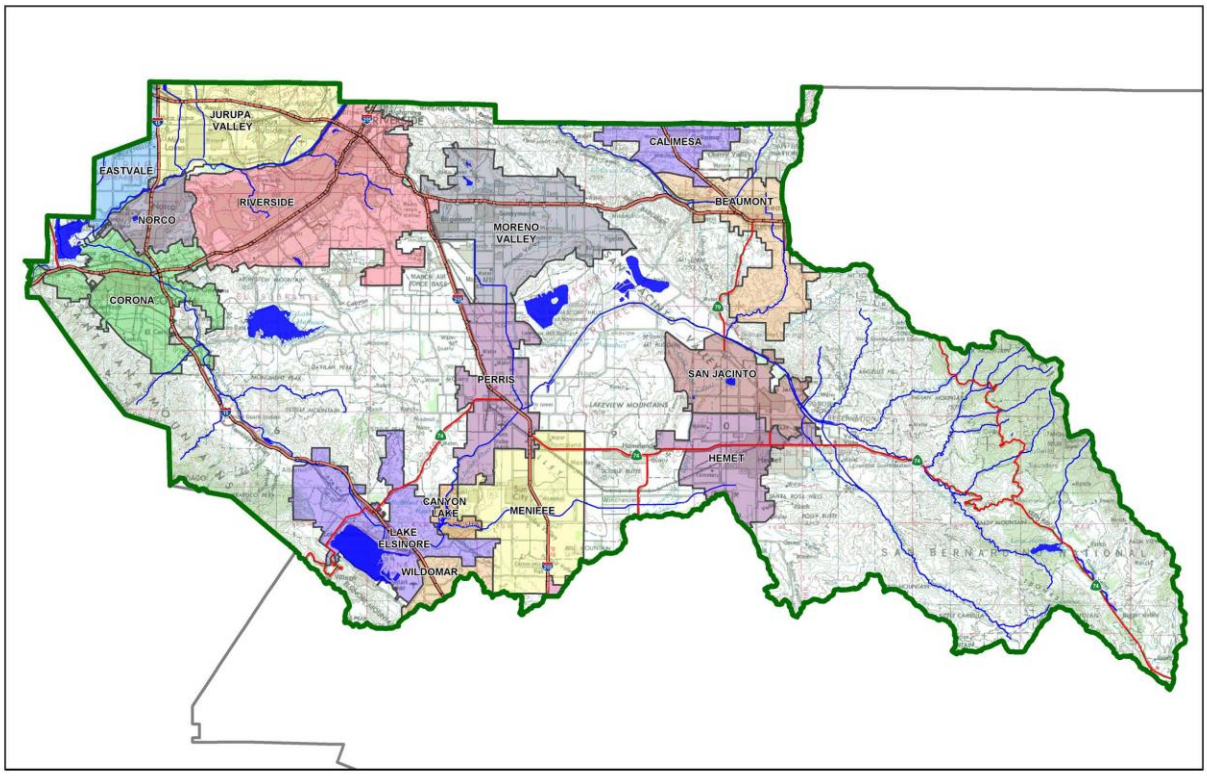
Preliminary Specific Water Quality Management Plan

*Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Glen Ivy Senior Living

Development No:

Design Review/Case :



☒ **Preliminary**

☐ **Final**

Original Date Prepared: May, 2020
Revision Date(s):

JN: 430-856

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

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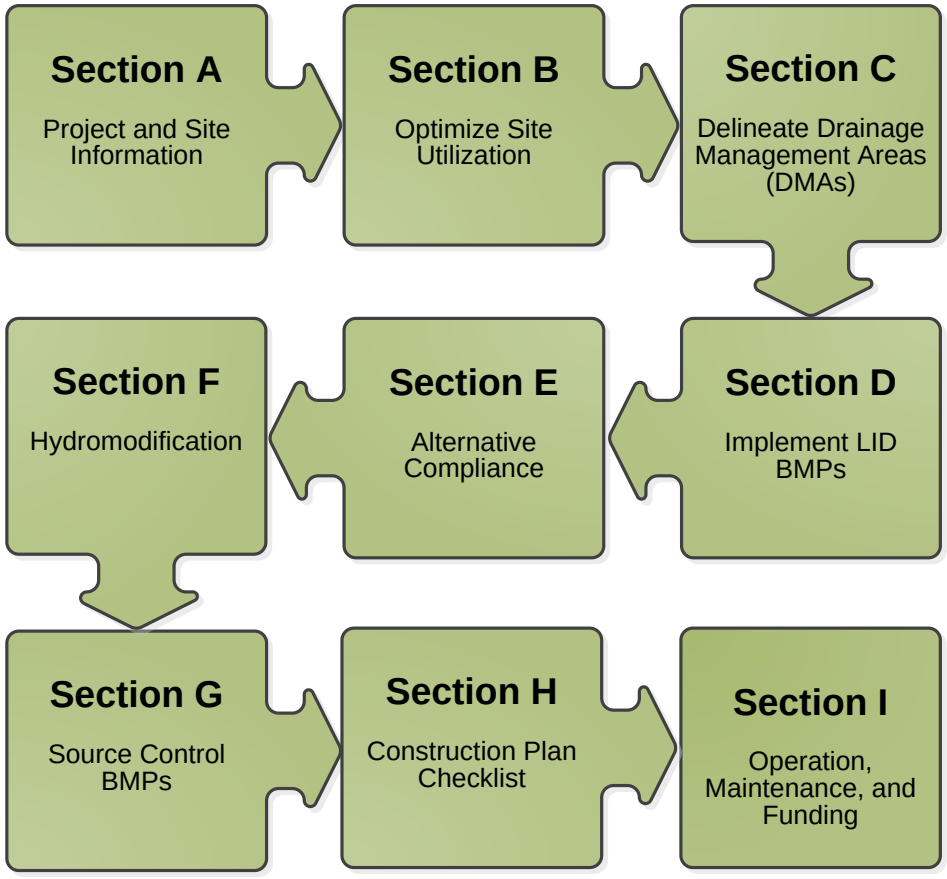
INTRODUCTION

This Preliminary Project-Specific Glen Ivy Senior Living WQMP for the **Santa Ana Region** has been prepared to help guide in documenting compliance for this project. Below is a flowchart for the layout of this WQMP that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Preliminary Project-Specific Water Quality Management Plan (PWQMP) has been prepared for **Glen Ivy Properties, LLC.** by **K&A Engineering, Inc.** for the **Glen Ivy Senior Living** Development project.

This PWQMP is intended to comply with the requirements of **County of Riverside** for Ordinance No. 754.2 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under **County of Riverside**, Water Quality Ordinance (Municipal Code Section 754.2).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
James R. Boton, P.E. Preparer's Printed Name	Project Manager Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Residential Senior Living Development
Planning Area:	Glen Ivy
Community Name:	Riverside County
Development Name:	Glen Ivy Senior Living
PROJECT LOCATION	
Latitude & Longitude (DMS): 33.765877° & -117.487443°	
Project Watershed and Sub-Watershed: Santa Ana River Watershed, Middle Santa Ana Sub-Watershed.	
APN(s): 290-190-083 & 290-190-084	
Map Book and Page No.:	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential Senior Living Dev.
Proposed or Potential SIC Code(s)	TBD
Area of Impervious Project Footprint (SF)	Residential: 5.7 Ac, Imp = 187372 sf.
Total Area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	1,149,970 sf
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the project limits (SF)	0 sf (ex. Dev.)
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	
Are there any natural hydrologic features on the project site?	☒ Y ☐ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site	See attached Geotech
What is the Water Quality Design Storm Depth for the project?	D85 = 0.97 inches

The Glen Ivy Senior Living project is located in the County of Riverside area, south of the City of Corona, west of the I-15 Freeway, at the southwest corner of Temescal Canyon Road and Trilogy Parkway. It is located in Section 3 of Township 5 South, Range 6 West, SBB and M and includes Assessor Parcels 290-190-083 and -084.

Coldwater Canyon Creek, drains from South to North in this area, and will be the receiving the drainage from this project and it tributary area. This creek runs

adjacent to this project along the east side of Temescal Canyon Road.

The 10 acre Glen Ivy Senior Living community will provide 188 full service residential facilities for Independent Living, Assisted Living, and Memory Care residents. The site includes two buildings, a 250,000 square foot 2-story building (including atrium spaces) and a 32,100 square foot single story building (including atrium space), along with on-site parking and a Water Quality basin. There are four access driveways provided. Two along Trilogy Parkway and two along Temescal Canyon Parkway. The project is being processed as a Conditional Use Permit, CUP, with the County of Riverside.

The offsite watershed area of the project contains approximately 0.9 acres will drain through the project. The land use of this offsite tributary area is the Glen Ivy RV Park. This offsite tributary along with the approximately 9 acres of onsite drainage area is collected in an onsite storm drain system and routed through the onsite Water Quality basin, which discharges into Coldwater Creek.

The drainage design for the Glen Ivy Senior Living project intercepts approximately 14 acres of other offsite tributary area and routes these flows around the large building and connects directly to the projects downstream storm drain system which drains to Coldwater Creek, thus by-passing the projects onsite Water Quality basin.

The grading and drainage design of Glen Ivy Senior Living has been developed to maintain the natural drainage patterns as much as practical. The roadway system and the proposed storm drain system will intercept runoff from the development and safely convey these flows to proposed mitigation infiltration/detention basins within the development.

The project takes its primary access from Trilogy Parkway and Temescal Canyon Parkway.

Following is a list of potential wastes/pollutants that may be generated on this site based upon the described use: Bacterial Indicators, Metals, Nutrients, Possible pesticides - fertilizers from landscape maintenance activities, Toxic Organic Compounds, Sediments, Trash and debris, Oil and grease.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces

- Drainage Infrastructure, Inlets, Overflows
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Coldwater Canyon Creek	None		None
Temescal Creek Reach 2	Bacteria	MUN, REC1, REC2, WARM, WILD, AGR, RARE, GWR, IND.	7 miles
Santa Ana River Reach 3 (HU# 801.21)	Copper, Lead, Pathogens	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	18 miles
Santa Ana River Reach 2 (HU# 801.13)	Indicator Bacteria	AGR, GWR, REC1, REC2, WARM, WILD, RARE, MUN, SPWN	20 miles

2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) — Statewide

2010 Integrated Report | Map | 303(d) List | References | Data Download | Past Reports | Contact Us

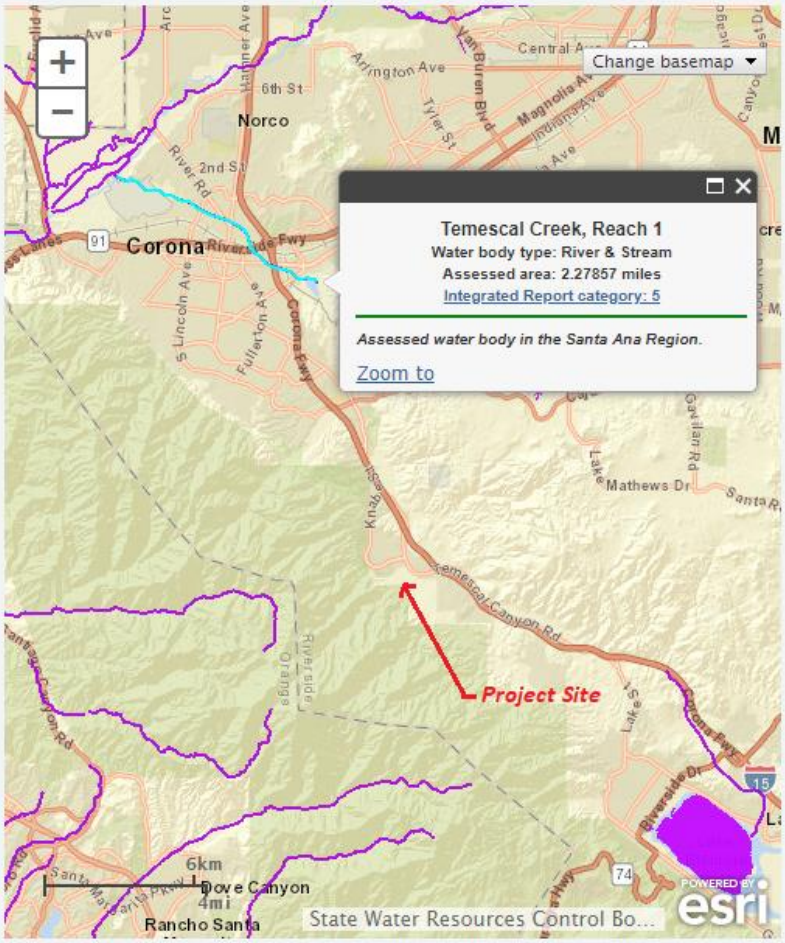
2010 INTEGRATED REPORT — ALL ASSESSED WATERS

Zoom to county: All — Show county

Zoom to Regional Board: All — Show Regional Board

Map Help

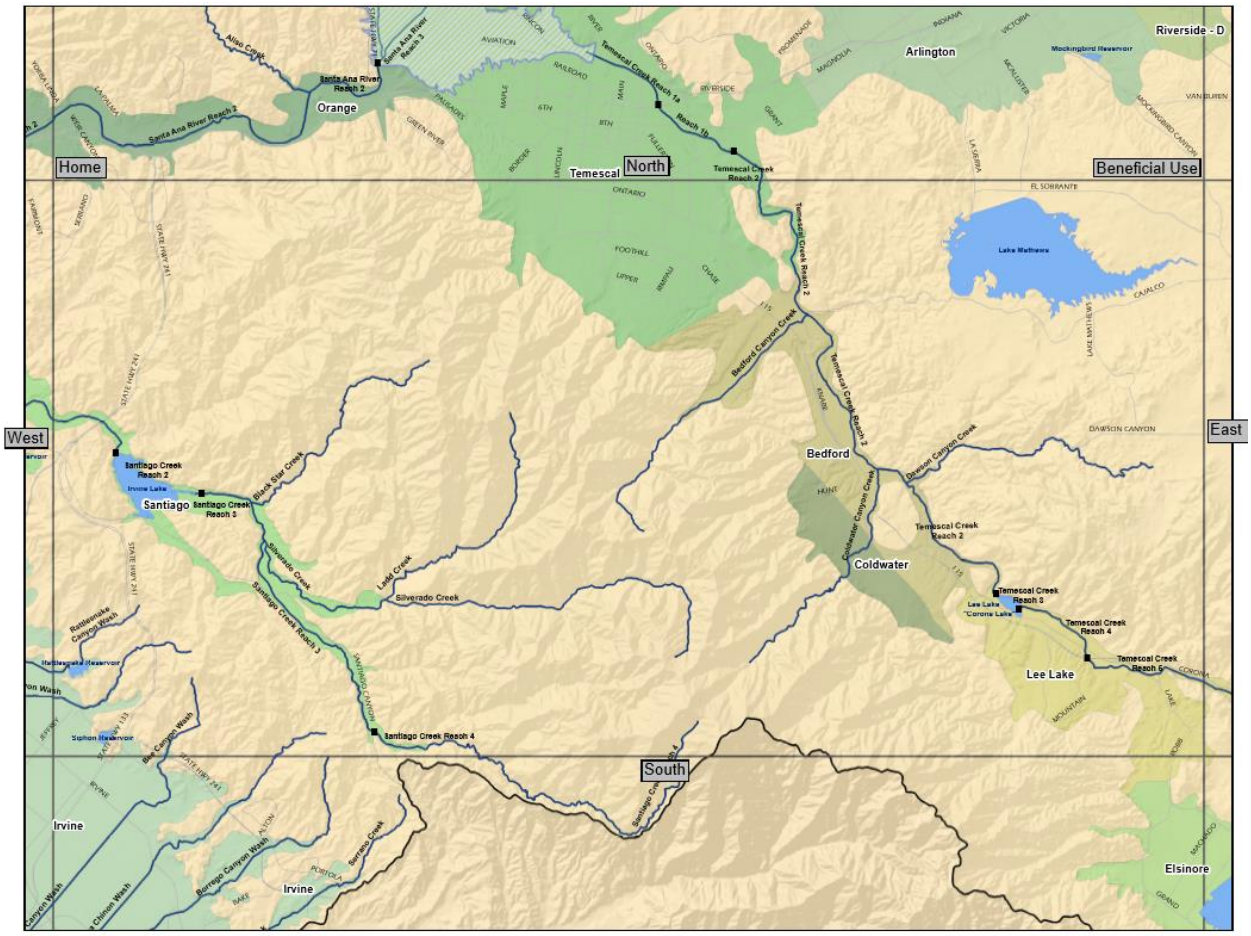
Zoom to water body: *(Filter: All)* — Filter list by: — Reset list



Temescal Creek, Reach 1 Close
Pollutant assessments

Pollutants	Listing Decision	List on 303(d) list (TMDL required list)
	Report Link	25614
	Potential Sources	n/a
	Schedule	Est. TMDL completion: 2021
	Comments	
pH		

This Webinar walks the user through the Integrated Report and its geospatial information system



RWQCB – Region 8 Basin Plan Map – Beneficial Uses

9	Temescal Creek Reach 2	AGR	X
		GWR	X
		IND	X
		WILD	X
		MUN	+
		REC1	X
		REC2	X
		WARM	X

		GWR	I
9	Santa Ana River Reach 2	GWR	X
		AGR	X
		REC2	X
		REC1	X
		RARE	X
		MUN	+
		WILD	X
		WARM	X
9	Santa Ana River Reach 3	AGR	X
		GWR	X
		MUN	+
		RARE	X
		REC1	X
		REC2	X
		SPWN	X
		WARM	X
		WILD	X

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Wildlife, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage *(2009-0009-DWQ as amended by 2010-0014-DWQ)*	☒ Y	☐ N
Statewide Industrial General Permit Coverage *(Order No. 1997-0003-DWQ)*	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* County Grading Permit and Building Permit.	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

All applicable permits will be included in this WQMP, when is available.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible

In addition to requiring implementation of LID BMPs, the MS4s Permit also prioritizes which LID BMPs should be used first.

1. Infiltrate,
2. Harvest and Use,
3. Evapotranspire,
4. Bio-Treatment and/or

Within the permits it is recognized that LID principles are not universally applicable throughout Riverside County and that they are dependent on factors such as:

1. Soil conditions including soil compaction and permeability,
2. Groundwater levels,
3. Soil contaminants (Brownfield development),
4. Space restrictions (in-fill projects, redevelopment projects, high density development),
5. Highest and best use of Urban Runoff (to support downstream uses)

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Coldwater Canyon Creek, drains from South to North in this area, and will be the receiving the drainage from this project and it tributary area. This creek runs adjacent to this project along the east side of Temescal Canyon Road.

The grading and drainage design of Glen Ivy Senior Living has been developed to maintain the natural discharge patterns as much as practical. The proposed drainage plan will provide for construction of inlets with the storm drain system. The project design directs all flows from within the developed residential senior living community into the proposed Infiltration/Detention Basin prior to discharge back to Coldwater Canyon Creek.

Did you identify and protect existing vegetation? If so, how? If not, why?

The project is in compliance with the this County's General Plan with respect to preservation of natural areas.

The grading and drainage design of Glen Ivy Senior Living project has been developed to maintain the natural drainage discharge patterns as much as practical.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

*Per GeoSoils, Inc. Exploration Location Map Figure 1, the proposed BMP basin area is within two soil types. The northern portion is **Qf** soil type (quaternary Alluvial Fan Deposits) and southerly portion is **Qal** soil type (quaternary alluvium, younger). Also confirm per Infiltration Test results, the infiltration rates average 0.05 in/hr within **Qf** limit (P-1) and 1.89 in/hr within **Qal** limit. Therefore the proposed gravel bottom for infiltration will be only within **Qal** limit.*

Based on LID BMP Prioritization, Pre-treatment BMP and Infiltration/Detention basin was selected as the most appropriate treatment BMPs for DMAs Area A for alternate BMP in sites with good infiltration rates.

Did you identify and minimize impervious area? If so, how? If not, why?

The proposed Glen Ivy Senior Living will include landscaped areas, proposed BMPs: catch basin inserts, pre-treatment filtration and Infiltration/Detention Basin in an effort to reduce urban runoff and maintain the natural landscape of the area.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

The building roof drains will be routed into adjacent landscape areas.
The proposed on-site drainage project disperses runoff into Infiltration/Detention Basin as structural BMPs.
With the proposed development draining into Infiltration/Detention Basin capable of treating the total Vbmp from proposed project site.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, the Table C.1 below was completed to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. This information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Ac)	DMA Type
DMA A-6	Off-site area (Mix surfaces)	0.86	"D", to BMP A
DMA A-7	Senior Living (Mix surfaces)	2.76	"D", to BMP A
DMA A-8	Senior Living (Mix surfaces)	3.44	"D", to BMP A
DMA A-9	Senior Living (Mix surfaces)	2.14	"D", to BMP A
DMA A-10	Basin (Ornamental Landscaping)	0.56	"D", to BMP A

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Ac.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA A-6 thru A-10	BMP A: Catch Basin Inserts (pre-treatment) and Infiltration/Detention Basin

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE D-5.6

For conservative Glen Ivy Senior Living Project, I = 0.65 – 0.9 ➔ Average 0.8

For Apartment areas use ➔ I = 0.9 in preliminary

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Co-Permittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour? *) see below	X	
If Yes, list affected DMAs: **All DMAs except Infiltration Basin bottom area.**		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here: *Per Supplemental Percolation/Infiltration Testing results, by GeoSoils, Inc. dated April 13, 2020 the infiltration rates at* ***outside Infiltration Basin bottom area is 0.05 in/hr (P-1 location) and at Infiltration Basin bottom area is 1.89 in/hr (P-2 location)****.*		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

- ☐ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: **N/A**

Type of Landscaping (Conservation Design or Active Turf):

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces:

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor:

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

*Minimum required irrigated area***:**

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
.	.

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: **N/A**

Project Type:

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces:

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor:

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users:

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
.	.

Other Non-Potable Use Feasibility – Not Applicable

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand:

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces:

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3:

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use:

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
.	.

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

- ✓ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).
- ☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

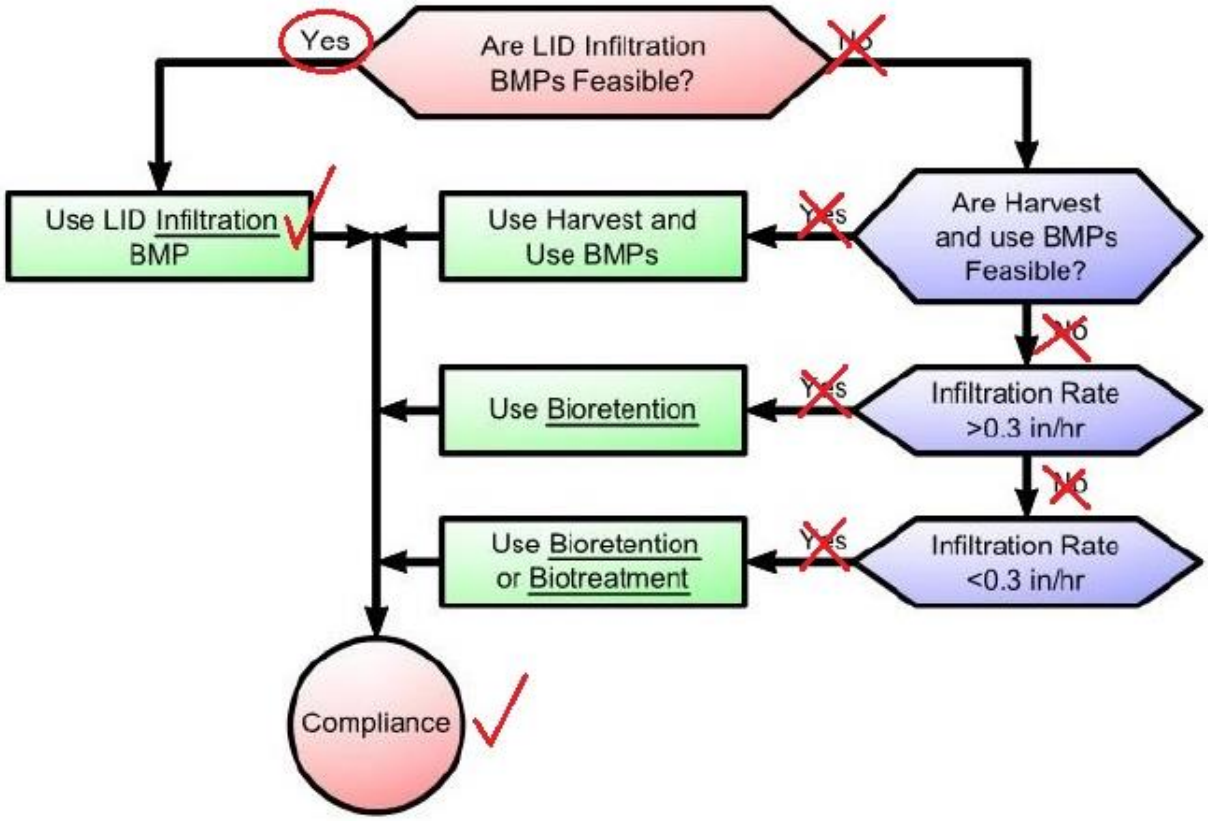
From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A-6 thru A-10	☒	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

DMA A-6, 0.86 Ac – Off-site (Mix surfaces) drains to grate inlet with filter insert. The Design Capture Volume for this area will be included to BMP-A, Infiltration/Detention Basin area A.
DMAs A-7 thru A-9, Area of 8.34 Ac - Residential Senior Living (Mix surface) drains to catch basins/inlets with filter inserts. The Design Capture Volume for this area will be added to BMP-A, Infiltration/Detention Basin area A.
DMA A-10, 0.56 Ac – Infiltration Basin area, will be basin ornamental landscape.



LID BMP Feasibility Flow Chart

Drainage Areas A

Based on LID BMP Prioritization, for alternate BMPs situated in good infiltration rate; Infiltration Basins were selected as the most appropriate treatment BMPs.

The project site infiltration rate is 1.89 in/hr > 1.6 in/hr at the infiltration basin bottom area. Therefore LID Infiltration BMPs are selected: Infiltration Basins.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *BMP A-7 thru BMP A-10*		
	[A]		[B]	[C]	[A] x [C]			
A-6 (0.86 Ac)	*37,461*	*Mix Surface*	*0.5*	*0.34*	*12708.6*			
A-7 (2.76 Ac)	*120,225*	*Mix Surface*	*0.9*	*0.73*	*87798.2*			
A-8 (3.44 Ac)	*149,846*	*Mix Surface*	*0.9*	*0.73*	*109429.8*			
A-9 (2.14 Ac)	*93,218*	*Mix Surface*	*0.9*	*0.73*	*68075.4*			
A-10 (0.56 Ac)	*24,393*	*Ornamental Landscaping*	*0.1*	*0.11*	*2694.4*			
	$A_T = \Sigma[A]$ 425,143				Σ= [D] 280,706.4	[E] 0.98	$[F] = \frac{[D]x[E]}{12}$ 22924.4	[G] >22,925

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*

	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{12}$	[G]

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***Enter BMP Name / Identifier Here "BMP C"***		
	[A]		[B]	[C]	[A] x [C]			
						Design Storm Depth (in)	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{12}$	[G]

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

See complete calculations in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

✓ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus **this Section is not required to be completed.**

Or -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☒ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P

☒	Parking Lots (>5,000 ft^2)	P[6]	P	P[1]	P[1]	P[4]	P[1]	P	P
☐	Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern		☒	☒	☒	☒	☒	☒	☒	☒

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

For DMA A-1 thru A-15, see Appendix 6.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		***BMP B-1 and BMP B-2***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or*	*Total Storm*	*Proposed Volume or Flow on Plans*

							Design Flow Rate (cubic feet or cfs)	*Water Credit % Reduction*	*(cubic feet or cfs)*
	A_T = Σ[A]			Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]	

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
N/A		

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*
[2] *Cross Reference Table E.1 above to populate this column.*
[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- **Riverside County Hydrology Manual**
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration (hr)	See Appendix 7		
Peak Runoff (cfs)			
Volume (Acre Feet)			

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

See Appendix 7 for HCOC mitigation

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

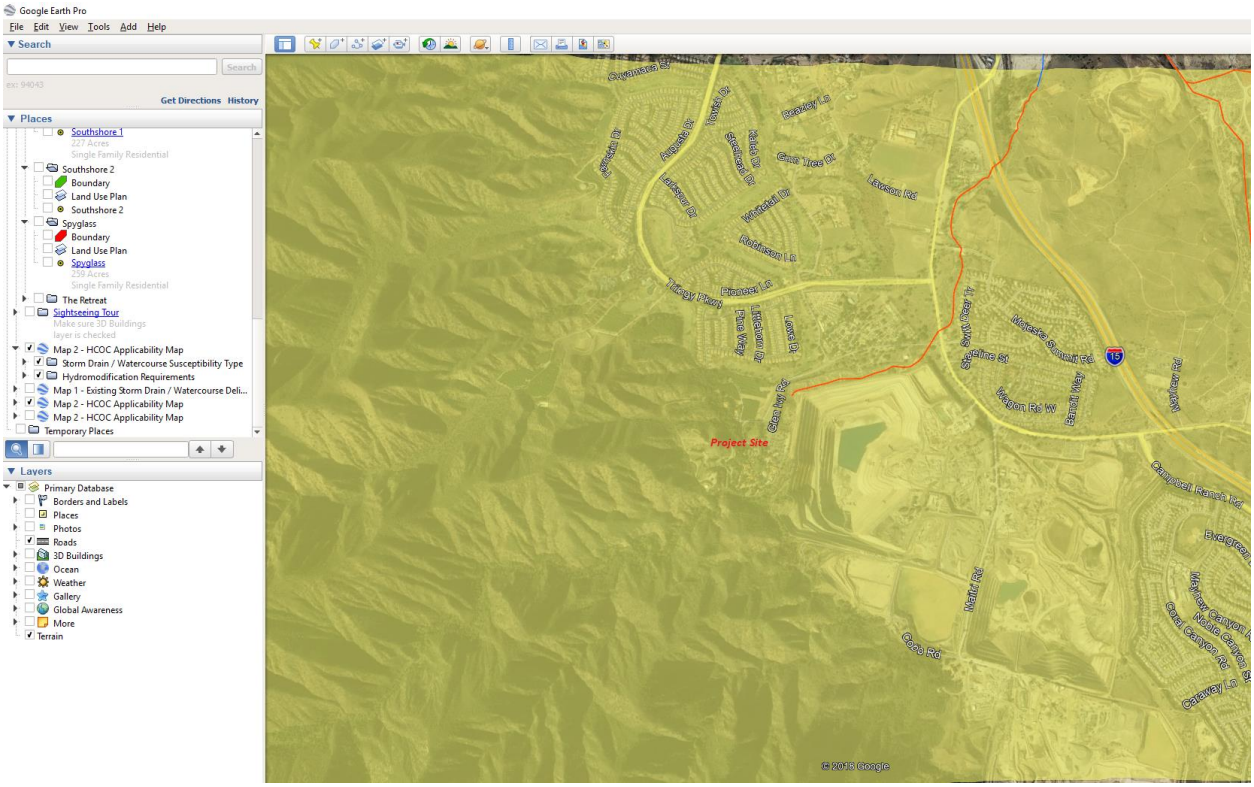
Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

Summary HCOC – Detention Basin A Routing result: Drainage Area A – existing (9.76 Ac), proposed (9.76 Ac)

Storm Frequency	**Existing** Q_2 (cfs) **[1]**	**Proposed** Q_2 (cfs)	**Det. Basin Outlet** Q_2 (cfs) **[2]**	**Different [2] – [1]** (cfs)	**Different [2] – [1]** (%)
2-year 24-hour	0.381	2.407	0.405	0.024	6.29%

Based on the information provided above, this project meets the requirements of Condition C and will not create a hydrologic condition of concern in the proximate or downstream receiving waters. The post-development hydrograph for the 2-year, 24-hour rainfall event will be mitigated by the implementation of Site Design BMPs to limit discharges to a flow rate ***no greater than 110% of pre-development 2-year flow.***



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

The project site is within an Applicable Area with the downstream being a potentially Susceptible Stream Channel, therefore HCOC mitigation is provided.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Based on the information provided above, this project meets the requirements of Condition C and will not create a hydrologic condition of concern in the proximate or downstream receiving waters. The post-development hydrograph for the 2-year, 24-hour rainfall event will be mitigated by the implementation of Site Design BMPs to limit discharges to a flow rate no greater than 110% of pre-development 2-year flow.
Project development and street improvements include local storm drain systems which convey developed flows and street runoff to a number of proposed Infiltration/Detention Basin. For Hydromodification, the proposed Infiltration Basin include sufficient volume above the proposed water quality volume within Infiltration/Detention Basin, that will satisfy the requirement of post-development peak discharge, volume and time of concentration for the 2-year 24-hour storm that DOES NOT exceed the pre-development peak runoff by more than 10 percent.

