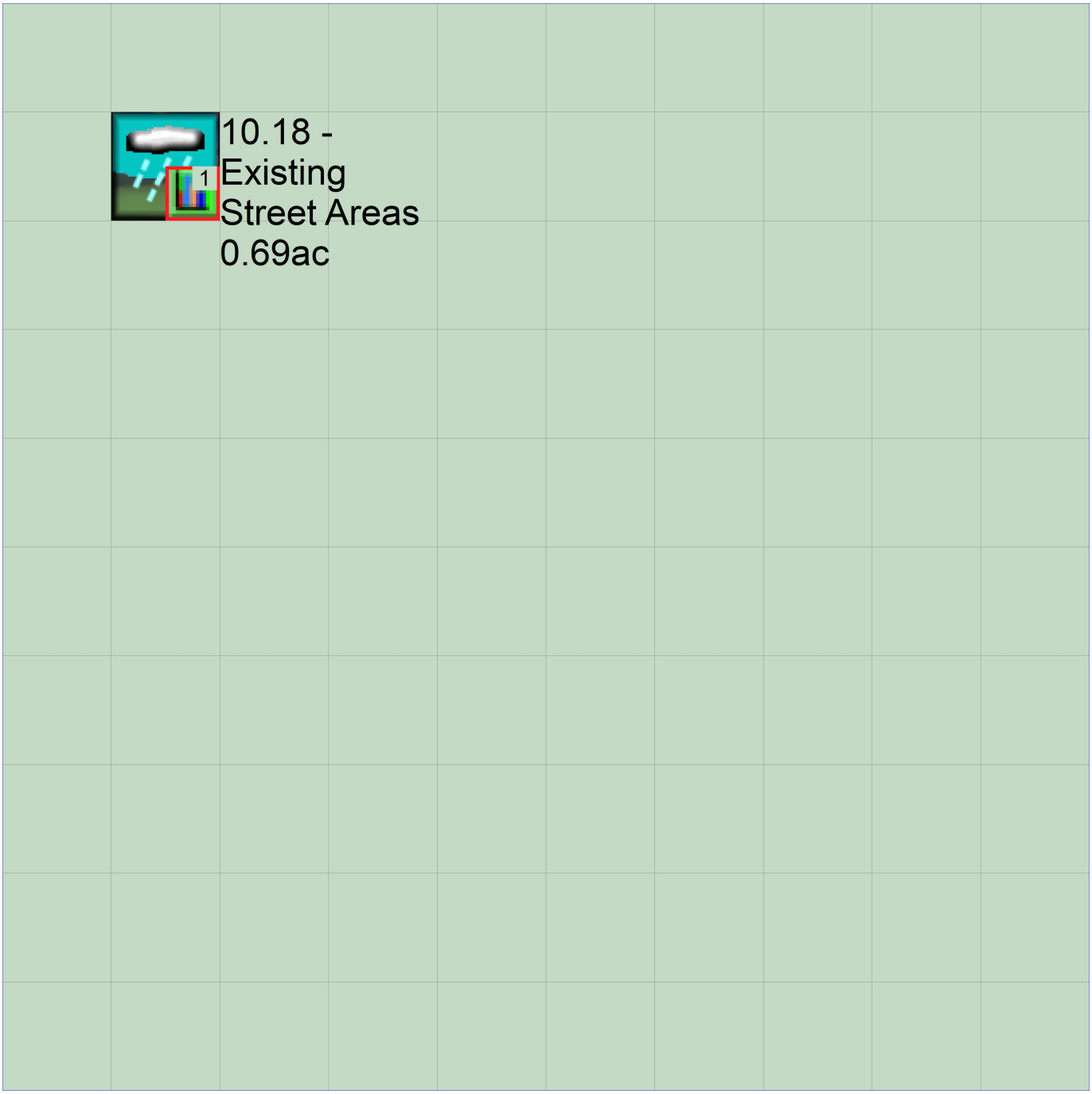
PERLND Changes

No PERLND changes have been made.

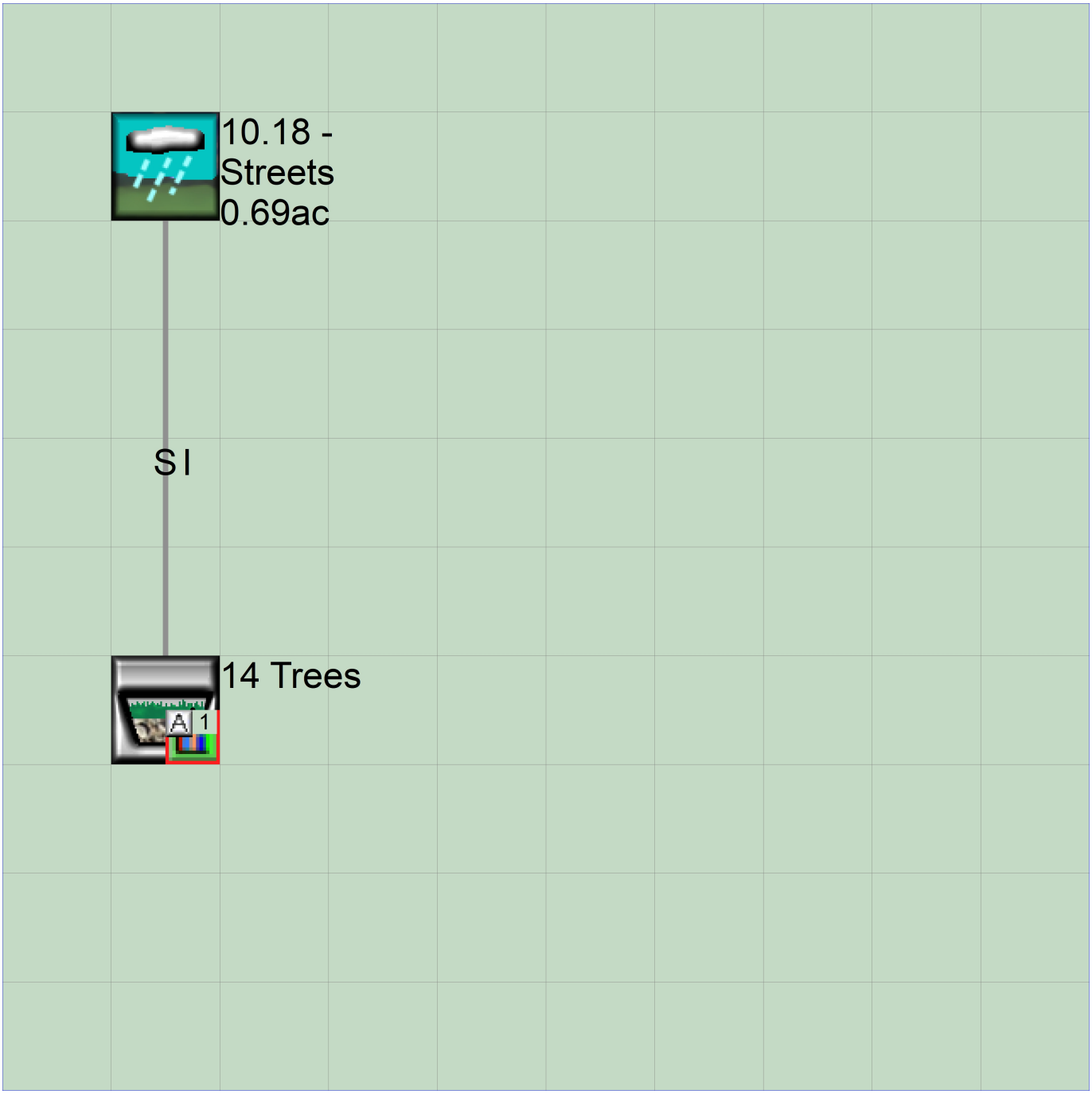
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.21 Streets-rev.wdm
MESSU       25   Mit4201-SDHM-10.21 Streets-rev.MES
            27   Mit4201-SDHM-10.21 Streets-rev.L61
            28   Mit4201-SDHM-10.21 Streets-rev.L62
            30   POC4201-SDHM-10.21 Streets-rev1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface 14 Trees            MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.18 - Streets***
PERLND   2                       0.269     RCHRES   1      2
PERLND   2                       0.269     RCHRES   1      3
IMPLND   2                       0.418     RCHRES   1      5

******Routing******
RCHRES   1                           1     RCHRES   2      8
PERLND   2                       0.269     COPY     1     12
IMPLND   2                       0.418     COPY     1     15
PERLND   2                       0.269     COPY     1     13
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface 14 Trees-017    3    1    1    1   28    0    1
    2     14 Trees                2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR      KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.02       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  1991.6
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   76    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