The proposed project Infiltration/Detention Basin is capable of all of the following:

1. Releasing the post-development hydrograph for 2-year, 24-hour at flow rates less than or equal to the pre-development 2-year, 24-hour peak flow rates.
2. Passing the 100-year storm event without damage to the BMP.
3. Controlling outlet velocities such that downstream erosion and habitat loss are minimized.

Supporting calculations can be found in the reference locations provided in Appendix 7 of this report.

With proposed mitigation, this project is not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Storm drain markers – Only Rain Down the Storm Drain.	Maintain and periodically repaint or replace inlet marking. Provide stormwater 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 Stormwater Quality Handbooks at www.cabmphandbooks.com 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."
Landscape / Outdoor Pesticide Use	Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. Proposed native trees or areas of shrubs and ground cover	Maintain landscaping using minimum or no pesticides Irrigation System and Landscape Management (N3) See applicable operational BMPs in "What you should know for…..Landscape and Gardening"
Pools, spas, ponds, decorative fountains, and other water features.	Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain"
Refuse areas	Site refuse and recycled materials will be handled and stored for pickup regularly. Refuse areas for commercial shall include trash enclosures, covered, gated, walled, bermed to prevent runoff from the area.	Common Area Litter Control (N4) 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 Stormwater Quality Handbooks at www.cabmphandbooks.com
Roofing, gutters and trim	Roofs designed to runoff into adjoining landscaping. Avoid roofing, gutters and trim made of copper or other unprotected metals that may leach into runoff. Driveways of minimal widths	Activity Restrictions (N2)
Fire Sprinkler Test Water		See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Man-made & irrigated slopes and landscaped areas	Protect slopes and channels (S5) Hillside Landscaping (S12)	Irrigation System and Landscape Management (N3)

Landscape and Basin areas	Efficient Irrigation (S4)	Common Area Litter Control (N4)
Plazas, sidewalks, and parking lots.		Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

See additional information on Source Control BMPs and their operation and maintenance in Appendix 8 and Appendix 9.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
BMP A	WQ Catch Basin Insert (pre-treatment) – Infiltration/Detention Basin "A"	BMP Site Plan (Construction Plan will be included in the FWQMP)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism:

The Glen Ivy Senior Living owner will maintain the pre-treatment Catch Basin Inserts, and Infiltration/Detention Basin within Glen Ivy Senior Living community. The funding of the proposed BMPs will provided by the owner.

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y (POA) ☐ N

LID AND TREATMENT CONTROL BMPS

Infiltration/Detention Basin, and Catch Basin Inserts

- Construction and Initial Funding until acceptance will be provided by the project Developer or Builder.
- The Glen Ivy Senior Living community Property Owner's Association (POA) will provide maintenance of the all proposed BMPs and landscaping within the property.

Project owner:

Glen Ivy Properties, LLC
34145 Pacific Coast Highway
Dana Point, CA. 92629

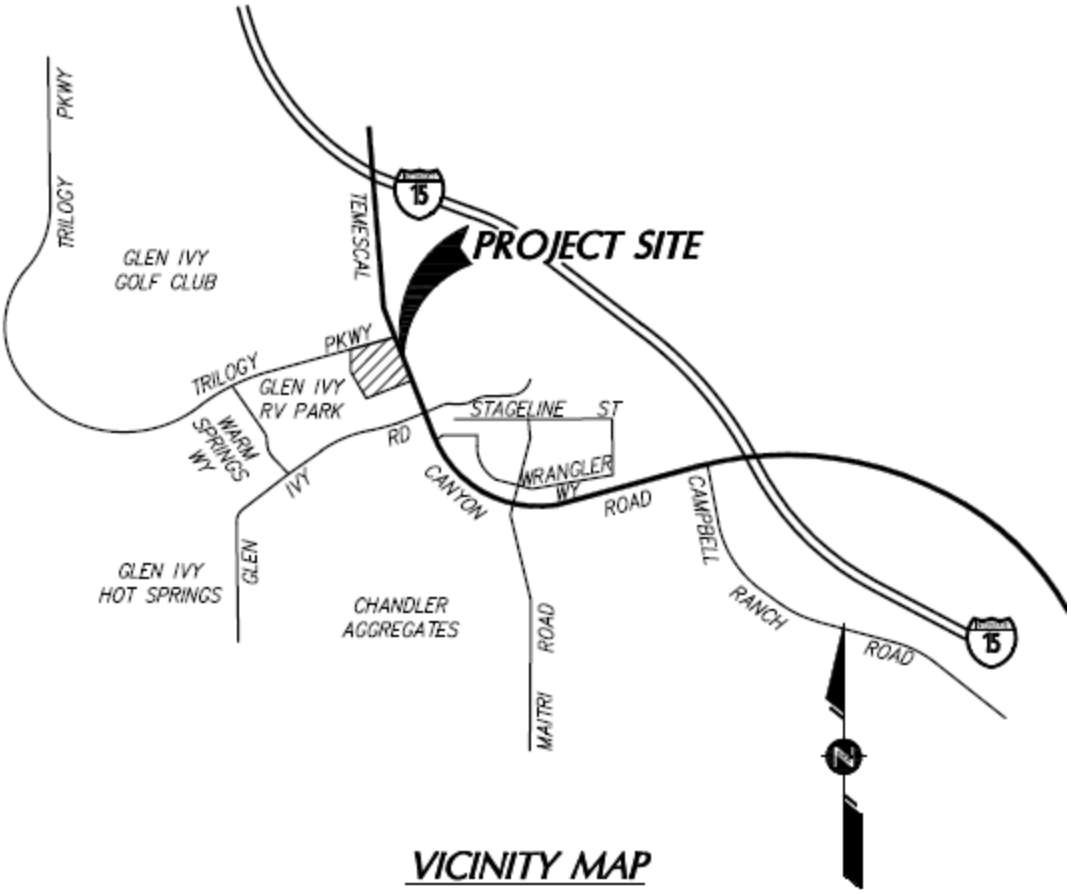
Telephone: (909) 260-9960

Contact person: Benjamin Day

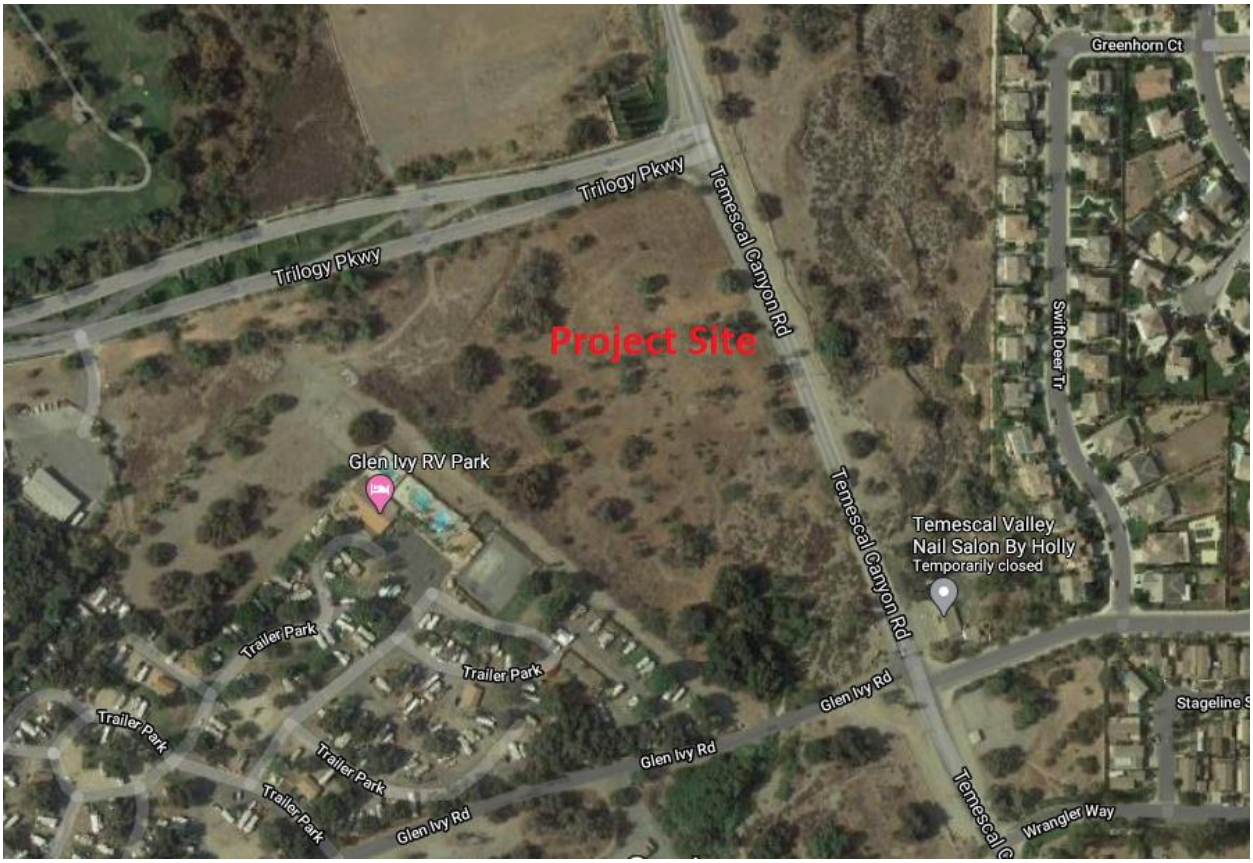
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



Vicinity Map
(NTS)



Aerial Map
(NTS)

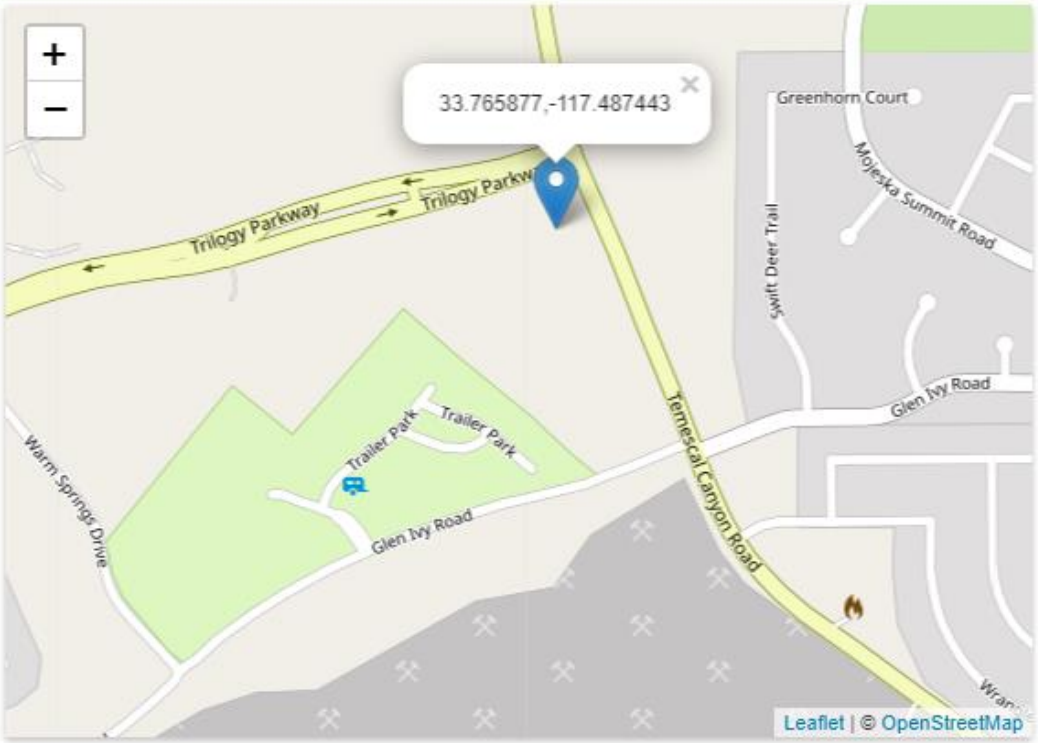
Latitude

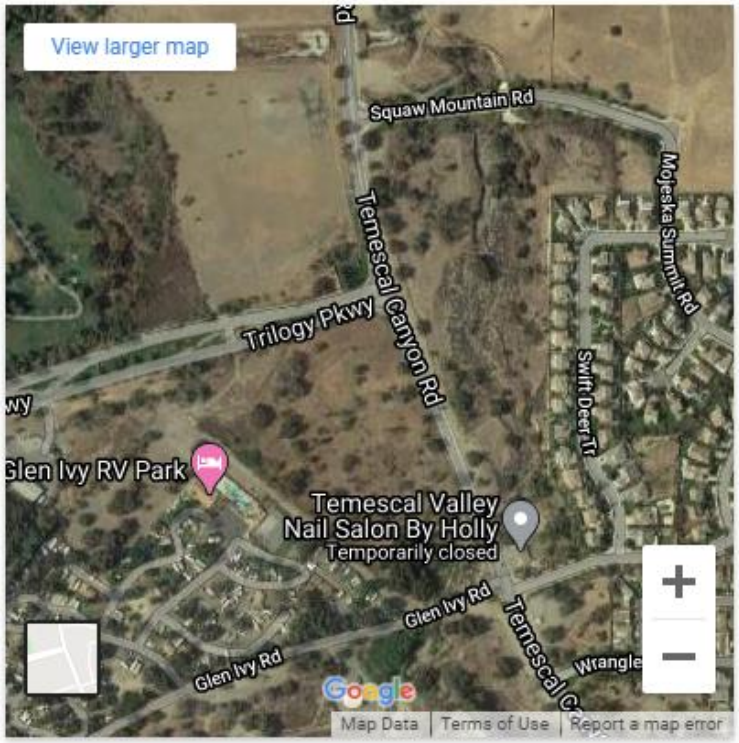
33.765877

Longitude

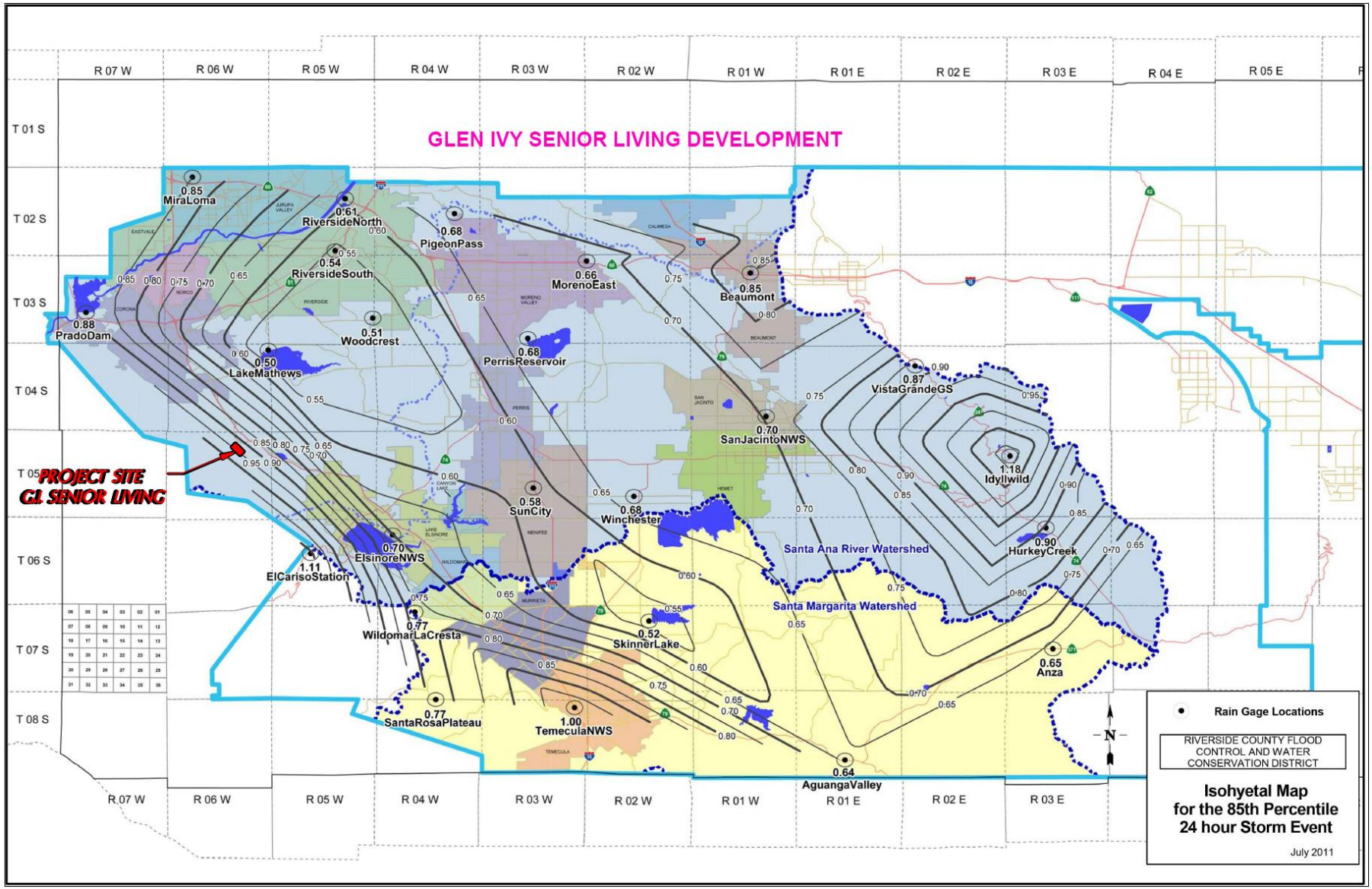
-117.487443

For better accuracy please type Name Address City State Zipcode.

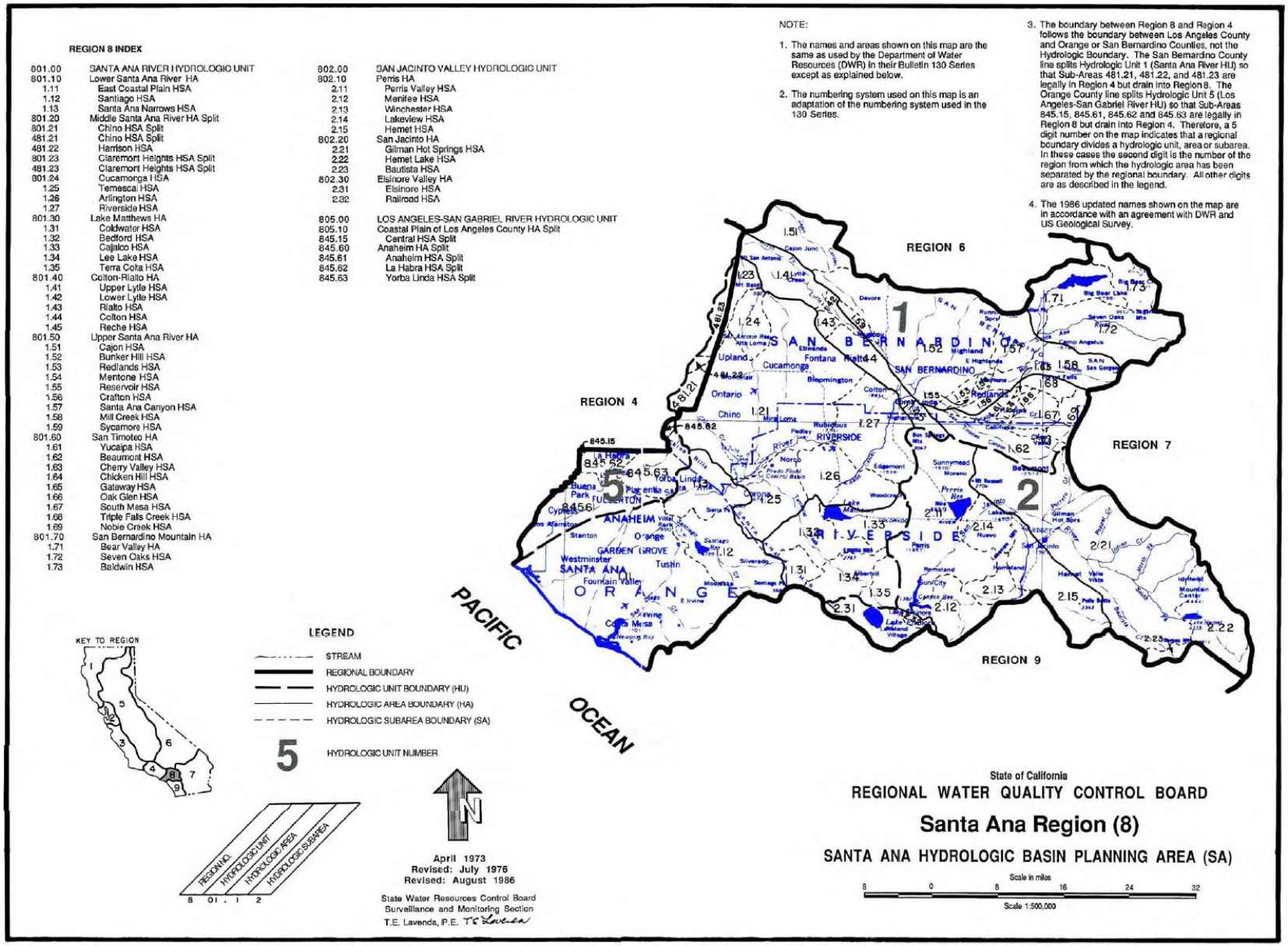




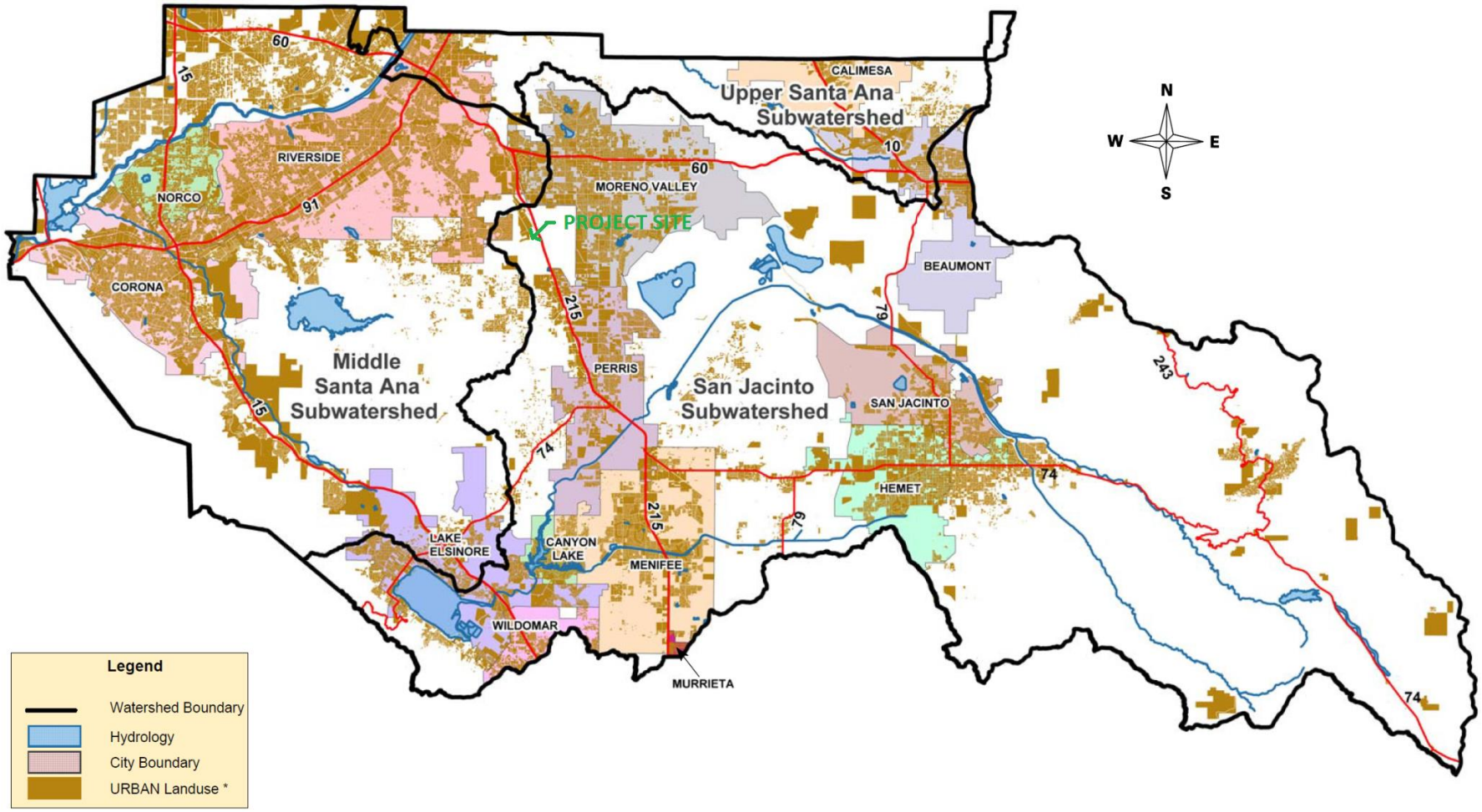
Latitude Longitude



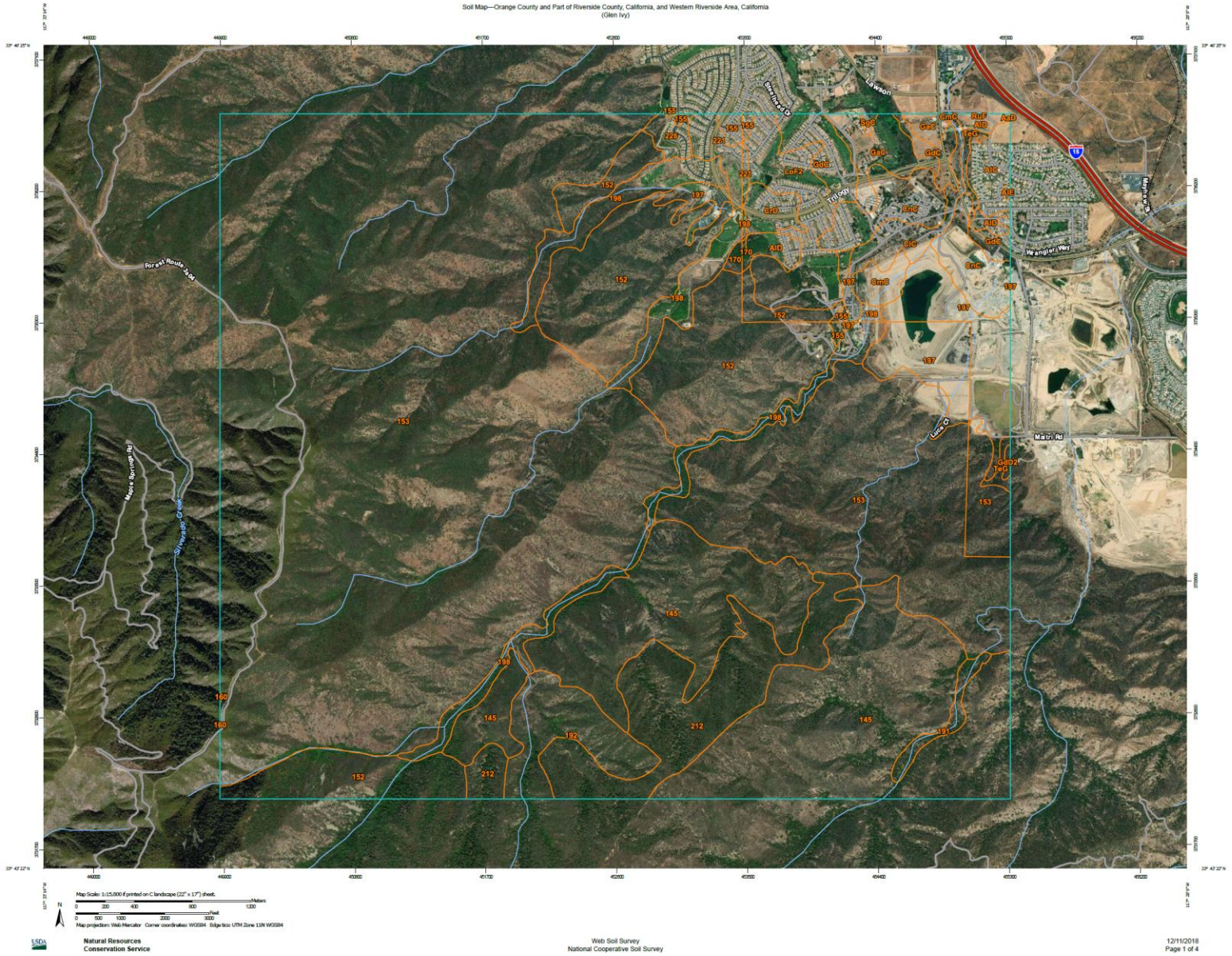
Isohyetal Map



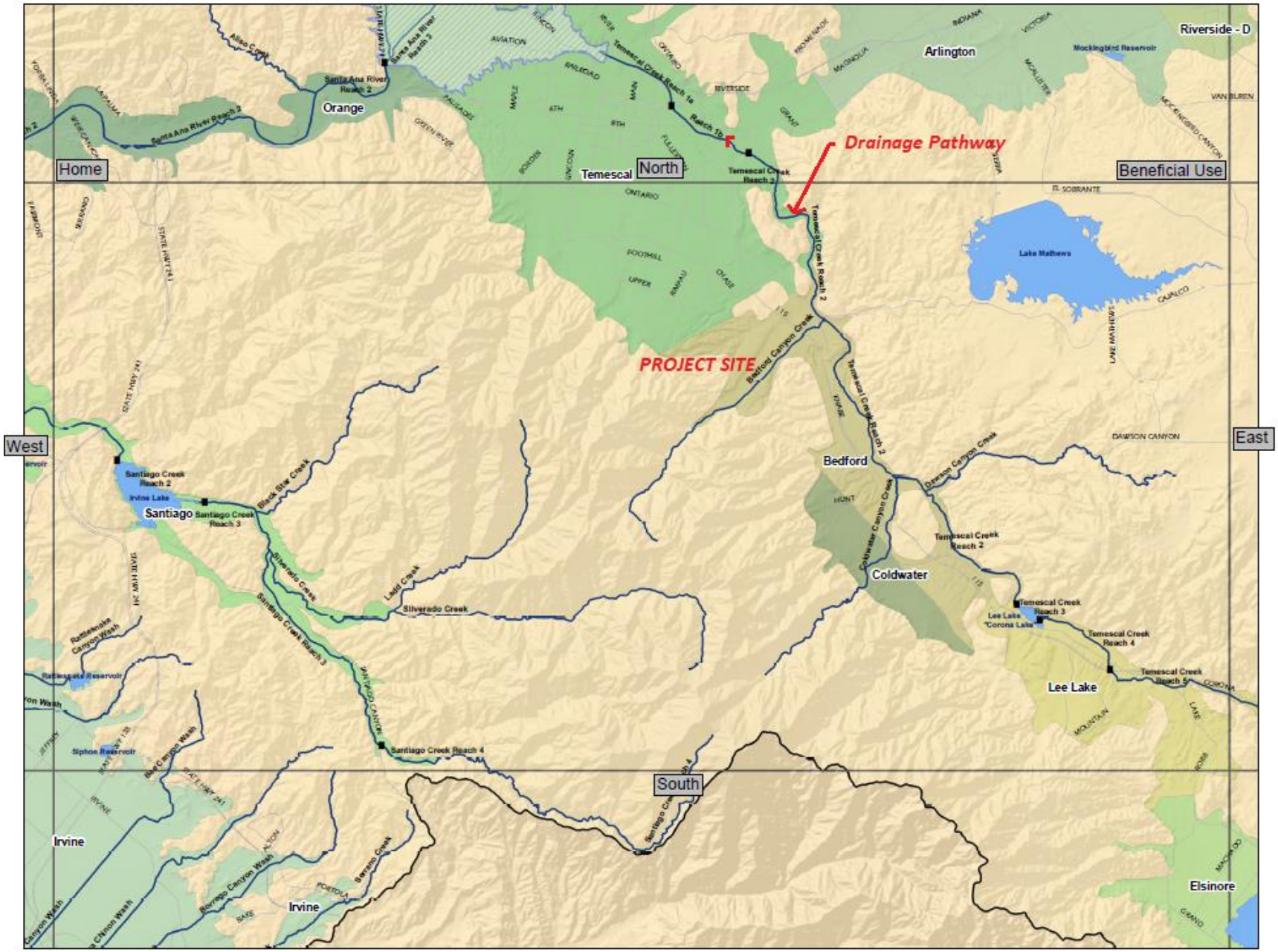
Receiving Water Map



* Areas not in URBAN: Agricultural, State, Federal, Tribal, Preserves & Open Space, Rural-Residential, Highways/Freeways