0.000000	0.066850	0.000000	0.000000	0.000000
0.040297	0.066622	0.000391	0.000000	0.000000
0.080593	0.066112	0.000787	0.000000	0.000000
0.120890	0.065604	0.001189	0.000000	0.000000
0.161187	0.065097	0.001595	0.000000	0.000000
0.201484	0.064591	0.002007	0.000000	0.000000
0.241780	0.064086	0.002424	0.000000	0.000000
0.282077	0.063583	0.002846	0.000000	0.000000
0.322374	0.063080	0.003273	0.000000	0.000000
0.362670	0.062579	0.003705	0.000000	0.001082
0.402967	0.062079	0.004143	0.000000	0.001384
0.443264	0.061580	0.004586	0.000000	0.001741
0.483560	0.061083	0.005034	0.000000	0.002160
0.523857	0.060586	0.005487	0.000000	0.002645
0.564154	0.060091	0.005946	0.000000	0.003201
0.604451	0.059597	0.006410	0.000000	0.003834
0.644747	0.059104	0.006879	0.000000	0.004548
0.685044	0.058613	0.007354	0.000000	0.005349
0.725341	0.058122	0.007834	0.000000	0.006241
0.765637	0.057633	0.008319	0.000000	0.007230
0.805934	0.057145	0.008810	0.000000	0.008321
0.846231	0.056658	0.009306	0.000000	0.009519
0.886527	0.056172	0.009808	0.000000	0.010830
0.926824	0.055688	0.010314	0.000000	0.012258
0.967121	0.055205	0.010827	0.000000	0.012889
1.007418	0.054723	0.011345	0.000000	0.013025
1.047714	0.054242	0.011868	0.000000	0.013162
1.088011	0.053762	0.012397	0.000000	0.013299
1.128308	0.053284	0.012931	0.000000	0.013437
1.168604	0.052806	0.013471	0.000000	0.013575
1.208901	0.052330	0.014016	0.000000	0.013713
1.249198	0.051855	0.014567	0.000000	0.013851
1.289495	0.051381	0.015123	0.000000	0.013990
1.329791	0.050909	0.015685	0.000000	0.014130
1.370088	0.050438	0.016252	0.000000	0.014269
1.410385	0.049967	0.016825	0.000000	0.014409
1.450681	0.049498	0.017404	0.000000	0.014550
1.490978	0.049031	0.017988	0.000000	0.014691
1.531275	0.048564	0.018578	0.000000	0.014832
1.571571	0.048099	0.019174	0.000000	0.014973
1.611868	0.047635	0.019775	0.000000	0.015115
1.652165	0.047172	0.020382	0.000000	0.015257
1.692462	0.046710	0.020994	0.000000	0.015400
1.732758	0.046249	0.021613	0.000000	0.015543
1.773055	0.045790	0.022237	0.000000	0.015686
1.813352	0.045332	0.022867	0.000000	0.015830
1.853648	0.044875	0.023502	0.000000	0.015974
1.893945	0.044419	0.024143	0.000000	0.016118
1.934242	0.043964	0.024790	0.000000	0.016263
1.974538	0.043511	0.025443	0.000000	0.016408
2.014835	0.043058	0.026102	0.000000	0.016554
2.055132	0.042607	0.026766	0.000000	0.016699
2.095429	0.042157	0.027437	0.000000	0.016846
2.135725	0.041709	0.028113	0.000000	0.016992
2.176022	0.041261	0.028795	0.000000	0.017139
2.216319	0.040815	0.029483	0.000000	0.017286
2.256615	0.040370	0.030176	0.000000	0.017434
2.296912	0.039926	0.030876	0.000000	0.017582
2.337209	0.039483	0.031582	0.000000	0.017730
2.377505	0.039042	0.032293	0.000000	0.017879
2.417802	0.038601	0.033011	0.000000	0.018028
2.458099	0.038162	0.033734	0.000000	0.018178
2.498396	0.037724	0.034464	0.000000	0.018327
2.538692	0.037288	0.035199	0.000000	0.018478
2.578989	0.036852	0.035940	0.000000	0.018628
2.619286	0.036418	0.036688	0.000000	0.018779
2.659582	0.035984	0.037441	0.000000	0.018930
2.699879	0.035552	0.038201	0.000000	0.019082
2.740176	0.035122	0.038967	0.000000	0.019234
2.780473	0.034692	0.039738	0.000000	0.019386

```
  2.820769  0.034264  0.040516  0.000000  0.019539
  2.861066  0.033836  0.041300  0.000000  0.019692
  2.901363  0.033410  0.042090  0.000000  0.019845
  2.941659  0.032986  0.042886  0.000000  0.019999
  2.981956  0.032562  0.043688  0.000000  0.020153
  3.000000  0.032140  0.045721  0.000000  0.020222
  END FTABLE  2
  FTABLE      1
   18    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.032140  0.000000  0.000000  0.000000  0.000155
  0.040297  0.067362  0.002704  0.000000  0.179142  0.000155
  0.080593  0.067874  0.005429  0.000000  0.181517  0.000310
  0.120890  0.068388  0.008174  0.000000  0.183891  0.000465
  0.161187  0.068902  0.010941  0.000000  0.186265  0.000621
  0.201484  0.069418  0.013727  0.339944  0.188640  0.000777
  0.241780  0.069936  0.016535  1.085151  0.191014  0.000933
  0.282077  0.070454  0.019364  2.070808  0.193389  0.001090
  0.322374  0.070974  0.022213  3.247767  0.195763  0.001247
  0.362670  0.071494  0.025084  4.588471  0.198137  0.001405
  0.402967  0.072016  0.027975  6.074441  0.200512  0.001563
  0.443264  0.072540  0.030888  7.691989  0.202886  0.001721
  0.483560  0.073064  0.033822  9.430269  0.205260  0.001880
  0.523857  0.073590  0.036776  11.28024  0.207635  0.002039
  0.564154  0.074116  0.039752  13.23405  0.210009  0.002198
  0.604451  0.074644  0.042750  15.28467  0.212384  0.002358
  0.644747  0.075173  0.045768  17.42562  0.214758  0.002518
  0.667000  0.075466  0.047444  19.65077  0.216069  0.002606
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

IMP 10.22

General Model Information

Project Name:	4201-SDHM-10.22 Streets
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	11/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/09/03

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

10.22 - Existing Street Areas

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Moderate	3.26
Pervious Total	3.26
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.26

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

10.22 - Streets

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	1.36
Pervious Total	1.36

Impervious Land Use	acre
IMPERVIOUS-MOD	1.9
Impervious Total	1.9
Basin Total	3.26

Element Flows To:

Surface	Interflow	Groundwater
Surface ation 10.22	Surface ation 10.22	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 10.22

Bottom Length:	58.00 ft.
Bottom Width:	120.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	93.761
Total Volume Through Riser (ac-ft.):	3.773
Total Volume Through Facility (ac-ft.):	116.215
Percent Infiltrated:	80.68
Total Precip Applied to Facility:	9.572
Total Evap From Facility:	7.838
Underdrain used	
Underdrain Diameter (feet):	0.33
Orifice Diameter (in.):	1.3
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	18.681
Total Outflow (ac-ft.):	116.215
Percent Through Underdrain:	16.07
Discharge Structure	
Riser Height:	3 ft.
Riser Diameter:	16 in.
Orifice 1 Diameter:	2 in. Elevation:1.5 ft.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
762.25	0.2335	0.0000	0.0000	0.0000
762.34	0.2327	0.0041	0.0000	0.0000
762.42	0.2303	0.0083	0.0000	0.0000
762.51	0.2278	0.0125	0.0000	0.0000
762.59	0.2254	0.0168	0.0000	0.0000
762.68	0.2229	0.0211	0.0000	0.0160
762.76	0.2205	0.0255	0.0000	0.0282
762.85	0.2181	0.0299	0.0000	0.0365
762.93	0.2157	0.0344	0.0000	0.0535
763.02	0.2133	0.0389	0.0000	0.0542
763.10	0.2110	0.0435	0.0000	0.0548
763.19	0.2086	0.0482	0.0000	0.0555
763.27	0.2063	0.0529	0.0000	0.0562
763.36	0.2039	0.0577	0.0000	0.0569
763.44	0.2016	0.0625	0.0000	0.0575
763.53	0.1993	0.0674	0.0025	0.0582
763.61	0.1970	0.0724	0.0037	0.0589
763.70	0.1947	0.0774	0.0072	0.0596

763.78	0.1924	0.0824	0.0090	0.0603
763.87	0.1902	0.0875	0.0117	0.0610
763.95	0.1879	0.0927	0.0130	0.0617
764.04	0.1857	0.1000	0.0151	0.0624
764.12	0.1835	0.1073	0.0162	0.0631
764.21	0.1813	0.1147	0.0180	0.0638
764.29	0.1791	0.1222	0.0188	0.0645
764.38	0.1769	0.1298	0.0194	0.0653
764.46	0.1747	0.1375	0.0197	0.0660
764.55	0.1725	0.1452	0.0217	0.0667
764.63	0.1704	0.1531	0.0245	0.0674
764.72	0.1682	0.1610	0.0274	0.0682
764.80	0.1661	0.1690	0.0304	0.0689
764.89	0.1640	0.1771	0.0331	0.0697
764.98	0.1619	0.1853	0.0358	0.0704
765.00	0.1598	0.1877	0.0725	0.0706

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.2335	0.1877	0.0000	0.9856	0.0008
2.8352	0.2359	0.2076	0.0000	0.9856	0.0015
2.9203	0.2384	0.2278	0.0000	1.0313	0.0023
3.0055	0.2409	0.2483	0.0000	1.0770	0.0030
3.0907	0.2435	0.2689	0.0000	1.1228	0.0038
3.1758	0.2460	0.2897	0.0000	1.1685	0.0046
3.2610	0.2485	0.3108	0.0000	1.2142	0.0053
3.3462	0.2511	0.3321	0.0000	1.2600	0.0061
3.4313	0.2536	0.3535	0.0000	1.3057	0.0069
3.5165	0.2562	0.3753	0.0000	1.3514	0.0077
3.6016	0.2588	0.3972	0.0000	1.3972	0.0085
3.6868	0.2614	0.4193	0.0000	1.4429	0.0092
3.7720	0.2640	0.4417	0.0000	1.4887	0.0100
3.8571	0.2666	0.4643	0.0000	1.5344	0.0108
3.9423	0.2693	0.4871	0.0000	1.5801	0.0116
4.0275	0.2719	0.5102	0.0000	1.6259	0.0124
4.1126	0.2746	0.5335	0.0000	1.6716	0.0133
4.1978	0.2773	0.5569	0.0000	1.7173	0.0141
4.2830	0.2799	0.5807	0.0197	1.7631	0.0149
4.3681	0.2826	0.6046	0.0373	1.8088	0.0157
4.4533	0.2854	0.6288	0.0489	1.8545	0.0165
4.5385	0.2881	0.6532	0.0583	1.9003	0.0173
4.6236	0.2908	0.6779	0.0663	1.9460	0.0182
4.7088	0.2936	0.7028	0.0735	1.9918	0.0190
4.7940	0.2963	0.7279	0.0801	2.0375	0.0199
4.8791	0.2991	0.7532	0.0861	2.0832	0.0207
4.9643	0.3019	0.7788	0.0917	2.1290	0.0215
5.0495	0.3047	0.8047	0.0971	2.1747	0.0224
5.1346	0.3075	0.8307	0.1021	2.2204	0.0232
5.2198	0.3103	0.8570	0.1069	2.2662	0.0241
5.3049	0.3131	0.8836	0.1115	2.3119	0.0250
5.3901	0.3159	0.9104	0.1159	2.3577	0.0258
5.4753	0.3188	0.9374	0.1202	2.4034	0.0267
5.5604	0.3217	0.9647	0.1243	2.4491	0.0276
5.6456	0.3245	0.9922	0.1282	2.4949	0.0284
5.7308	0.3274	1.0199	0.1321	2.5406	0.0293
5.8159	0.3303	1.0480	0.3751	2.5863	0.0302
5.9011	0.3332	1.0762	0.9634	2.6321	0.0311
5.9863	0.3362	1.1047	1.7179	2.6778	0.0320

6.0714	0.3391	1.1335	2.5335	2.7235	0.0329
6.1566	0.3421	1.1625	3.3045	2.7693	0.0337
6.2418	0.3450	1.1917	3.9374	2.8150	0.0346
6.3269	0.3480	1.2212	4.3818	2.8608	0.0355
6.4121	0.3510	1.2510	4.6694	2.9065	0.0365
6.4973	0.3540	1.2810	5.0030	2.9522	0.0374
6.5824	0.3570	1.3113	5.2744	2.9980	0.0383
6.6676	0.3600	1.3418	5.5324	3.0437	0.0392
6.7527	0.3630	1.3726	5.7788	3.0894	0.0401
6.8379	0.3661	1.4037	6.0149	3.1352	0.0410
6.9231	0.3691	1.4350	6.2420	3.1809	0.0420
7.0082	0.3722	1.4665	6.4611	3.2267	0.0429
7.0934	0.3753	1.4984	6.6730	3.2724	0.0438
7.1786	0.3784	1.5305	6.8783	3.3181	0.0448
7.2637	0.3815	1.5628	7.0775	3.3639	0.0457
7.3489	0.3846	1.5954	7.2713	3.4096	0.0467
7.4341	0.3877	1.6283	7.4600	3.4553	0.0476
7.5192	0.3909	1.6615	7.6441	3.5011	0.0486
7.6044	0.3940	1.6949	7.8238	3.5468	0.0495
7.6896	0.3972	1.7286	7.9994	3.5925	0.0502
7.7500	0.3994	1.7527	8.1713	3.6250	0.0021

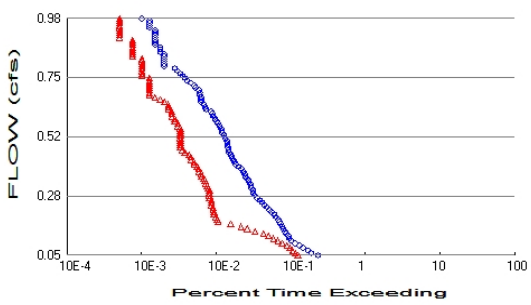
Surface ation 10.22

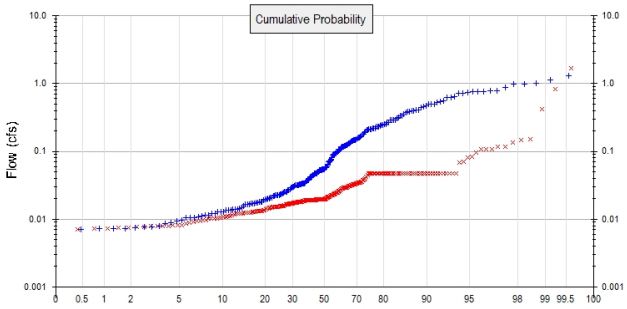
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 10.22

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.26
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.36
Total Impervious Area: 1.9

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.501416
5 year	0.765374
10 year	0.983553
25 year	1.160444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.047369
5 year	0.108518
10 year	0.149385
25 year	0.904884

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0501	909	492	54	Pass
0.0596	746	454	60	Pass
0.0690	668	419	62	Pass
0.0784	576	382	66	Pass
0.0879	523	350	66	Pass
0.0973	449	302	67	Pass
0.1067	401	266	66	Pass
0.1161	378	231	61	Pass
0.1256	362	197	54	Pass
0.1350	344	170	49	Pass
0.1444	332	130	39	Pass
0.1539	314	104	33	Pass
0.1633	302	85	28	Pass
0.1727	289	62	21	Pass
0.1821	278	42	15	Pass
0.1916	267	41	15	Pass
0.2010	251	39	15	Pass
0.2104	237	37	15	Pass
0.2199	220	37	16	Pass
0.2293	205	36	17	Pass
0.2387	191	36	18	Pass
0.2481	175	34	19	Pass
0.2576	162	34	20	Pass
0.2670	151	34	22	Pass
0.2764	139	32	23	Pass
0.2859	131	32	24	Pass
0.2953	123	32	26	Pass
0.3047	123	32	26	Pass
0.3141	117	31	26	Pass
0.3236	115	30	26	Pass
0.3330	112	29	25	Pass
0.3424	107	28	26	Pass
0.3519	101	27	26	Pass
0.3613	97	25	25	Pass
0.3707	96	25	26	Pass
0.3801	92	23	25	Pass
0.3896	86	23	26	Pass
0.3990	79	22	27	Pass
0.4084	72	20	27	Pass
0.4178	70	20	28	Pass
0.4273	67	18	26	Pass
0.4367	64	18	28	Pass
0.4461	62	17	27	Pass
0.4556	59	15	25	Pass
0.4650	58	14	24	Pass
0.4744	57	13	22	Pass
0.4838	56	13	23	Pass
0.4933	56	13	23	Pass
0.5027	55	13	23	Pass
0.5121	52	13	25	Pass
0.5216	50	13	26	Pass
0.5310	48	13	27	Pass
0.5404	47	13	27	Pass

0.5498	46	13	28	Pass
0.5593	44	12	27	Pass
0.5687	42	12	28	Pass
0.5781	40	11	27	Pass
0.5876	38	11	28	Pass
0.5970	36	10	27	Pass
0.6064	35	10	28	Pass
0.6158	34	10	29	Pass
0.6253	29	9	31	Pass
0.6347	28	9	32	Pass
0.6441	27	9	33	Pass
0.6536	25	8	32	Pass
0.6630	25	7	28	Pass
0.6724	25	6	24	Pass
0.6818	24	5	20	Pass
0.6913	24	5	20	Pass
0.7007	23	5	21	Pass
0.7101	21	5	23	Pass
0.7196	20	5	25	Pass
0.7290	18	5	27	Pass
0.7384	16	5	31	Pass
0.7478	15	5	33	Pass
0.7573	14	4	28	Pass
0.7667	13	4	30	Pass
0.7761	12	4	33	Pass
0.7856	11	4	36	Pass
0.7950	8	4	50	Pass
0.8044	8	4	50	Pass
0.8138	8	4	50	Pass
0.8233	8	4	50	Pass
0.8327	8	3	37	Pass
0.8421	8	3	37	Pass
0.8516	7	3	42	Pass
0.8610	7	3	42	Pass
0.8704	7	3	42	Pass
0.8798	6	3	50	Pass
0.8893	6	3	50	Pass
0.8987	6	3	50	Pass
0.9081	6	2	33	Pass
0.9176	6	2	33	Pass
0.9270	6	2	33	Pass
0.9364	6	2	33	Pass
0.9458	5	2	40	Pass
0.9553	5	2	40	Pass
0.9647	5	2	40	Pass
0.9741	5	2	40	Pass
0.9836	4	2	50	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

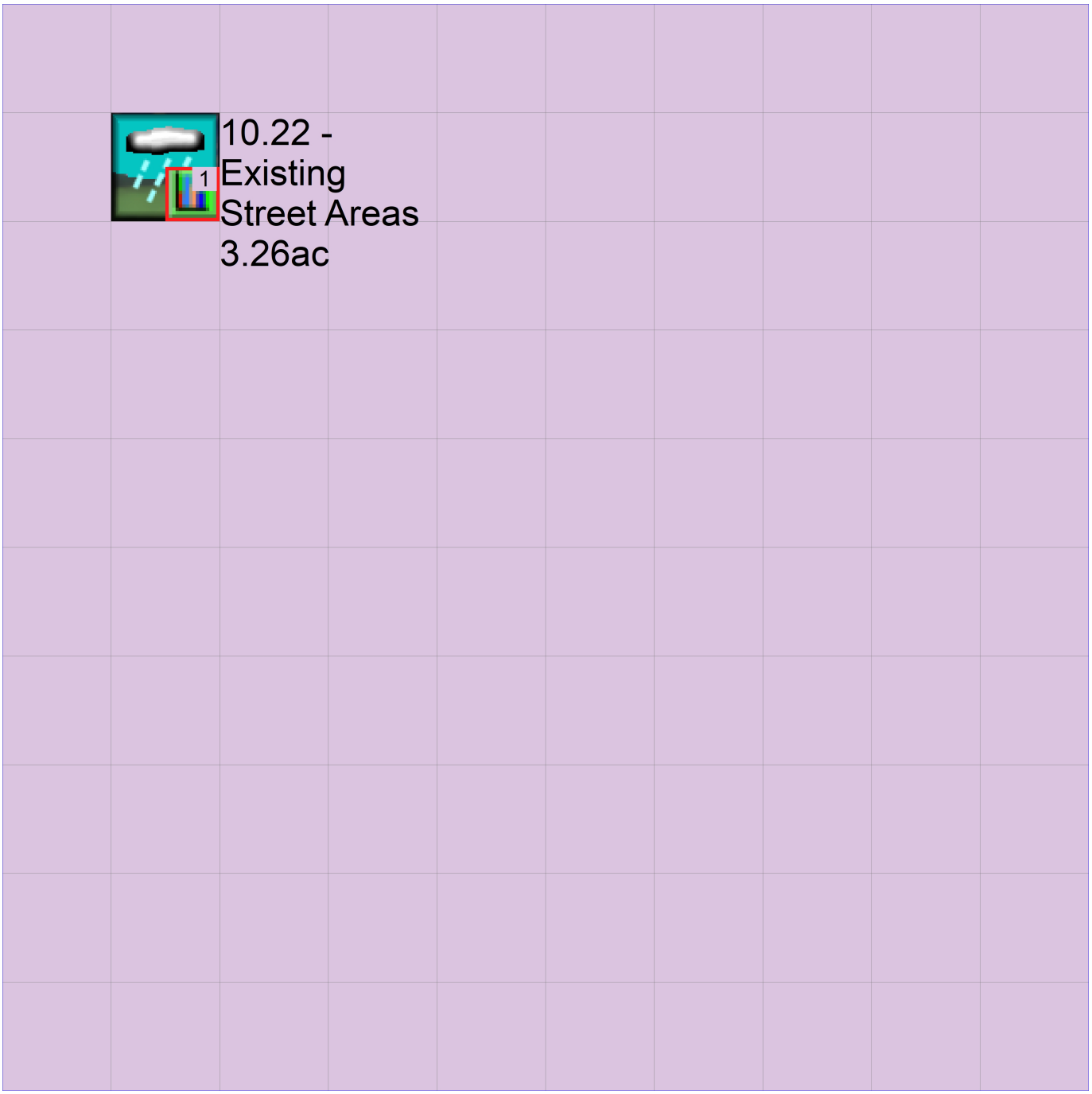
PERLND Changes

No PERLND changes have been made.

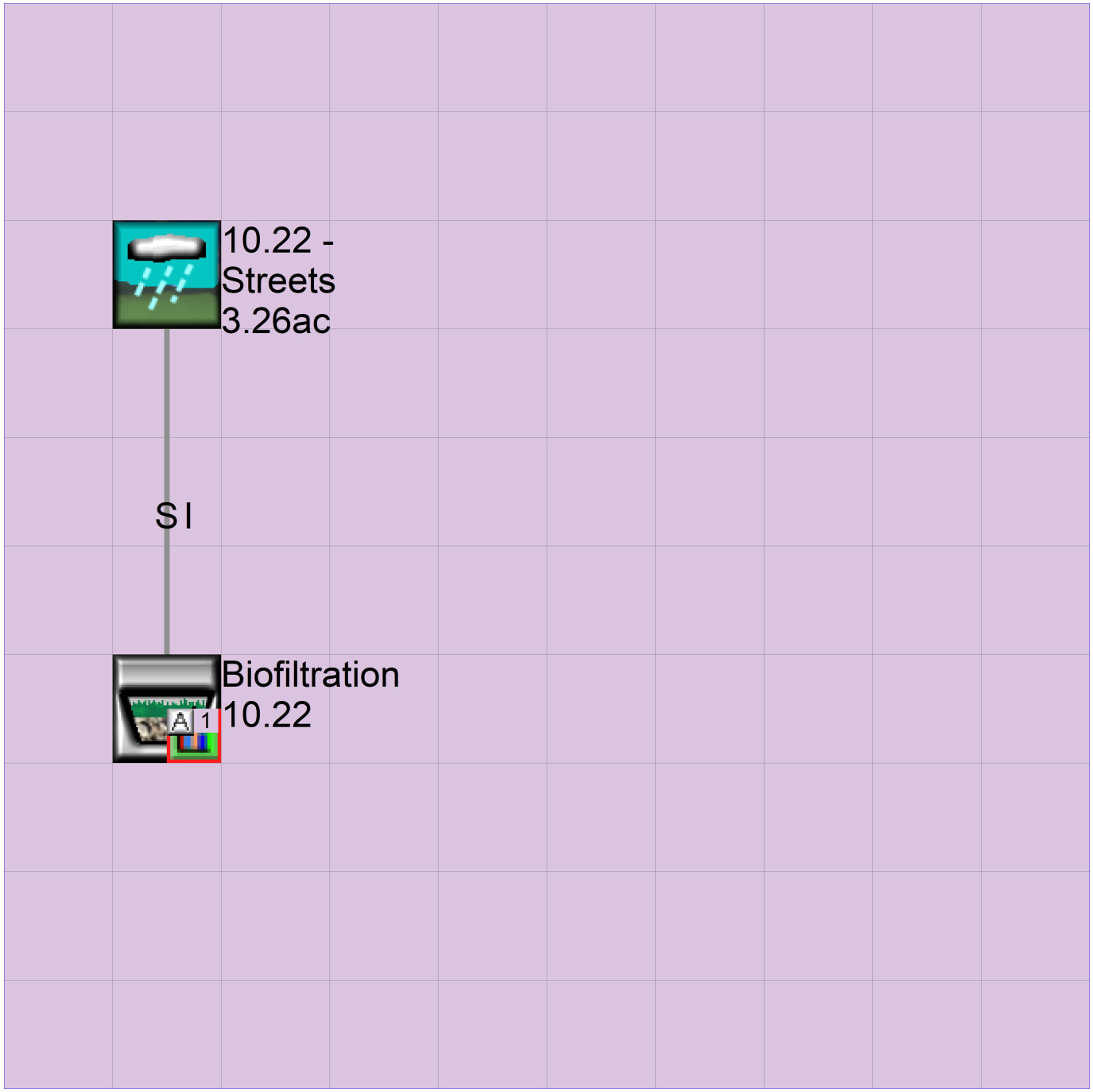
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-10.22 Streets.wdm
MESSU       25   Mit4201-SDHM-10.22 Streets.MES
            27   Mit4201-SDHM-10.22 Streets.L61
            28   Mit4201-SDHM-10.22 Streets.L62
            30   POC4201-SDHM-10.22 Streets1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       2
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface ation  10.22        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    2      A,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    2         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    2         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    2         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    2              0       3.8      0.07        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    2              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    2              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    2       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    2              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    2      IMPERVIOUS-MOD         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2           100       0.1     0.011      0.08
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
10.22 - Streets***
PERLND   2                       1.36     RCHRES   1      2
PERLND   2                       1.36     RCHRES   1      3
IMPLND   2                        1.9     RCHRES   1      5

******Routing******
RCHRES   1                          1     RCHRES   2      8
PERLND   2                       1.36     COPY     1     12
IMPLND   2                        1.9     COPY     1     15
PERLND   2                       1.36     COPY     1     13
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface ation  1-017    3    1    1    1   28    0    1
    2     Biofiltration  1-016    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0    762.25       0.0       0.0
    2              2      0.01       0.0    762.25       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1           0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  8689.61
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   34    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.233454  0.000000  0.000000  0.000000
  0.085165  0.232736  0.004109  0.000000  0.000000
  0.170330  0.230270  0.008272  0.000000  0.000000
  0.255495  0.227816  0.012488  0.000000  0.000000
  0.340659  0.225375  0.016759  0.000000  0.000000
  0.425824  0.222945  0.021085  0.000000  0.015954
  0.510989  0.220527  0.025465  0.000000  0.028245
  0.596154  0.218121  0.029901  0.000000  0.036521
  0.681319  0.215728  0.034392  0.000000  0.053502
  0.766484  0.213346  0.038939  0.000000  0.054165
  0.851648  0.210976  0.043542  0.000000  0.054831
  0.936813  0.208618  0.048201  0.000000  0.055501
  1.021978  0.206272  0.052917  0.000000  0.056174
  1.107143  0.203939  0.057690  0.000000  0.056851
  1.192308  0.201617  0.062521  0.000000  0.057532
  1.277473  0.199307  0.067409  0.002476  0.058216
  1.362637  0.197009  0.072355  0.003714  0.058904
  1.447802  0.194723  0.077359  0.007234  0.059595
  1.532967  0.192449  0.082422  0.008994  0.060290
  1.618132  0.190187  0.087543  0.011685  0.060989
  1.703297  0.187937  0.092724  0.013030  0.061691
  1.788462  0.185700  0.099973  0.015140  0.062397
  1.873626  0.183474  0.107305  0.016195  0.063107
  1.958791  0.181260  0.114720  0.017951  0.063820
  2.043956  0.179058  0.122219  0.018830  0.064537
  2.129121  0.176868  0.129801  0.019416  0.065258
  2.214286  0.174690  0.137468  0.019710  0.065982
  2.299451  0.172524  0.145220  0.021700  0.066709
  2.384615  0.170370  0.153057  0.024477  0.067441
  2.469780  0.168228  0.160979  0.027441  0.068176
  2.554945  0.166098  0.168988  0.030353  0.068914
  2.640110  0.163980  0.177083  0.033133  0.069657
  2.725275  0.161874  0.185265  0.035783  0.070403
  2.750000  0.159780  0.199486  0.072513  0.070620
  END FTABLE  2
  FTABLE      1
   60    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.159780  0.000000  0.000000  0.000000  0.000751
  0.085165  0.235935  0.019988  0.000000  0.985552  0.000751
  0.170330  0.238428  0.040187  0.000000  1.031289  0.001505
  0.255495  0.240933  0.060600  0.000000  1.077026  0.002263
  0.340659  0.243450  0.081226  0.000000  1.122762  0.003024
  0.425824  0.245980  0.102067  0.000000  1.168499  0.003789
  0.510989  0.248521  0.123124  0.000000  1.214236  0.004558
  0.596154  0.251074  0.144398  0.000000  1.259973  0.005330
  0.681319  0.253639  0.165890  0.000000  1.305709  0.006106
  0.766484  0.256216  0.187601  0.000000  1.351446  0.006886
  0.851648  0.258805  0.209532  0.000000  1.397183  0.007669
  0.936813  0.261406  0.231683  0.000000  1.442919  0.008456
  1.021978  0.264019  0.254057  0.000000  1.488656  0.009246
  1.107143  0.266644  0.276654  0.000000  1.534393  0.010040
  1.192308  0.269281  0.299475  0.000000  1.580129  0.010838
  1.277473  0.271930  0.322521  0.000000  1.625866  0.011639
  1.362637  0.274591  0.345793  0.000000  1.671603  0.012444
  1.447802  0.277264  0.369293  0.000000  1.717340  0.013253
  1.532967  0.279949  0.393020  0.019709  1.763076  0.014065
  1.618132  0.282646  0.416977  0.037308  1.808813  0.014881
  1.703297  0.285355  0.441164  0.048942  1.854550  0.015700
  1.788462  0.288076  0.465582  0.058299  1.900286  0.016523
  1.873626  0.290809  0.490232  0.066349  1.946023  0.017350
  1.958791  0.293554  0.515116  0.073524  1.991760  0.018180
  2.043956  0.296311  0.540234  0.080057  2.037497  0.019014
  2.129121  0.299080  0.565587  0.086097  2.083233  0.019852
  2.214286  0.301861  0.591176  0.091739  2.128970  0.020693
  2.299451  0.304653  0.617003  0.097054  2.174707  0.021538
  2.384615  0.307458  0.643068  0.102093  2.220443  0.022386
```

```
  2.469780  0.310275  0.669373  0.106895  2.266180  0.023238
  2.554945  0.313104  0.695918  0.111489  2.311917  0.024094
  2.640110  0.315945  0.722704  0.115902  2.357653  0.024954
  2.725275  0.318798  0.749733  0.120153  2.403390  0.025816
  2.810440  0.321662  0.777006  0.124259  2.449127  0.026683
  2.895604  0.324539  0.804522  0.128233  2.494864  0.027553
  2.980769  0.327428  0.832285  0.132088  2.540600  0.028427
  3.065934  0.330329  0.860294  0.375064  2.586337  0.029305
  3.151099  0.333242  0.888550  0.963392  2.632074  0.030186
  3.236264  0.336166  0.917055  1.717882  2.677810  0.031071
  3.321429  0.339103  0.945810  2.533543  2.723547  0.031959
  3.406593  0.342052  0.974815  3.304456  2.769284  0.032851
  3.491758  0.345012  1.004072  3.937370  2.815021  0.033746
  3.576923  0.347985  1.033581  4.381789  2.860757  0.034646
  3.662088  0.350970  1.063344  4.669388  2.906494  0.035549
  3.747253  0.353966  1.093362  5.003005  2.952231  0.036455
  3.832418  0.356975  1.123636  5.274444  2.997967  0.037365
  3.917582  0.359996  1.154166  5.532415  3.043704  0.038279
  4.002747  0.363028  1.184954  5.778751  3.089441  0.039196
  4.087912  0.366073  1.216001  6.014903  3.135178  0.040117
  4.173077  0.369130  1.247308  6.242043  3.180914  0.041042
  4.258242  0.372198  1.278876  6.461134  3.226651  0.041970
  4.343407  0.375279  1.310705  6.672978  3.272388  0.042902
  4.428571  0.378371  1.342797  6.878252  3.318124  0.043838
  4.513736  0.381476  1.375153  7.077533  3.363861  0.044777
  4.598901  0.384593  1.407774  7.271321  3.409598  0.045719
  4.684066  0.387721  1.440661  7.460045  3.455334  0.046666
  4.769231  0.390862  1.473815  7.644086  3.501071  0.047616
  4.854396  0.394014  1.507237  7.823776  3.546808  0.048570
  4.939560  0.397179  1.540928  7.999410  3.592545  0.049527
  5.000000  0.399432  1.565002  8.171253  3.625003  0.050208
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO      1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       1 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   O       2 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE   1 1        1      WDM   1013 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE   1 1        1      WDM   1014 STAG     ENGL      REPL
RCHRES   1 HYDR   O       1 1        1      WDM   1015 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN    1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN    1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

LARGE LOT

General Model Information

Project Name:	4201-SDHM-LARGE LOT-PADS w-Dispersion trees
Site Name:	Shadow Run Ranch
Site Address:	14828 Adams Dr.
City:	Pauma Valley
Report Date:	12/20/2019
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/08/22

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

EXISTING - PAD GRADING

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Moderate	0.413
A,NatVeg,Steep	0.5
Pervious Total	0.913

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.913

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Pad Slopes

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,NatVeg,Steep	0.2
Pervious Total	0.2
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.2

Element Flows To:

Surface	Interflow	Groundwater
Pad Swale	Pad Swale	

Lateral Basin 0.366 PERV

Bypass: No

GroundWater: No

Pervious Land Use	acre
A,NatVeg,Flat	.366

Element Flows To:

Surface	Interflow	Groundwater
On Pad Hmod-Basin	On Pad Hmod-Basin	

Lateral I Basin .303 IMPERV

Bypass:	No
Impervious Land Use	acre
IMPERVIOUS-FLAT LAT	0.303

Element Flows To:

Outlet 1	Outlet 2
Lateral Basin 0.366 PERV	

Mitigated Routing

On Pad Hmod-Basin

Bottom Length: 20.00 ft.
Bottom Width: 20.00 ft.
Depth: 2 ft.
Volume at riser head: 0.0111 acre-feet.
Infiltration On
Infiltration rate: 0.3
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 4.695
Total Volume Through Riser (ac-ft.): 9.909
Total Volume Through Facility (ac-ft.): 14.604
Percent Infiltrated: 32.15
Total Precip Applied to Facility: 0.55
Total Evap From Facility: 0.084
Side slope 1: 2 To 1
Side slope 2: 2 To 1
Side slope 3: 2 To 1
Side slope 4: 2 To 1
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 6 in.
Orifice 2 Diameter: 1 in. Elevation:0.5 ft.
Element Flows To:
Outlet 1 Outlet 2
Surface 5 Tree Wells

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.009	0.000	0.000	0.000
0.0222	0.009	0.000	0.000	0.002
0.0444	0.009	0.000	0.000	0.002
0.0667	0.009	0.000	0.000	0.002
0.0889	0.009	0.000	0.000	0.002
0.1111	0.009	0.001	0.000	0.002
0.1333	0.009	0.001	0.000	0.002
0.1556	0.009	0.001	0.000	0.003
0.1778	0.009	0.001	0.000	0.003
0.2000	0.009	0.001	0.000	0.003
0.2222	0.010	0.002	0.000	0.003
0.2444	0.010	0.002	0.000	0.003
0.2667	0.010	0.002	0.000	0.003