Hydrologic Soils Group for the project site(NTS)



RECEIVING WATERS

GLEN IVY SENIOR LIVING

3.1 Infiltration Basin

Type of BMP	LID - Infiltration
Treatment Mechanisms	Infiltration, Evapotranspiration (when vegetated), Evaporation, and Sedimentation
Maximum Treatment Area	50 acres
Other Names	Bioinfiltration Basin

Description

An Infiltration Basin is a flat earthen basin designed to capture the design capture volume, V_{BMP}. The stormwater infiltrates through the bottom of the basin into the underlying soil over a 72 hour drawdown period. Flows exceeding V_{BMP} must discharge to a downstream conveyance system. Trash and sediment accumulate within the forebay as stormwater passes into the basin. Infiltration basins are highly effective in removing all targeted pollutants from stormwater runoff.

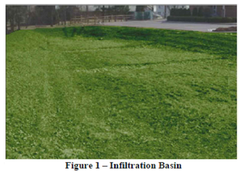
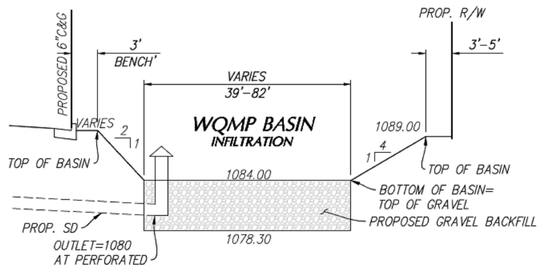
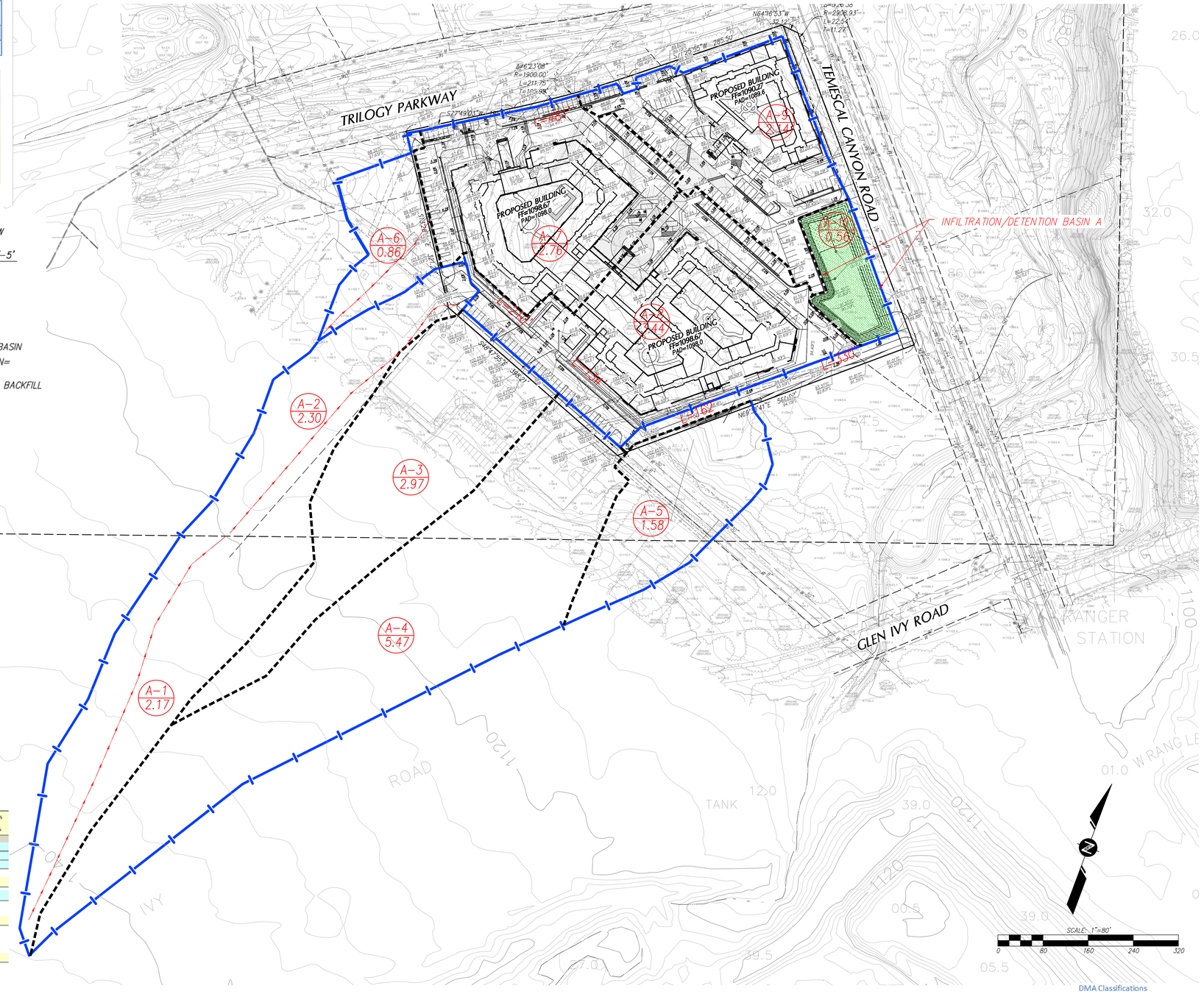
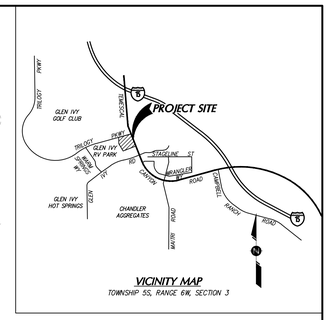


Figure 1 – Infiltration Basin



SECTION THROUGH BASIN





Santa Ana Watershed - BMP Design Volume, V_{BMP} (Rev. 10-2011)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook.)

Company Name	K&A Engineering, Inc.
Designed by	JY
Date	5/23/2020
Case No	
Company Project Number/Name	430.856 Glen Ivy Senior Living Project

BMP Identification

BMP NAME / ID: BMP-Glen Ivy Senior Living Project

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E: D_{85}= 0.98 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
A-6 (0.86 Ac)	37461	Mixed Surface Types	0.5	0.34	12708.6			
A-7 (2.76 Ac)	120225	Mixed Surface Types	0.9	0.73	87798.2			
A-8 (3.44 Ac)	149846	Mixed Surface Types	0.9	0.73	109429.8			
A-9 (2.14 Ac)	93218	Mixed Surface Types	0.9	0.73	68075.4			
A-10 (0.56 Ac)	24393	Ornamental Landscaping	0.1	0.11	2694.4			
	425143	Total			280706.4	0.98	22924.4	22925

DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Ac)	DMA Type
DMA A-6	Off-site area (Mix surfaces)	0.86	"D", to BMP A
DMA A-7	Senior Living (Mix surfaces)	2.76	"D", to BMP A
DMA A-8	Senior Living (Mix surfaces)	3.44	"D", to BMP A
DMA A-9	Senior Living (Mix surfaces)	2.14	"D", to BMP A
DMA A-10	Basin (Ornamental Landscaping)	0.56	"D", to BMP A

MARK	BY	DATE	REVISIONS	APPR.	DATE

ENGINEER — COUNTY

SEAL–ENGINEER: REGISTERED PROFESSIONAL ENGINEER JAMES R. BOLTON No. 30236 CIVIL STATE OF CALIFORNIA

K&A Engineering, Inc.
ENGINEERING
LAND PLANNING
SURVEYING
357 N. SHERIDAN STREET
SUITE 117
CORONA, CALIFORNIA 92880
TEL. (951) 279-1800
FAX (951) 279-4380

PREPARED BY:

JAMES R. BOLTON R.C.E. NO. 30236 DATE: _____

BENCHMARK:

SCALE: AS SHOWN

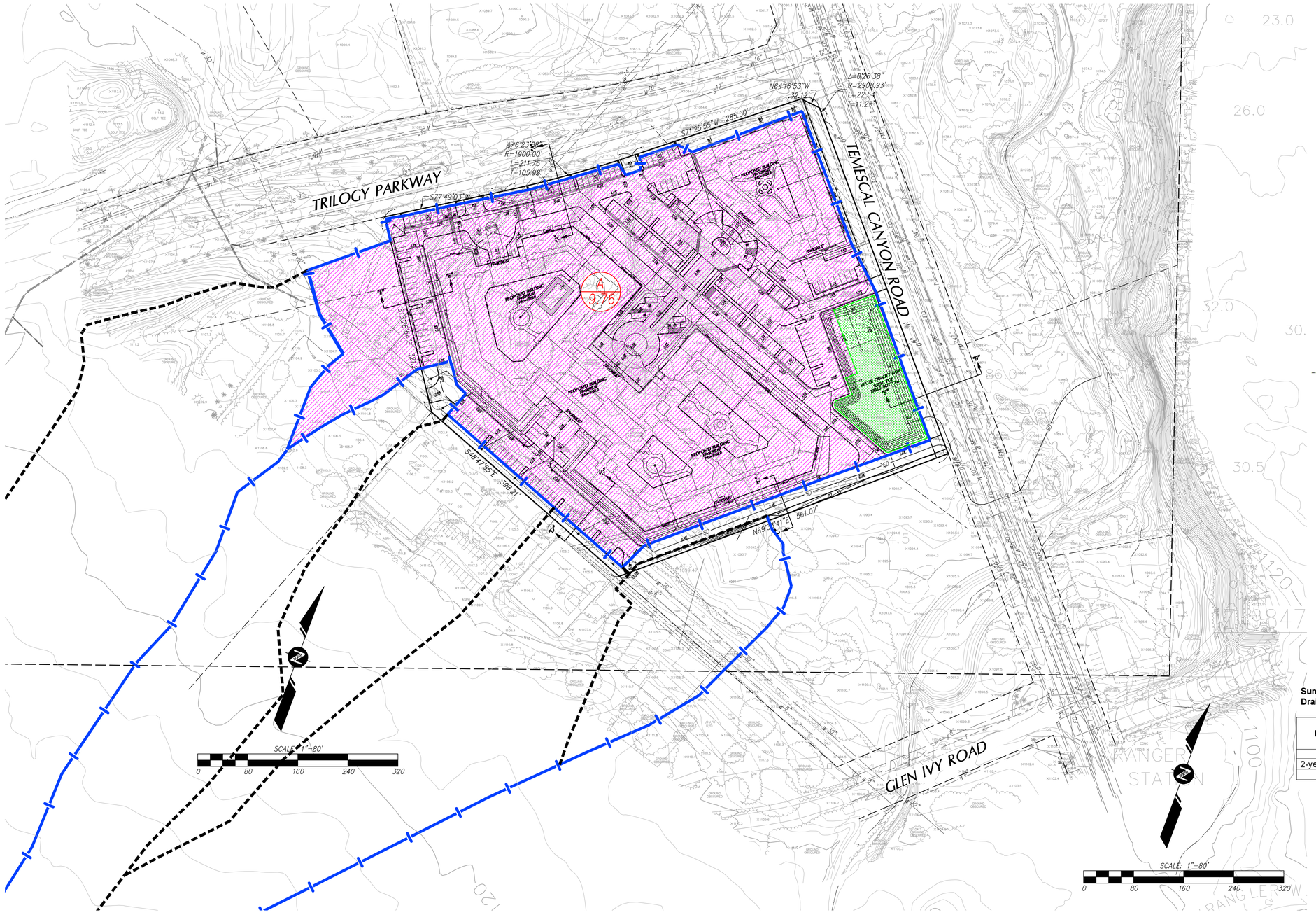
FOR: W.O. COUNTY FILE NO.

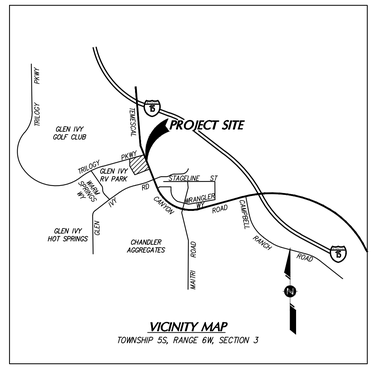
COUNTY OF RIVERSIDE
GLEN IVY SENIOR LIVING
GLEN IVY PROPERTIES, LLC
WQMP SITE PLAN

SHEET NO. _____ OF _____ SHTS

Drawing: C:\K&A projects\Senior Housing\856-WQMP-Site Plan-May 2020.dwg Layout: 30x42 Saved: 5/27/2020 3:07 PM Plotted: 5/27/2020 3:07 PM By: JY

GLEN IVY SENIOR LIVING





VICINITY MAP
TOWNSHIP 5S, RANGE 6W, SECTION 3

```
------------------------------------------------------------------------
Glen Ivy Senior Living
Inflow Hydrograph Calculations
Existing Condition
2-year 24-hour storm

------------------------------------------------------------------------
Drainage Area =       9.73(Ac.)  =      0.015 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       9.73(Ac.)  =      0.015 Sq. Mi.
Length along longest watercourse =      1323.00(Ft.)
Length along longest watercourse measured to centroid =       593.00(Ft.)
Length along longest watercourse =       0.251 Mi.
Length along longest watercourse measured to centroid =       0.112 Mi.
Difference in elevation =       20.80(Ft.)
Slope along watercourse =      83.0113 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.067 Hr.
Lag time =    4.00 Min.
25% of lag time =    1.00 Min.
40% of lag time =    1.60 Min.
Unit time =    5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =      0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]       Weighting[1*2]
        9.73                  2.20                21.41

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]       Weighting[1*2]
        9.73                  5.83                56.73

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.200(In)
Area Averaged 100-Year Rainfall =    5.830(In)

Point rain (area averaged) =    2.200(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.200(In)
```

Summary HCOC – Detention Basin A Routing result:
Drainage Area A – existing (9.76 Ac), proposed (9.76 Ac)

Storm Frequency	Existing Q_2 (cfs) [1]	Proposed Q_2 (cfs)	Det. Basin Outlet Q_2 (cfs) [2]	Different [2] – [1] (cfs)	Different [2] – [1] (%)
2-year 24-hour	0.381	2.407	0.405	0.024	6.29%

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TEL (951) 279-1800
FAX (951) 279-4380

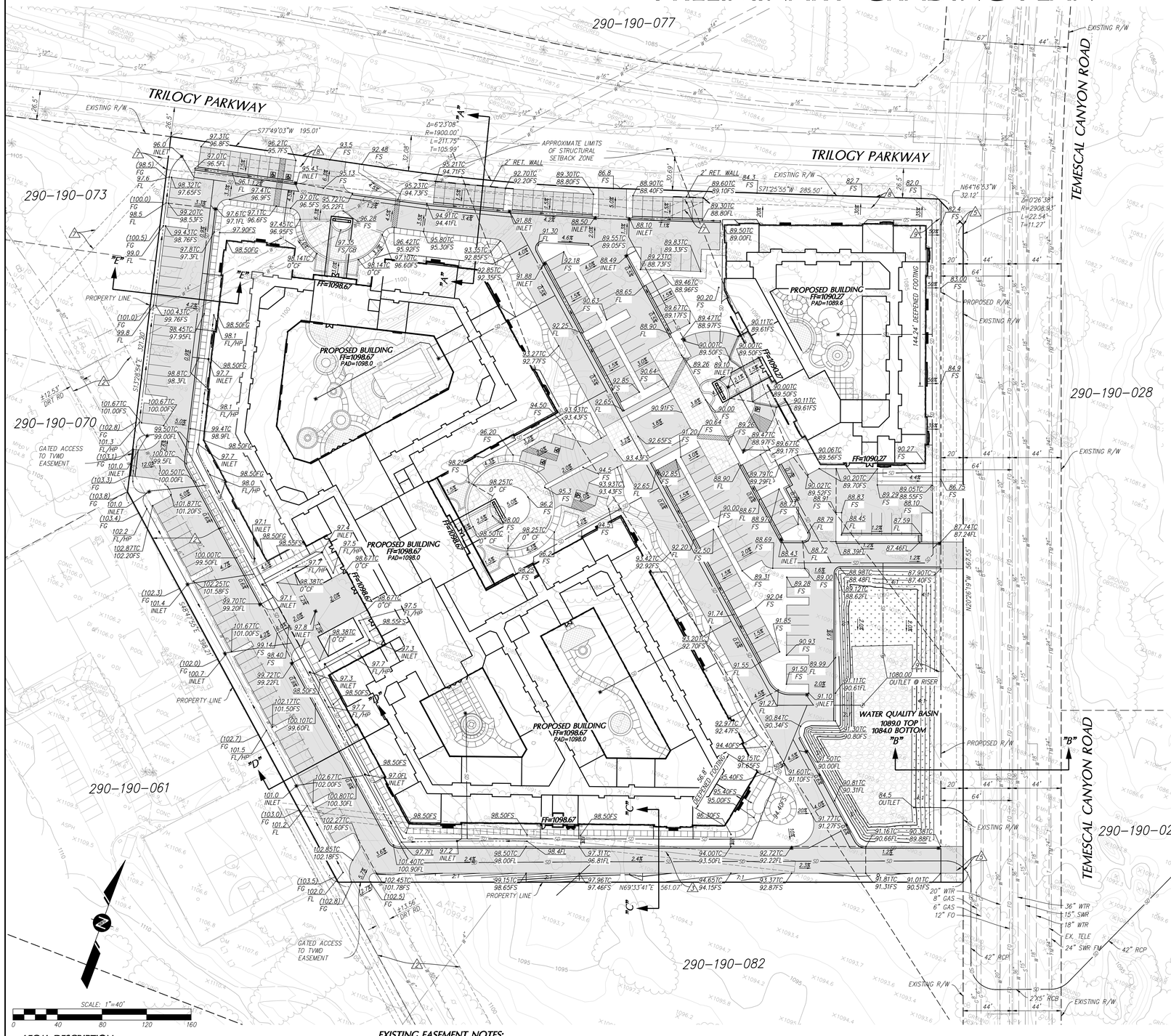
Hydrograph to Basin A

Drawing: C:\K&A projects\Senior Housing\856-WQMP-HCOC-May 2020.dwg Layout: 24x36L Saved: 5/27/2020 4:45 PM Plotted: 5/27/2020 4:45 PM By: JT

Appendix 2: Construction Plans

Grading and Drainage Plans

GLEN IVY SENIOR LIVING
PRELIMINARY GRADING PLAN



OWNER/ DEVELOPER
GLEN IVY PROPERTIES, LLC
34145 PACIFIC COAST HIGHWAY #621
DANA POINT, CA 92629
CONTACT: BENJAMIN DAY

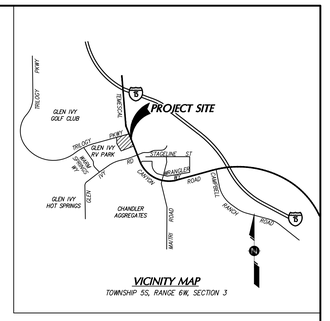
JOB SITE ADDRESS
TEMESCAL CANYON ROAD &
TRILOGY PARKWAY
CORONA, CA 92883

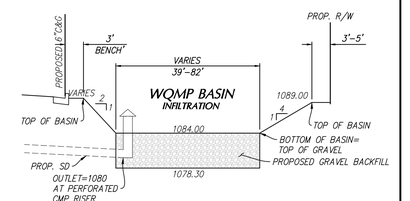
ASSESSOR'S PARCEL NUMBERS
290-190-083
290-190-084

ENGINEER
K & A ENGINEERING INC.
357 N. SHERIDAN STREET SUITE 117
CORONA, CA. 92880
PHONE: (951) 279-1800
FAX: (951) 279-4380
JAMES BOLTON, P.E.

ABBREVIATIONS
TC – TOP OF CURB
FL – FLOW LINE
GB – GRADE BREAK
BCR – BEGINNING CURB RETURN
ECR – END CURB RETURN
STA. – STATION
BC – BEGINNING CURVE
DS – DOWNSPOUT
EC – END CURVE
FS – FINISH SURFACE
CL – CENTERLINE
INV./I.E. – INVERT ELEVATION
RW – RIGHT-OF-WAY
PL – PROPERTY LINE

LEGEND
PROJECT BOUNDARY
CENTER LINE
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING PL
EXISTING UTILITY
TOP OF SLOPE
2:1 SLOPE RATIO
TOE OF SLOPE
FLOW LINE
1120 EXISTING GROUND CONTOUR
1120 PROPOSED CONTOUR
DAYLIGHT LINE
2% GRADE
50 STORM DRAIN
AC PAVEMENT
DECORATIVE PVMT
GRAVEL AT INFILTRATION LIMITS
LANDSCAPED BASIN





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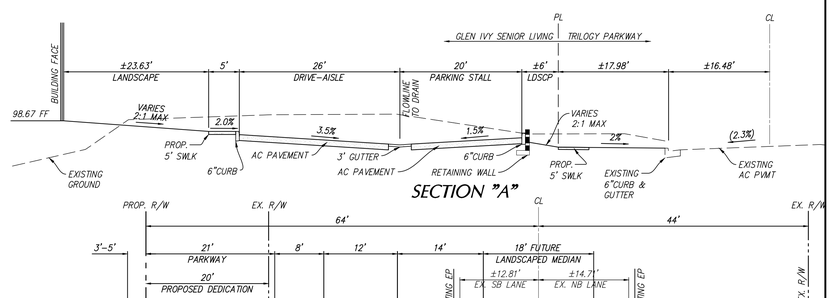

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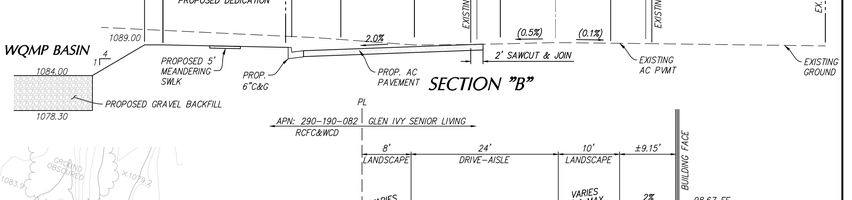
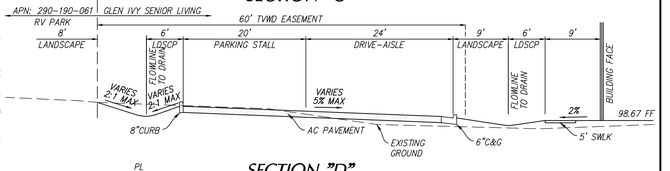


SECTION "B"

SECTION "C"



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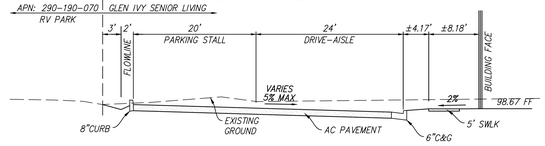

SECTION "E"

LEGAL DESCRIPTION

APN 290-190-083:

PARCEL A OF THAT CERTAIN NOTICE OF LOT LINE ADJUSTMENT NO. 64436, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, RECORDED NOVEMBER 14, 2002 AS INSTRUMENT NO. 2002-665539 OF OFFICIAL RECORDS.

APN 290-190-084:

ALSO INCLUDING THAT PORTION OF THE EAST HALF OF SECTION 3, TOWNSHIP 5 SOUTH, RANGE 6 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

COMMENCING AT THE MOST EASTERLY CORNER OF PARCEL 2 OF PARCEL MAP NO. 6780, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 20, PAGE 99 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE NORTHWESTERLY ALONG THE EASTERLY LINE OF SAID PARCEL 2, 461.94 FEET; THENCE SOUTH 68° 55' WEST, 208.49 FEET TO THE TRUE POINT OF BEGINNING; THENCE NORTH 21° 05' WEST, 205 FEET; THENCE NORTH 68° 55' EAST, 212.49 FEET; THENCE SOUTH 21° 05' EAST, 205 FEET; THENCE SOUTH 68° 55' WEST, 212.49 FEET, TO THE POINT OF BEGINNING.

EXISTING EASEMENT NOTES:

2 AN EXISTING EASEMENT IN FAVOR OF TEMESCAL WATER COMPANY FOR INGRESS, EGRESS AND WATER PIPELINE PURPOSES, RECORDED JANUARY 15, 1965 AS INSTRUMENT NO. 5629, AND RECORDED JANUARY 31, 1975 AS INSTRUMENT NO. 12745, O.R. – TO REMAIN

3 AN EXISTING EASEMENT IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY FOR PUBLIC UTILITIES PURPOSES, RECORDED SEPTEMBER 26, 1969 AS INSTRUMENT NO. 98965, O.R. – TO BE REMOVED

5 AN EXISTING EASEMENT IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY FOR PUBLIC UTILITIES PURPOSES, RECORDED SEPTEMBER 1, 1977 AS INSTRUMENT NO. 171110, O.R. – TO REMAIN

7 AN EXISTING EASEMENT IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY FOR UNDERGROUND ELECTRICAL SUPPLY SYSTEMS AND COMMUNICATION SYSTEMS PURPOSES, RECORDED JULY 25, 1991 AS INSTRUMENT NO. 253893, O.R. – TO BE REVOED

8 AN EXISTING EASEMENT IN FAVOR OF SHEA HOMES INC. FOR MONUMENT AND LANDSCAPING PURPOSES, RECORDED MAY 15, 2001 AS INSTRUMENT NO. 2001-212361, O.R. – TO BE REMOVED

9 AN EXISTING EASEMENT IN FAVOR OF PACIFIC BELL TELEPHONE COMPANY FOR PUBLIC UTILITIES PURPOSES, RECORDED JANUARY 31, 2003 AS INSTRUMENT NO. 2003-073536, O.R. – TO BE REMOVED

MARK	BY	DATE	REVISIONS	APPR.	DATE
				ENGINEER	COUNTY

SEAL–ENGINEER
REGISTERED PROFESSIONAL ENGINEER JAMES R. BOLTON No. 30236 CIVIL STATE OF CALIFORNIA

K&A Engineering, Inc.
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CORONA, CALIFORNIA 92880
TEL. (951) 279-1800
FAX (951) 279-4380

PREPARED BY:
JAMES R. BOLTON R.C.E. NO. 30236 DATE:

BENCHMARK:

SCALE: AS SHOWN

FOR:

W.O.