0.2889	0.010	0.002	0.000	0.003
0.3111	0.010	0.003	0.000	0.003
0.3333	0.010	0.003	0.000	0.003
0.3556	0.010	0.003	0.000	0.003
0.3778	0.010	0.003	0.000	0.003
0.4000	0.010	0.004	0.000	0.003
0.4222	0.010	0.004	0.000	0.003
0.4444	0.010	0.004	0.000	0.003
0.4667	0.011	0.004	0.000	0.003
0.4889	0.011	0.004	0.000	0.003
0.5111	0.011	0.005	0.002	0.003
0.5333	0.011	0.005	0.005	0.003

0.5556	0.011	0.005	0.006	0.003
0.5778	0.011	0.005	0.007	0.003
0.6000	0.011	0.006	0.008	0.003
0.6222	0.011	0.006	0.009	0.003
0.6444	0.011	0.006	0.010	0.003
0.6667	0.011	0.007	0.011	0.003
0.6889	0.011	0.007	0.011	0.003
0.7111	0.012	0.007	0.012	0.003
0.7333	0.012	0.007	0.013	0.003
0.7556	0.012	0.008	0.013	0.003
0.7778	0.012	0.008	0.014	0.003
0.8000	0.012	0.008	0.014	0.003
0.8222	0.012	0.008	0.015	0.003
0.8444	0.012	0.009	0.015	0.003
0.8667	0.012	0.009	0.016	0.003
0.8889	0.012	0.009	0.016	0.003
0.9111	0.012	0.010	0.017	0.003
0.9333	0.012	0.010	0.017	0.003
0.9556	0.013	0.010	0.018	0.003
0.9778	0.013	0.010	0.018	0.004
1.0000	0.013	0.011	0.019	0.004
1.0222	0.013	0.011	0.037	0.004
1.0444	0.013	0.011	0.069	0.004
1.0667	0.013	0.012	0.110	0.004
1.0889	0.013	0.012	0.157	0.004
1.1111	0.013	0.012	0.206	0.004
1.1333	0.013	0.012	0.254	0.004
1.1556	0.013	0.013	0.299	0.004
1.1778	0.014	0.013	0.338	0.004
1.2000	0.014	0.013	0.369	0.004
1.2222	0.014	0.014	0.392	0.004
1.2444	0.014	0.014	0.409	0.004
1.2667	0.014	0.014	0.430	0.004
1.2889	0.014	0.015	0.447	0.004
1.3111	0.014	0.015	0.463	0.004
1.3333	0.014	0.015	0.479	0.004
1.3556	0.014	0.016	0.494	0.004
1.3778	0.014	0.016	0.509	0.004
1.4000	0.015	0.016	0.523	0.004
1.4222	0.015	0.017	0.537	0.004
1.4444	0.015	0.017	0.551	0.004
1.4667	0.015	0.017	0.564	0.004
1.4889	0.015	0.018	0.577	0.004
1.5111	0.015	0.018	0.590	0.004
1.5333	0.015	0.018	0.602	0.004
1.5556	0.015	0.019	0.614	0.004
1.5778	0.015	0.019	0.626	0.004
1.6000	0.016	0.019	0.638	0.004
1.6222	0.016	0.020	0.649	0.004
1.6444	0.016	0.020	0.661	0.004
1.6667	0.016	0.021	0.672	0.004
1.6889	0.016	0.021	0.683	0.005
1.7111	0.016	0.021	0.693	0.005
1.7333	0.016	0.022	0.704	0.005
1.7556	0.016	0.022	0.714	0.005
1.7778	0.016	0.022	0.725	0.005
1.8000	0.017	0.023	0.735	0.005
1.8222	0.017	0.023	0.745	0.005

1.8444	0.017	0.024	0.755	0.005
1.8667	0.017	0.024	0.764	0.005
1.8889	0.017	0.024	0.774	0.005
1.9111	0.017	0.025	0.783	0.005
1.9333	0.017	0.025	0.793	0.005
1.9556	0.017	0.025	0.802	0.005
1.9778	0.017	0.026	0.811	0.005
2.0000	0.018	0.026	0.820	0.005
2.0222	0.018	0.027	0.829	0.005

Pad Swale

Bottom Length:	50.00 ft.
Bottom Width:	1.00 ft.
Manning's n:	0.03
Channel bottom slope 1:	0.5 To 1
Channel Left side slope 0:	4 To 1
Channel right side slope 2:	4 To 1
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	0.061
Total Volume Through Riser (ac-ft.):	2.285
Total Volume Through Facility (ac-ft.):	2.346
Percent Infiltrated:	2.6
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	0 ft.
Riser Diameter:	0 in.
Element Flows To:	
Outlet 1	Outlet 2
On Pad Hmod-Basin	

Channel Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.001148	0.000000	0.000	0.000
0.0056	0.001199	0.000007	0.006	0.000
0.0111	0.001250	0.000013	0.019	0.000
0.0167	0.001301	0.000020	0.039	0.000
0.0222	0.001353	0.000028	0.063	0.000
0.0278	0.001404	0.000035	0.093	0.000
0.0333	0.001455	0.000043	0.127	0.000
0.0389	0.001506	0.000052	0.165	0.000
0.0444	0.001557	0.000060	0.208	0.000
0.0500	0.001609	0.000069	0.256	0.000
0.0556	0.001660	0.000078	0.308	0.000
0.0611	0.001711	0.000087	0.365	0.000
0.0667	0.001762	0.000097	0.426	0.000
0.0722	0.001814	0.000107	0.491	0.000
0.0778	0.001865	0.000117	0.561	0.000
0.0833	0.001916	0.000128	0.636	0.000
0.0889	0.001968	0.000138	0.715	0.000
0.0944	0.002019	0.000150	0.799	0.000
0.1000	0.002070	0.000161	0.887	0.000
0.1056	0.002122	0.000173	0.981	0.000
0.1111	0.002173	0.000184	1.079	0.000
0.1167	0.002224	0.000197	1.181	0.000
0.1222	0.002276	0.000209	1.289	0.000
0.1278	0.002327	0.000222	1.402	0.000
0.1333	0.002379	0.000235	1.519	0.000
0.1389	0.002430	0.000248	1.642	0.000
0.1444	0.002481	0.000262	1.770	0.000
0.1500	0.002533	0.000276	1.903	0.000
0.1556	0.002584	0.000290	2.041	0.000
0.1611	0.002636	0.000305	2.184	0.000

0.1667	0.002687	0.000319	2.333	0.000
0.1722	0.002739	0.000335	2.487	0.000
0.1778	0.002790	0.000350	2.647	0.000
0.1833	0.002842	0.000366	2.812	0.000
0.1889	0.002893	0.000381	2.983	0.000
0.1944	0.002945	0.000398	3.159	0.000
0.2000	0.002996	0.000414	3.341	0.000
0.2056	0.003048	0.000431	3.529	0.000
0.2111	0.003099	0.000448	3.723	0.000
0.2167	0.003151	0.000465	3.922	0.001
0.2222	0.003203	0.000483	4.128	0.001
0.2278	0.003254	0.000501	4.339	0.001
0.2333	0.003306	0.000519	4.557	0.001
0.2389	0.003357	0.000538	4.780	0.001
0.2444	0.003409	0.000557	5.010	0.001
0.2500	0.003461	0.000576	5.246	0.001
0.2556	0.003512	0.000595	5.488	0.001
0.2611	0.003564	0.000615	5.737	0.001
0.2667	0.003616	0.000635	5.992	0.001
0.2722	0.003667	0.000655	6.254	0.001
0.2778	0.003719	0.000675	6.522	0.001
0.2833	0.003771	0.000696	6.796	0.001
0.2889	0.003823	0.000717	7.077	0.001
0.2944	0.003874	0.000739	7.365	0.001
0.3000	0.003926	0.000760	7.660	0.001
0.3056	0.003978	0.000782	7.961	0.001
0.3111	0.004030	0.000804	8.270	0.001
0.3167	0.004081	0.000827	8.585	0.001
0.3222	0.004133	0.000850	8.907	0.001
0.3278	0.004185	0.000873	9.236	0.001
0.3333	0.004237	0.000896	9.573	0.001
0.3389	0.004289	0.000920	9.916	0.001
0.3444	0.004340	0.000944	10.26	0.001
0.3500	0.004392	0.000968	10.62	0.001
0.3556	0.004444	0.000993	10.99	0.001
0.3611	0.004496	0.001018	11.36	0.001
0.3667	0.004548	0.001043	11.74	0.001
0.3722	0.004600	0.001068	12.13	0.001
0.3778	0.004652	0.001094	12.52	0.001
0.3833	0.004704	0.001120	12.92	0.001
0.3889	0.004756	0.001146	13.33	0.001
0.3944	0.004808	0.001173	13.75	0.001
0.4000	0.004860	0.001200	14.18	0.001
0.4056	0.004911	0.001227	14.61	0.001
0.4111	0.004963	0.001254	15.05	0.001
0.4167	0.005015	0.001282	15.50	0.001
0.4222	0.005067	0.001310	15.96	0.001
0.4278	0.005119	0.001338	16.42	0.001
0.4333	0.005171	0.001367	16.90	0.001
0.4389	0.005223	0.001396	17.38	0.001
0.4444	0.005276	0.001425	17.87	0.001
0.4500	0.005328	0.001454	18.37	0.001
0.4556	0.005380	0.001484	18.87	0.001
0.4611	0.005432	0.001514	19.39	0.001
0.4667	0.005484	0.001544	19.91	0.001
0.4722	0.005536	0.001575	20.44	0.001
0.4778	0.005588	0.001606	20.98	0.001
0.4833	0.005640	0.001637	21.53	0.001

0.4889	0.005692	0.001668	22.08	0.001
0.4944	0.005744	0.001700	22.65	0.001
0.5000	0.005797	0.001732	23.22	0.001
0.5056	0.005849	0.001765	23.81	0.001

5 Tree Wells

Bottom Length:	20.00 ft.
Bottom Width:	25.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2.75
Material type for second layer:	ESM
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	4.966
Total Volume Through Riser (ac-ft.):	5.217
Total Volume Through Facility (ac-ft.):	10.183
Percent Infiltrated:	48.77
Total Precip Applied to Facility:	0.456
Total Evap From Facility:	0.183
Underdrain not used	
Discharge Structure	
Riser Height:	0.167 ft.
Riser Diameter:	60 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0272	0.0000	0.0000	0.0000
0.0403	0.0271	0.0001	0.0000	0.0000
0.0806	0.0268	0.0003	0.0000	0.0000
0.1209	0.0266	0.0004	0.0000	0.0000
0.1612	0.0263	0.0006	0.0000	0.0000
0.2015	0.0261	0.0007	0.0000	0.0000
0.2418	0.0258	0.0009	0.0000	0.0000
0.2821	0.0256	0.0010	0.0000	0.0000
0.3224	0.0253	0.0012	0.0000	0.0000
0.3627	0.0251	0.0013	0.0000	0.0004
0.4030	0.0248	0.0015	0.0000	0.0005
0.4433	0.0246	0.0017	0.0000	0.0006
0.4836	0.0243	0.0018	0.0000	0.0008
0.5239	0.0241	0.0020	0.0000	0.0010
0.5642	0.0239	0.0021	0.0000	0.0012
0.6045	0.0236	0.0023	0.0000	0.0014
0.6447	0.0234	0.0025	0.0000	0.0017
0.6850	0.0231	0.0027	0.0000	0.0020
0.7253	0.0229	0.0028	0.0000	0.0023
0.7656	0.0227	0.0030	0.0000	0.0027
0.8059	0.0224	0.0032	0.0000	0.0031
0.8462	0.0222	0.0034	0.0000	0.0035
0.8865	0.0220	0.0036	0.0000	0.0040
0.9268	0.0218	0.0038	0.0000	0.0045
0.9671	0.0215	0.0039	0.0000	0.0048
1.0074	0.0213	0.0041	0.0000	0.0048
1.0477	0.0211	0.0043	0.0000	0.0049

1.0880	0.0208	0.0045	0.0000	0.0050
1.1283	0.0206	0.0047	0.0000	0.0050
1.1686	0.0204	0.0049	0.0000	0.0051
1.2089	0.0202	0.0051	0.0000	0.0051
1.2492	0.0200	0.0053	0.0000	0.0052
1.2895	0.0197	0.0055	0.0000	0.0053
1.3298	0.0195	0.0058	0.0000	0.0053
1.3701	0.0193	0.0060	0.0000	0.0054
1.4104	0.0191	0.0062	0.0000	0.0055
1.4507	0.0189	0.0064	0.0000	0.0055
1.4910	0.0187	0.0066	0.0000	0.0056
1.5313	0.0185	0.0069	0.0000	0.0056
1.5716	0.0182	0.0071	0.0000	0.0057
1.6119	0.0180	0.0073	0.0000	0.0058
1.6522	0.0178	0.0075	0.0000	0.0058
1.6925	0.0176	0.0078	0.0000	0.0059
1.7328	0.0174	0.0080	0.0000	0.0060
1.7731	0.0172	0.0083	0.0000	0.0060
1.8134	0.0170	0.0085	0.0000	0.0061
1.8536	0.0168	0.0087	0.0000	0.0062
1.8939	0.0166	0.0090	0.0000	0.0062
1.9342	0.0164	0.0092	0.0000	0.0063
1.9745	0.0162	0.0095	0.0000	0.0064
2.0148	0.0160	0.0098	0.0000	0.0064
2.0551	0.0158	0.0100	0.0000	0.0065
2.0954	0.0156	0.0103	0.0000	0.0066
2.1357	0.0154	0.0105	0.0000	0.0066
2.1760	0.0152	0.0108	0.0000	0.0067
2.2163	0.0150	0.0111	0.0000	0.0068
2.2566	0.0149	0.0113	0.0000	0.0069
2.2969	0.0147	0.0116	0.0000	0.0069
2.3372	0.0145	0.0119	0.0000	0.0070
2.3775	0.0143	0.0122	0.0000	0.0071
2.4178	0.0141	0.0125	0.0000	0.0071
2.4581	0.0139	0.0128	0.0000	0.0072
2.4984	0.0137	0.0130	0.0000	0.0073
2.5387	0.0136	0.0133	0.0000	0.0074
2.5790	0.0134	0.0136	0.0000	0.0074
2.6193	0.0132	0.0139	0.0000	0.0075
2.6596	0.0130	0.0142	0.0000	0.0076
2.6999	0.0128	0.0145	0.0000	0.0077
2.7402	0.0127	0.0148	0.0000	0.0077
2.7805	0.0125	0.0152	0.0000	0.0078
2.8208	0.0123	0.0155	0.0000	0.0079
2.8611	0.0122	0.0158	0.0000	0.0080
2.9014	0.0120	0.0161	0.0000	0.0080
2.9417	0.0118	0.0164	0.0000	0.0081
2.9820	0.0116	0.0168	0.0000	0.0082
3.0000	0.0115	0.0169	0.0000	0.0082

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0272	0.0169	0.0000	0.0640	0.0001
3.0403	0.0274	0.0180	0.0000	0.0640	0.0002
3.0806	0.0277	0.0191	0.0000	0.0648	0.0002
3.1209	0.0280	0.0202	0.0000	0.0657	0.0003
3.1612	0.0282	0.0214	0.0000	0.0665	0.0004
3.2015	0.0285	0.0225	0.3399	0.0674	0.0005

3.2418	0.0287	0.0237	1.0852	0.0682	0.0005
3.2821	0.0290	0.0248	2.0708	0.0691	0.0006
3.3224	0.0293	0.0260	3.2478	0.0699	0.0007
3.3627	0.0295	0.0272	4.5885	0.0708	0.0008
3.4030	0.0298	0.0284	6.0744	0.0716	0.0009
3.4433	0.0301	0.0296	7.6920	0.0725	0.0010
3.4836	0.0303	0.0308	9.4303	0.0733	0.0010
3.5239	0.0306	0.0320	11.280	0.0742	0.0011
3.5642	0.0309	0.0333	13.234	0.0750	0.0012
3.6045	0.0311	0.0345	15.285	0.0759	0.0013
3.6447	0.0314	0.0358	17.426	0.0767	0.0013
3.6670	0.0316	0.0365	19.651	0.0772	0.0000

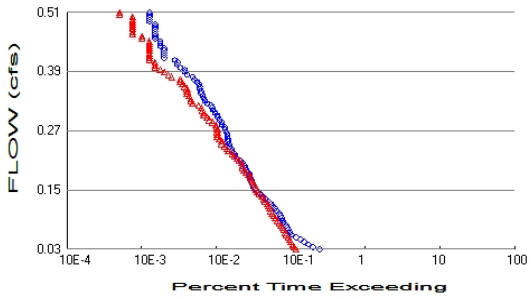
Surface 5 Tree Wells

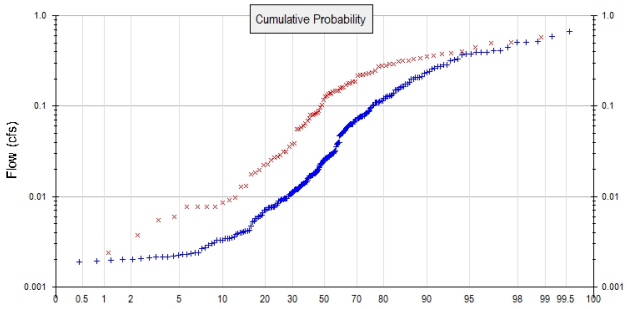
Element Flows To:

Outlet 1	Outlet 2
	5 Tree Wells

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.913
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.566
Total Impervious Area: 0.303

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.259991
5 year	0.395362
10 year	0.506799
25 year	0.597572

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.224395
5 year	0.349395
10 year	0.420721
25 year	0.515933

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0260	959	461	48	Pass
0.0309	774	439	56	Pass
0.0357	677	420	62	Pass
0.0406	594	395	66	Pass
0.0454	534	380	71	Pass
0.0503	461	364	78	Pass
0.0551	408	348	85	Pass
0.0600	387	333	86	Pass
0.0649	366	317	86	Pass
0.0697	352	305	86	Pass
0.0746	339	290	85	Pass
0.0794	318	277	87	Pass
0.0843	308	264	85	Pass
0.0891	295	244	82	Pass
0.0940	285	233	81	Pass
0.0988	275	221	80	Pass
0.1037	256	215	83	Pass
0.1086	244	206	84	Pass
0.1134	227	200	88	Pass
0.1183	215	192	89	Pass
0.1231	195	181	92	Pass
0.1280	181	175	96	Pass
0.1328	167	161	96	Pass
0.1377	156	149	95	Pass
0.1426	144	142	98	Pass
0.1474	132	137	103	Pass
0.1523	125	130	104	Pass
0.1571	124	129	104	Pass
0.1620	119	122	102	Pass
0.1668	116	116	100	Pass
0.1717	114	114	100	Pass