COUNTY FILE NO.

COUNTY OF RIVERSIDE
GLEN IVY SENIOR LIVING
GLEN IVY PROPERTIES, LLC
PRELIMINARY GRADING PLANS

SHEET NO. 1 OF 1 SHTS

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

26590 Madison Avenue • Murrieta, California 92562 • (951) 677-9651 • FAX (951) 677-9301 • www.geosoilsinc.com

April 13, 2020

W.O. 7731-A1-SC

Glen Ivy Properties, LLC
34145 Pacific Coast Hwy #621
Dana Point, California 92629

Attention: Mr. Benjamin Day

Subject: Supplemental Percolation/Infiltration Testing, Lot 39 of Tract 7240, ±10.01-Acre Site, Glen Ivy Senior Community and Retail/Commercial Project, Temescal Valley Area, Riverside County, California

Dear Mr. Day:

In accordance with your request and authorization GeoSoils, Inc. (GSI) is providing the results of our supplemental percolation/infiltration testing within Lot 39 of Tract 7240 in the Temescal Valley area of Riverside County, California. The scope of our services has included a review of the referenced reports, documents, and plans (see the Appendix), the advancement of two (2) exploratory borings, which were excavated to a depth of approximately ±5 feet below the existing surface (bgs), geologic logging, subsequent field percolation/infiltration testing, analysis of field test data obtained, and preparation of this summary percolation/infiltration testing report.

SITE LOCATION AND DESCRIPTION

The subject property is located on the southwest corner of the intersection of Temescal Canyon Road and Trilogy Parkway in the unincorporated area of Temescal Valley, Riverside County, California. The property (APN 290-190-083) consists of an irregularly-shaped parcel, totaling approximately ±10.01 acres. With the exception of recent flood control improvements along the southern property line (i.e., grubbing and new chain-link fencing) and localized landscape improvements on the northern portion of the property, site is generally undeveloped. Topographically, a majority of the project area is generally flat-lying. Site elevations range from a high of about ±1,100 feet Mean Sea Level (MSL), in the northwest portion of the site, to a low of about ±1,083 feet MSL within the closed depression in the central portion of the site, for an overall relief of about ±17 feet. Overall site drainage is generally to the east by sheetflow; however, drainage is variable and trapped in localized areas depending on the relief. Several oak trees, native weeds and grasses, and other vegetation were noted onsite, and the localized landscape improvements along Trilogy Parkway on the north, as previously discussed.

PROPOSED DEVELOPMENT AND BACKGROUND

Although preliminary in nature, GSI understands that proposed onsite improvements will consist of the construction of a one- to three-story senior living community and one- to two-story retail/commercial project onsite along with underground utility, associated infrastructure, driveway/parking areas, and offsite roadway improvements. Based on our review of the proposed infiltration test sites exhibit by K&A Engineering, Inc. (K&A, 2020), a water quality basin is now proposed to be constructed in the southeast corner of the project site. It is our understanding that the basin will be approximately ±5 feet in overall depth. Based our review, site elevations may be raised on the order of ±1 to locally as much as ±14 feet above existing grades during site grading. Building loads are assumed to be typical for this type of relatively light mixed-use development. Sewage disposal is to be accommodated by tying into the regional system.

The site was recently (GSI, 2020) and previously (GSI, 1999) geotechnically and geologically evaluated, respectively. An initial fault-finding study was performed onsite by GSI in 1999, in conjunction with work on the commercial parcel to the north. This study included the advancement of two (2) fault finding trenches which identified active faulting onsite (GSI, 1999), as such, appropriate structural setbacks were provided (GSI, 1999). GSI recently geotechnically evaluated the property for the proposed senior living community and retail/commercial development concept discussed above. Our recent study (GSI, 2020) included the advancement of six (6) exploratory borings and six (6) Cone Penetration Tests (CPTs), for evaluation of near-surface soil and geologic conditions. These studies concluded that the project site appears suitable for its intended mixed-use development from a geotechnical and geologic viewpoint, provided the recommendations presented (GSI, 2020 and 1999) were appropriately implemented during planning, design, and construction of the project.

SITE GEOLOGY

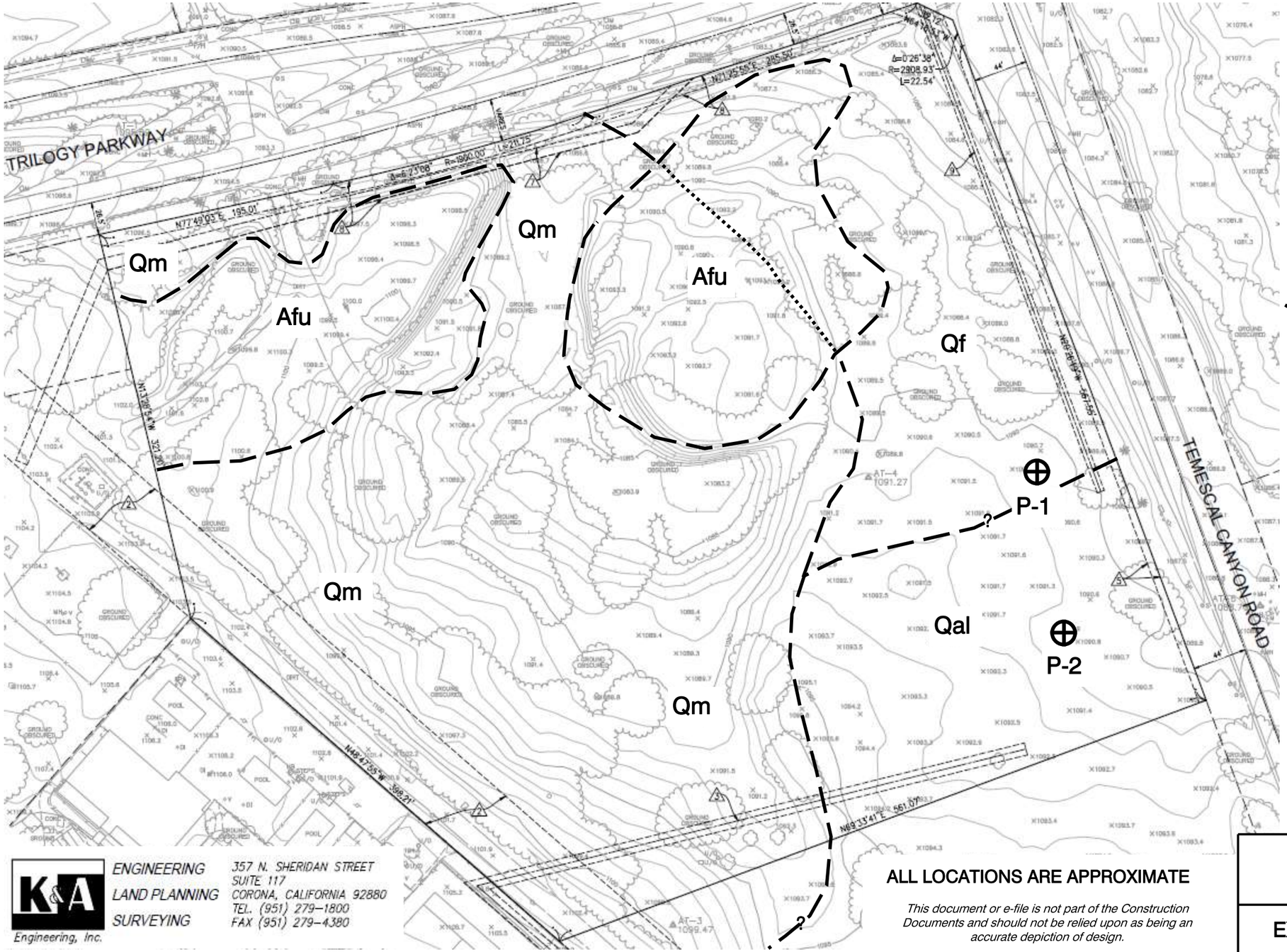
As discussed by GSI (2020), most of the site is underlain by fluvial sediments emanating from Bixby and Anderson Canyons, and to a lessor extent Coldwater Canyon, where they coalesce as they flow out of the Santa Ana Mountains. These sediments may reach several tens of feet in thickness before basement rock is reached. As encountered during this supplemental study, a layer of topsoil/colluvium (±4 feet in thickness) mantles the Pleistocene-age alluvial fan deposits on the northern area of the proposed water quality basin. In contrast, younger alluvial materials (>±5 feet in thickness) were encountered within the southern area of the proposed water quality basin. The young alluvium is generally silty sand, with gravels and cobbles, to sands with pebbles, gravels and cobbles, to locally sandy gravels/gravelly sands with cobbles and minor boulders, which were loose to medium dense and relatively free-draining. The alluvial fan deposits are generally silty to gravely sands, to sands with pebbles, gravels, cobbles, and minor boulders, which were medium dense to dense and less-permeable.

GROUNDWATER

Seeps or springs were not noted on the subject property during the time of our field investigation. During our field study, perched groundwater was encountered in the marsh deposits at a depth of approximately ±32 feet below the ground surface (b.g.s.). Based on water well data acquired from the California Department of Water Resources (CDWR, 2020), "Water Data Library," groundwater levels in other nearby wells were previously measured at depths ranging from ±22 feet (Well No. 337430N1174280W001 - November 13, 2018) to ±53 feet (Well No. 338227N1175072W001 - November 13, 2016) below the ground surface. During previous geotechnical and fault evaluation studies onsite (GSI, 1999) and on adjoining properties, evidence of a relatively high long-term groundwater level was documented only within the marsh deposits. This evidence was from the geologic past, in the form of peat deposits and soil mottling. In contrast, modern evidence, only in the form of localized seepage and perched groundwater within the zone of faulting or within the marsh deposits, was observed. No evidence for artesian/spring conditions were noted during our investigations and subsurface water was encountered during our study at a depth of approximately ±32 feet b.g.s. However, these observations reflect site conditions at the time of our investigation and do not preclude changes in local groundwater conditions in the future from heavy irrigation, precipitation, or other factors not obvious at the time of our field work. Perched groundwater may occur in the future due to increased precipitation or increased irrigation and runoff from urbanization, and/or along zones of contrasting permeabilities (i.e., marsh deposits, alluvium, and older alluvial fan deposit contacts, etc.).

PERCOLATION TESTING

In general accordance with guidelines of the RCFC (2011) Design Handbook for Low Impact Development Best Management Practices, two (2) percolation tests were conducted within the proposed stormwater basin location onsite, as provided by representatives of K&A (2020). The percolation testing was conducted within the proposed area of the water quality basin, at a depth of 5 feet, as provided by representatives of K&A. The approximate locations of the percolation/infiltration tests for this study are provided on Figure 1 (Excavation Location Map). The percolation/infiltration testing was performed to further evaluate site conditions with respect to the proposed water quality basin that will retain and filter onsite storm water. The percolation testing was performed in general conformance with the RCFC (2011) and CASQA (2003) design handbooks for such testing. The field percolation testing and geologic logging were performed by an engineering geologist from our firm (Todd A. Greer, CEG 2377). Logs of the borings advanced for this study and the field percolation data sheets are retained within our in-house files. Procedures for testing are outlined briefly below:



GSI LEGEND

Afu	Artificial Fill - Undocumented
Qal	Quaternary Alluvium - Younger
Qm	Quaternary Marsh Deposits
Qf	Quaternary Alluvial Fan Deposits
	Approximate Location of Geologic Contact, Dotted where Buried, Queried where Uncertain
P-2	Approximate Location of Percolation/ Infiltration Test

N

ALL LOCATIONS ARE APPROXIMATE

This document or e-file is not part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

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Figure Adapted from 40-Scale Rough Grading Plans by Myers & Associates (2006).

GeoSoils, Inc.

EXPLORATION LOCATION MAP

Figure 1

W.O. 7731-A-SC	DATE: 4/20	SCALE: NTS

Percolation Test Procedures

Test Borings:

1. Backhoe excavated to a depth of 5 feet.
2. Diameter - 6 inches.
3. After the removal of loose materials, 2 inches of gravel were placed on the bottom of each test boring.
4. A perforated pipe was then installed within each test boring to facilitate accurate field measurements and prevent caving during the pre-soak period and subsequent testing.

Pre-Soaking: After the installation of the perforated pipes, an inverted 5-gallon bottle of clear water was utilized to fill the borings. The borings were filled with a column of clear water to five (5) times the borings radius (RCFC, 2011). The pre-soak period for percolation test P-1 continued overnight, as all the water did not seep away while the tester was present. The pre-soak period for percolation test P-2 continued for a period of approximately ±2 hours, as all the initial pre-soak water seeped away while the tester was present.

Sandy Soil Test: During the sandy soil test period, two (2) consecutive measurements were conducted at each test location at intervals of approximately 25 minutes. More than 6 inches of water seeped away during each of the two (2) test measurements within percolation test location P-2, therefore testing was initiated the same day at this location. Less than 6 inches of water seeped away during each of the two (2) test measurements within percolation test location P-1, therefore the pre-soak period continued overnight, at the testing was initiated the following day at this location.

Testing: After required pre-soak period, percolation testing measurements were made the following day within percolation test location P-1, and the same day within percolation test location P-2. A column of clear water was re-established within each of the test locations to five (5) times the borings radius (i.e., ±30 inches). The drop in water level was measured from a fixed reference point, refilling after each test measurement. Within percolation test location P-1 a series of test measurements were taken for a minimum of six (6) hours, at time intervals of approximately ±30 minutes. Within percolation test location P-2 a series of test measurements were taken for a minimum of two (2) hours, at time intervals of approximately ±10 minutes.

Accuracy: All test measurements were read to the nearest ¼-inch.

Test Results: Calculations from our field testing indicate percolation rates of between 1.67 and 60 minutes/inch, at a depth of 5 feet. Per the RCFC (2011) guidelines, the percolation rates obtained were then converted to infiltration rates utilizing the "Porchet Method," to be utilized by the design engineer for appropriate sizing of the basin (RCFC, 2011). The converted infiltration rates obtained varied between 0.05 and 1.89 inches/hour, with an average of 0.97 inches/hour. Typically, the lowest infiltration rate obtained is applied to the design. The converted infiltration rates, along with the formulas utilized are provided on Figure 2.

USDA Site Soil Groups, Soil Units, Ksat Values, and Infiltration Basin Siting Requirements

Our review of the United States Department of Agriculture (USDA, 2020) Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm), indicates two (2) major soil units underlie the proposed basin location in the southeast corner of the site. The Cortina gravelly loamy sand (CIC) and the Garretson gravelly very fine sandy loam (GdC) are shown underlying the proposed basin location with generalized Hydrologic Soil Groups of "A" and "B," and a capacity of the most limiting soil layer to transmit water (Ksat) of "high" (i.e., 1.98 to 5.95 in/hr) to "Moderately high to high" (i.e., 0.57 to 1.98 in/hr), respectively.

Our review of the general infiltration basin siting requirements and limitations (CASQA, 2003), indicates sites with Hydrologic Soil Groups of "A" and "B" are generally suitable for infiltration. However, infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour (CASQA, 2003). As such, the design engineer of record may consider siting the water quality basin entirely within the younger alluvium mapped on the southeastern portion of the site (see Figure 1).

CONCLUSIONS AND RECOMMENDATIONS

Based on the field percolation/infiltration testing conducted, it is our opinion that the proposed mixed-use site development is feasible from a geotechnical viewpoint, provided the recommendations presented herein, and within the previous reports by GSI (2020 and 1999) are properly implemented during project planning, design, and construction, as warranted.

The design engineer will need to review basin siting requirements by CASQA (2003) and the converted rates obtained during this study with respect to the proposed water quality basins. Due to the lower infiltration rates obtained on the northern portion of the proposed water quality basin (test location P-1), supplemental up-gradient filtration/detention systems or bio-retention facilities, extended detention basins, sand filter/media treatment areas, vegetated swales, etc., may need to be incorporated onsite, and should be considered for supplemental planning purposes. An appropriate factor of safety (FOS),

Percolation Rate to Infiltration Rate Conversion

* Infiltration Rate (I_t) = $\dfrac{\Delta H\ \pi r^2\ 60}{\Delta t(\pi r^2 + 2\pi r H_{avg})} = \dfrac{\Delta H\ 60\ r}{\Delta t(r+2H_{avg})}$

Where:
- I_t = tested infiltration rate, inches/hour
- ΔH = change in head over the time interval, inches
- Δt = time interval, minutes
- r = effective radius of test hole
- H_{avg} = average head over the time interval, inches

		Δt	Init Level	Fnl Level	ΔH	H_{avg}	I_t	
Infiltration Test Numbers	P-1 @ 5 ft.	30	30	29 1/2	1/2	29 3/4	0.05	
								High = 1.89
	P-2 @ 5 ft.	10	30	24	6	27	1.89	Low = 0.05
								Average = 0.97

* Conversion per the "Porchet Method" (RCFC, 2011)

W.O. 7731-A1-SC
Figure 2

per the controlling authorities requirements, should also be incorporated into the design calculations, as warranted. The infiltration rates, design parameters, and recommendations proved herein are based on our experience with earth materials within the Temescal Valley area, RCFC (2011) and State criteria (CASQA, 2003), and our experience on adjacent sites with similar geologic conditions.

Onsite Storm Water Quality Best Management Practice (BMP) Systems

Should onsite infiltration-runoff retention systems (OIRRS) be planned for Best Management Practices (BMP's) or Low Impact Development (LID) principles for the project, some guidelines should/must be followed in the planning, design, and construction of such systems. Such facilities, if improperly designed or implemented without consideration of the geotechnical aspects of site conditions, can contribute to flooding, saturation of bearing materials beneath site improvements, slope instability, and possible concentration and contribution of pollutants into the groundwater or storm drain and/or utility trench systems.

A key factor in these systems is the infiltration rate (often referred to as the percolation rate) which can be ascribed to, or determined for, the earth materials within which these systems are installed. Additionally, the infiltration rate of the designed system (which may include gravel, sand, mulch/topsoil, or other amendments, etc.) will need to be considered. The project infiltration testing is very site specific, any changes to the location of the proposed OIRRS and/or estimated size of the OIRRS, may require additional infiltration testing. Locally, relatively impermeable formations include: terrace deposits, claystone, siltstone, cemented sandstone, igneous and metamorphic bedrock, as well as expansive fill soils.

Some of the methods which are utilized for onsite infiltration include percolation basins, dry wells, bio-swale/bio-retention, permeable pavers/pavement, infiltration trenches, filter boxes and subsurface infiltration galleries/chambers. Some of these systems are constructed using native and import soils, perforated piping, and filter fabrics while others employ structural components such as stormwater infiltration chambers and filters/separators. Every site will have characteristics which should lend themselves to one or more of these methods; but, not every site is suitable for OIRRS. In practice, OIRRS are usually initially designed by the project design civil engineer. Selection of methods should include (but should not be limited to) review by licensed professionals including the geotechnical engineer, hydrogeologist, engineering geologist, project civil engineer, landscape architect, environmental professional, and industrial hygienist. Applicable governing agency requirements should be reviewed and included in design considerations.

The following geotechnical guidelines should be considered when designing onsite infiltration-runoff retention systems:

- It is not good engineering practice to allow water to saturate soils, especially near slopes or improvements; however, the controlling agency/authority is now requiring this for OIRRS purposes on many projects.

- Where possible, infiltration system design should be based on actual infiltration testing results/data, preferably utilizing double-ring infiltrometer testing (ASTM D 3385) to determine the infiltration rate of the earth materials being contemplated for infiltration.

- Wherever possible, infiltration systems should not be installed within ±50 feet of the tops of slopes steeper than 15 percent or within H/3 from the tops of slopes (where H equals the height of slope).

- Impermeable liners used in conjunction with basins should consist of a 30-mil polyvinyl chloride (PVC) membrane that is covered by a minimum of 12-inches of clean soil, free from rocks and debris, at a maximum inclination of 4:1 (h:v), and meets the following minimum specifications:

  Specific Gravity (ASTM D792): 1.2 (g/cc [min.]); Tensile (ASTM D882): 73 (lb/in-width [min.]); Elongation at Break (ASTM D882): 380 (% [min.]); Modulus (ASTM D882): 30 (lb/in-width [min.]); and Tear Strength (ASTM D1004): 8 (lbs [min.]); Seam Shear Strength (ASTM D882) 58.4 (lb/in [min.]); Seam Peel Strength (ASTM D882) 15 (lb/in [min]).

- Wherever possible, infiltrations systems should not be placed within a distance of H/2 from the toes of slopes (where H equals the height of slope).

- The landscape architect should be notified of the location of the proposed OIRRS. If landscaping is proposed within the OIRRS, consideration should be given to the type of vegetation chosen and their potential effect upon subsurface improvements (i.e., some trees/shrubs will have an effect on subsurface improvements with their extensive root systems). Over-watering landscape areas above, or adjacent to, the proposed OIRRS could adversely affect performance of the system.

- Areas adjacent to, or within, the OIRRS that are subject to inundation should be properly protected against scouring, undermining, and erosion, in accordance with the recommendations of the design engineer.

- If subsurface infiltration galleries/chambers are proposed, the appropriate size, depth interval, and ultimate placement of the detention/infiltration system should be evaluated by the design engineer, and be of sufficient width/depth to achieve optimum performance, based on the infiltration rates provided. In addition, proper debris filter systems will need to be utilized for the infiltration galleries/chambers. Debris filter systems will need to be self cleaning and periodically and regularly

maintained on a regular basis. Provisions for the regular and periodic maintenance of any debris filter system is recommended and this condition should be disclosed to all interested/affected parties.

- Infiltrations systems should not be installed within ±8 feet of building foundations utility trenches, and walls, or a 1:1 (horizontal to vertical [h:v]) slope (down and away) from the bottom elements of these improvements. Alternatively, deepened foundations and/or pile/pier supported improvements may be used.

- Infiltrations systems should not be installed adjacent to pavement and/or hardscape improvements. Alternatively, deepened/thickened edges and curbs and/or impermeable liners may be utilized in areas adjoining the OIRRS.

- As with any OIRRS, localized ponding and groundwater seepage should be anticipated. The potential for seepage and/or perched groundwater to occur after site development should be disclosed to all interested/affected parties.

- Installation of infiltrations systems should avoid expansive soils (Expansion Index [E.I.] ≥51) or soils with a relatively high plasticity index (P.I. > 20).

- Infiltration systems should not be installed where the vertical separation of the groundwater level is less than ±10 feet from the base of the system.

- Where permeable pavements are planned as part of the system, the site Traffic Index (T.I.) Should be less than 25,000 Average Daily Traffic (ADT), as recommended in Allen, et al. (2011).

- Infiltration systems should be designed using a suitable factor of safety (FOS) to account for uncertainties in the known infiltration rates (as generally required by the controlling authorities), and reduction in performance over time.

- As with any OIRRS, proper care will need to provided. Best management practices should be followed at all times, especially during inclement weather. Provisions for the management of any siltation, debris within the OIRRS, and/or overgrown vegetation (including root systems) should be considered. An appropriate inspection schedule will need to adopted and provided to all interested/affected parties.

- Any designed system will require regular and periodic maintenance, which may include rehabilitation and/or complete replacement of the filter media (e.g., sand, gravel, filter fabrics, topsoils, mulch, etc.) or other components utilized in construction, so that the design life exceeds 15 years. Due to the potential for piping and adverse seepage conditions, a burrowing rodent control program should also be implemented onsite.

- All or portions of these systems may be considered attractive nuisances. Thus, consideration of the effects of, or potential for, vandalism should be addressed.

- Newly established vegetation/landscaping (including phreatophytes) may have root systems that will influence the performance of the OIRRS or nearby LID systems.

- The potential for surface flooding, in the case of system blockage, should be evaluated by the design engineer.

- Any proposed utility backfill materials (i.e., inlet/outlet piping and/or other subsurface utilities) located within or near the proposed area of the OIRRS may become saturated. This is due to the potential for piping, water migration, and/or seepage along the utility trench line backfill. If utility trenches cross and/or are proposed near the OIRRS, cut-off walls or other water barriers will need to be installed to mitigate the potential for piping and excess water entering the utility backfill materials. Planned or existing utilities may also be subject to piping of fines into open-graded gravel backfill layers unless separated from overlying or adjoining OIRRS by geotextiles and/or slurry backfill.

- The use of OIRRS above existing utilities that might degrade/corrode with the introduction of water/seepage should be avoided.

LIMITATIONS

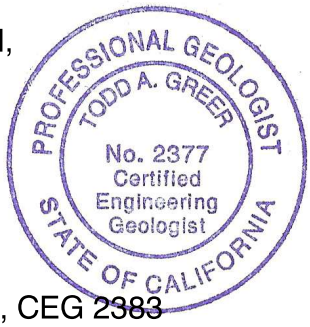
The materials encountered on the project site and utilized for our analysis are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors.

Inasmuch as our study is based upon our review and engineering analyses and field test data, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty, either express or implied, is given. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GeoSoils, Inc.



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David W. Skelly
Civil Engineer, RCE 47857

TAG/JPF/DWS/mn

Enclosures: Appendix - References

Distribution: (1) Addressee (and email pdf)
(3) K&A Engineering, Inc., Attn: Mr. James Bolton
(2 wet signed and email pdf)

APPENDIX

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Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

PROJECT DESCRIPTION

The Glen Ivy Senior Living project is located in the County of Riverside area, south of the City of Corona, west of the I-15 Freeway, at the southwest corner of Temescal Canyon Road and Trilogy Parkway. It is located in Section 3 of Township 5 South, Range 6 West, SBB and M and includes Assessor Parcels 290-190-083 and -084.

Coldwater Canyon Creek, drains from South to North in this area, and will be the receiving the drainage from this project and it tributary area. This creek runs adjacent to this project along the east side of Temescal Canyon Road.

The 10 acre Glen Ivy Senior Living community will provide 188 full service residential facilities for Independent Living, Assisted Living, and Memory Care residents. The site includes two buildings, a 250,000 square foot 2-story building (including atrium spaces) and a 32,100 square foot single story building (including atrium space), along with on-site parking and a Water Quality basin. There are four access driveways provided. Two along Trilogy Parkway and two along Temescal Canyon Parkway. The project is being processed as a Conditional Use Permit, CUP, with the County of Riverside.

The offsite watershed area of the project contains approximately 0.9 acres will drain through the project. The land use of this offsite tributary area is the Glen Ivy RV Park. This offsite tributary along with the approximately 9 acres of onsite drainage area is collected in an onsite storm drain system and routed through the onsite Water Quality basin, which discharges into Coldwater Creek.

The drainage design for the Glen Ivy Senior Living project intercepts approximately 14 acres of other offsite tributary area and routes these flows around the large building and connects directly to the projects downstream storm drain system which drains to Coldwater Creek, thus by-passing the projects onsite Water Quality basin.

The grading and drainage design of Glen Ivy Senior Living has been developed to maintain the natural drainage patterns as much as practical. The roadway system and the proposed storm drain system will intercept runoff from the development and safely convey these flows to proposed mitigation infiltration/detention basins within the development.

The project takes its primary access from Trilogy Parkway and Temescal Canyon Parkway. Following is a list of potential wastes/pollutants that may be generated on this site based upon the described use: Bacterial Indicators, Metals, Nutrients, Possible pesticides - fertilizers from landscape maintenance activities, Toxic Organic Compounds, Sediments, Trash and debris, Oil and grease.

Tabulation and Sizing Calculations

BMPs Sizing Calculation:

These calculations are based on approved methodologies within the currently active Municipal Separate Storm Sewer System (MS4) permits for Santa Ana River Watershed regions of Riverside County. All included BMP designs are sized based on the design capture volume, V_{BMP}. However, there may be circumstances when flow based Treatment Control BMPs are utilized and therefore this section also includes the methodology for calculating the design flow rate, Q_{BMP}.

Calculating V_{BMP}:

Volume based BMPs, including all of the BMPs in this report, are sized to capture and treat the design capture volume, V_{BMP}. As the method for calculating and documenting the design capture volume varies by watershed. The watershed a particular project is within can be determined from the 'Locate my Watershed' tool available at: www.rcflood.org/npdes/. This project is within Santa Ana River watershed.

In order to meet Regional Water Quality Control Board (RWQCB) requirements, in the Santa Ana River Watershed the design capture volume (V_{BMP}) is based on capturing the volume of runoff generated from an 85th percentile, 24-hour storm event. Following the steps using the worksheet provided in the LID Handbook to calculate V_{BMP} in the Santa Ana River Watershed.

The Design Storm Depth (D_{85}) is determined by locating the project site on the Isohyetal Map for the 85th Percentile 24-hour Storm Event. For the Lake Elsinore area project D_{85} is 0.98 inches. See below Isohyetal Map.

Project Site Design BMPs:

DMA A-6, 0.86 Ac – Off-site (Mix surfaces) drains to grate inlet with filter insert. The Design Capture Volume for this area will be included to BMP-A, Infiltration/Detention Basin area A.

DMAs A-7 thru A-9, Area of 8.34 Ac - Residential Senior Living (Mix surface) drains to catch basins/inlets with filter inserts. The Design Capture Volume for this area will be added to BMP-A, Infiltration/Detention Basin area A.

DMA A-10, 0.56 Ac – Infiltration Basin area, will be basin ornamental landscape.

Santa Ana Watershed

V_{BMP} and Q_{BMP} worksheets

These worksheets are to be used to determine the required

Design Capture Volume (V_{BMP})
or the
Design Flow Rate (Q_{BMP})

for BMPs in the Santa Ana Watershed

To verify which watershed your project is located within, visit

www.rcflood.org/npdes

and use the 'Locate my Watershed' tool

If your project is not located in the Santa Ana Watershed,

Do not use these worksheets! Instead visit

www.rcflood.org/npdes/developers.aspx

To access worksheets applicable to your watershed

Use the tabs across the bottom
to access the worksheets for the Santa Ana Watershed

Table 2-1: Impervious Fraction Based on Various Land Use Covers

Surface Type	Effective Impervious Fraction, I_f
Roofs	1.00
Concrete or Asphalt	1.00
Grouted or Gapless Paving Blocks	1.00
Compacted Soil (e.g. unpaved parking)	0.40
Decomposed Granite	0.40
Permeable Paving Blocks w/ Sand Filled Gap	0.25
Class 2 Base	0.30
Gravel or Class 2 Permeable Base	0.10
Pervious Concrete / Porous Asphalt	0.10
Open and Porous Pavers	0.10
Turf block	0.10
Ornamental Landscaping	0.10
Natural (A Soil)	0.03
Natural (B Soil)	0.15
Natural (C Soil)	0.30
Natural (D Soil)	0.40

See below Impervious cover table from Hydrology Manual:

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE D-5.6

For conservative Glen Ivy Senior Living Project, I = 0.65 – 0.9 ➔ Average 0.8

For Apartment areas use ➔ I = 0.9 in preliminary

DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Ac)	DMA Type
DMA A-6	Off-site area (Mix surfaces)	0.86	"D", to BMP A
DMA A-7	Senior Living (Mix surfaces)	2.76	"D", to BMP A
DMA A-8	Senior Living (Mix surfaces)	3.44	"D", to BMP A
DMA A-9	Senior Living (Mix surfaces)	2.14	"D", to BMP A
DMA A-10	Basin (Ornamental Landscaping)	0.56	"D", to BMP A

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)

Company Name: K&A Engineering, Inc. Date: 5/23/2020

Designed by: JY Case No:

Company Project Number/Name: 430.856 Glen Ivy Senior Living Project

BMP Identification

BMP NAME / ID: BMP-Glen Ivy Senior Living Project

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

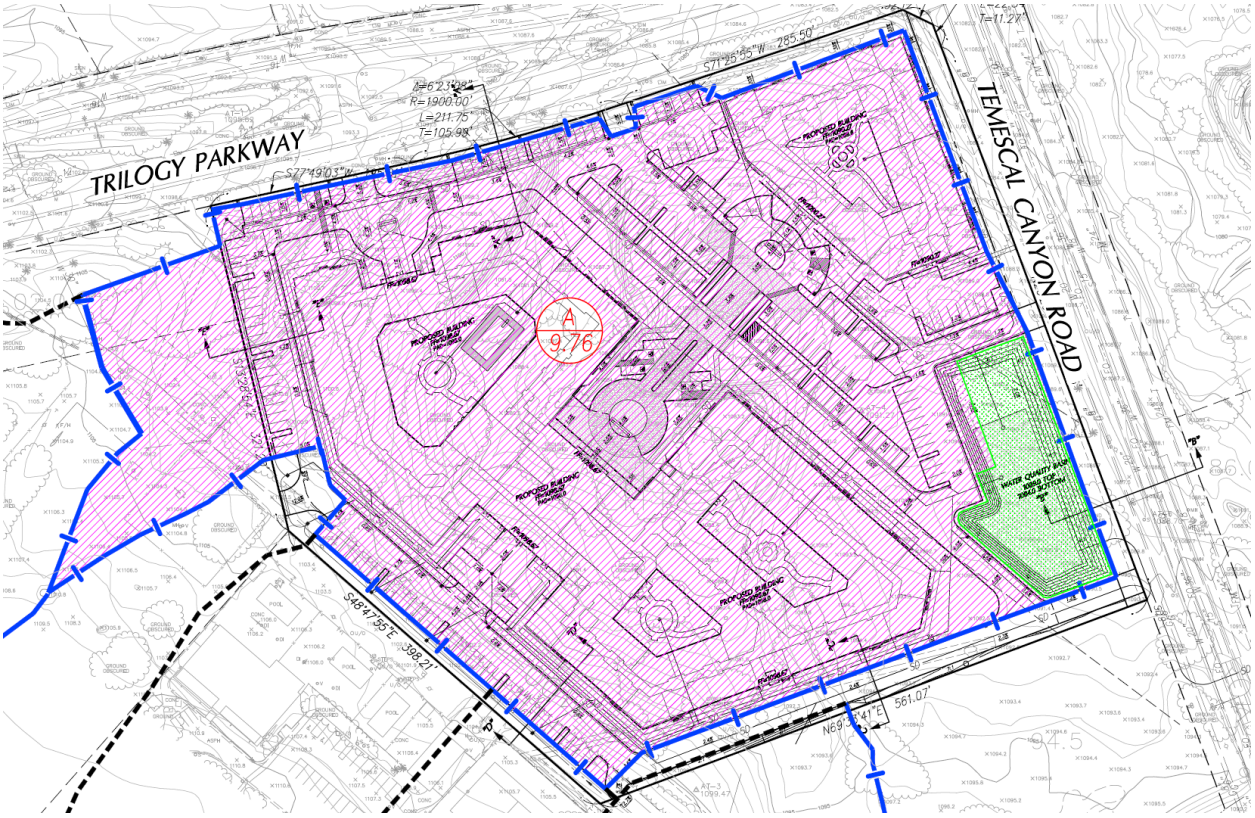
D_{85}= 0.98 inches

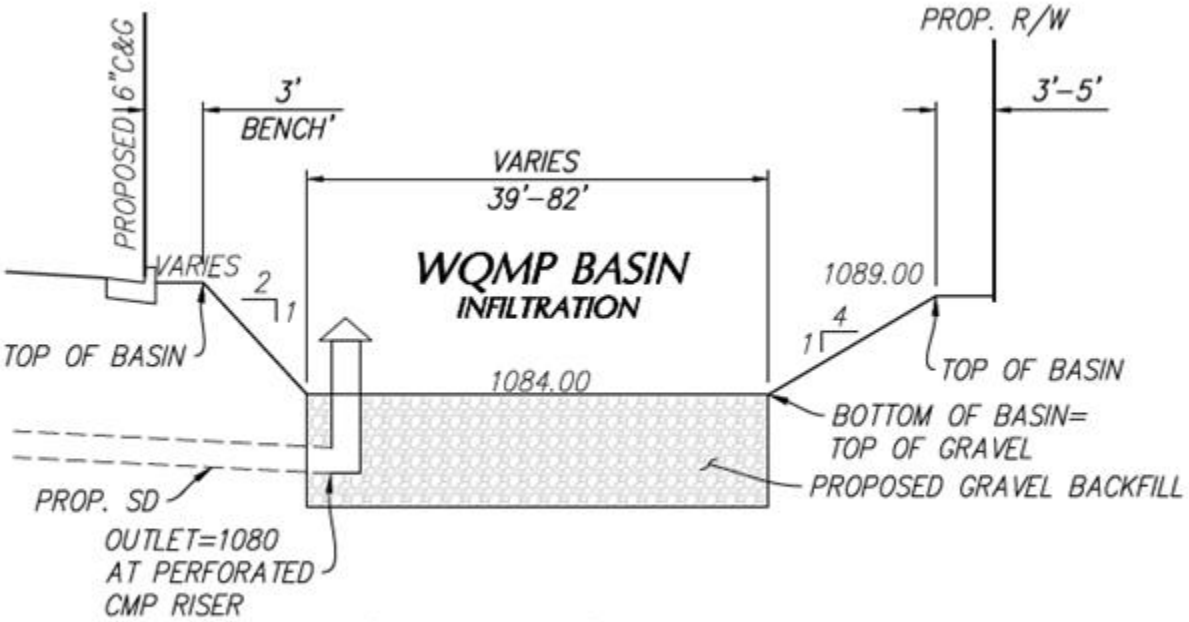
Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
A-6 (0.86 Ac)	37461	Mixed Surface Types	0.5	0.34	12708.6			
A-7 (2.76 Ac)	120225	Mixed Surface Types	0.9	0.73	87798.2			
A-8 (3.44 Ac)	149846	Mixed Surface Types	0.9	0.73	109429.8			
A-9 (2.14 Ac)	93218	Mixed Surface Types	0.9	0.73	68075.4			
A-10 (0.56 Ac)	24393	Ornamental Landscaping	0.1	0.11	2694.4			
	425143	Total			280706.4	0.98	22924.4	22925

Proposed Infiltration/Detention Basin A:





SECTION THROUGH BASIN

Proposed Catch Basin/Grate Inlet Insert (OAE):

Curb Inlet Filter (CIB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

BIO CLEAN ENVIRONMENTAL SERVICES, INC.

Overview

The Bio Clean Curb Inlet Filter (CIB) is best known for its patented 'Shelf System'. The shelf directs water flow into the filter which is positioned directly under the manhole for easy access.

Used exclusively by numerous cities and counties for its easy maintenance and 15 minute cleaning time, the 'Shelf System' eliminates the need for confined space entry and allows it to be serviced with a standard vacuum truck or by lifting the basket through the manhole. The 'Shelf System' makes this filter the preferred choice of maintenance crews nationwide.

This industry leading filter and shelf system are constructed of UV coated marine grade fiberglass and high grade stainless steel. Its multi-level screening and hydrocarbon media captures everything from oils & grease to sediments, to foliage and litter.

Our manufacturing capabilities allow us to make these filters and shelf systems in any size. This filter is easily adaptable to any size and style of catch basin.

www.BioCleanEnvironmental.com

Includes the patented 'Shelf System'

- Allows the Filter to Be Cleaned in 15 Minutes or Less -

Performance

- 93% Removal of TSS
- 84% Removal of Turbidity
- 85% Removal of Nitrates
- 79% Removal of Zinc
- 32% Removal of BOD

Advantages

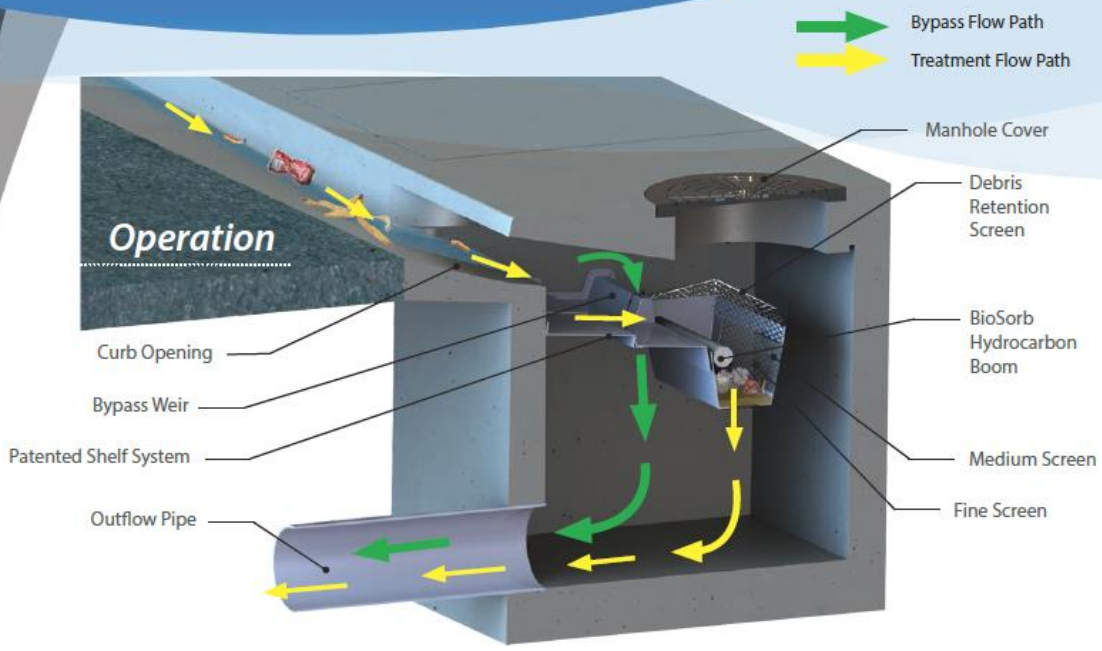
- 8 Year Warranty
- Works in Any Size Catch Basin
- No Nets or Geofabrics
- 15+ Year User Life
- Meets LEED Requirements
- Patented Shelf System
- Fiberglass Construction
- Internal Bypass

Specifications

Model #	Treatment Flow(CFS)	Bypass Flow (CFS)
BC-CIB-3	0.85	Unlimited

Curb Inlet Filter (CIB)

PROVEN STORMWATER TREATMENT TECHNOLOGY



Installation & Maintenance

Site	Company	Service Time (hours)	Total Scores (out of 25)
15	Hydrocompliance	1.75	9
17	KriStar	1.0	15
18	AbTech	0.5	18
19	Bio Clean	0.25	22

Hawaii Report Maintenance Score

Application

- Parking Lots
- Roadways

Superior Design Maximizes Debris Capture & Retention

Easy Maintenance Access

Approvals

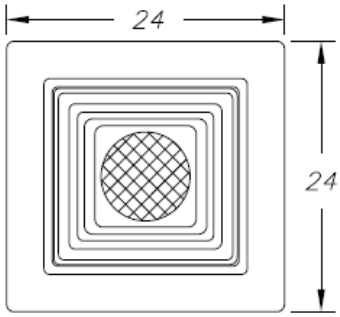
City and County of Honolulu

County of San Diego

2972 San Luis Rey Rd
Oceanside, CA 92058
p 760.433.7640 f 760.433.3176
www.BioCleanEnvironmental.com

BIO CLEAN

Part # GISB-24-24-24

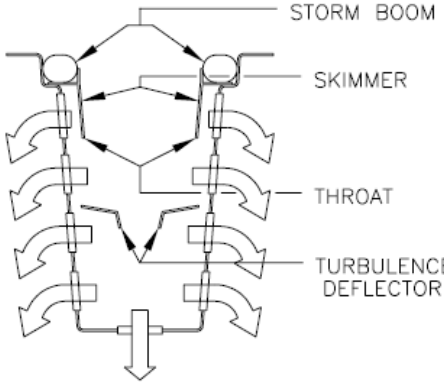


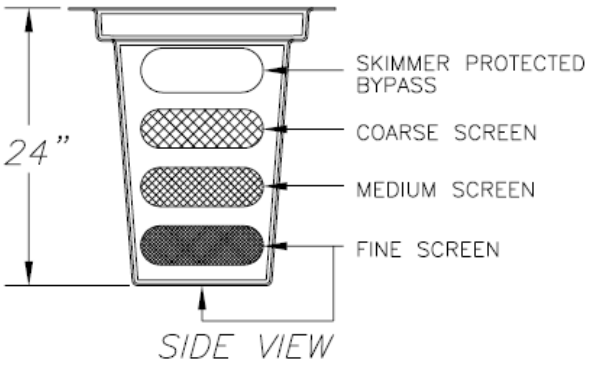
TOP VIEW

Flow Specifications

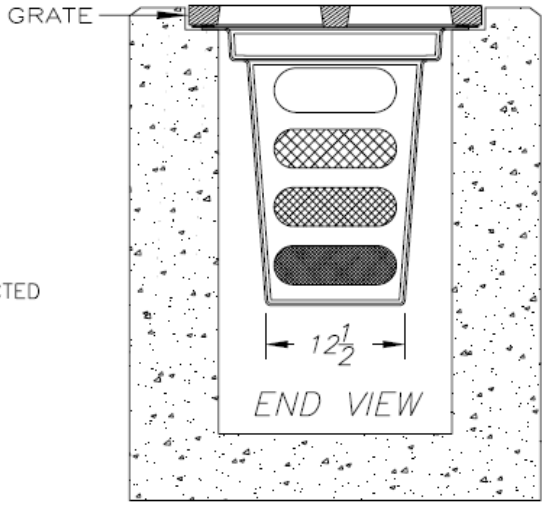
Description of filter opening	Percent Open (Based on Screen Dimensions)	Total Square Inches per Unit	Square Inches of Total Unobstructed Openings	Flow Rate (Cubic Feet per Second)
Skimmer protected By-Pass	100%	162.3	162.3	6.7 cfs
Coarse Screen 3/4" x 1-3/4" stainless steel flattened expanded	62%	143.5	89.0	4.3cfs
Medium Screen 10x10 mesh stainless steel	56%	143.5	80.4	4.3cfs
Fine screen 14 x 18 mesh stainless steel	68%	156.1	106.1	6.3cfs
THROAT FLOW RATE Total: 4.4 cfs			TREATED FLOW RATE Total: 14.9cfs	
FLOW RATES BASED ON UNOBSTRUCTED OPENINGS				

FLOW SCHEMATIC





SIDE VIEW



END VIEW

CONCRETE STRUCTURE

BOX MANUFACTURED FROM MARINE GRADE FIBERGLASS & GEL COATED FOR UV PROTECTION

5 YEAR MANUFACTURERS WARRANTY

PATENTED

ALL FILTER SCREENS ARE STAINLESS STEEL

REMOVE GRATE
INSERT GISB
REINSTALL GRATE

EXCLUSIVE CALIFORNIA DISTRIBUTOR:
BIO CLEAN ENVIRONMENTAL SERVICE
P.O. BOX 869, OCEANSIDE, CA. 92049
TEL. 760-433-7640 FAX:760-433-3176
Email: info@biocleanenvironmental.net

SUNTREE QUALITY PRODUCTS ARE BUILT FOR EASY CLEANING AND ARE DESIGNED TO BE PERMANENT INFRASTRUCTURE AND SHOULD LAST FOR DECADES.

SUNTREE TECHNOLOGIES
798 CLEARLAKE RD. SUITE #2
COCOA FL. 32922
TEL. 321-637-7552 FAX 321-637-7554

GRATE INLET SKIMMER BOX
GISB-24-24-24

DATE: 05/20/04 | SCALE:SF = 15

DRAFTER: N.R.B. | UNITS =INCHES

PROJECT:

REVISIONS: DATE:

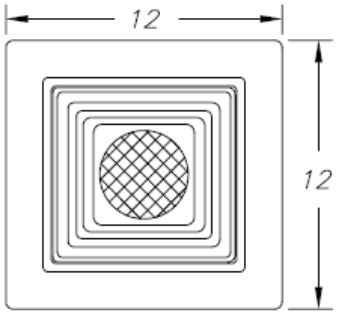
REVISIONS: DATE:

REVISIONS: DATE:

REVISIONS: DATE:

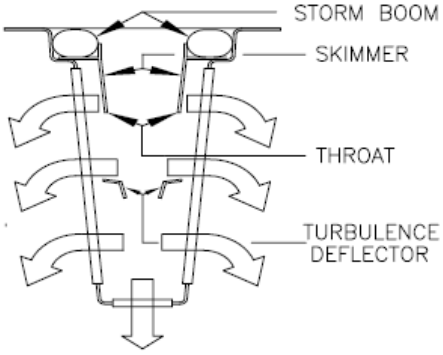
REVISIONS: DATE:

Part # GISB–12–12–12

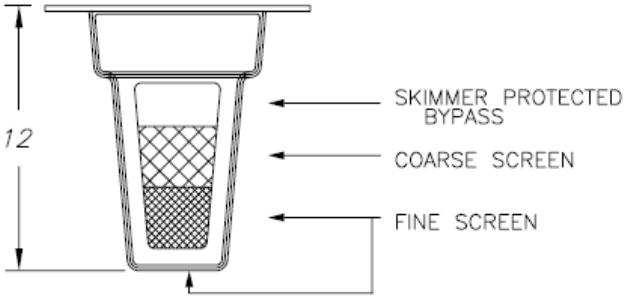


TOP VIEW

FLOW SCHEMATIC



SIDE VIEW

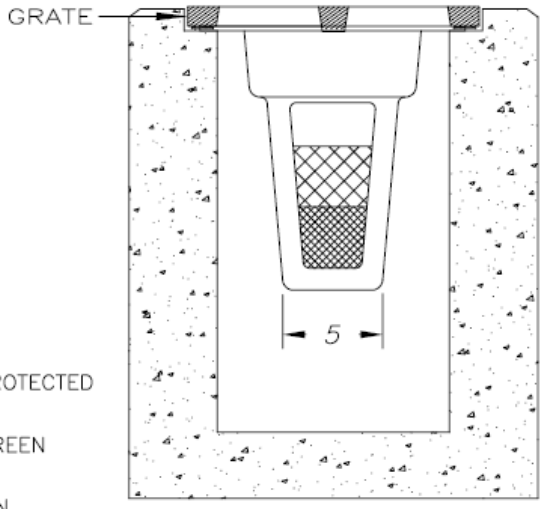


Flow Specifications

Description of filter opening	Percent Open (Based on Screen Dimensions)	Total Square Inches per Unit	Square Inches of Total Unobstructed Openings	Flow Rate (Cubic Feet per Second)
Skimmer protected By–Pass	100%	28.0	28.0	1.0 cfs
Coarse Screen 3/4" x 1–3/4" stainless steel flattened expanded	62%	28.0	17.3	.8 cfs
Medium Screen 10x10 mesh stainless steel	56%	28.0	15.8	.7 cfs
Fine screen 14 x 18 mesh stainless steel	68%	16.0	10.8	.6 cfs

THROAT FLOW RATE	TREATED FLOW RATE
Total:0.5cfs	Total: 2.1 cfs

FLOW RATES BASED ON UNOBSTRUCTED OPENINGS



CONCRETE STRUCTURE

BOX MANUFACTURED FROM MARINE GRADE FIBERGLASS & GEL COATED FOR UV PROTECTION

5 YEAR MANUFACTURERS WARRANTY

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REMOVE GRATE
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TEL. 760–433–7640 FAX:760–433–3176
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SUNTREE QUALITY PRODUCTS ARE BUILT FOR EASY CLEANING AND ARE DESIGNED TO BE PERMANENT INFRASTRUCTURE AND SHOULD LAST FOR DECADES.

NOTE: DETAIL DRAWINGS ARE 2 TO 1

SUNTREE TECHNOLOGIES
798 CLEARLAKE RD. SUITE #2
COCOA FL. 32922
TEL. 321–637–7552 FAX 321–637–7554

GRATE INLET SKIMMER BOX
GISB–12–12–12

DATE: 04/12/04 | SCALE:SF = 15

DRAFTER: N.R.B. | UNITS =INCHES

PROJECT:

REVISIONS:	DATE:
REVISIONS:	DATE:
REVISIONS:	DATE:
REVISIONS:	DATE:
REVISIONS:	DATE:

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

HCOC Mitigation

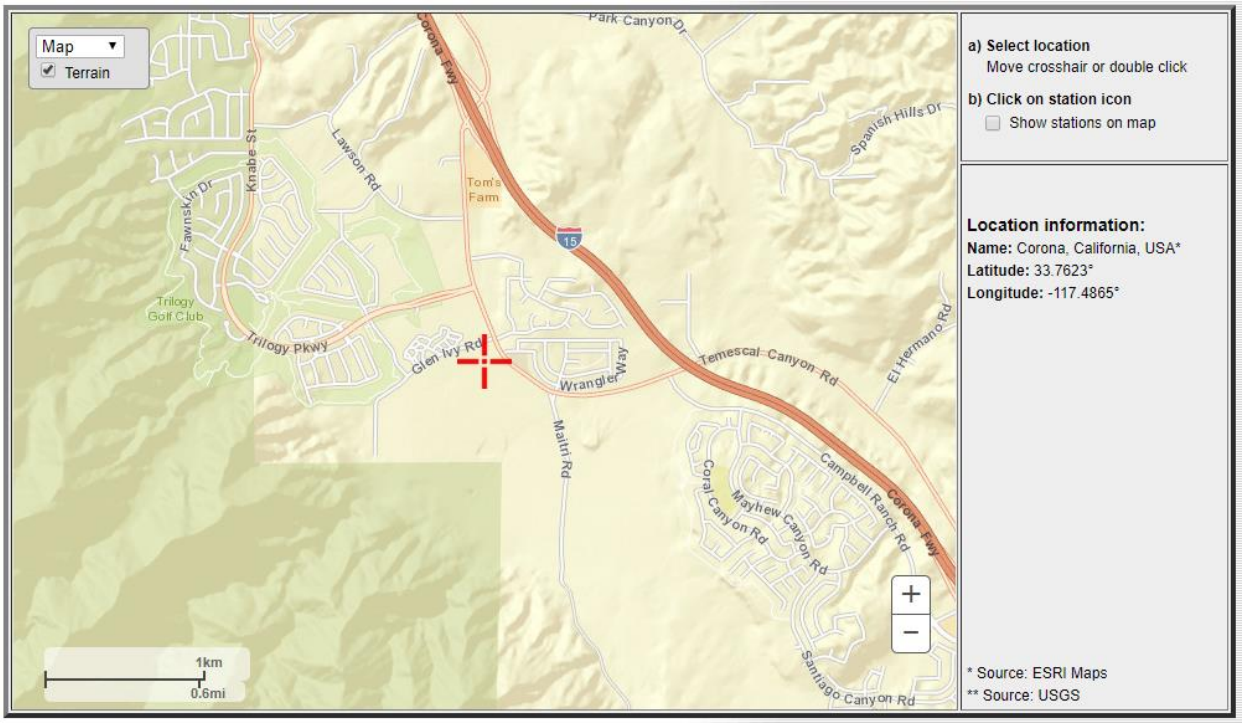
UNIT HYDROGRAPH ANALYSIS

The unit hydrograph analysis was conducted using the CivilDesign Corporation Unit Hydrograph software and the Riverside County Hydrology Manual. In this study analysis, the goal was to estimate the quantity of storm water to be detained onsite to mitigate the increase in storm water peak discharge and volume resulting from this development. The 2-year 24-hour storm Inflow Hydrographs in the existing and proposed conditions were computed for HCOC mitigation.

The ultimate condition-project hydrographs will be used as inflow hydrograph in detention basin routing with restricted basin outlet structure works.

Summary of Precipitation – Intensity Pattern BASED on NOAA Atlas 14:

Storm Event	1-hour	3-hour	6-hour	24-hour
2-year	0.512	0.884	1.23	2.20
100-year	1.43	2.28	3.12	5.83


Map
Terrain
Park Canyon Dr
Corona Fwy
Spanish Hills Dr
Lawson Rd
Knabe St
Fawnskin Dr
Tom's Farm
15
Trilogy Golf Club
Trilogy Pkwy
Glen Ivy Rd
Wrangler Way
Temescal Canyon Rd
El Hermano Rd
Maitri Rd
Campbell Ranch Rd
Corona Fwy
Coral Canyon Rd
Mayhew Canyon Rd
Santiago Canyon Rd
1km
0.6mi
a) Select location
Move crosshair or double click
b) Click on station icon
Show stations on map
Location information:
Name: Corona, California, USA*
Latitude: 33.7623°
Longitude: -117.4865°
* Source: ESRI Maps
** Source: USGS

NOAA Atlas 14, Volume 6, Version 2
Location name: Corona, California, USA*
Latitude: 33.7623°, Longitude: -117.4865°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.098 (0.082-0.118)	0.137 (0.115-0.166)	0.189 (0.158-0.229)	0.231 (0.191-0.283)	0.290 (0.231-0.367)	0.335 (0.262-0.434)	0.382 (0.291-0.507)	0.431 (0.318-0.589)	0.498 (0.352-0.711)	0.550 (0.375-0.815)
10-min	0.141 (0.118-0.169)	0.196 (0.164-0.237)	0.271 (0.226-0.328)	0.332 (0.274-0.405)	0.415 (0.332-0.526)	0.481 (0.375-0.622)	0.548 (0.417-0.727)	0.618 (0.456-0.845)	0.713 (0.504-1.02)	0.788 (0.537-1.17)
15-min	0.170 (0.142-0.205)	0.238 (0.199-0.287)	0.327 (0.273-0.396)	0.401 (0.332-0.490)	0.502 (0.401-0.636)	0.581 (0.454-0.752)	0.662 (0.504-0.880)	0.747 (0.552-1.02)	0.863 (0.610-1.23)	0.953 (0.650-1.41)
30-min	0.252 (0.211-0.304)	0.353 (0.295-0.426)	0.486 (0.406-0.589)	0.596 (0.493-0.727)	0.746 (0.596-0.944)	0.864 (0.674-1.12)	0.984 (0.749-1.31)	1.11 (0.819-1.52)	1.28 (0.906-1.83)	1.42 (0.965-2.10)
60-min	0.366 (0.307-0.442)	0.512 (0.429-0.618)	0.705 (0.589-0.854)	0.864 (0.715-1.06)	1.08 (0.864-1.37)	1.25 (0.978-1.62)	1.43 (1.09-1.90)	1.61 (1.19-2.20)	1.86 (1.32-2.66)	2.06 (1.40-3.05)
2-hr	0.546 (0.457-0.658)	0.725 (0.607-0.875)	0.967 (0.807-1.17)	1.17 (0.967-1.43)	1.45 (1.16-1.84)	1.68 (1.31-2.17)	1.91 (1.45-2.53)	2.15 (1.59-2.94)	2.49 (1.76-3.56)	2.76 (1.88-4.09)
3-hr	0.676 (0.567-0.815)	0.884 (0.740-1.07)	1.17 (0.973-1.41)	1.40 (1.16-1.71)	1.74 (1.39-2.20)	2.00 (1.56-2.59)	2.28 (1.73-3.03)	2.57 (1.90-3.52)	2.98 (2.11-4.26)	3.31 (2.25-4.90)
6-hr	0.952 (0.798-1.15)	1.23 (1.03-1.49)	1.61 (1.34-1.95)	1.93 (1.59-2.35)	2.38 (1.90-3.01)	2.74 (2.14-3.54)	3.12 (2.37-4.14)	3.52 (2.60-4.81)	4.08 (2.88-5.83)	4.53 (3.09-6.71)
12-hr	1.24 (1.04-1.50)	1.63 (1.36-1.97)	2.15 (1.80-2.61)	2.59 (2.14-3.16)	3.20 (2.55-4.05)	3.68 (2.88-4.77)	4.19 (3.19-5.56)	4.72 (3.49-6.45)	5.46 (3.86-7.80)	6.05 (4.12-8.96)
24-hr	1.63 (1.44-1.88)	2.20 (1.94-2.54)	2.95 (2.60-3.42)	3.58 (3.13-4.18)	4.44 (3.76-5.36)	5.12 (4.25-6.30)	5.83 (4.72-7.34)	6.56 (5.17-8.49)	7.58 (5.74-10.2)	8.38 (6.14-11.7)
2-day	1.97 (1.75-2.28)	2.71 (2.39-3.13)	3.69 (3.25-4.28)	4.51 (3.94-5.26)	5.63 (4.76-6.79)	6.51 (5.40-8.01)	7.42 (6.01-9.35)	8.37 (6.60-10.8)	9.68 (7.33-13.0)	10.7 (7.84-14.9)
3-day	2.12 (1.87-2.45)	2.94 (2.60-3.40)	4.05 (3.57-4.69)	4.97 (4.34-5.80)	6.24 (5.28-7.52)	7.24 (6.00-8.90)	8.27 (6.70-10.4)	9.35 (7.37-12.1)	10.8 (8.21-14.6)	12.0 (8.81-16.8)
4-day	2.29 (2.03-2.65)	3.21 (2.83-3.71)	4.44 (3.91-5.14)	5.47 (4.78-6.38)	6.89 (5.83-8.31)	8.02 (6.65-9.86)	9.18 (7.44-11.6)	10.4 (8.21-13.5)	12.1 (9.18-16.3)	13.5 (9.87-18.8)
7-day	2.61 (2.30-3.01)	3.68 (3.25-4.25)	5.14 (4.52-5.95)	6.37 (5.56-7.43)	8.10 (6.85-9.76)	9.48 (7.86-11.7)	10.9 (8.84-13.8)	12.5 (9.81-16.1)	14.6 (11.1-19.7)	16.3 (12.0-22.8)
10-day	2.78 (2.46-3.21)	3.95 (3.49-4.56)	5.55 (4.89-6.43)	6.91 (6.04-8.07)	8.85 (7.49-10.7)	10.4 (8.62-12.8)	12.0 (9.75-15.2)	13.8 (10.9-17.8)	16.3 (12.3-21.9)	18.3 (13.4-25.5)
20-day	3.30 (2.92-3.81)	4.72 (4.17-5.46)	6.72 (5.92-7.79)	8.45 (7.38-9.86)	10.9 (9.26-13.2)	13.0 (10.8-16.0)	15.1 (12.3-19.1)	17.5 (13.8-22.6)	20.8 (15.8-28.1)	23.6 (17.3-32.9)
30-day	3.91 (3.46-4.51)	5.59 (4.94-6.46)	7.98 (7.03-9.25)	10.1 (8.79-11.7)	13.1 (11.1-15.8)	15.6 (12.9-19.2)	18.3 (14.8-23.0)	21.2 (16.7-27.4)	25.4 (19.2-34.2)	28.9 (21.1-40.2)
45-day	4.62 (4.09-5.34)	6.56 (5.80-7.58)	9.34 (8.23-10.8)	11.8 (10.3-13.8)	15.4 (13.0-18.6)	18.4 (15.2-22.6)	21.6 (17.5-27.2)	25.2 (19.8-32.6)	30.3 (23.0-40.8)	34.6 (25.3-48.2)
60-day	5.34 (4.72-6.16)	7.49 (6.61-8.65)	10.6 (9.33-12.3)	13.3 (11.7-15.6)	17.4 (14.7-21.0)	20.8 (17.3-25.6)	24.5 (19.9-30.9)	28.6 (22.5-37.0)	34.5 (26.1-46.5)	39.5 (28.9-55.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