0.1766	111	107	96	Pass
0.1814	105	99	94	Pass
0.1863	100	93	93	Pass
0.1911	97	89	91	Pass
0.1960	95	89	93	Pass
0.2008	89	86	96	Pass
0.2057	82	80	97	Pass
0.2105	75	76	101	Pass
0.2154	71	69	97	Pass
0.2203	69	65	94	Pass
0.2251	64	58	90	Pass
0.2300	63	55	87	Pass
0.2348	60	51	85	Pass
0.2397	59	47	79	Pass
0.2445	57	47	82	Pass
0.2494	57	44	77	Pass
0.2543	56	41	73	Pass
0.2591	56	41	73	Pass
0.2640	54	41	75	Pass
0.2688	52	41	78	Pass
0.2737	51	40	78	Pass
0.2785	47	39	82	Pass

0.2834	47	35	74	Pass
0.2883	44	32	72	Pass
0.2931	42	30	71	Pass
0.2980	41	27	65	Pass
0.3028	38	27	71	Pass
0.3077	36	26	72	Pass
0.3125	35	25	71	Pass
0.3174	34	23	67	Pass
0.3222	30	19	63	Pass
0.3271	28	18	64	Pass
0.3320	27	18	66	Pass
0.3368	26	17	65	Pass
0.3417	25	16	64	Pass
0.3465	25	16	64	Pass
0.3514	24	16	66	Pass
0.3562	24	15	62	Pass
0.3611	23	14	60	Pass
0.3660	22	13	59	Pass
0.3708	20	13	65	Pass
0.3757	19	10	52	Pass
0.3805	16	9	56	Pass
0.3854	15	8	53	Pass
0.3902	15	7	46	Pass
0.3951	13	6	46	Pass
0.4000	12	6	50	Pass
0.4048	12	6	50	Pass
0.4097	11	5	45	Pass
0.4145	8	5	62	Pass
0.4194	8	5	62	Pass
0.4242	8	5	62	Pass
0.4291	8	5	62	Pass
0.4340	8	5	62	Pass
0.4388	7	5	71	Pass
0.4437	7	5	71	Pass
0.4485	7	5	71	Pass
0.4534	6	4	66	Pass
0.4582	6	4	66	Pass
0.4631	6	3	50	Pass
0.4679	6	3	50	Pass
0.4728	6	3	50	Pass
0.4777	6	3	50	Pass
0.4825	6	3	50	Pass
0.4874	5	3	60	Pass
0.4922	5	3	60	Pass
0.4971	5	3	60	Pass
0.5019	5	2	40	Pass
0.5068	5	2	40	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



EXISTING - PAD GRADING 0.91ac

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   4201-SDHM-LARGE LOT-PADS w-Dispersion trees.wdm
MESSU       25   Mit4201-SDHM-LARGE LOT-PADS w-Dispersion trees.MES
            27   Mit4201-SDHM-LARGE LOT-PADS w-Dispersion trees.L61
            28   Mit4201-SDHM-LARGE LOT-PADS w-Dispersion trees.L62
            30   POC4201-SDHM-LARGE LOT-PADS w-Dispersion trees1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND       3
      IMPLND       8
      PERLND      66
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface 5 Tree Wells        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    4        24
  END OPCODE
  PARM
    #    #         K ***
    4             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    3      A,NatVeg,Steep         1    1    1    1   27    0
   66     A,NatVeg,Flat          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    3         0    0    1    0    0    0    0    0    0    0    0    0
   66         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    3         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   66         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    3         0    1    1    1    0    0    0    0    1    1    0
   66         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
    3              0       3.5     0.045        75      0.15        2.5     0.915
   66              0       4.2      0.09       100      0.05        2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    3              0         0         2         2         0      0.05      0.05
   66              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    3              0       0.6      0.04         1       0.3         0
   66              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
   66       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
   66       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    3              0         0      0.01         0       0.4      0.01         0
   66              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    8     IMPERVIOUS-FLAT LAT     1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***
```

```
  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    8         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    8            100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    8               0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Pad Slopes***
PERLND   3                       0.2     RCHRES   1      2
PERLND   3                       0.2     RCHRES   1      3
Lateral Basin  0.366 PERV***
PERLND  66                     0.366     RCHRES   2      2
PERLND  66                     0.366     RCHRES   2      3
Lateral I Basin  .303 IMPERV***
IMPLND   8                    0.8279     PERLND  66     50

******Routing******
RCHRES   2                           1     RCHRES   3      7
RCHRES   2                                 COPY     1     17
RCHRES   1                           1     RCHRES   2      7
RCHRES   3                           1     RCHRES   4      8
RCHRES   4                           1     COPY   501     17
RCHRES   3                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
```

```
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<-----------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                             ***
    1     Pad Swale               2    1    1    1   28    0    1
    2     On Pad Hmod-Basi-019    2    1    1    1   28    0    1
    3     Surface 5 Tree W-031    3    1    1    1   28    0    1
    4     5 Tree Wells            2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
          FG FG FG FG  possible  exit  *** possible  exit      possible  exit
           *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
    1      0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    2      0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3      0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    4      0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR      KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
    3              3      0.01       0.0       0.0       0.0       0.0
    4              4      0.01       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL              4
```

```
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                               v2m4            =  765.8
*** Compute remaining available pore space
  GENER   4                               vpo4            =  v2m4
  GENER   4                               vpo4           -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                               vpo4            =  0.0
END IF
*** Infiltration volume
  GENER   4                               v2d4            =  vpo4
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.009183  0.000000  0.000000  0.000000
  0.022222  0.009265  0.000205  0.000000  0.002803
  0.044444  0.009347  0.000412  0.000000  0.002827
  0.066667  0.009429  0.000620  0.000000  0.002852
  0.088889  0.009512  0.000831  0.000000  0.002877
  0.111111  0.009595  0.001043  0.000000  0.002903
  0.133333  0.009679  0.001257  0.000000  0.002928
  0.155556  0.009763  0.001473  0.000000  0.002953
  0.177778  0.009847  0.001691  0.000000  0.002979
  0.200000  0.009932  0.001911  0.000000  0.003004
  0.222222  0.010017  0.002133  0.000000  0.003030
  0.244444  0.010103  0.002356  0.000000  0.003056
  0.266667  0.010188  0.002582  0.000000  0.003082
  0.288889  0.010275  0.002809  0.000000  0.003108
  0.311111  0.010361  0.003038  0.000000  0.003134
  0.333333  0.010448  0.003270  0.000000  0.003160
  0.355556  0.010535  0.003503  0.000000  0.003187
  0.377778  0.010623  0.003738  0.000000  0.003213
  0.400000  0.010711  0.003975  0.000000  0.003240
  0.422222  0.010799  0.004214  0.000000  0.003267
  0.444444  0.010888  0.004455  0.000000  0.003294
  0.466667  0.010977  0.004698  0.000000  0.003320
  0.488889  0.011066  0.004943  0.000000  0.003348
  0.511111  0.011156  0.005190  0.002860  0.003375
  0.533333  0.011246  0.005438  0.004954  0.003402
  0.555556  0.011337  0.005689  0.006396  0.003429
  0.577778  0.011428  0.005942  0.007568  0.003457
  0.600000  0.011519  0.006197  0.008581  0.003484
  0.622222  0.011610  0.006454  0.009487  0.003512
  0.644444  0.011702  0.006713  0.010314  0.003540
  0.666667  0.011795  0.006974  0.011079  0.003568
  0.688889  0.011887  0.007237  0.011794  0.003596
  0.711111  0.011980  0.007503  0.012469  0.003624
  0.733333  0.012074  0.007770  0.013108  0.003652
  0.755556  0.012168  0.008039  0.013718  0.003681
  0.777778  0.012262  0.008311  0.014302  0.003709
  0.800000  0.012356  0.008584  0.014863  0.003738
  0.822222  0.012451  0.008860  0.015404  0.003766
  0.844444  0.012546  0.009138  0.015926  0.003795
  0.866667  0.012642  0.009418  0.016432  0.003824
  0.888889  0.012738  0.009700  0.016923  0.003853
```

```
0.911111  0.012834  0.009984  0.017400  0.003882
0.933333  0.012931  0.010270  0.017864  0.003912
0.955556  0.013028  0.010558  0.018316  0.003941
0.977778  0.013125  0.010849  0.018757  0.003970
1.000000  0.013223  0.011142  0.019189  0.004000
1.022222  0.013321  0.011437  0.037168  0.004030
1.044444  0.013420  0.011734  0.069513  0.004059
1.066667  0.013519  0.012033  0.110524  0.004089
1.088889  0.013618  0.012335  0.157068  0.004119
1.111111  0.013717  0.012638  0.206128  0.004150
1.133333  0.013817  0.012944  0.254602  0.004180
1.155556  0.013918  0.013252  0.299486  0.004210
1.177778  0.014018  0.013563  0.338228  0.004241
1.200000  0.014119  0.013876  0.369193  0.004271
1.222222  0.014221  0.014190  0.392213  0.004302
1.244444  0.014323  0.014508  0.409212  0.004333
1.266667  0.014425  0.014827  0.430376  0.004363
1.288889  0.014527  0.015149  0.447322  0.004394
1.311111  0.014630  0.015473  0.463635  0.004426
1.333333  0.014733  0.015799  0.479382  0.004457
1.355556  0.014837  0.016127  0.494620  0.004488
1.377778  0.014941  0.016458  0.509394  0.004520
1.400000  0.015045  0.016791  0.523744  0.004551
1.422222  0.015150  0.017127  0.537707  0.004583
1.444444  0.015255  0.017465  0.551311  0.004615
1.466667  0.015360  0.017805  0.564582  0.004646
1.488889  0.015466  0.018147  0.577546  0.004678
1.511111  0.015572  0.018492  0.590221  0.004711
1.533333  0.015678  0.018840  0.602627  0.004743
1.555556  0.015785  0.019189  0.614779  0.004775
1.577778  0.015892  0.019541  0.626694  0.004807
1.600000  0.016000  0.019895  0.638385  0.004840
1.622222  0.016108  0.020252  0.649863  0.004873
1.644444  0.016216  0.020611  0.661140  0.004905
1.666667  0.016325  0.020973  0.672227  0.004938
1.688889  0.016434  0.021337  0.683132  0.004971
1.711111  0.016543  0.021703  0.693865  0.005004
1.733333  0.016653  0.022072  0.704432  0.005038
1.755556  0.016763  0.022444  0.714843  0.005071
1.777778  0.016874  0.022817  0.725103  0.005104
1.800000  0.016984  0.023193  0.735219  0.005138
1.822222  0.017096  0.023572  0.745197  0.005171
1.844444  0.017207  0.023953  0.755043  0.005205
1.866667  0.017319  0.024337  0.764761  0.005239
1.888889  0.017431  0.024723  0.774356  0.005273
1.911111  0.017544  0.025112  0.783833  0.005307
1.933333  0.017657  0.025503  0.793197  0.005341
1.955556  0.017770  0.025896  0.802450  0.005376
1.977778  0.017884  0.026293  0.811598  0.005410
2.000000  0.017998  0.026691  0.820643  0.005444
END FTABLE  2
FTABLE      1
 91    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.001148  0.000000  0.000000  0.000000
0.005556  0.001199  0.000007  0.006162  0.000363
0.011111  0.001250  0.000013  0.019705  0.000378
0.016667  0.001301  0.000020  0.039030  0.000394
0.022222  0.001353  0.000028  0.063550  0.000409
0.027778  0.001404  0.000035  0.092952  0.000425
0.033333  0.001455  0.000043  0.127047  0.000440
0.038889  0.001506  0.000052  0.165721  0.000456
0.044444  0.001557  0.000060  0.208903  0.000471
0.050000  0.001609  0.000069  0.256556  0.000487
0.055556  0.001660  0.000078  0.308662  0.000502
0.061111  0.001711  0.000087  0.365222  0.000518
0.066667  0.001762  0.000097  0.426247  0.000533
0.072222  0.001814  0.000107  0.491758  0.000549
0.077778  0.001865  0.000117  0.561785  0.000564
```