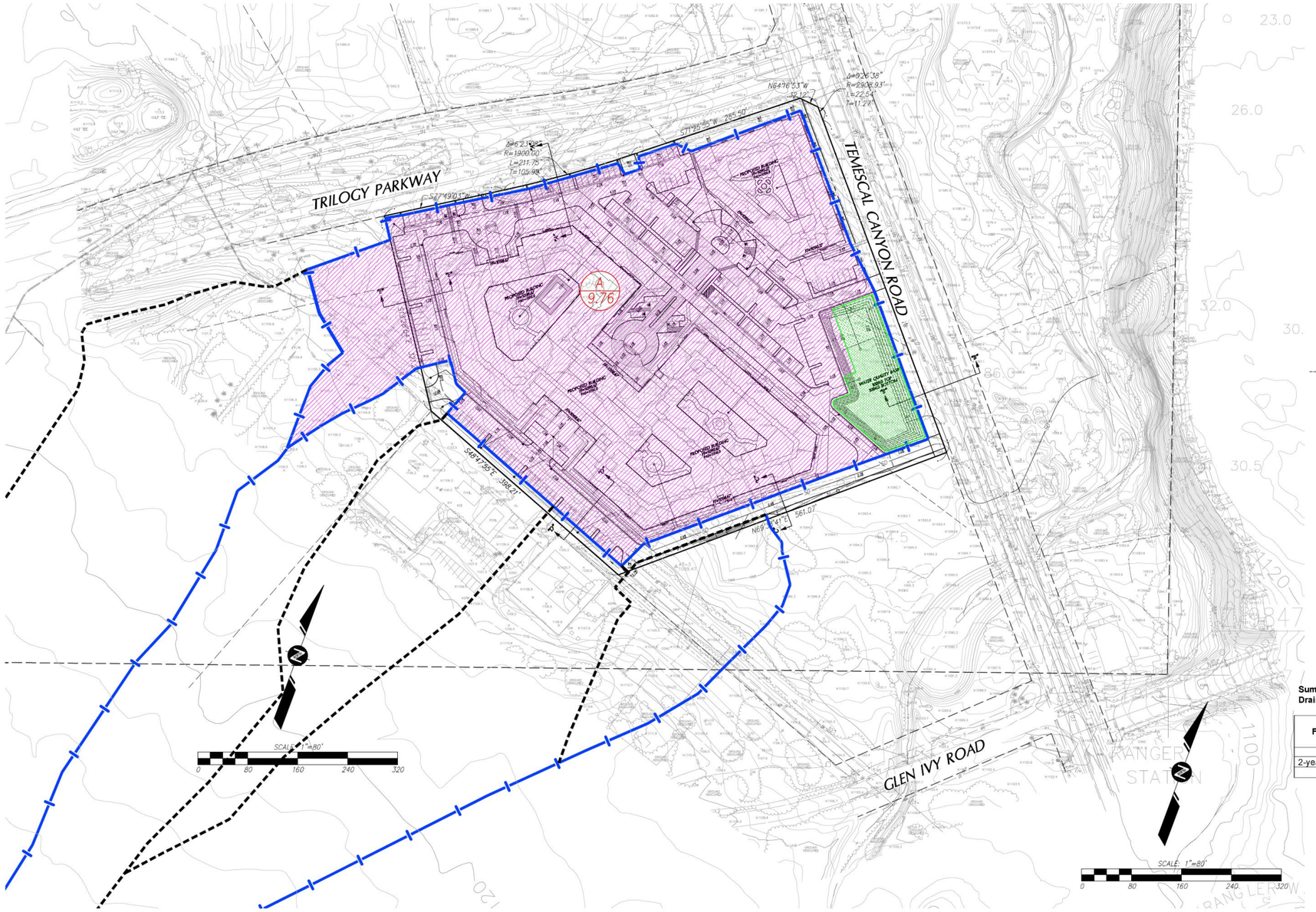
IMPERVIOUS COVER FOR DEVELOPED AREAS

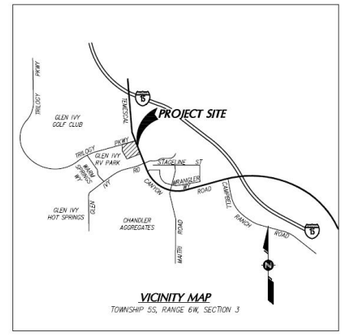
PLATE D-5.6

For conservative Glen Ivy Senior Living Project, I = 0.65 – 0.9 ➔ Average 0.8

For Apartment areas use ➔ I = 0.9 in preliminary

GLEN IVY SENIOR LIVING






```
------------------------------------------------------------------------
Glen Ivy Senior Living
Inflow Hydrograh Calculations
Existing Condition
2-year 24-hour storm

------------------------------------------------------------------------
Drainage Area =       9.73(Ac.)  =    0.015 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =    9.73(Ac.)  =    0.015 Sq. Mi.
Length along longest watercourse =    1323.00(Ft.)
Length along longest watercourse measured to centroid =    593.00(Ft.)
Length along longest watercourse =    0.251 Mi.
Length along longest watercourse measured to centroid =    0.112 Mi.
Difference in elevation =    20.80(Ft.)
Slope along watercourse =    83.0113 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.067 Hr.
Lag time =    4.00 Min.
25% of lag time =    1.00 Min.
40% of lag time =    1.60 Min.
Unit time =    5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =    0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]      Rainfall(In)[2]      Weighting[1*2]
      9.73                2.20              21.41

100 YEAR Area rainfall data:


Area(Ac.)[1]      Rainfall(In)[2]      Weighting[1*2]
      9.73                5.83              56.73

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.200(In)
Area Averaged 100-Year Rainfall =    5.830(In)

Point rain (area averaged) =    2.200(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.200(In)
```

Summary HCOC – Detention Basin A Routing result:
Drainage Area A – existing (9.76 Ac), proposed (9.76 Ac)

Storm Frequency	Existing Q_2 (cfs) [1]	Proposed Q_2 (cfs)	Det. Basin Outlet Q_2 (cfs) [2]	Different [2] – [1] (cfs)	Different [2] – [1] (%)
2-year 24-hour	0.381	2.407	0.405	0.024	6.29%

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Hydrograph to Basin A

Summary HCOC – Detention Basin A Routing result:
Drainage Area A – existing (9.76 Ac), proposed (9.76 Ac)

Storm Frequency	**Existing** Q_2 (cfs) **[1]**	**Proposed** Q_2 (cfs)	**Det. Basin Outlet** Q_2 (cfs) **[2]**	**Different [2] – [1]** (cfs)	**Different [2] – [1]** (%)
2-year 24-hour	0.381	2.407	0.405	0.024	6.29%

Based on the information provided above, this project meets the requirements of Condition C in WQMP and will not create a hydrologic condition of concern in the proximate or downstream receiving waters.
The post-development hydrograph for the 2-year, 24-hour rainfall event will be mitigated by the implementation of Site Design BMPs to limit discharges to a flow rate no greater than 110% of pre-development 2-year flow.

HCOC – Detention Basin A:

Glen Ivy Senior Living Project
Infiltration/Detention Basin A

Elev.	**Depth**	**Area**	**Vol. Inc.**	**Vol. Accum.**	**Vol. Accum.**
	(ft)	**(sqft)**	**(cuft)**	**(cuft)**	**(Acft)**
1084	0	9076	0	0	0
1084.5	0.5	11246	5080.5	5080.5	0.12
1085	1	13415	6165.25	11245.75	0.26
1086	2	15181	14298	25543.75	0.59
1087	3	17019	16100	41643.75	0.96
1088	4	18951	17985	59628.75	1.37
1089	5	20921	19936	79564.75	1.83

Glen Ivy Senior Living Project
County of Riverside
Proposed Infiltration/Detention Basin Area A

			Headwater Stage 1	HCOC Basin	Stage 1 Orifice A=0.05 sf	Headwater Stage 2	Stage 2	Headwater Stage 3	Emergency Spillway	Total Outflow
Elev	Depth	Vol	Depth	Vol	1ea-3" Opening	Depth	Weir L=2'	Depth	5' Opening	**Q total**
(ft)	(ft)	(ac-ft)	(ft)	(ac-ft)	1084.5	(ft)	1087	(ft)	1088	(cfs)
1079	-5	0							Gravel Backfill	
1080	-4	0.21							Gravel Backfill	
1081	-3	0.42							Gravel Backfill	
1082	-2	0.63							Gravel Backfill	
1083	-1	0.83							Gravel Backfill	
1084	0	1.04							Gravel Backfill	
Water Quality Volume = 22,925 cu-ft, Gravel backfill Void (40%) volume = 45,380 cu-ft*0.4=18,152 cu-ft < Vbmp										
WQ surface volume = 22,925 - 18,152 = 4,773 cu-ft (0.1095 Ac-ft)										
1084	0	0.000	0							
1084.5	0.5	0.117	0	0	0					**0.00**
1085	1	0.258	0.5	0.14	0.17					**0.17**
1086	2	0.586	1.5	0.47	0.29					**0.29**
1087	3	0.956	2.5	0.84	0.37					**0.37**
1088	4	1.369	3.5	1.25	0.44	0	0			**0.44**
1089	5	1.827	4.5	1.71	0.5	1	6	0	0	**6.50**
1090	6	2.476	5.5	2.36	0.55	2	16.97	1	15.00	**32.52**
Basin bottom Infiltration Outflow is ignored for HCOC calculations.										
HCOC Detention Basin is above Water Quality volume @ elev = 1084.5 (DC Volume provided 5,081 cf > 4,773 cf)										

Rating Table for Circular Orifice - 3" opening @ 1084.5

Project Description

Solve For	Discharge

Input Data

Headwater Elevation	0.50	ft
Centroid Elevation	0.00	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.60	
Diameter	0.25	ft

Headwater Elevation (ft)	Discharge (ft³/s)	Velocity (ft/s)
0.50	0.17	3.40
1.00	0.24	4.81
1.50	0.29	5.89
2.00	0.33	6.81
2.50	0.37	7.61
3.00	0.41	8.34
3.50	0.44	9.00
4.00	0.47	9.63
4.50	0.50	10.21
5.00	0.53	10.76
5.50	0.55	11.29
6.00	0.58	11.79

Rating Table for Rectangular Weir – Emergency Spillway @ 1088

Project Description

Solve For	Discharge

Input Data

Headwater Elevation		1.00	ft
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Weir Coefficient		3.00	US
Crest Length		5.00	ft
Number Of Contractions	0		

Headwater Elevation (ft)	Discharge (ft³/s)	Velocity (ft/s)
1.00	15.00	3.00
2.00	42.43	4.24
3.00	77.94	5.20
4.00	120.00	6.00

Inflow Hydrographs

Drainage Area A

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
              Study date  05/12/20 File: sh2ex242.out

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------------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 4029

------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

------------------------------------------------------------------------
Glen Ivy Senior Living
Inflow Hydrograh Calculations
Existing Condition
2-year 24-hour storm

------------------------------------------------------------------------
Drainage Area =       9.76(Ac.)  =      0.015 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       9.76(Ac.)  =      0.015 Sq. Mi.
Length along longest watercourse =    1323.00(Ft.)
Length along longest watercourse measured to centroid =     593.00(Ft.)
Length along longest watercourse =      0.251 Mi.
Length along longest watercourse measured to centroid =      0.112 Mi.
Difference in elevation =      20.80(Ft.)
Slope along watercourse =     83.0113 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.067 Hr.
Lag time =     4.00 Min.
25% of lag time =     1.00 Min.
40% of lag time =     1.60 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        9.76           2.20                 21.41

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        9.76           5.83                 56.73

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.200(In)
Area Averaged 100-Year Rainfall =    5.830(In)

Point rain (area averaged) =    2.200(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     9.760           75.00         0.025
 Total Area Entered =      9.76(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
```

```
 75.0  57.0      0.501     0.025        0.489       1.000      0.489
                                                   Sum (F) =   0.489
 Area averaged mean soil loss (F) (In/Hr) =  0.489
 Minimum soil loss rate ((In/Hr)) =  0.245
 (for 24 hour storm duration)
 Soil low loss rate (decimal) =   0.870
 ------------------------------------------------------------------------

                U n i t  H y d r o g r a p h
                       VALLEY S-Curve
 ------------------------------------------------------------------------
                Unit Hydrograph Data
 ------------------------------------------------------------------------
 Unit time period   Time % of lag   Distribution   Unit Hydrograph
     (hrs)                          Graph %            (CFS)
 ------------------------------------------------------------------------
     1   0.083        124.897         26.601              2.608
     2   0.167        249.794         48.537              4.760
     3   0.250        374.691         12.896              1.265
     4   0.333        499.588          5.804              0.569
     5   0.417        624.485          3.228              0.317
     6   0.500        749.382          1.793              0.176
     7   0.583        874.279          1.141              0.112
                               Sum = 100.000   Sum=       9.806
-------------------------------------------------------------------------
```

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.018	(0.867)	0.015	0.002
2	0.17	0.07	0.018	(0.864)	0.015	0.002
3	0.25	0.07	0.018	(0.861)	0.015	0.002
4	0.33	0.10	0.026	(0.857)	0.023	0.003
5	0.42	0.10	0.026	(0.854)	0.023	0.003
6	0.50	0.10	0.026	(0.851)	0.023	0.003
7	0.58	0.10	0.026	(0.847)	0.023	0.003
8	0.67	0.10	0.026	(0.844)	0.023	0.003
9	0.75	0.10	0.026	(0.841)	0.023	0.003
10	0.83	0.13	0.035	(0.838)	0.031	0.005
11	0.92	0.13	0.035	(0.834)	0.031	0.005
12	1.00	0.13	0.035	(0.831)	0.031	0.005
13	1.08	0.10	0.026	(0.828)	0.023	0.003
14	1.17	0.10	0.026	(0.824)	0.023	0.003
15	1.25	0.10	0.026	(0.821)	0.023	0.003
16	1.33	0.10	0.026	(0.818)	0.023	0.003
17	1.42	0.10	0.026	(0.815)	0.023	0.003
18	1.50	0.10	0.026	(0.811)	0.023	0.003
19	1.58	0.10	0.026	(0.808)	0.023	0.003
20	1.67	0.10	0.026	(0.805)	0.023	0.003
21	1.75	0.10	0.026	(0.802)	0.023	0.003
22	1.83	0.13	0.035	(0.798)	0.031	0.005
23	1.92	0.13	0.035	(0.795)	0.031	0.005
24	2.00	0.13	0.035	(0.792)	0.031	0.005
25	2.08	0.13	0.035	(0.789)	0.031	0.005
26	2.17	0.13	0.035	(0.786)	0.031	0.005
27	2.25	0.13	0.035	(0.782)	0.031	0.005
28	2.33	0.13	0.035	(0.779)	0.031	0.005
29	2.42	0.13	0.035	(0.776)	0.031	0.005
30	2.50	0.13	0.035	(0.773)	0.031	0.005
31	2.58	0.17	0.044	(0.770)	0.038	0.006
32	2.67	0.17	0.044	(0.767)	0.038	0.006
33	2.75	0.17	0.044	(0.763)	0.038	0.006
34	2.83	0.17	0.044	(0.760)	0.038	0.006
35	2.92	0.17	0.044	(0.757)	0.038	0.006
36	3.00	0.17	0.044	(0.754)	0.038	0.006
37	3.08	0.17	0.044	(0.751)	0.038	0.006
38	3.17	0.17	0.044	(0.748)	0.038	0.006
39	3.25	0.17	0.044	(0.745)	0.038	0.006
40	3.33	0.17	0.044	(0.741)	0.038	0.006
41	3.42	0.17	0.044	(0.738)	0.038	0.006
42	3.50	0.17	0.044	(0.735)	0.038	0.006
43	3.58	0.17	0.044	(0.732)	0.038	0.006

44	3.67	0.17	0.044	(0.729)	0.038	0.006
45	3.75	0.17	0.044	(0.726)	0.038	0.006
46	3.83	0.20	0.053	(0.723)	0.046	0.007
47	3.92	0.20	0.053	(0.720)	0.046	0.007
48	4.00	0.20	0.053	(0.717)	0.046	0.007
49	4.08	0.20	0.053	(0.714)	0.046	0.007
50	4.17	0.20	0.053	(0.711)	0.046	0.007
51	4.25	0.20	0.053	(0.708)	0.046	0.007
52	4.33	0.23	0.062	(0.705)	0.054	0.008
53	4.42	0.23	0.062	(0.702)	0.054	0.008
54	4.50	0.23	0.062	(0.699)	0.054	0.008
55	4.58	0.23	0.062	(0.696)	0.054	0.008
56	4.67	0.23	0.062	(0.693)	0.054	0.008
57	4.75	0.23	0.062	(0.690)	0.054	0.008
58	4.83	0.27	0.070	(0.687)	0.061	0.009
59	4.92	0.27	0.070	(0.684)	0.061	0.009
60	5.00	0.27	0.070	(0.681)	0.061	0.009
61	5.08	0.20	0.053	(0.678)	0.046	0.007
62	5.17	0.20	0.053	(0.675)	0.046	0.007
63	5.25	0.20	0.053	(0.672)	0.046	0.007
64	5.33	0.23	0.062	(0.669)	0.054	0.008
65	5.42	0.23	0.062	(0.666)	0.054	0.008
66	5.50	0.23	0.062	(0.663)	0.054	0.008
67	5.58	0.27	0.070	(0.660)	0.061	0.009
68	5.67	0.27	0.070	(0.657)	0.061	0.009
69	5.75	0.27	0.070	(0.655)	0.061	0.009
70	5.83	0.27	0.070	(0.652)	0.061	0.009
71	5.92	0.27	0.070	(0.649)	0.061	0.009
72	6.00	0.27	0.070	(0.646)	0.061	0.009
73	6.08	0.30	0.079	(0.643)	0.069	0.010
74	6.17	0.30	0.079	(0.640)	0.069	0.010
75	6.25	0.30	0.079	(0.637)	0.069	0.010
76	6.33	0.30	0.079	(0.634)	0.069	0.010
77	6.42	0.30	0.079	(0.632)	0.069	0.010
78	6.50	0.30	0.079	(0.629)	0.069	0.010
79	6.58	0.33	0.088	(0.626)	0.077	0.011
80	6.67	0.33	0.088	(0.623)	0.077	0.011
81	6.75	0.33	0.088	(0.620)	0.077	0.011
82	6.83	0.33	0.088	(0.618)	0.077	0.011
83	6.92	0.33	0.088	(0.615)	0.077	0.011
84	7.00	0.33	0.088	(0.612)	0.077	0.011
85	7.08	0.33	0.088	(0.609)	0.077	0.011
86	7.17	0.33	0.088	(0.606)	0.077	0.011
87	7.25	0.33	0.088	(0.604)	0.077	0.011
88	7.33	0.37	0.097	(0.601)	0.084	0.013
89	7.42	0.37	0.097	(0.598)	0.084	0.013
90	7.50	0.37	0.097	(0.595)	0.084	0.013
91	7.58	0.40	0.106	(0.593)	0.092	0.014
92	7.67	0.40	0.106	(0.590)	0.092	0.014
93	7.75	0.40	0.106	(0.587)	0.092	0.014
94	7.83	0.43	0.114	(0.585)	0.100	0.015
95	7.92	0.43	0.114	(0.582)	0.100	0.015
96	8.00	0.43	0.114	(0.579)	0.100	0.015
97	8.08	0.50	0.132	(0.576)	0.115	0.017
98	8.17	0.50	0.132	(0.574)	0.115	0.017
99	8.25	0.50	0.132	(0.571)	0.115	0.017
100	8.33	0.50	0.132	(0.568)	0.115	0.017
101	8.42	0.50	0.132	(0.566)	0.115	0.017
102	8.50	0.50	0.132	(0.563)	0.115	0.017
103	8.58	0.53	0.141	(0.560)	0.122	0.018
104	8.67	0.53	0.141	(0.558)	0.122	0.018
105	8.75	0.53	0.141	(0.555)	0.122	0.018
106	8.83	0.57	0.150	(0.553)	0.130	0.019
107	8.92	0.57	0.150	(0.550)	0.130	0.019
108	9.00	0.57	0.150	(0.547)	0.130	0.019
109	9.08	0.63	0.167	(0.545)	0.145	0.022
110	9.17	0.63	0.167	(0.542)	0.145	0.022
111	9.25	0.63	0.167	(0.540)	0.145	0.022
112	9.33	0.67	0.176	(0.537)	0.153	0.023
113	9.42	0.67	0.176	(0.534)	0.153	0.023
114	9.50	0.67	0.176	(0.532)	0.153	0.023
115	9.58	0.70	0.185	(0.529)	0.161	0.024
116	9.67	0.70	0.185	(0.527)	0.161	0.024
117	9.75	0.70	0.185	(0.524)	0.161	0.024
118	9.83	0.73	0.194	(0.522)	0.168	0.025

119	9.92	0.73	0.194	(0.519)	0.168	0.025
120	10.00	0.73	0.194	(0.517)	0.168	0.025
121	10.08	0.50	0.132	(0.514)	0.115	0.017
122	10.17	0.50	0.132	(0.512)	0.115	0.017
123	10.25	0.50	0.132	(0.509)	0.115	0.017
124	10.33	0.50	0.132	(0.507)	0.115	0.017
125	10.42	0.50	0.132	(0.504)	0.115	0.017
126	10.50	0.50	0.132	(0.502)	0.115	0.017
127	10.58	0.67	0.176	(0.499)	0.153	0.023
128	10.67	0.67	0.176	(0.497)	0.153	0.023
129	10.75	0.67	0.176	(0.495)	0.153	0.023
130	10.83	0.67	0.176	(0.492)	0.153	0.023
131	10.92	0.67	0.176	(0.490)	0.153	0.023
132	11.00	0.67	0.176	(0.487)	0.153	0.023
133	11.08	0.63	0.167	(0.485)	0.145	0.022
134	11.17	0.63	0.167	(0.483)	0.145	0.022
135	11.25	0.63	0.167	(0.480)	0.145	0.022
136	11.33	0.63	0.167	(0.478)	0.145	0.022
137	11.42	0.63	0.167	(0.475)	0.145	0.022
138	11.50	0.63	0.167	(0.473)	0.145	0.022
139	11.58	0.57	0.150	(0.471)	0.130	0.019
140	11.67	0.57	0.150	(0.468)	0.130	0.019
141	11.75	0.57	0.150	(0.466)	0.130	0.019
142	11.83	0.60	0.158	(0.464)	0.138	0.021
143	11.92	0.60	0.158	(0.461)	0.138	0.021
144	12.00	0.60	0.158	(0.459)	0.138	0.021
145	12.08	0.83	0.220	(0.457)	0.191	0.029
146	12.17	0.83	0.220	(0.454)	0.191	0.029
147	12.25	0.83	0.220	(0.452)	0.191	0.029
148	12.33	0.87	0.229	(0.450)	0.199	0.030
149	12.42	0.87	0.229	(0.448)	0.199	0.030
150	12.50	0.87	0.229	(0.445)	0.199	0.030
151	12.58	0.93	0.246	(0.443)	0.214	0.032
152	12.67	0.93	0.246	(0.441)	0.214	0.032
153	12.75	0.93	0.246	(0.439)	0.214	0.032
154	12.83	0.97	0.255	(0.437)	0.222	0.033
155	12.92	0.97	0.255	(0.434)	0.222	0.033
156	13.00	0.97	0.255	(0.432)	0.222	0.033
157	13.08	1.13	0.299	(0.430)	0.260	0.039
158	13.17	1.13	0.299	(0.428)	0.260	0.039
159	13.25	1.13	0.299	(0.426)	0.260	0.039
160	13.33	1.13	0.299	(0.423)	0.260	0.039
161	13.42	1.13	0.299	(0.421)	0.260	0.039
162	13.50	1.13	0.299	(0.419)	0.260	0.039
163	13.58	0.77	0.202	(0.417)	0.176	0.026
164	13.67	0.77	0.202	(0.415)	0.176	0.026
165	13.75	0.77	0.202	(0.413)	0.176	0.026
166	13.83	0.77	0.202	(0.411)	0.176	0.026
167	13.92	0.77	0.202	(0.409)	0.176	0.026
168	14.00	0.77	0.202	(0.406)	0.176	0.026
169	14.08	0.90	0.238	(0.404)	0.207	0.031
170	14.17	0.90	0.238	(0.402)	0.207	0.031
171	14.25	0.90	0.238	(0.400)	0.207	0.031
172	14.33	0.87	0.229	(0.398)	0.199	0.030
173	14.42	0.87	0.229	(0.396)	0.199	0.030
174	14.50	0.87	0.229	(0.394)	0.199	0.030
175	14.58	0.87	0.229	(0.392)	0.199	0.030
176	14.67	0.87	0.229	(0.390)	0.199	0.030
177	14.75	0.87	0.229	(0.388)	0.199	0.030
178	14.83	0.83	0.220	(0.386)	0.191	0.029
179	14.92	0.83	0.220	(0.384)	0.191	0.029
180	15.00	0.83	0.220	(0.382)	0.191	0.029
181	15.08	0.80	0.211	(0.380)	0.184	0.027
182	15.17	0.80	0.211	(0.378)	0.184	0.027
183	15.25	0.80	0.211	(0.376)	0.184	0.027
184	15.33	0.77	0.202	(0.374)	0.176	0.026
185	15.42	0.77	0.202	(0.372)	0.176	0.026
186	15.50	0.77	0.202	(0.371)	0.176	0.026
187	15.58	0.63	0.167	(0.369)	0.145	0.022
188	15.67	0.63	0.167	(0.367)	0.145	0.022
189	15.75	0.63	0.167	(0.365)	0.145	0.022
190	15.83	0.63	0.167	(0.363)	0.145	0.022
191	15.92	0.63	0.167	(0.361)	0.145	0.022
192	16.00	0.63	0.167	(0.359)	0.145	0.022
193	16.08	0.13	0.035	(0.358)	0.031	0.005

194	16.17	0.13	0.035	(0.356)	0.031	0.005
195	16.25	0.13	0.035	(0.354)	0.031	0.005
196	16.33	0.13	0.035	(0.352)	0.031	0.005
197	16.42	0.13	0.035	(0.350)	0.031	0.005
198	16.50	0.13	0.035	(0.348)	0.031	0.005
199	16.58	0.10	0.026	(0.347)	0.023	0.003
200	16.67	0.10	0.026	(0.345)	0.023	0.003
201	16.75	0.10	0.026	(0.343)	0.023	0.003
202	16.83	0.10	0.026	(0.341)	0.023	0.003
203	16.92	0.10	0.026	(0.340)	0.023	0.003
204	17.00	0.10	0.026	(0.338)	0.023	0.003
205	17.08	0.17	0.044	(0.336)	0.038	0.006
206	17.17	0.17	0.044	(0.335)	0.038	0.006
207	17.25	0.17	0.044	(0.333)	0.038	0.006
208	17.33	0.17	0.044	(0.331)	0.038	0.006
209	17.42	0.17	0.044	(0.330)	0.038	0.006
210	17.50	0.17	0.044	(0.328)	0.038	0.006
211	17.58	0.17	0.044	(0.326)	0.038	0.006
212	17.67	0.17	0.044	(0.325)	0.038	0.006
213	17.75	0.17	0.044	(0.323)	0.038	0.006
214	17.83	0.13	0.035	(0.321)	0.031	0.005
215	17.92	0.13	0.035	(0.320)	0.031	0.005
216	18.00	0.13	0.035	(0.318)	0.031	0.005
217	18.08	0.13	0.035	(0.317)	0.031	0.005
218	18.17	0.13	0.035	(0.315)	0.031	0.005
219	18.25	0.13	0.035	(0.314)	0.031	0.005
220	18.33	0.13	0.035	(0.312)	0.031	0.005
221	18.42	0.13	0.035	(0.311)	0.031	0.005
222	18.50	0.13	0.035	(0.309)	0.031	0.005
223	18.58	0.10	0.026	(0.308)	0.023	0.003
224	18.67	0.10	0.026	(0.306)	0.023	0.003
225	18.75	0.10	0.026	(0.305)	0.023	0.003
226	18.83	0.07	0.018	(0.303)	0.015	0.002
227	18.92	0.07	0.018	(0.302)	0.015	0.002
228	19.00	0.07	0.018	(0.300)	0.015	0.002
229	19.08	0.10	0.026	(0.299)	0.023	0.003
230	19.17	0.10	0.026	(0.297)	0.023	0.003
231	19.25	0.10	0.026	(0.296)	0.023	0.003
232	19.33	0.13	0.035	(0.295)	0.031	0.005
233	19.42	0.13	0.035	(0.293)	0.031	0.005
234	19.50	0.13	0.035	(0.292)	0.031	0.005
235	19.58	0.10	0.026	(0.291)	0.023	0.003
236	19.67	0.10	0.026	(0.289)	0.023	0.003
237	19.75	0.10	0.026	(0.288)	0.023	0.003
238	19.83	0.07	0.018	(0.287)	0.015	0.002
239	19.92	0.07	0.018	(0.285)	0.015	0.002
240	20.00	0.07	0.018	(0.284)	0.015	0.002
241	20.08	0.10	0.026	(0.283)	0.023	0.003
242	20.17	0.10	0.026	(0.282)	0.023	0.003
243	20.25	0.10	0.026	(0.280)	0.023	0.003
244	20.33	0.10	0.026	(0.279)	0.023	0.003
245	20.42	0.10	0.026	(0.278)	0.023	0.003
246	20.50	0.10	0.026	(0.277)	0.023	0.003
247	20.58	0.10	0.026	(0.276)	0.023	0.003
248	20.67	0.10	0.026	(0.275)	0.023	0.003
249	20.75	0.10	0.026	(0.273)	0.023	0.003
250	20.83	0.07	0.018	(0.272)	0.015	0.002
251	20.92	0.07	0.018	(0.271)	0.015	0.002
252	21.00	0.07	0.018	(0.270)	0.015	0.002
253	21.08	0.10	0.026	(0.269)	0.023	0.003
254	21.17	0.10	0.026	(0.268)	0.023	0.003
255	21.25	0.10	0.026	(0.267)	0.023	0.003
256	21.33	0.07	0.018	(0.266)	0.015	0.002
257	21.42	0.07	0.018	(0.265)	0.015	0.002
258	21.50	0.07	0.018	(0.264)	0.015	0.002
259	21.58	0.10	0.026	(0.263)	0.023	0.003
260	21.67	0.10	0.026	(0.262)	0.023	0.003
261	21.75	0.10	0.026	(0.261)	0.023	0.003
262	21.83	0.07	0.018	(0.260)	0.015	0.002
263	21.92	0.07	0.018	(0.259)	0.015	0.002
264	22.00	0.07	0.018	(0.258)	0.015	0.002
265	22.08	0.10	0.026	(0.258)	0.023	0.003
266	22.17	0.10	0.026	(0.257)	0.023	0.003
267	22.25	0.10	0.026	(0.256)	0.023	0.003
268	22.33	0.07	0.018	(0.255)	0.015	0.002

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269  22.42     0.07      0.018       (  0.254)       0.015        0.002
270  22.50     0.07      0.018       (  0.254)       0.015        0.002
271  22.58     0.07      0.018       (  0.253)       0.015        0.002
272  22.67     0.07      0.018       (  0.252)       0.015        0.002
273  22.75     0.07      0.018       (  0.251)       0.015        0.002
274  22.83     0.07      0.018       (  0.251)       0.015        0.002
275  22.92     0.07      0.018       (  0.250)       0.015        0.002
276  23.00     0.07      0.018       (  0.249)       0.015        0.002
277  23.08     0.07      0.018       (  0.249)       0.015        0.002
278  23.17     0.07      0.018       (  0.248)       0.015        0.002
279  23.25     0.07      0.018       (  0.248)       0.015        0.002
280  23.33     0.07      0.018       (  0.247)       0.015        0.002
281  23.42     0.07      0.018       (  0.247)       0.015        0.002
282  23.50     0.07      0.018       (  0.246)       0.015        0.002
283  23.58     0.07      0.018       (  0.246)       0.015        0.002
284  23.67     0.07      0.018       (  0.246)       0.015        0.002
285  23.75     0.07      0.018       (  0.245)       0.015        0.002
286  23.83     0.07      0.018       (  0.245)       0.015        0.002
287  23.92     0.07      0.018       (  0.245)       0.015        0.002
288  24.00     0.07      0.018       (  0.245)       0.015        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =      3.4
      Flood volume = Effective rainfall      0.29(In)
       times area       9.7(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      1.91(In)
      Total soil loss =     1.552(Ac.Ft)
      Total rainfall =      2.20(In)
      Flood volume =       10101.3 Cubic Feet
      Total soil loss =       67601.0 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.381(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ----------------------------------------------------------------------------
   0+ 5       0.0000      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0003      0.02  Q         |         |         |         |
   0+20       0.0005      0.02  Q         |         |         |         |
   0+25       0.0007      0.03  Q         |         |         |         |
   0+30       0.0009      0.03  Q         |         |         |         |
   0+35       0.0011      0.03  Q         |         |         |         |
   0+40       0.0013      0.03  Q         |         |         |         |
   0+45       0.0016      0.03  Q         |         |         |         |
   0+50       0.0018      0.04  Q         |         |         |         |
   0+55       0.0021      0.04  Q         |         |         |         |
   1+ 0       0.0024      0.04  Q         |         |         |         |
   1+ 5       0.0027      0.04  Q         |         |         |         |
   1+10       0.0030      0.04  Q         |         |         |         |
   1+15       0.0032      0.03  Q         |         |         |         |
   1+20       0.0034      0.03  Q         |         |         |         |
   1+25       0.0037      0.03  Q         |         |         |         |
   1+30       0.0039      0.03  Q         |         |         |         |
   1+35       0.0041      0.03  Q         |         |         |         |
   1+40       0.0044      0.03  Q         |         |         |         |
   1+45       0.0046      0.03  Q         |         |         |         |
   1+50       0.0048      0.04  Q         |         |         |         |
   1+55       0.0051      0.04  Q         |         |         |         |
   2+ 0       0.0054      0.04  Q         |         |         |         |
   2+ 5       0.0057      0.04  Q         |         |         |         |
   2+10       0.0060      0.04  QV        |         |         |         |
   2+15       0.0064      0.04  QV        |         |         |         |
   2+20       0.0067      0.04  QV        |         |         |         |
   2+25       0.0070      0.04  QV        |         |         |         |
   2+30       0.0073      0.04  QV        |         |         |         |
   2+35       0.0076      0.05  QV        |         |         |         |
   2+40       0.0080      0.05  QV        |         |         |         |
   2+45       0.0084      0.05  QV        |         |         |         |
   2+50       0.0087      0.06  QV        |         |         |         |
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2+55       0.0091      0.06  QV        |         |         |         |
3+ 0       0.0095      0.06  QV        |         |         |         |
3+ 5       0.0099      0.06  QV        |         |         |         |
3+10       0.0103      0.06  QV        |         |         |         |
3+15       0.0107      0.06  QV        |         |         |         |
3+20       0.0111      0.06  QV        |         |         |         |
3+25       0.0114      0.06  QV        |         |         |         |
3+30       0.0118      0.06  Q V       |         |         |         |
3+35       0.0122      0.06  Q V       |         |         |         |
3+40       0.0126      0.06  Q V       |         |         |         |
3+45       0.0130      0.06  Q V       |         |         |         |
3+50       0.0134      0.06  Q V       |         |         |         |
3+55       0.0138      0.06  Q V       |         |         |         |
4+ 0       0.0143      0.07  Q V       |         |         |         |
4+ 5       0.0147      0.07  Q V       |         |         |         |
4+10       0.0152      0.07  Q V       |         |         |         |
4+15       0.0157      0.07  Q V       |         |         |         |
4+20       0.0162      0.07  Q V       |         |         |         |
4+25       0.0167      0.08  Q V       |         |         |         |
4+30       0.0172      0.08  Q V       |         |         |         |
4+35       0.0177      0.08  Q  V      |         |         |         |
4+40       0.0183      0.08  Q  V      |         |         |         |
4+45       0.0188      0.08  Q  V      |         |         |         |
4+50       0.0194      0.08  Q  V      |         |         |         |
4+55       0.0200      0.09  Q  V      |         |         |         |
5+ 0       0.0206      0.09  Q  V      |         |         |         |
5+ 5       0.0212      0.08  Q  V      |         |         |         |
5+10       0.0217      0.07  Q  V      |         |         |         |
5+15       0.0222      0.07  Q  V      |         |         |         |
5+20       0.0226      0.07  Q  V      |         |         |         |
5+25       0.0232      0.08  Q  V      |         |         |         |
5+30       0.0237      0.08  Q   V     |         |         |         |
5+35       0.0243      0.08  Q   V     |         |         |         |
5+40       0.0249      0.09  Q   V     |         |         |         |
5+45       0.0255      0.09  Q   V     |         |         |         |
5+50       0.0261      0.09  Q   V     |         |         |         |
5+55       0.0267      0.09  Q   V     |         |         |         |
6+ 0       0.0273      0.09  Q   V     |         |         |         |
6+ 5       0.0280      0.09  Q   V     |         |         |         |
6+10       0.0286      0.10  Q   V     |         |         |         |
6+15       0.0293      0.10  Q    V    |         |         |         |
6+20       0.0300      0.10  Q    V    |         |         |         |
6+25       0.0307      0.10  Q    V    |         |         |         |
6+30       0.0314      0.10  Q    V    |         |         |         |
6+35       0.0321      0.10  Q    V    |         |         |         |
6+40       0.0329      0.11  Q    V    |         |         |         |
6+45       0.0336      0.11  Q    V    |         |         |         |
6+50       0.0344      0.11  Q    V    |         |         |         |
6+55       0.0352      0.11  Q     V   |         |         |         |
7+ 0       0.0359      0.11  Q     V   |         |         |         |
7+ 5       0.0367      0.11  Q     V   |         |         |         |
7+10       0.0375      0.11  Q     V   |         |         |         |
7+15       0.0383      0.11  Q     V   |         |         |         |
7+20       0.0391      0.12  Q     V   |         |         |         |
7+25       0.0399      0.12  Q     V   |         |         |         |
7+30       0.0407      0.12  Q      V  |         |         |         |
7+35       0.0416      0.13  Q      V  |         |         |         |
7+40       0.0425      0.13  Q      V  |         |         |         |
7+45       0.0434      0.13  Q      V  |         |         |         |
7+50       0.0444      0.14  Q      V  |         |         |         |
7+55       0.0453      0.14  Q      V  |         |         |         |
8+ 0       0.0463      0.14  Q      V  |         |         |         |
8+ 5       0.0474      0.15  Q       V |         |         |         |
8+10       0.0485      0.16  Q       V |         |         |         |
8+15       0.0496      0.17  Q       V |         |         |         |
8+20       0.0508      0.17  Q       V |         |         |         |
8+25       0.0519      0.17  Q       V |         |         |         |
8+30       0.0531      0.17  Q        V|         |         |         |
8+35       0.0543      0.17  Q        V|         |         |         |
8+40       0.0555      0.18  Q        V|         |         |         |
8+45       0.0567      0.18  Q        V|         |         |         |
8+50       0.0580      0.18  Q         V        |         |         |
8+55       0.0593      0.19  Q         V        |         |         |
9+ 0       0.0606      0.19  Q         V        |         |         |
9+ 5       0.0619      0.20  Q         V        |         |         |
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 9+10       0.0634      0.21  Q          V          |          |          |
 9+15       0.0648      0.21  Q          |V         |          |          |
 9+20       0.0663      0.21  Q          |V         |          |          |
 9+25       0.0678      0.22  Q          |V         |          |          |
 9+30       0.0693      0.22  Q          |V         |          |          |
 9+35       0.0709      0.23  Q          | V        |          |          |
 9+40       0.0725      0.23  Q          | V        |          |          |
 9+45       0.0741      0.23  Q          | V        |          |          |
 9+50       0.0758      0.24  Q          |  V       |          |          |
 9+55       0.0774      0.24  Q          |  V       |          |          |
10+ 0       0.0791      0.25  Q          |  V       |          |          |
10+ 5       0.0807      0.23  Q          |  V       |          |          |
10+10       0.0820      0.19  Q          |   V      |          |          |
10+15       0.0832      0.18  Q          |   V      |          |          |
10+20       0.0844      0.17  Q          |   V      |          |          |
10+25       0.0856      0.17  Q          |   V      |          |          |
10+30       0.0867      0.17  Q          |   V      |          |          |
10+35       0.0880      0.18  Q          |    V     |          |          |
10+40       0.0894      0.21  Q          |    V     |          |          |
10+45       0.0909      0.22  Q          |    V     |          |          |
10+50       0.0925      0.22  Q          |    V     |          |          |
10+55       0.0940      0.22  Q          |     V    |          |          |
11+ 0       0.0955      0.22  Q          |     V    |          |          |
11+ 5       0.0971      0.22  Q          |     V    |          |          |
11+10       0.0985      0.22  Q          |     V    |          |          |
11+15       0.1000      0.21  Q          |      V   |          |          |
11+20       0.1015      0.21  Q          |      V   |          |          |
11+25       0.1030      0.21  Q          |      V   |          |          |
11+30       0.1044      0.21  Q          |       V  |          |          |
11+35       0.1059      0.21  Q          |       V  |          |          |
11+40       0.1072      0.20  Q          |       V  |          |          |
11+45       0.1086      0.19  Q          |       V  |          |          |
11+50       0.1099      0.20  Q          |       V  |          |          |
11+55       0.1113      0.20  Q          |        V |          |          |
12+ 0       0.1127      0.20  Q          |        V |          |          |
12+ 5       0.1142      0.22  Q          |        V |          |          |
12+10       0.1160      0.26  |Q         |         V          |          |
12+15       0.1178      0.27  |Q         |         V          |          |
12+20       0.1198      0.28  |Q         |         V          |          |
12+25       0.1217      0.29  |Q         |         V          |          |
12+30       0.1237      0.29  |Q         |         |V         |          |
12+35       0.1258      0.30  |Q         |         |V         |          |
12+40       0.1279      0.31  |Q         |         | V        |          |
12+45       0.1301      0.31  |Q         |         | V        |          |
12+50       0.1322      0.32  |Q         |         | V        |          |
12+55       0.1344      0.32  |Q         |         |  V       |          |
13+ 0       0.1367      0.32  |Q         |         |  V       |          |
13+ 5       0.1390      0.34  |Q         |         |  V       |          |
13+10       0.1415      0.37  |Q         |         |   V      |          |
13+15       0.1441      0.37  |Q         |         |   V      |          |
13+20       0.1467      0.38  |Q         |         |    V     |          |
13+25       0.1493      0.38  |Q         |         |    V     |          |
13+30       0.1520      0.38  |Q         |         |     V    |          |
13+35       0.1544      0.35  |Q         |         |     V    |          |
13+40       0.1564      0.29  |Q         |         |     V    |          |
13+45       0.1582      0.27  |Q         |         |      V   |          |
13+50       0.1601      0.27  |Q         |         |      V   |          |
13+55       0.1619      0.26  |Q         |         |      V   |          |
14+ 0       0.1637      0.26  |Q         |         |       V  |          |
14+ 5       0.1655      0.27  |Q         |         |       V  |          |
14+10       0.1675      0.29  |Q         |         |       V  |          |
14+15       0.1696      0.30  |Q         |         |        V |          |
14+20       0.1716      0.30  |Q         |         |        V |          |
14+25       0.1737      0.29  |Q         |         |        V |          |
14+30       0.1757      0.29  |Q         |         |         V          |
14+35       0.1777      0.29  |Q         |         |         V          |
14+40       0.1797      0.29  |Q         |         |         V          |
14+45       0.1817      0.29  |Q         |         |         |V         |
14+50       0.1837      0.29  |Q         |         |         |V         |
14+55       0.1856      0.28  |Q         |         |         | V        |
15+ 0       0.1876      0.28  |Q         |         |         | V        |
15+ 5       0.1895      0.28  |Q         |         |         | V        |
15+10       0.1914      0.27  |Q         |         |         |  V       |
15+15       0.1932      0.27  |Q         |         |         |  V       |
15+20       0.1951      0.27  |Q         |         |         |  V       |
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15+25	0.1969	0.26	|Q	|	|	| V |
15+30	0.1987	0.26	|Q	|	|	| V |
15+35	0.2004	0.25	Q	|	|	| V |
15+40	0.2019	0.22	Q	|	|	| V |
15+45	0.2034	0.22	Q	|	|	| V |
15+50	0.2049	0.22	Q	|	|	| V |
15+55	0.2064	0.21	Q	|	|	| V |
16+ 0	0.2079	0.21	Q	|	|	| V |
16+ 5	0.2090	0.17	Q	|	|	| V |
16+10	0.2096	0.09	Q	|	|	| V |
16+15	0.2101	0.07	Q	|	|	| V |
16+20	0.2104	0.06	Q	|	|	| V |
16+25	0.2108	0.05	Q	|	|	| V |
16+30	0.2111	0.05	Q	|	|	| V |
16+35	0.2114	0.04	Q	|	|	| V |
16+40	0.2117	0.04	Q	|	|	| V |
16+45	0.2119	0.04	Q	|	|	| V |
16+50	0.2121	0.03	Q	|	|	| V |
16+55	0.2124	0.03	Q	|	|	| V |
17+ 0	0.2126	0.03	Q	|	|	| V |
17+ 5	0.2129	0.04	Q	|	|	| V |
17+10	0.2132	0.05	Q	|	|	| V |
17+15	0.2136	0.05	Q	|	|	| V |
17+20	0.2140	0.05	Q	|	|	| V |
17+25	0.2143	0.06	Q	|	|	| V |
17+30	0.2147	0.06	Q	|	|	| V |
17+35	0.2151	0.06	Q	|	|	| V |
17+40	0.2155	0.06	Q	|	|	| V |
17+45	0.2159	0.06	Q	|	|	| V |
17+50	0.2163	0.05	Q	|	|	| V |
17+55	0.2166	0.05	Q	|	|	| V |
18+ 0	0.2169	0.05	Q	|	|	| V |
18+ 5	0.2172	0.05	Q	|	|	| V |
18+10	0.2175	0.05	Q	|	|	| V |
18+15	0.2178	0.05	Q	|	|	| V |
18+20	0.2181	0.04	Q	|	|	| V |
18+25	0.2185	0.04	Q	|	|	| V |
18+30	0.2188	0.04	Q	|	|	| V |
18+35	0.2191	0.04	Q	|	|	| V |
18+40	0.2193	0.04	Q	|	|	| V |
18+45	0.2195	0.04	Q	|	|	| V |
18+50	0.2198	0.03	Q	|	|	| V |
18+55	0.2199	0.03	Q	|	|	| V |
19+ 0	0.2201	0.02	Q	|	|	| V |
19+ 5	0.2203	0.03	Q	|	|	| V |
19+10	0.2205	0.03	Q	|	|	| V |
19+15	0.2207	0.03	Q	|	|	| V |
19+20	0.2210	0.04	Q	|	|	| V |
19+25	0.2213	0.04	Q	|	|	| V |
19+30	0.2216	0.04	Q	|	|	| V |
19+35	0.2218	0.04	Q	|	|	| V |
19+40	0.2221	0.04	Q	|	|	| V |
19+45	0.2223	0.03	Q	|	|	| V |
19+50	0.2225	0.03	Q	|	|	| V |
19+55	0.2227	0.03	Q	|	|	| V |
20+ 0	0.2229	0.02	Q	|	|	| V |
20+ 5	0.2231	0.03	Q	|	|	| V |
20+10	0.2233	0.03	Q	|	|	| V |
20+15	0.2235	0.03	Q	|	|	| V |
20+20	0.2237	0.03	Q	|	|	| V |
20+25	0.2240	0.03	Q	|	|	| V |
20+30	0.2242	0.03	Q	|	|	| V |
20+35	0.2244	0.03	Q	|	|	| V |
20+40	0.2247	0.03	Q	|	|	| V |
20+45	0.2249	0.03	Q	|	|	| V |