0.083333	0.001916	0.000128	0.636362	0.000580
0.088889	0.001968	0.000138	0.715527	0.000595
0.094444	0.002019	0.000150	0.799325	0.000611
0.100000	0.002070	0.000161	0.887800	0.000626
0.105556	0.002122	0.000173	0.981001	0.000642
0.111111	0.002173	0.000184	1.078979	0.000657
0.116667	0.002224	0.000197	1.181787	0.000673
0.122222	0.002276	0.000209	1.289477	0.000688
0.127778	0.002327	0.000222	1.402105	0.000704
0.133333	0.002379	0.000235	1.519727	0.000720
0.138889	0.002430	0.000248	1.642399	0.000735
0.144444	0.002481	0.000262	1.770179	0.000751
0.150000	0.002533	0.000276	1.903123	0.000766
0.155556	0.002584	0.000290	2.041291	0.000782
0.161111	0.002636	0.000305	2.184741	0.000797
0.166667	0.002687	0.000319	2.333532	0.000813
0.172222	0.002739	0.000335	2.487722	0.000828
0.177778	0.002790	0.000350	2.647372	0.000844
0.183333	0.002842	0.000366	2.812539	0.000860
0.188889	0.002893	0.000381	2.983284	0.000875
0.194444	0.002945	0.000398	3.159665	0.000891
0.200000	0.002996	0.000414	3.341743	0.000906
0.205556	0.003048	0.000431	3.529576	0.000922
0.211111	0.003099	0.000448	3.723224	0.000938
0.216667	0.003151	0.000465	3.922746	0.000953
0.222222	0.003203	0.000483	4.128200	0.000969
0.227778	0.003254	0.000501	4.339647	0.000984
0.233333	0.003306	0.000519	4.557145	0.001000
0.238889	0.003357	0.000538	4.780752	0.001016
0.244444	0.003409	0.000557	5.010528	0.001031
0.250000	0.003461	0.000576	5.246530	0.001047
0.255556	0.003512	0.000595	5.488818	0.001063
0.261111	0.003564	0.000615	5.737449	0.001078
0.266667	0.003616	0.000635	5.992482	0.001094
0.272222	0.003667	0.000655	6.253974	0.001109
0.277778	0.003719	0.000675	6.521983	0.001125
0.283333	0.003771	0.000696	6.796567	0.001141
0.288889	0.003823	0.000717	7.077783	0.001156
0.294444	0.003874	0.000739	7.365689	0.001172
0.300000	0.003926	0.000760	7.660341	0.001188
0.305556	0.003978	0.000782	7.961796	0.001203
0.311111	0.004030	0.000804	8.270111	0.001219
0.316667	0.004081	0.000827	8.585343	0.001235
0.322222	0.004133	0.000850	8.907547	0.001250
0.327778	0.004185	0.000873	9.236781	0.001266
0.333333	0.004237	0.000896	9.573100	0.001282
0.338889	0.004289	0.000920	9.916559	0.001297
0.344444	0.004340	0.000944	10.26722	0.001313
0.350000	0.004392	0.000968	10.62512	0.001329
0.355556	0.004444	0.000993	10.99034	0.001344
0.361111	0.004496	0.001018	11.36292	0.001360
0.366667	0.004548	0.001043	11.74291	0.001376
0.372222	0.004600	0.001068	12.13038	0.001391
0.377778	0.004652	0.001094	12.52538	0.001407
0.383333	0.004704	0.001120	12.92795	0.001423
0.388889	0.004756	0.001146	13.33816	0.001439
0.394444	0.004808	0.001173	13.75607	0.001454
0.400000	0.004860	0.001200	14.18171	0.001470
0.405556	0.004911	0.001227	14.61516	0.001486
0.411111	0.004963	0.001254	15.05645	0.001501
0.416667	0.005015	0.001282	15.50565	0.001517
0.422222	0.005067	0.001310	15.96281	0.001533
0.427778	0.005119	0.001338	16.42797	0.001549
0.433333	0.005171	0.001367	16.90121	0.001564
0.438889	0.005223	0.001396	17.38256	0.001580
0.444444	0.005276	0.001425	17.87207	0.001596
0.450000	0.005328	0.001454	18.36982	0.001612
0.455556	0.005380	0.001484	18.87583	0.001627
0.461111	0.005432	0.001514	19.39017	0.001643
0.466667	0.005484	0.001544	19.91289	0.001659

```
0.472222  0.005536  0.001575  20.44405  0.001675
0.477778  0.005588  0.001606  20.98368  0.001690
0.483333  0.005640  0.001637  21.53185  0.001706
0.488889  0.005692  0.001668  22.08860  0.001722
0.494444  0.005744  0.001700  22.65400  0.001738
0.500000  0.005797  0.001732  23.22808  0.001753
END FTABLE  1
FTABLE      4
 76    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
0.000000  0.027181  0.000000  0.000000  0.000000
0.040297  0.027067  0.000140  0.000000  0.000000
0.080593  0.026812  0.000282  0.000000  0.000000
0.120890  0.026559  0.000425  0.000000  0.000000
0.161187  0.026308  0.000571  0.000000  0.000000
0.201484  0.026057  0.000719  0.000000  0.000000
0.241780  0.025808  0.000869  0.000000  0.000000
0.282077  0.025559  0.001021  0.000000  0.000000
0.322374  0.025312  0.001176  0.000000  0.000000
0.362670  0.025067  0.001332  0.000000  0.000392
0.402967  0.024822  0.001491  0.000000  0.000502
0.443264  0.024578  0.001651  0.000000  0.000632
0.483560  0.024336  0.001814  0.000000  0.000786
0.523857  0.024095  0.001979  0.000000  0.000964
0.564154  0.023855  0.002147  0.000000  0.001168
0.604451  0.023617  0.002316  0.000000  0.001402
0.644747  0.023379  0.002488  0.000000  0.001665
0.685044  0.023143  0.002662  0.000000  0.001962
0.725341  0.022908  0.002838  0.000000  0.002293
0.765637  0.022674  0.003016  0.000000  0.002661
0.805934  0.022441  0.003197  0.000000  0.003068
0.846231  0.022209  0.003380  0.000000  0.003516
0.886527  0.021979  0.003566  0.000000  0.004006
0.926824  0.021750  0.003753  0.000000  0.004543
0.967121  0.021522  0.003943  0.000000  0.004785
1.007418  0.021295  0.004136  0.000000  0.004844
1.047714  0.021070  0.004331  0.000000  0.004904
1.088011  0.020845  0.004528  0.000000  0.004964
1.128308  0.020622  0.004727  0.000000  0.005024
1.168604  0.020400  0.004929  0.000000  0.005085
1.208901  0.020179  0.005134  0.000000  0.005146
1.249198  0.019960  0.005341  0.000000  0.005207
1.289495  0.019741  0.005550  0.000000  0.005269
1.329791  0.019524  0.005762  0.000000  0.005331
1.370088  0.019308  0.005976  0.000000  0.005393
1.410385  0.019093  0.006193  0.000000  0.005456
1.450681  0.018880  0.006412  0.000000  0.005519
1.490978  0.018667  0.006634  0.000000  0.005583
1.531275  0.018456  0.006858  0.000000  0.005647
1.571571  0.018246  0.007085  0.000000  0.005711
1.611868  0.018037  0.007315  0.000000  0.005776
1.652165  0.017829  0.007547  0.000000  0.005841
1.692462  0.017623  0.007782  0.000000  0.005906
1.732758  0.017418  0.008019  0.000000  0.005972
1.773055  0.017214  0.008259  0.000000  0.006038
1.813352  0.017011  0.008502  0.000000  0.006104
1.853648  0.016809  0.008747  0.000000  0.006171
1.893945  0.016608  0.008995  0.000000  0.006238
1.934242  0.016409  0.009245  0.000000  0.006306
1.974538  0.016211  0.009499  0.000000  0.006374
2.014835  0.016014  0.009755  0.000000  0.006442
2.055132  0.015818  0.010014  0.000000  0.006510
2.095429  0.015624  0.010275  0.000000  0.006579
2.135725  0.015430  0.010540  0.000000  0.006649
2.176022  0.015238  0.010807  0.000000  0.006718
2.216319  0.015047  0.011077  0.000000  0.006788
2.256615  0.014858  0.011349  0.000000  0.006859
2.296912  0.014669  0.011625  0.000000  0.006930
2.337209  0.014482  0.011903  0.000000  0.007001
```

```
  2.377505  0.014295  0.012184  0.000000  0.007072
  2.417802  0.014110  0.012468  0.000000  0.007144
  2.458099  0.013927  0.012755  0.000000  0.007216
  2.498396  0.013744  0.013045  0.000000  0.007289
  2.538692  0.013562  0.013338  0.000000  0.007362
  2.578989  0.013382  0.013634  0.000000  0.007435
  2.619286  0.013203  0.013932  0.000000  0.007509
  2.659582  0.013025  0.014234  0.000000  0.007583
  2.699879  0.012849  0.014538  0.000000  0.007657
  2.740176  0.012673  0.014846  0.000000  0.007732
  2.780473  0.012499  0.015156  0.000000  0.007807
  2.820769  0.012326  0.015470  0.000000  0.007882
  2.861066  0.012154  0.015786  0.000000  0.007958
  2.901363  0.011983  0.016106  0.000000  0.008034
  2.941659  0.011814  0.016428  0.000000  0.008111
  2.981956  0.011646  0.016754  0.000000  0.008188
  3.000000  0.011478  0.017580  0.000000  0.008222
  END FTABLE  4
  FTABLE      3
   18    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.011478  0.000000  0.000000  0.000000  0.000077
  0.040297  0.027437  0.001100  0.000000  0.063979  0.000077
  0.080593  0.027694  0.002211  0.000000  0.064827  0.000155
  0.120890  0.027952  0.003332  0.000000  0.065675  0.000233
  0.161187  0.028212  0.004464  0.000000  0.066523  0.000312
  0.201484  0.028472  0.005606  0.339944  0.067371  0.000391
  0.241780  0.028734  0.006759  1.085151  0.068219  0.000470
  0.282077  0.028997  0.007922  2.070808  0.069067  0.000549
  0.322374  0.029262  0.009096  3.247767  0.069915  0.000629
  0.362670  0.029527  0.010280  4.588471  0.070763  0.000710
  0.402967  0.029794  0.011475  6.074441  0.071611  0.000790
  0.443264  0.030062  0.012681  7.691989  0.072459  0.000871
  0.483560  0.030331  0.013898  9.430269  0.073307  0.000953
  0.523857  0.030601  0.015126  11.28024  0.074155  0.001035
  0.564154  0.030872  0.016365  13.23405  0.075003  0.001117
  0.604451  0.031145  0.017614  15.28467  0.075851  0.001199
  0.644747  0.031419  0.018875  17.42562  0.076699  0.001282
  0.667000  0.031570  0.019575  19.65077  0.077168  0.001328
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   2     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     EXTNL  PREC
WDM      1 EVAP     ENGL    1              RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   4     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   4 HYDR   RO     1 1        1      WDM   1020 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      1 1        1      WDM   1021 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      2 1        1      WDM   1022 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1023 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1024 STAG     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1025 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
```

```
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
  END MASS-LINK    7

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17

  MASS-LINK       50
IMPLND     IWATER SURO                     PERLND         EXTNL  SURLI
  END MASS-LINK   50


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1964/ 5/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-1.673E-03     0.00000  0.0000E+00     0.00000  3.1730E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1969/ 9/30 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-1.000E+00     0.00000  0.0000E+00     0.00000  2.2140E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
```

DATE/TIME: 1979/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-1.000E+00	0.00000	0.0000E+00	0.00000	6.0990E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1983/ 9/30 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-2.855E-02	0.00000	0.0000E+00	0.00000	1.8939E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1984/ 6/30 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-1.000E+00	0.00000	0.0000E+00	0.00000	2.9881E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.

REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

The count for the WARNING printed above has reached its maximum.

If the condition is encountered again the message will not be repeated.

ERROR/WARNING ID: 238 1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1995/11/30 24: 0

RCHRES : 2

RELERR	STORS	STOR	MATIN	MATDIF
-1.000E+00	0.00000	0.0000E+00	0.00000	3.6765E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

8.2 Hydromodification Management Points of Compliance

- List and describe all points of compliance (POCs) for flow control for hydromodification management.
- For each POC, provide a POC identification name or number, and a receiving channel identification name or number correlating to the project's HMP Exhibit (see Attachment 2).

POC name or #	Channel name or #	POC Description
POC-1		POC that corresponds with BMPs drain to the unnamed Creek to the East, along Adams Drive. Each IMP will discharge directly into the hills sheet flowing to the stream, and its discharge in itself could also be considered as a separate point of compliance.
POC-2		POC that corresponds with IMPs that drain into a culvert that eventually drains into the San Luis Rey River. IMP-10.22, located upstream of IMP-2.06, will have a separate drainage to avoid hydromodification overload of IMP-2.06, and the discharge from IMP-10.22 will join the discharge from IMP-2B downstream of IMP-2.06. Both drainages will then discharge to the aforementioned culvert. Additional IMPs with numbers (IMP-10.16 and IMP-10.17) are located upstream of the corresponding numbered IMP, and their drainage will eventually discharge into the downstream DMA and sheet flow to the POC from there(for example, IMP-10.16 discharges into DMA-2.04 and continues downstream to the POC). It must be pointed out that most of the drainage will infiltrate in the corresponding IMP and only large storms will find their way downstream, but with a released discharge that is going to be smaller than the discharge nature intended and therefore, not generating hydromodification effects.
POC-3		POC that corresponds with IMPs that drain to Frey Creek to the West. Each pad will have an IMP that will discharge directly into the hills sheet flowing to Frey Creek, and its discharge in itself could also be considered as a separate point of compliance.

8.3 Geomorphic Assessment of Receiving Water Channels

Insert Geomorphic Assessment behind this cover page or submit as a separate stand-alone document labeled Sub-attachment 8.3.

N/a

8.4 Vector Control Plan

Insert Vector Control Plan behind this cover page or submit as a separate stand-alone document labeled Sub-attachment 8.4.

N/a

9.0 General Requirements

- Complete the table below to indicate which compliance pathway was selected in PDP SWQMP Table 6. Include the corresponding sub-attachment with your SWQMP submittal. Other sub-attachments do not need to be included.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: CCSYAs and applicable BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.

Sub-attachments	BMPDM Design Resources
☐ **9.1: Documentation of Hydromodification Management Exemption**[1]	Section 1.6
☐ **9.2: Watershed Management Area Analysis (WMAA) Mapping**[1]	Appendix H.1.1.2
☒ **9.3: Resource Protection Ordinance (RPO) Methods**	Appendix H.1.1.1
☐ **9.4: No Net Impact Analysis**	Appendix H.4

[1] The San Diego County Regional comprehensive WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/

9.1 Documentation of Hydromodification Management Exemption (BMPDM Section 1.6)

- If the PDP is exempt from hydromodification management requirements (see Table 4 Part A.1 of the PDP SWQMP), use this Sub-attachment to document the exemption.
- Select the type of exemption below that applies and provide an explanation of the selection, including maps or other applicable documentation. Additional documentation may be requested by County staff.

Exemption Type per BMPDM Figure 1-2 (select one)
☐ a. The proposed project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
☐ b. The proposed 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.
☐ c. The proposed project will discharge runoff directly to an area identified by the County as appropriate for an exemption by the WMAA for the watershed in which the project resides[2].
Explanation (add or attach pages as necessary)

[2] This option must include an analysis of the project using the methodology presented in Attachment E of the Regional Watershed Management Area Analysis.

9.2 Watershed Management Area Analysis (WMAA) Mapping (BMPDM Appendix H.1.1.2)

Watershed Management Area Analysis (WMAA) mapping is a simple way to screen projects to determine the presence of onsite or offsite upstream Potential Critical Coarse Sediment Yield Areas (PCCSYAs). The San Diego County Regional WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/ .[3]

- Based on the WMAA map and the proposed project design, demonstrate below that both of the following conditions apply to the PDP:

  (a) Less than 5% of PCCSYAs will be impacted (built on or obstructed) by the PDP, and

  (b) All upstream offsite PCCYSAs will be bypassed (see BMPDM Appendix H.3).

A. Mapping Results -- At a minimum, show: (1) the project footprint, (2) areas of proposed development, (3) impacted onsite PCCSYAs, (4) offsite tributary areas[4], and (5) bypass of upstream offsite PCCSYAs.

[3] Applicants may refine initial mapping results using options identified in BMPDM Appendix H.1.2.

[4] Tributary areas must be shown to demonstrate that upstream offsite PCCSYAs do not exist. If bypassing these areas, only the bypass should be shown.

B. Explanation -- Provide documentation as needed to demonstrate that (1) impacts to PCCSYAs are below 5%, and (2) upstream offsite PCCYSAs are effectively bypassed. Add pages as necessary.

9.3 Resource Protection Ordinance (RPO) Methods (BMPDM Appendix H.1.1.1)

- Either of two Resource Protection Ordinance (RPO) methods may also be used to demonstrate compliance with CCSYA requirements. Select either option and document the selection below:

  ☒ **RPO Scenario 1: PDP is subject to and in compliance with RPO requirements**[5]

  - **Select** if the project requires one or more discretionary permits;
  - **Demonstrate** that onsite AND upstream offsite CCSYAs will be avoided and/or bypassed.

  ☐ **RPO Scenario 2: PDP is entirely exempt/not subject to RPO requirements**[6]

  - **Select** if the project does not require discretionary permits;
  - **Demonstrate** that all upstream offsite CCSYAs will be bypassed[7].

A. Mapping Results -- At a minimum, show as applicable: (1) the project footprint, (2) areas of proposed development, (3) locations of onsite and upstream offsite CCSYAs, and (4) bypass of all identified CCSYAs.
See RPO Slope Analysis/Density Calculations

[5] RPO applicability is normally confirmed during discretionary review. Check with your project manager if you're not sure of your status.
[6] Does not include PDPs utilizing exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3).
[7] This scenario does not impose requirements for onsite CCSYAs.

COUNTY OF SAN DIEGO TRACT NO. TM 5223 RPL-3

SHADOW RUN RANCH, PAUMA VALLEY
RPO SLOPE ANALYSIS/DENSITY CACULATIONS

PROJECT BOUNDARY

Slopes Table

Number	Minimum Slope	Maximum Slope	Acres	Color
1	0.00%	15.00%	148.895	
2	15.00%	25.00%	31.985	
3	25.00%	50.00%	30.337	
4	50.00%	153.69%	36.440	

RPO LEGEND

RPO STEEP SLOPE AREAS

SUBDIVISION BOUNDARY

RPO DENSITY ANALYSIS

AREA 0-25% SLOPE..... 180.88 AC /4 ACRE = 45.22 DWELLING UNITS
AREA GREATER THAN 25%... 66.78 AC /8 ACRE = 8.35 DWELLING UNITS
TOTAL DENSITY PERMITTED 53.57 DWELLING UNITS

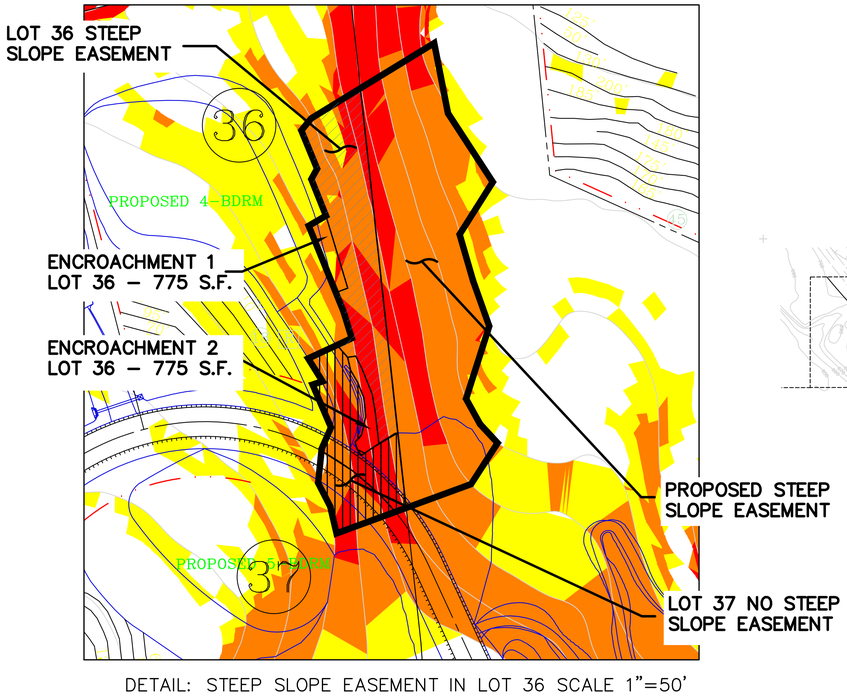
RPO STEEP SLOPE AREAS

LOT 37 INCLUDES 1,982 SF OF STEEP SLOPE AREA (1.7% OF LOT)
ALLOWED ENCROACHMENT = 198 SF
PROPOSED ENCROACHMENT = 0 SF

LOT 36 INCLUDES 15,500 SF OF STEEP SLOPE AREA (17% OF LOT)
ALLOWED ENCROACHMENT = 1,550 SF
PROPOSED ENCROACHMENT = 1550 SF.

** EACH LOT LISTED ABOVE INCLUDES STEEP SLOPE LANDS WITHIN EXEMPT AREAS OF ROAD/DRIVEWAY GRADING.

NOTE: RPO STEEP SLOPE AREAS WILL BE PLACED IN STEEP SLOPE EASEMENTS EXCEPT FOR AREAS WITHIN ROADS, DRIVEWAYS AND GRADING FOR ROADS - WHICH INCLUDE THE STEEP SLOPE AREAS WITHIN LOT 36 AND LOT 37



DETAIL: STEEP SLOPE EASEMENT IN LOT 36 SCALE 1"=50'

STEEP SLOPE AREA = 779138.69 S.F. / 17.89 AC.
PROPOSED RPO STEEP SLOPE OPEN SPACE EASEMENT

STEEP SLOPE AREA = 1056183.07 S.F. / 24.25 AC.
PROPOSED RPO STEEP SLOPE OPEN SPACE EASEMENT

STEEP SLOPE AREA = 82545.45 S.F. / 1.89 AC.
PROPOSED RPO STEEP SLOPE OPEN SPACE EASEMENT

STEEP SLOPE AREA = 23874.25 S.F. / 0.55 AC.
PROPOSED RPO STEEP SLOPE OPEN SPACE EASEMENT

STEEP SLOPE AREA = 43353.54 S.F. / 0.99 AC.
NO STEEP SLOPE EASEMENT IS PROPOSED FOR LOT 37

PHYLLIS J. BAUMANN
BRADFORD TRUST
ALBERT'S BRADFORD TRUST
I.V. MASHBURN
INDIAN RESERVATION
BIOLOGICAL OPEN SPACE LOT
7.96 GR. AC. RECREATIONAL OPEN SPACE LOT
39.12 GR. AC. AGRICULTURAL OPEN SPACE LOT
SHERRILL SCHOEPE
FIG TREE BEND
ADAMS DRIVE "PRD-6"
MARY L COYKENDALL TRUST
FLORES
SAN BERNARDINO MEDICAL
STUMPGE
DONALD H. CLIFT
HAAS VIEW WAY
HAAS VIEW LANE
HAAS GROVE LANE
AQUA CREST TRAIL
CREEK VIEW
EUREKA
PAUMA RIDGE RD
HIGHWAY 76 (PUBLIC)
FUTURE MOUNTAIN DEVELOPMENT
BUSINESS TRUST PAUMA VALLEY
ELIZABETH A. SANCHEZ TRUST

200 100 0 200 400 600
SCALE IN FEET
GRAPHIC SCALE

MASSON & ASSOCIATES, INC.
200 East Washington Avenue, Suite 200
Escondido, CA 92025 P. 760.741.3570
www.masson-assoc.com
Planning ▲ Engineering ▲ Surveying ▲ Telecom

DATE: Oct 10, 19 1:06pm By: rfriggen R:\E1\SWG\4\4201\PROD\EE2000\CSD\4201-CSD-slopeMap.dwg
CALIF. COORD. INDEX: 327-1764

B. Explanation -- Provide documentation as needed to demonstrate that (1) onsite CCSYAs are avoided and bypassed [if applicable], and (2) upstream offsite CCYSAs are effectively bypassed. Add pages as necessary.

RPO Slope analysis shows that the majority of the steep slopes occur in the offsite areas that are being bypassed and unaffected (i.e. DMAs 1.01, 1.03, 1.04, and 1.06. Areas like those shown in DMA 2.04 are also being bypassed through the storm drain system and being allowed to flow downstream. Additionally as shown in the RPO slope analysis the upstream CCYSAs areas are effectively bypassed as they flow straight into Frey Creek before reaching the site.

9.4 No Net Impact Analysis (BMPDM Appendix H.4)

- When impacts to CCSYAs cannot be avoided or effectively bypassed, applicants must demonstrate that their project generates no net impact to the receiving water per the performance metrics identified in BMPDM Appendix H.4.
- Use the space below to document that the PDP will generate no net impact to any receiving water.

No Net Impact Analysis (add or attach pages as necessary)

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Its purpose is to provide documentation of the final installation of permanent Best Management Practices (BMPs) used to satisfy Structural Performance Standards for the development project. Compliance with these standards reduces the discharge of pollutants and flows from the completed project site. Applicable standards may be satisfied using Structural BMPs (S-BMPs), Significant Site Design BMPs (SSD-BMPs), or both. Applicants are responsible for providing all requested information. Do not leave any fields blank; indicate *N/A* for any requested item that is not applicable.

PART 1 General Project and Applicant Information

Table 1: Project and Applicant Information

A. Project Summary Information	**ID No. IVF-20___-____ To be assigned by DPW-WPP**
Project Name	Shadow Run Ranch TM 5223
Record ID (e.g. grading/improvement plan number, building permit)	PDS2001-3100-5223
Project Address	State Highway 76 and Adams Drive
Assessor's Parcel Number(s) APN(s)	111-080-07, 08, 09, 10, 14, 18, 19, 21, 111-070-12, 13
Project Watershed (complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Watershed: San Luis Rey 903 Subarea Name(s): 903.2 Monserate 903.22 Pauma
B. Owner Information	
Name	Sherrill Ann Schoepe
Address	P.O. Box 1249 Pauma Valley, CA 92061
Email Address	wpvr101@yahoo.com
Phone Number	(760)742-1893

****THIS PAGE IS FOR PARTIAL RECORD PLAN VERIFICATIONS ONLY ****

If this is a partial Installation Verification Form submittal, list ALL DMAs and BMPs for the Priority Development Project in **Table 2**. Provide acceptance information where applicable.

Table 2: Information for Partial IVF Submittals

A: DMA and BMP Information

DMA #	Structural and Significant Site Design BMPs	WPP Acceptance Date	IVF ID No. (e.g. 2018-001)

B: DMA and BMP Map

Please attach a map showing (1) all DMAs for the project site, (2) the DMAs and/or lots accepted under previous Verification Forms, and (3) the locations of Structural BMPs and Significant Site Design BMPs previously accepted.

PART 2 DMA and BMP Inventory Information

Use this table to document Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) for the PDP. All DMAs that are not self-mitigating or de minimis must have at least one Structural BMP or Significant Site Design BMP.

- In **Part A**, list all Structural BMPs (including both Pollutant Control and/or Hydromodification as applicable) by DMA.
- Complete **Part B** for all DMAs that contain only Significant Site Design BMPs. SSD-BMPs are Site Design BMPs (SD-BMPs) that are sized and constructed to satisfy Structural Performance Standards for a DMA.
- Documentation of SD-BMPs is not required in this table for any DMA that also contains S-BMPs.
- The information provided for each BMP in the table must match that provided in the Stormwater Quality Management Plan (SWQMP), construction plans, maintenance agreements, and other relevant project documentation.

Table 3: Required Information for Structural BMPs and Significant Site Design BMPs

DMA #	BMP Information			Maintenance Category	Maintenance Agreement or Maintenance Notification Recorded Doc. #	Construction Plan Sheet #	Landscape Plan # & Sheet # (For Vegetated BMPs Only)	FOR DPW-WPP USE ONLY *Reviewer concurs that the BMP(s) may be accepted into inventory (date and initial)*
	Quantity	Description/Type of Structural BMP	BMP ID #(s)					
Part A Structural BMPs (S-BMPs)								
1.14	1	Unlined Biofiltration	1.14	2				
10.10	1	Unlined Biofiltration	10.10	2				
10.11,12,14	1	Unlined Biofiltration	10.11,12,14	2				
10.13	1	Unlined Biofiltration	10.13	2				
10.16	1	Unlined Biofiltration	10.16	2				
10.17	1	Unlined Biofiltration	10.17	2				

10.19	1	Unlined Biofiltration	10.19	2			
10.22	1	Unlined Biofiltration	10.22	2			
Add rows as needed							
Part B Significant Site Design BMPs (SSD-BMPs)							
1.12	1	Dispersion Area	1.12	---	---		
1.13	1	Dispersion Area	1.13	---	---		
10.15	1	Tree Well	10.15	---	---		
10.18	1	Dispersion Area and Tree Wells	10.18	---	---		
2.01	1	Dispersion Area and Tree Wells	2.01	---	---		
2.02	1	Dispersion Area	2.02	---	---		
Large Lot	1	Dispersion Area and Tree Wells	Large Lot	---	---		
Add rows as needed							

PART 3 Required Attachments for All BMPs Listed in Table 3

For ALL projects, submit the following to the County inspector (check all that are attached):

☐ Photographs: Labeled photographs illustrating proper construction of each S-BMP or SSD-BMP.

☐ Maintenance Agreements: Copies of all approved and recorded Storm Water Maintenance Agreements (SWMAs) or Maintenance Notifications (MNs) for all S-BMPs.

Note: All BMPs proposed for County ownership will remain the responsibility of the owner listed on **Page 1** until a signed Letter of Acceptance of Completion is received by the DPW Watershed Protection Program.

For Grading and Improvement projects only, ALSO submit:

☐ Construction Plans: An 11" X 17" copy of the most current applicable approved Construction Plan sheets:

- ☐ Grading Plans, AND/OR
- ☐ Improvement Plans, AND/OR
- ☐ Precise Grading Plan(s) (only for residential subdivisions with tract homes), AND/OR
- ☐ Other (Please specify) Click here to enter text.

Note: For each Construction Plan, the sheets submitted must incorporate all of the following:

- ☐ A BMP Table, AND
- ☐ A plan/cross-section of each verified as-built BMP, AND
- ☐ The location of each verified as-built BMP

☐ Landscape Plans: An 11" X 17" copy of the most current applicable Landscape Plan sheets where the BMPs are required to be vegetated, including:

- ☐ The Certification of Completion (Form 407), AND
- ☐ The Certificate of Approval from PDS Landscape Architect

Note: For each Landscape Plan, the sheets submitted must show the location of each verified as-built BMP.

Required only for Verifications for Partial Record Plans

☐ If this is a partial record plan verification, please include the following:

- ☐ A list of previously submitted Verification Forms (**Table 2, A**)
- ☐ A map of DMAs and BMPs (**Table 2, B**)

PART 4 Preparer's Certification

By signing below, I certify that the BMP(s) listed in Table 3 of this Verification Form have been constructed and all 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.

Note: Structural BMPs (Table 3, Part A) must be certified by a licensed professional engineer.

Please sign and, if applicable, provide your seal below.



Preparer's Printed Name:

____Rob D'Amaro_____

Email: _robdamaro@masson-assoc.com_____

Phone Number: _(760)741-3570_____

Preparer's Signed Name:

_____

Date: _ 11/22/2019 _____

COUNTY - OFFICIAL USE ONLY:

For County Inspectors

County Department: _____

Date verification received from EOW: _____

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

Inspector Name: _____

Inspector's Signature: _____ Date: _____

For Building Division Only

Inspection Supervisor Name: _____

Inspector Supervisor's Signature: _____ Date: _____

PDCI & Building, along with the rest of this package, please provide to DPW WPP:

☐ A copy of the final accepted SWQMP and any accepted addendum

For Watershed Protection Program Only

Date Received: _____

WPP Reviewer: _____

WPP Reviewer concurs that the BMPs accepted in **Part 2** above may be entered into inventory.

WPP Reviewer's Signature: _____ Date: _____

11.0 Cover Sheet and General Requirements

- All Structural BMPs must have a plan and mechanism to ensure on-going maintenance. Use the table below to document the types of agreements to be submitted for the PDP and submit them under cover of this sheet.
- See BMPDM Section 7.3 for a description of maintenance categories and responsibilities. Note that since Category 3 and 4 BMPs are County-maintained, they do not require maintenance agreements.

a. Applicability of Maintenance Agreements

Check the boxes below to indicate which types of agreements are included with this attachment.

☐ Maintenance Notification (Category 1 BMPs)

- Exhibit A: Project Site Vicinity; Project Site Map; and a map for each BMP and its Drainage Management Area
- Exhibit B: BMP Maintenance Plan (see below)

☒ Stormwater Maintenance Agreement (Category 2 BMPs)

- Exhibit A: Legal Description of Property
- Exhibit B: BMP Maintenance Plan (see below)
- Exhibit C: Project Site Vicinity Map

Maintenance agreement templates and instructions are provided on the County's website:

www.sandiegocounty.gov/stormwater under the Development Resources tab.

PDP applicants contact County staff to ensure they have the most current forms.

b. Maintenance Plan Requirements

Use this checklist to confirm that each maintenance plan includes the following that as applicable.

☐ Specific **maintenance indicators and actions** for proposed structural BMP(s). These must be based on based on maintenance indicators presented in BMP Design Fact Sheets in Appendix E and enhanced to reflect actual proposed components of the structural BMP(s).

☐ **Access** to inspect and perform maintenance on the structural BMP(s).

☐ Features 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.

Tree Planting Design in New or Reconstructed Streetscapes

1. Maximized open soil area for tree planting is the most cost effective method of achieving the required soil volume.

2. Tree wells within sidewalks shall have a minimum open area of four feet wide by six feet long. Larger areas may be required to accommodate large root balls.

3. Tree well soil characteristics shall meet the requirements of SD-F Amended Soil.

Structural Requirements for Confined Tree Well Soil Volume

In order to provide adequate soil volume for tree wells, soils may be placed confined beneath adjacent paved surfaces. Acceptable soil systems capable of carrying D-50 loading include structural soils, structural slabs, and structural cells:

1. Structural soil systems include CU-StructuralSoil™, Stalite Structural Soil, or equivalent.

2. Suspended pavements that allow uncompacted growing soil beneath the sidewalk include; structural slabs that span between structural supports, structural cells, and other commercially available structural systems. See Page 7 of the Green Streets Guidelines in Appendix K for illustrations. Manufacturer details and certification must be provided for commercial systems. Structural calculations and details must be provided for structural slab installations. Structural cells are commercially-available structural systems placed subsurface that support the sidewalk and are filled with amended soil (SD-F). Manufacturer details and certification must be provided for commercial systems.

Stormwater Retention and Treatment Volume

Tree wells with expanded soil volume will serve as a method of capturing and retaining the required volume of stormwater in accordance with County requirements in Appendix B of this manual. These facilities can be designed to meet the County requirements when surface ponding volume is provided, whether designed as an enclosed plant bed with covered soil volume, or a continuous open area (either mulched or with turf) with soil volume under the adjacent sidewalk.

Maintenance Overview

Normal Expected Maintenance. Tree health shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the tree well as designed. That is, the opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression) shall not be blocked, filled, re-graded, or otherwise changed in a manner that prevents storm water from draining into the tree well. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure. Trees wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected maintenance described above ensures the BMP functionality. If changes have been made to the tree well entrance / opening such that runoff is prevented from draining into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well, or a surface depression has been filled so runoff flows away from the tree well), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the tree well as designed.

Surface ponding of runoff directed into tree wells is expected to infiltrate/evapotranspirate within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils surrounding the tree. Loosen or replace the soils to restore drainage.

Other Special Considerations. Site design BMPs, such as tree wells, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the County Engineer may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the County Engineer to determine requirements.

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Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Tree health	Routine actions as necessary to maintain tree health.	• Inspect monthly. • Maintain when needed.
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	• Inspect monthly. • Maintain when needed.
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health	Loosen or replace soils surrounding the tree to restore drainage.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any standing water from the tree well to nearby landscaping. Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water).	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well)	Make repairs as appropriate to restore drainage into the tree well.	• Inspect monthly. • Maintain when needed.

Siting and Design		*Intent/Rationale*
☐	Dispersion areas must be owned by the project owner and be dedicated for the purposes of dispersion to the exclusion of other future uses that might reduce the effectiveness of the dispersion area.	Dedicated dispersion areas prevent future conversion to alternate uses and facilitate continued full and partial infiltration benefits.
Vegetation		
☐	Dispersion typically requires dense and robust vegetation for proper function. Drought tolerant species should be selected to minimize irrigation needs. A plant list to aid in selection can be found in Appendix F.	Vegetation improves resistance to erosion and aids in runoff treatment.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where dispersion can be used in the site design to reduce the DCV for pollutant control sizing.
2. Calculate the DCV for storm water pollutant control per Appendix B.2, taking into account reduced runoff from dispersion.
3. Determine if a DMA is considered "Self-retaining" if the impervious to pervious ratio is:
    a. 2:1 when the pervious area is composed of Hydrologic Soil Group A
    b. 1:1 when the pervious area is composed of Hydrologic Soil Group B

Conceptual Design and Sizing Approach for Storm Water Pollutant Treatment and Flow Control

DMAs using impervious area dispersion are considered to meet both pollutant control and hydromodification flow control requirements if ALL of the following criteria are met:

1. All impervious area within the DMA discharges to the pervious area before the runoff discharges from the DMA.
2. As a minimum, the top 11 inches of the pervious area uses amended soils in accordance with the SD-F fact sheet and the pervious area also meets the requirements for dispersion (e.g. slope, inflow velocities, etc.) in the SD-B fact sheet.
3. The impervious to pervious area ratio is 1:1 or less.

Impervious Area Dispersion designed to meet both pollutant control and flow control requirements are designated as SSD BMPs.

Maintenance Overview

Normal Expected Maintenance. Vegetated area shall be maintained as part of normal landscape

maintenance. Additionally, ensure that storm water runoff can be conveyed into the vegetated area as designed. That is, the mechanism that allows storm water runoff from impervious area to flow into the pervious area (e.g., a curb cut allows runoff from a parking lot to drain onto adjacent landscaping area, or a roof drain outlet is directed to a lawn) shall not be removed, blocked, filled, or otherwise changed in a manner that prevents storm water from draining into the pervious area. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure. Impervious area dispersion is a site design BMP that normally does not require maintenance actions beyond routine landscape maintenance. If changes have been made to the area, such as the vegetated area has been replaced with impervious area, or the mechanism that allows storm water runoff from impervious area to flow into the pervious area has been removed (e.g., roof drains previously directed to vegetated area have been directly connected to the street or storm drain system), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the pervious area as designed. If the pervious area has been removed, contact the County reviewer to determine a solution.

Runoff directed into vegetated areas is expected to be drained within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils. Loosen or replace the soils to restore drainage.

Other Special Considerations. Site design BMPs, such as impervious area dispersion, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the County reviewer may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the County reviewer to determine requirements.

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Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
Standing water in vegetated pervious area for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil). Make appropriate corrective measures such as adjusting irrigation system, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil). Loosen or replace soils to restore drainage (and prevent standing water)	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed
Entrance / opening to the vegetated pervious area is blocked such that storm water from impervious area will not drain into the pervious area (e.g., a curb cut opening is blocked by debris or a roof drain outlet has been directly connected to the storm drain system)	Make repairs as appropriate to restore drainage into the vegetated pervious area.	• Inspect monthly. • Maintain when needed.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention and/or infiltration storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If biofiltration with partial retention cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After biofiltration with partial retention has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

Maintenance Overview

Normal Expected Maintenance. Biofiltration with partial retention requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure. If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations. Biofiltration with partial retention is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, routine maintenance is key to preventing this scenario.

Sediment Loading. Consider the effects of BMP design and tributary area land uses on the clogging potential of the BMP. Complete the sediment loading analysis included in Appendix F.

Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the County reviewer shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Underdrain clogged	Clear blockage.	Inspect if standing water is observed for longer than 24-96 hours following a storm event. Maintain when needed.

the available infiltration storage volume calculated from the bioretention without underdrain footprint area, effective depths for surface ponding, media and aggregate storage layers, and in-situ soil design infiltration rate for a maximum 36-hour drawdown time for the aggregate storage layer (unless percent capture method is used), with surface ponding no greater than a maximum 24-hour drawdown. The drawdown time can be estimated by dividing the average depth of the basin by the design infiltration rate of the underlying soil. Appendix D provides guidance on evaluating a site's infiltration rate. A generic sizing worksheet is provided in Appendix B.4.

4. Where the DCV cannot be fully infiltrated based on the site or bioretention constraints, an underdrain can be added to the design (use biofiltration with partial retention factsheet).

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations must be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, maximum side and finish grade slopes, and the recommended media surface area tributary area ratio. Design for flow control can be achieved using various design configurations.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide infiltration storage to reduce flow rates and durations to allowable limits while adhering to the maximum drawdown times for surface ponding and aggregate storage. Flow rates and durations can be controlled using flow splitters that route the appropriate inflow amounts to the bioretention facility and bypass excess flows to the downstream storm drain system or discharge point.
3. If bioretention without underdrain facility cannot fully provide the flow rate and duration control required by the MS4 permit, an upstream or downstream structure with appropriate storage volume such as an underground vault can be used to provide additional control.
4. After bioretention without underdrain BMPs have been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

Maintenance Overview

Normal Expected Maintenance. Bioretention requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

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- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underlying native soils, or outlet structure. The specific cause of the drainage issue must be determined and corrected. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

5. **Other Special Considerations.** Bioretention is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, routine maintenance is key to preventing this scenario.

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Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or repairing/replacing clogged or compacted soils. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the County reviewer shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.

"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).