20+50	0.2251	0.03	Q	|	|	| V |
20+55	0.2253	0.03	Q	|	|	| V |
21+ 0	0.2254	0.02	Q	|	|	| V |
21+ 5	0.2256	0.03	Q	|	|	| V |
21+10	0.2258	0.03	Q	|	|	| V |
21+15	0.2261	0.03	Q	|	|	| V |
21+20	0.2263	0.03	Q	|	|	| V|
21+25	0.2264	0.02	Q	|	|	| V|
21+30	0.2266	0.02	Q	|	|	| V|
21+35	0.2268	0.03	Q	|	|	| V|

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21+40       0.2270      0.03  Q          |          |          |         V|
21+45       0.2272      0.03  Q          |          |          |         V|
21+50       0.2274      0.03  Q          |          |          |         V|
21+55       0.2276      0.02  Q          |          |          |         V|
22+ 0       0.2278      0.02  Q          |          |          |         V|
22+ 5       0.2279      0.03  Q          |          |          |         V|
22+10       0.2282      0.03  Q          |          |          |         V|
22+15       0.2284      0.03  Q          |          |          |         V|
22+20       0.2286      0.03  Q          |          |          |         V|
22+25       0.2288      0.02  Q          |          |          |         V|
22+30       0.2289      0.02  Q          |          |          |         V|
22+35       0.2291      0.02  Q          |          |          |         V|
22+40       0.2292      0.02  Q          |          |          |         V|
22+45       0.2294      0.02  Q          |          |          |         V|
22+50       0.2295      0.02  Q          |          |          |         V|
22+55       0.2297      0.02  Q          |          |          |         V|
23+ 0       0.2299      0.02  Q          |          |          |         V|
23+ 5       0.2300      0.02  Q          |          |          |         V|
23+10       0.2302      0.02  Q          |          |          |         V|
23+15       0.2303      0.02  Q          |          |          |         V|
23+20       0.2305      0.02  Q          |          |          |         V|
23+25       0.2306      0.02  Q          |          |          |         V|
23+30       0.2308      0.02  Q          |          |          |         V|
23+35       0.2309      0.02  Q          |          |          |         V|
23+40       0.2311      0.02  Q          |          |          |         V|
23+45       0.2312      0.02  Q          |          |          |         V|
23+50       0.2314      0.02  Q          |          |          |         V|
23+55       0.2316      0.02  Q          |          |          |         V|
24+ 0       0.2317      0.02  Q          |          |          |         V|
24+ 5       0.2318      0.02  Q          |          |          |         V|
24+10       0.2319      0.01  Q          |          |          |         V|
24+15       0.2319      0.00  Q          |          |          |         V|
24+20       0.2319      0.00  Q          |          |          |         V|
24+25       0.2319      0.00  Q          |          |          |         V|
24+30       0.2319      0.00  Q          |          |          |          V
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U n i t H y d r o g r a p h A n a l y s i s

Study date 05/12/20 File: sh2pr242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4029

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Glen Ivy Senior Living
Inflow Hydrograh Calculations
Proposed Condition
2-year 24-hour storm

Drainage Area = 9.76(Ac.) = 0.015 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 9.76(Ac.) = 0.015 Sq. Mi.
Length along longest watercourse = 1323.00(Ft.)
Length along longest watercourse measured to centroid = 593.00(Ft.)
Length along longest watercourse = 0.251 Mi.
Length along longest watercourse measured to centroid = 0.112 Mi.
Difference in elevation = 20.80(Ft.)
Slope along watercourse = 83.0113 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.040 Hr.
Lag time = 2.40 Min.
25% of lag time = 0.60 Min.
40% of lag time = 0.96 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.76	2.20	21.41

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.76	5.83	56.73

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.200(In)
Area Averaged 100-Year Rainfall = 5.830(In)

Point rain (area averaged) = 2.200(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.200(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
9.760	65.00	0.900

Total Area Entered = 9.76(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

65.0	45.0	0.621	0.900	0.118	1.000	0.118
					Sum (F) =	0.118

Area averaged mean soil loss (F) (In/Hr) = 0.118
Minimum soil loss rate ((In/Hr)) = 0.059
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	208.162	44.777	4.391
2	0.167	416.323	42.802	4.197
3	0.250	624.485	8.471	0.831
4	0.333	832.646	3.950	0.387
		Sum = 100.000	Sum=	9.806

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	Pattern	Storm Rain	Loss rate(In./Hr)		Effective
(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	0.07	0.018	(0.209)	0.003	0.014
2	0.17	0.07	0.018	(0.208)	0.003	0.014
3	0.25	0.07	0.018	(0.208)	0.003	0.014
4	0.33	0.10	0.026	(0.207)	0.005	0.022
5	0.42	0.10	0.026	(0.206)	0.005	0.022
6	0.50	0.10	0.026	(0.205)	0.005	0.022
7	0.58	0.10	0.026	(0.204)	0.005	0.022
8	0.67	0.10	0.026	(0.204)	0.005	0.022
9	0.75	0.10	0.026	(0.203)	0.005	0.022
10	0.83	0.13	0.035	(0.202)	0.006	0.029
11	0.92	0.13	0.035	(0.201)	0.006	0.029
12	1.00	0.13	0.035	(0.200)	0.006	0.029
13	1.08	0.10	0.026	(0.200)	0.005	0.022
14	1.17	0.10	0.026	(0.199)	0.005	0.022
15	1.25	0.10	0.026	(0.198)	0.005	0.022
16	1.33	0.10	0.026	(0.197)	0.005	0.022
17	1.42	0.10	0.026	(0.196)	0.005	0.022
18	1.50	0.10	0.026	(0.196)	0.005	0.022
19	1.58	0.10	0.026	(0.195)	0.005	0.022
20	1.67	0.10	0.026	(0.194)	0.005	0.022
21	1.75	0.10	0.026	(0.193)	0.005	0.022
22	1.83	0.13	0.035	(0.193)	0.006	0.029
23	1.92	0.13	0.035	(0.192)	0.006	0.029
24	2.00	0.13	0.035	(0.191)	0.006	0.029
25	2.08	0.13	0.035	(0.190)	0.006	0.029
26	2.17	0.13	0.035	(0.189)	0.006	0.029
27	2.25	0.13	0.035	(0.189)	0.006	0.029
28	2.33	0.13	0.035	(0.188)	0.006	0.029
29	2.42	0.13	0.035	(0.187)	0.006	0.029
30	2.50	0.13	0.035	(0.186)	0.006	0.029
31	2.58	0.17	0.044	(0.186)	0.008	0.036
32	2.67	0.17	0.044	(0.185)	0.008	0.036
33	2.75	0.17	0.044	(0.184)	0.008	0.036
34	2.83	0.17	0.044	(0.183)	0.008	0.036
35	2.92	0.17	0.044	(0.183)	0.008	0.036
36	3.00	0.17	0.044	(0.182)	0.008	0.036
37	3.08	0.17	0.044	(0.181)	0.008	0.036
38	3.17	0.17	0.044	(0.180)	0.008	0.036
39	3.25	0.17	0.044	(0.180)	0.008	0.036
40	3.33	0.17	0.044	(0.179)	0.008	0.036
41	3.42	0.17	0.044	(0.178)	0.008	0.036
42	3.50	0.17	0.044	(0.177)	0.008	0.036
43	3.58	0.17	0.044	(0.177)	0.008	0.036
44	3.67	0.17	0.044	(0.176)	0.008	0.036
45	3.75	0.17	0.044	(0.175)	0.008	0.036
46	3.83	0.20	0.053	(0.174)	0.010	0.043

47	3.92	0.20	0.053	(0.174)	0.010	0.043
48	4.00	0.20	0.053	(0.173)	0.010	0.043
49	4.08	0.20	0.053	(0.172)	0.010	0.043
50	4.17	0.20	0.053	(0.171)	0.010	0.043
51	4.25	0.20	0.053	(0.171)	0.010	0.043
52	4.33	0.23	0.062	(0.170)	0.011	0.051
53	4.42	0.23	0.062	(0.169)	0.011	0.051
54	4.50	0.23	0.062	(0.168)	0.011	0.051
55	4.58	0.23	0.062	(0.168)	0.011	0.051
56	4.67	0.23	0.062	(0.167)	0.011	0.051
57	4.75	0.23	0.062	(0.166)	0.011	0.051
58	4.83	0.27	0.070	(0.166)	0.013	0.058
59	4.92	0.27	0.070	(0.165)	0.013	0.058
60	5.00	0.27	0.070	(0.164)	0.013	0.058
61	5.08	0.20	0.053	(0.163)	0.010	0.043
62	5.17	0.20	0.053	(0.163)	0.010	0.043
63	5.25	0.20	0.053	(0.162)	0.010	0.043
64	5.33	0.23	0.062	(0.161)	0.011	0.051
65	5.42	0.23	0.062	(0.161)	0.011	0.051
66	5.50	0.23	0.062	(0.160)	0.011	0.051
67	5.58	0.27	0.070	(0.159)	0.013	0.058
68	5.67	0.27	0.070	(0.159)	0.013	0.058
69	5.75	0.27	0.070	(0.158)	0.013	0.058
70	5.83	0.27	0.070	(0.157)	0.013	0.058
71	5.92	0.27	0.070	(0.156)	0.013	0.058
72	6.00	0.27	0.070	(0.156)	0.013	0.058
73	6.08	0.30	0.079	(0.155)	0.014	0.065
74	6.17	0.30	0.079	(0.154)	0.014	0.065
75	6.25	0.30	0.079	(0.154)	0.014	0.065
76	6.33	0.30	0.079	(0.153)	0.014	0.065
77	6.42	0.30	0.079	(0.152)	0.014	0.065
78	6.50	0.30	0.079	(0.152)	0.014	0.065
79	6.58	0.33	0.088	(0.151)	0.016	0.072
80	6.67	0.33	0.088	(0.150)	0.016	0.072
81	6.75	0.33	0.088	(0.150)	0.016	0.072
82	6.83	0.33	0.088	(0.149)	0.016	0.072
83	6.92	0.33	0.088	(0.148)	0.016	0.072
84	7.00	0.33	0.088	(0.148)	0.016	0.072
85	7.08	0.33	0.088	(0.147)	0.016	0.072
86	7.17	0.33	0.088	(0.146)	0.016	0.072
87	7.25	0.33	0.088	(0.146)	0.016	0.072
88	7.33	0.37	0.097	(0.145)	0.017	0.079
89	7.42	0.37	0.097	(0.144)	0.017	0.079
90	7.50	0.37	0.097	(0.144)	0.017	0.079
91	7.58	0.40	0.106	(0.143)	0.019	0.087
92	7.67	0.40	0.106	(0.142)	0.019	0.087
93	7.75	0.40	0.106	(0.142)	0.019	0.087
94	7.83	0.43	0.114	(0.141)	0.021	0.094
95	7.92	0.43	0.114	(0.140)	0.021	0.094
96	8.00	0.43	0.114	(0.140)	0.021	0.094
97	8.08	0.50	0.132	(0.139)	0.024	0.108
98	8.17	0.50	0.132	(0.138)	0.024	0.108
99	8.25	0.50	0.132	(0.138)	0.024	0.108
100	8.33	0.50	0.132	(0.137)	0.024	0.108
101	8.42	0.50	0.132	(0.136)	0.024	0.108
102	8.50	0.50	0.132	(0.136)	0.024	0.108
103	8.58	0.53	0.141	(0.135)	0.025	0.115
104	8.67	0.53	0.141	(0.135)	0.025	0.115
105	8.75	0.53	0.141	(0.134)	0.025	0.115
106	8.83	0.57	0.150	(0.133)	0.027	0.123
107	8.92	0.57	0.150	(0.133)	0.027	0.123
108	9.00	0.57	0.150	(0.132)	0.027	0.123
109	9.08	0.63	0.167	(0.131)	0.030	0.137
110	9.17	0.63	0.167	(0.131)	0.030	0.137
111	9.25	0.63	0.167	(0.130)	0.030	0.137
112	9.33	0.67	0.176	(0.129)	0.032	0.144
113	9.42	0.67	0.176	(0.129)	0.032	0.144
114	9.50	0.67	0.176	(0.128)	0.032	0.144
115	9.58	0.70	0.185	(0.128)	0.033	0.152
116	9.67	0.70	0.185	(0.127)	0.033	0.152
117	9.75	0.70	0.185	(0.126)	0.033	0.152
118	9.83	0.73	0.194	(0.126)	0.035	0.159
119	9.92	0.73	0.194	(0.125)	0.035	0.159
120	10.00	0.73	0.194	(0.125)	0.035	0.159
121	10.08	0.50	0.132	(0.124)	0.024	0.108

122	10.17	0.50	0.132	(0.123)	0.024	0.108
123	10.25	0.50	0.132	(0.123)	0.024	0.108
124	10.33	0.50	0.132	(0.122)	0.024	0.108
125	10.42	0.50	0.132	(0.122)	0.024	0.108
126	10.50	0.50	0.132	(0.121)	0.024	0.108
127	10.58	0.67	0.176	(0.120)	0.032	0.144
128	10.67	0.67	0.176	(0.120)	0.032	0.144
129	10.75	0.67	0.176	(0.119)	0.032	0.144
130	10.83	0.67	0.176	(0.119)	0.032	0.144
131	10.92	0.67	0.176	(0.118)	0.032	0.144
132	11.00	0.67	0.176	(0.117)	0.032	0.144
133	11.08	0.63	0.167	(0.117)	0.030	0.137
134	11.17	0.63	0.167	(0.116)	0.030	0.137
135	11.25	0.63	0.167	(0.116)	0.030	0.137
136	11.33	0.63	0.167	(0.115)	0.030	0.137
137	11.42	0.63	0.167	(0.115)	0.030	0.137
138	11.50	0.63	0.167	(0.114)	0.030	0.137
139	11.58	0.57	0.150	(0.113)	0.027	0.123
140	11.67	0.57	0.150	(0.113)	0.027	0.123
141	11.75	0.57	0.150	(0.112)	0.027	0.123
142	11.83	0.60	0.158	(0.112)	0.029	0.130
143	11.92	0.60	0.158	(0.111)	0.029	0.130
144	12.00	0.60	0.158	(0.111)	0.029	0.130
145	12.08	0.83	0.220	(0.110)	0.040	0.180
146	12.17	0.83	0.220	(0.110)	0.040	0.180
147	12.25	0.83	0.220	(0.109)	0.040	0.180
148	12.33	0.87	0.229	(0.108)	0.041	0.188
149	12.42	0.87	0.229	(0.108)	0.041	0.188
150	12.50	0.87	0.229	(0.107)	0.041	0.188
151	12.58	0.93	0.246	(0.107)	0.044	0.202
152	12.67	0.93	0.246	(0.106)	0.044	0.202
153	12.75	0.93	0.246	(0.106)	0.044	0.202
154	12.83	0.97	0.255	(0.105)	0.046	0.209
155	12.92	0.97	0.255	(0.105)	0.046	0.209
156	13.00	0.97	0.255	(0.104)	0.046	0.209
157	13.08	1.13	0.299	(0.104)	0.054	0.245
158	13.17	1.13	0.299	(0.103)	0.054	0.245
159	13.25	1.13	0.299	(0.103)	0.054	0.245
160	13.33	1.13	0.299	(0.102)	0.054	0.245
161	13.42	1.13	0.299	(0.102)	0.054	0.245
162	13.50	1.13	0.299	(0.101)	0.054	0.245
163	13.58	0.77	0.202	(0.101)	0.036	0.166
164	13.67	0.77	0.202	(0.100)	0.036	0.166
165	13.75	0.77	0.202	(0.100)	0.036	0.166
166	13.83	0.77	0.202	(0.099)	0.036	0.166
167	13.92	0.77	0.202	(0.099)	0.036	0.166
168	14.00	0.77	0.202	(0.098)	0.036	0.166
169	14.08	0.90	0.238	(0.098)	0.043	0.195
170	14.17	0.90	0.238	(0.097)	0.043	0.195
171	14.25	0.90	0.238	(0.097)	0.043	0.195
172	14.33	0.87	0.229	(0.096)	0.041	0.188
173	14.42	0.87	0.229	(0.096)	0.041	0.188
174	14.50	0.87	0.229	(0.095)	0.041	0.188
175	14.58	0.87	0.229	(0.095)	0.041	0.188
176	14.67	0.87	0.229	(0.094)	0.041	0.188
177	14.75	0.87	0.229	(0.094)	0.041	0.188
178	14.83	0.83	0.220	(0.093)	0.040	0.180
179	14.92	0.83	0.220	(0.093)	0.040	0.180
180	15.00	0.83	0.220	(0.092)	0.040	0.180
181	15.08	0.80	0.211	(0.092)	0.038	0.173
182	15.17	0.80	0.211	(0.091)	0.038	0.173
183	15.25	0.80	0.211	(0.091)	0.038	0.173
184	15.33	0.77	0.202	(0.090)	0.036	0.166
185	15.42	0.77	0.202	(0.090)	0.036	0.166
186	15.50	0.77	0.202	(0.089)	0.036	0.166
187	15.58	0.63	0.167	(0.089)	0.030	0.137
188	15.67	0.63	0.167	(0.088)	0.030	0.137
189	15.75	0.63	0.167	(0.088)	0.030	0.137
190	15.83	0.63	0.167	(0.088)	0.030	0.137
191	15.92	0.63	0.167	(0.087)	0.030	0.137
192	16.00	0.63	0.167	(0.087)	0.030	0.137
193	16.08	0.13	0.035	(0.086)	0.006	0.029
194	16.17	0.13	0.035	(0.086)	0.006	0.029
195	16.25	0.13	0.035	(0.085)	0.006	0.029
196	16.33	0.13	0.035	(0.085)	0.006	0.029

197	16.42	0.13	0.035	(0.084)	0.006	0.029
198	16.50	0.13	0.035	(0.084)	0.006	0.029
199	16.58	0.10	0.026	(0.084)	0.005	0.022
200	16.67	0.10	0.026	(0.083)	0.005	0.022
201	16.75	0.10	0.026	(0.083)	0.005	0.022
202	16.83	0.10	0.026	(0.082)	0.005	0.022
203	16.92	0.10	0.026	(0.082)	0.005	0.022
204	17.00	0.10	0.026	(0.082)	0.005	0.022
205	17.08	0.17	0.044	(0.081)	0.008	0.036
206	17.17	0.17	0.044	(0.081)	0.008	0.036
207	17.25	0.17	0.044	(0.080)	0.008	0.036
208	17.33	0.17	0.044	(0.080)	0.008	0.036
209	17.42	0.17	0.044	(0.079)	0.008	0.036
210	17.50	0.17	0.044	(0.079)	0.008	0.036
211	17.58	0.17	0.044	(0.079)	0.008	0.036
212	17.67	0.17	0.044	(0.078)	0.008	0.036
213	17.75	0.17	0.044	(0.078)	0.008	0.036
214	17.83	0.13	0.035	(0.078)	0.006	0.029
215	17.92	0.13	0.035	(0.077)	0.006	0.029
216	18.00	0.13	0.035	(0.077)	0.006	0.029
217	18.08	0.13	0.035	(0.076)	0.006	0.029
218	18.17	0.13	0.035	(0.076)	0.006	0.029
219	18.25	0.13	0.035	(0.076)	0.006	0.029
220	18.33	0.13	0.035	(0.075)	0.006	0.029
221	18.42	0.13	0.035	(0.075)	0.006	0.029
222	18.50	0.13	0.035	(0.075)	0.006	0.029
223	18.58	0.10	0.026	(0.074)	0.005	0.022
224	18.67	0.10	0.026	(0.074)	0.005	0.022
225	18.75	0.10	0.026	(0.073)	0.005	0.022
226	18.83	0.07	0.018	(0.073)	0.003	0.014
227	18.92	0.07	0.018	(0.073)	0.003	0.014
228	19.00	0.07	0.018	(0.072)	0.003	0.014
229	19.08	0.10	0.026	(0.072)	0.005	0.022
230	19.17	0.10	0.026	(0.072)	0.005	0.022
231	19.25	0.10	0.026	(0.071)	0.005	0.022
232	19.33	0.13	0.035	(0.071)	0.006	0.029
233	19.42	0.13	0.035	(0.071)	0.006	0.029
234	19.50	0.13	0.035	(0.070)	0.006	0.029
235	19.58	0.10	0.026	(0.070)	0.005	0.022
236	19.67	0.10	0.026	(0.070)	0.005	0.022
237	19.75	0.10	0.026	(0.069)	0.005	0.022
238	19.83	0.07	0.018	(0.069)	0.003	0.014
239	19.92	0.07	0.018	(0.069)	0.003	0.014
240	20.00	0.07	0.018	(0.069)	0.003	0.014
241	20.08	0.10	0.026	(0.068)	0.005	0.022
242	20.17	0.10	0.026	(0.068)	0.005	0.022
243	20.25	0.10	0.026	(0.068)	0.005	0.022
244	20.33	0.10	0.026	(0.067)	0.005	0.022
245	20.42	0.10	0.026	(0.067)	0.005	0.022
246	20.50	0.10	0.026	(0.067)	0.005	0.022
247	20.58	0.10	0.026	(0.066)	0.005	0.022
248	20.67	0.10	0.026	(0.066)	0.005	0.022
249	20.75	0.10	0.026	(0.066)	0.005	0.022
250	20.83	0.07	0.018	(0.066)	0.003	0.014
251	20.92	0.07	0.018	(0.065)	0.003	0.014
252	21.00	0.07	0.018	(0.065)	0.003	0.014
253	21.08	0.10	0.026	(0.065)	0.005	0.022
254	21.17	0.10	0.026	(0.065)	0.005	0.022
255	21.25	0.10	0.026	(0.064)	0.005	0.022
256	21.33	0.07	0.018	(0.064)	0.003	0.014
257	21.42	0.07	0.018	(0.064)	0.003	0.014
258	21.50	0.07	0.018	(0.064)	0.003	0.014
259	21.58	0.10	0.026	(0.063)	0.005	0.022
260	21.67	0.10	0.026	(0.063)	0.005	0.022
261	21.75	0.10	0.026	(0.063)	0.005	0.022
262	21.83	0.07	0.018	(0.063)	0.003	0.014
263	21.92	0.07	0.018	(0.063)	0.003	0.014
264	22.00	0.07	0.018	(0.062)	0.003	0.014
265	22.08	0.10	0.026	(0.062)	0.005	0.022
266	22.17	0.10	0.026	(0.062)	0.005	0.022
267	22.25	0.10	0.026	(0.062)	0.005	0.022
268	22.33	0.07	0.018	(0.062)	0.003	0.014
269	22.42	0.07	0.018	(0.061)	0.003	0.014
270	22.50	0.07	0.018	(0.061)	0.003	0.014
271	22.58	0.07	0.018	(0.061)	0.003	0.014

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272  22.67     0.07      0.018       (  0.061)       0.003        0.014
273  22.75     0.07      0.018       (  0.061)       0.003        0.014
274  22.83     0.07      0.018       (  0.060)       0.003        0.014
275  22.92     0.07      0.018       (  0.060)       0.003        0.014
276  23.00     0.07      0.018       (  0.060)       0.003        0.014
277  23.08     0.07      0.018       (  0.060)       0.003        0.014
278  23.17     0.07      0.018       (  0.060)       0.003        0.014
279  23.25     0.07      0.018       (  0.060)       0.003        0.014
280  23.33     0.07      0.018       (  0.060)       0.003        0.014
281  23.42     0.07      0.018       (  0.060)       0.003        0.014
282  23.50     0.07      0.018       (  0.059)       0.003        0.014
283  23.58     0.07      0.018       (  0.059)       0.003        0.014
284  23.67     0.07      0.018       (  0.059)       0.003        0.014
285  23.75     0.07      0.018       (  0.059)       0.003        0.014
286  23.83     0.07      0.018       (  0.059)       0.003        0.014
287  23.92     0.07      0.018       (  0.059)       0.003        0.014
288  24.00     0.07      0.018       (  0.059)       0.003        0.014
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    21.6
      Flood volume = Effective rainfall      1.80(In)
       times area       9.7(Ac.)/[(In)/(Ft.)] =       1.5(Ac.Ft)
      Total soil loss =      0.40(In)
      Total soil loss =     0.321(Ac.Ft)
      Total rainfall =      2.20(In)
      Flood volume =       63715.9 Cubic Feet
      Total soil loss =       13986.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.407(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0004      0.06  Q          |         |         |         |
   0+10       0.0013      0.12  Q          |         |         |         |
   0+15       0.0022      0.14  Q          |         |         |         |
   0+20       0.0034      0.17  Q          |         |         |         |
   0+25       0.0048      0.20  Q          |         |         |         |
   0+30       0.0063      0.21  Q          |         |         |         |
   0+35       0.0077      0.21  Q          |         |         |         |
   0+40       0.0092      0.21  Q          |         |         |         |
   0+45       0.0107      0.21  Q          |         |         |         |
   0+50       0.0123      0.24  Q          |         |         |         |
   0+55       0.0142      0.27  VQ         |         |         |         |
   1+ 0       0.0162      0.28  VQ         |         |         |         |
   1+ 5       0.0179      0.25  VQ         |         |         |         |
   1+10       0.0194      0.22  Q          |         |         |         |
   1+15       0.0209      0.22  Q          |         |         |         |
   1+20       0.0224      0.21  Q          |         |         |         |
   1+25       0.0238      0.21  Q          |         |         |         |
   1+30       0.0253      0.21  Q          |         |         |         |
   1+35       0.0267      0.21  Q          |         |         |         |
   1+40       0.0282      0.21  Q          |         |         |         |
   1+45       0.0297      0.21  Q          |         |         |         |
   1+50       0.0314      0.24  Q          |         |         |         |
   1+55       0.0332      0.27  VQ         |         |         |         |
   2+ 0       0.0352      0.28  VQ         |         |         |         |
   2+ 5       0.0371      0.28  |Q         |         |         |         |
   2+10       0.0391      0.28  |Q         |         |         |         |
   2+15       0.0410      0.28  |Q         |         |         |         |
   2+20       0.0430      0.28  |Q         |         |         |         |
   2+25       0.0449      0.28  |Q         |         |         |         |
   2+30       0.0469      0.28  |Q         |         |         |         |
   2+35       0.0490      0.31  |Q         |         |         |         |
   2+40       0.0514      0.35  |Q         |         |         |         |
   2+45       0.0538      0.35  |Q         |         |         |         |
   2+50       0.0563      0.35  |Q         |         |         |         |
   2+55       0.0587      0.35  |Q         |         |         |         |
   3+ 0       0.0612      0.35  |Q         |         |         |         |
   3+ 5       0.0636      0.35  |Q         |         |         |         |
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3+10       0.0660      0.35  |Q        |         |         |         |
3+15       0.0685      0.35  |Q        |         |         |         |
3+20       0.0709      0.35  |Q        |         |         |         |
3+25       0.0733      0.35  |QV       |         |         |         |
3+30       0.0758      0.35  |QV       |         |         |         |
3+35       0.0782      0.35  |QV       |         |         |         |
3+40       0.0807      0.35  |QV       |         |         |         |
3+45       0.0831      0.35  |QV       |         |         |         |
3+50       0.0857      0.39  |QV       |         |         |         |
3+55       0.0886      0.42  |QV       |         |         |         |
4+ 0       0.0915      0.42  |QV       |         |         |         |
4+ 5       0.0944      0.42  |QV       |         |         |         |
4+10       0.0974      0.42  |QV       |         |         |         |
4+15       0.1003      0.42  |QV       |         |         |         |
4+20       0.1034      0.46  |QV       |         |         |         |
4+25       0.1068      0.49  |QV       |         |         |         |
4+30       0.1102      0.49  |Q V      |         |         |         |
4+35       0.1136      0.50  |Q V      |         |         |         |
4+40       0.1170      0.50  |Q V      |         |         |         |
4+45       0.1204      0.50  |Q V      |         |         |         |
4+50       0.1241      0.53  | QV      |         |         |         |
4+55       0.1279      0.56  | QV      |         |         |         |
5+ 0       0.1318      0.56  | QV      |         |         |         |
5+ 5       0.1352      0.50  | QV      |         |         |         |
5+10       0.1383      0.44  |Q V      |         |         |         |
5+15       0.1413      0.43  |Q V      |         |         |         |
5+20       0.1444      0.46  |Q V      |         |         |         |
5+25       0.1477      0.49  |Q  V     |         |         |         |
5+30       0.1511      0.49  |Q  V     |         |         |         |
5+35       0.1548      0.53  | Q V     |         |         |         |
5+40       0.1586      0.56  | Q V     |         |         |         |
5+45       0.1625      0.56  | Q V     |         |         |         |
5+50       0.1664      0.57  | Q V     |         |         |         |
5+55       0.1703      0.57  | Q V     |         |         |         |
6+ 0       0.1742      0.57  | Q V     |         |         |         |
6+ 5       0.1783      0.60  | Q V     |         |         |         |
6+10       0.1826      0.63  | Q V     |         |         |         |
6+15       0.1870      0.63  | Q  V    |         |         |         |
6+20       0.1914      0.64  | Q  V    |         |         |         |
6+25       0.1958      0.64  | Q  V    |         |         |         |
6+30       0.2002      0.64  | Q  V    |         |         |         |
6+35       0.2048      0.67  | Q  V    |         |         |         |
6+40       0.2096      0.70  | Q  V    |         |         |         |
6+45       0.2145      0.71  | Q  V    |         |         |         |
6+50       0.2193      0.71  | Q  V    |         |         |         |
6+55       0.2242      0.71  | Q   V   |         |         |         |
7+ 0       0.2291      0.71  | Q   V   |         |         |         |
7+ 5       0.2340      0.71  | Q   V   |         |         |         |
7+10       0.2388      0.71  | Q   V   |         |         |         |
7+15       0.2437      0.71  | Q   V   |         |         |         |
7+20       0.2488      0.74  | Q   V   |         |         |         |
7+25       0.2541      0.77  |  Q  V   |         |         |         |
7+30       0.2594      0.78  |  Q   V  |         |         |         |
7+35       0.2650      0.81  |  Q   V  |         |         |         |
7+40       0.2708      0.84  |  Q   V  |         |         |         |
7+45       0.2767      0.85  |  Q   V  |         |         |         |
7+50       0.2827      0.88  |  Q   V  |         |         |         |
7+55       0.2890      0.91  |  Q   V  |         |         |         |
8+ 0       0.2953      0.92  |  Q    V |         |         |         |
8+ 5       0.3021      0.98  |  Q    V |         |         |         |
8+10       0.3093      1.04  |   Q   V |         |         |         |
8+15       0.3166      1.06  |   Q   V |         |         |         |
8+20       0.3239      1.06  |   Q   V |         |         |         |
8+25       0.3312      1.06  |   Q    V|         |         |         |
8+30       0.3385      1.06  |   Q    V|         |         |         |
8+35       0.3460      1.09  |   Q    V|         |         |         |
8+40       0.3538      1.12  |   Q    V|         |         |         |
8+45       0.3616      1.13  |   Q    V|         |         |         |
8+50       0.3696      1.16  |   Q     V         |         |         |
8+55       0.3778      1.19  |   Q     V         |         |         |
9+ 0       0.3861      1.20  |   Q     V         |         |         |
9+ 5       0.3948      1.27  |    Q    V         |         |         |
9+10       0.4039      1.33  |    Q    |V        |         |         |
9+15       0.4132      1.34  |    Q    |V        |         |         |
9+20       0.4226      1.38  |    Q    |V        |         |         |
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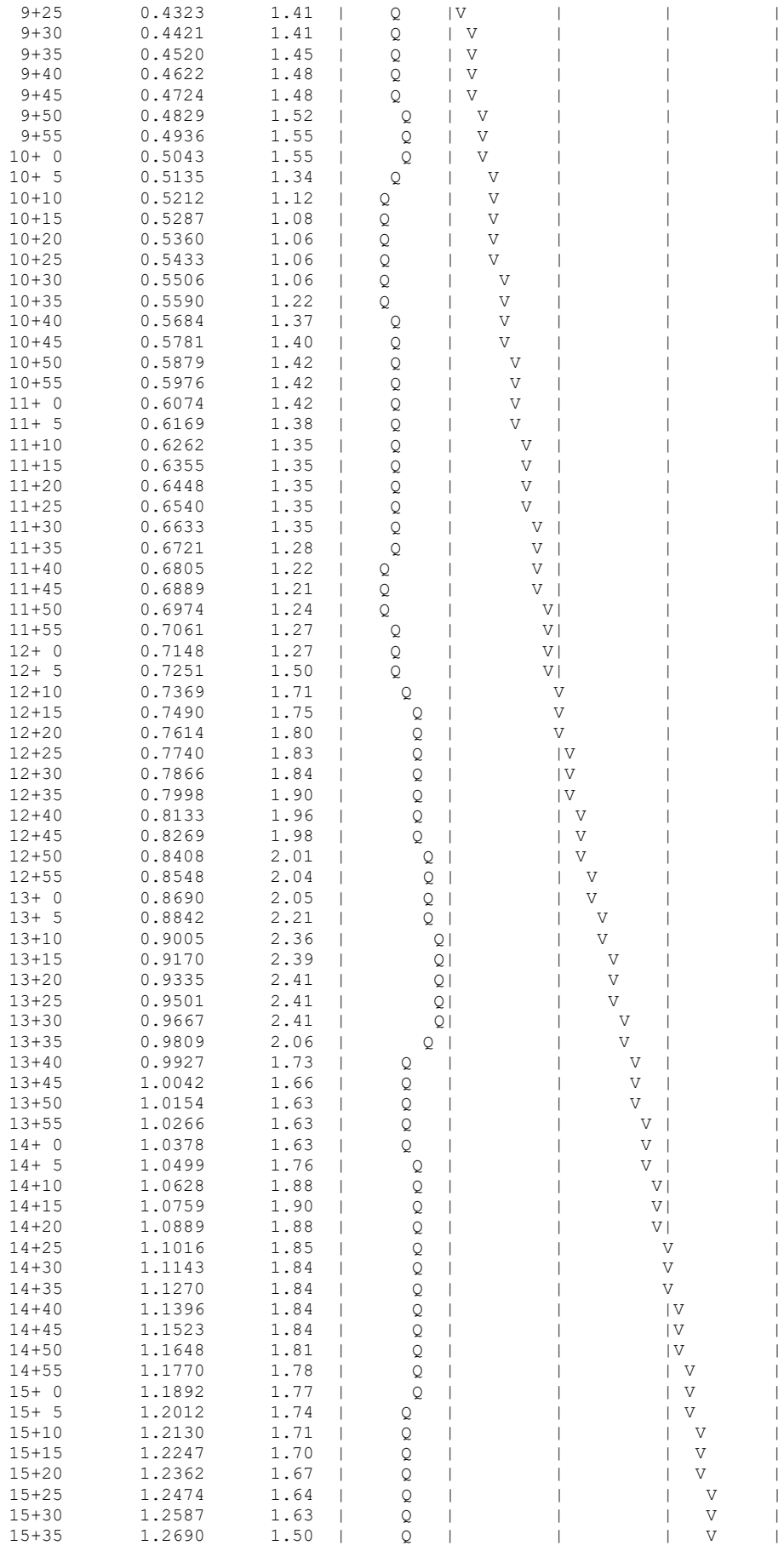
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9+35 0.4520 1.45
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10+ 0 0.5043 1.55
10+ 5 0.5135 1.34
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10+55 0.5976 1.42
11+ 0 0.6074 1.42
11+ 5 0.6169 1.38
11+10 0.6262 1.35
11+15 0.6355 1.35
11+20 0.6448 1.35
11+25 0.6540 1.35
11+30 0.6633 1.35
11+35 0.6721 1.28
11+40 0.6805 1.22
11+45 0.6889 1.21
11+50 0.6974 1.24
11+55 0.7061 1.27
12+ 0 0.7148 1.27
12+ 5 0.7251 1.50
12+10 0.7369 1.71
12+15 0.7490 1.75
12+20 0.7614 1.80
12+25 0.7740 1.83
12+30 0.7866 1.84
12+35 0.7998 1.90
12+40 0.8133 1.96
12+45 0.8269 1.98
12+50 0.8408 2.01
12+55 0.8548 2.04
13+ 0 0.8690 2.05
13+ 5 0.8842 2.21
13+10 0.9005 2.36
13+15 0.9170 2.39
13+20 0.9335 2.41
13+25 0.9501 2.41
13+30 0.9667 2.41
13+35 0.9809 2.06
13+40 0.9927 1.73
13+45 1.0042 1.66
13+50 1.0154 1.63
13+55 1.0266 1.63
14+ 0 1.0378 1.63
14+ 5 1.0499 1.76
14+10 1.0628 1.88
14+15 1.0759 1.90
14+20 1.0889 1.88
14+25 1.1016 1.85
14+30 1.1143 1.84
14+35 1.1270 1.84
14+40 1.1396 1.84
14+45 1.1523 1.84
14+50 1.1648 1.81
14+55 1.1770 1.78
15+ 0 1.1892 1.77
15+ 5 1.2012 1.74
15+10 1.2130 1.71
15+15 1.2247 1.70
15+20 1.2362 1.67
15+25 1.2474 1.64
15+30 1.2587 1.63
15+35 1.2690 1.50

15+40	1.2785	1.38	| Q |	|	|	| V |
15+45	1.2879	1.36	| Q |	|	|	| V |
15+50	1.2971	1.35	| Q |	|	|	| V |
15+55	1.3064	1.35	| Q |	|	|	| V |
16+ 0	1.3157	1.35	| Q |	|	|	| V |
16+ 5	1.3217	0.87	| Q |	|	|	| V |
16+10	1.3245	0.42	|Q |	|	|	| V |
16+15	1.3267	0.33	|Q |	|	|	| V |
16+20	1.3287	0.28	|Q |	|	|	| V |
16+25	1.3306	0.28	|Q |	|	|	| V |
16+30	1.3326	0.28	|Q |	|	|	| V |
16+35	1.3343	0.25	|Q |	|	|	| V |
16+40	1.3359	0.22	Q |	|	|	| V |
16+45	1.3373	0.22	Q |	|	|	| V |
16+50	1.3388	0.21	Q |	|	|	| V |
16+55	1.3403	0.21	Q |	|	|	| V |
17+ 0	1.3417	0.21	Q |	|	|	| V |
17+ 5	1.3436	0.28	|Q |	|	|	| V |
17+10	1.3459	0.34	|Q |	|	|	| V |
17+15	1.3483	0.35	|Q |	|	|	| V |
17+20	1.3508	0.35	|Q |	|	|	| V |
17+25	1.3532	0.35	|Q |	|	|	| V |
17+30	1.3557	0.35	|Q |	|	|	| V |
17+35	1.3581	0.35	|Q |	|	|	| V |
17+40	1.3605	0.35	|Q |	|	|	| V |
17+45	1.3630	0.35	|Q |	|	|	| V |
17+50	1.3652	0.32	|Q |	|	|	| V |
17+55	1.3672	0.29	|Q |	|	|	| V |
18+ 0	1.3692	0.29	|Q |	|	|	| V |
18+ 5	1.3711	0.28	|Q |	|	|	| V |
18+10	1.3731	0.28	|Q |	|	|	| V |
18+15	1.3750	0.28	|Q |	|	|	| V |
18+20	1.3770	0.28	|Q |	|	|	| V |
18+25	1.3789	0.28	|Q |	|	|	| V |
18+30	1.3809	0.28	|Q |	|	|	| V |
18+35	1.3826	0.25	|Q |	|	|	| V |
18+40	1.3841	0.22	Q |	|	|	| V |
18+45	1.3856	0.22	Q |	|	|	| V |
18+50	1.3869	0.18	Q |	|	|	| V |
18+55	1.3879	0.15	Q |	|	|	| V |
19+ 0	1.3889	0.14	Q |	|	|	| V |
19+ 5	1.3901	0.17	Q |	|	|	| V |
19+10	1.3915	0.20	Q |	|	|	| V |
19+15	1.3929	0.21	Q |	|	|	| V |
19+20	1.3946	0.24	Q |	|	|	| V |
19+25	1.3965	0.27	|Q |	|	|	| V |
19+30	1.3984	0.28	|Q |	|	|	| V |
19+35	1.4002	0.25	|Q |	|	|	| V |
19+40	1.4017	0.22	Q |	|	|	| V |
19+45	1.4032	0.22	Q |	|	|	| V |
19+50	1.4044	0.18	Q |	|	|	| V |
19+55	1.4054	0.15	Q |	|	|	| V |
20+ 0	1.4064	0.14	Q |	|	|	| V |
20+ 5	1.4076	0.17	Q |	|	|	| V |
20+10	1.4090	0.20	Q |	|	|	| V |
20+15	1.4105	0.21	Q |	|	|	| V |
20+20	1.4119	0.21	Q |	|	|	| V |
20+25	1.4134	0.21	Q |	|	|	| V |
20+30	1.4149	0.21	Q |	|	|	| V |
20+35	1.4163	0.21	Q |	|	|	| V |
20+40	1.4178	0.21	Q |	|	|	| V |
20+45	1.4192	0.21	Q |	|	|	| V |
20+50	1.4205	0.18	Q |	|	|	| V |
20+55	1.4215	0.15	Q |	|	|	| V |
21+ 0	1.4225	0.14	Q |	|	|	| V |
21+ 5	1.4237	0.17	Q |	|	|	| V |
21+10	1.4251	0.20	Q |	|	|	| V |
21+15	1.4266	0.21	Q |	|	|	| V|
21+20	1.4278	0.18	Q |	|	|	| V|
21+25	1.4288	0.15	Q |	|	|	| V|
21+30	1.4298	0.14	Q |	|	|	| V|
21+35	1.4310	0.17	Q |	|	|	| V|
21+40	1.4324	0.20	Q |	|	|	| V|
21+45	1.4339	0.21	Q |	|	|	| V|
21+50	1.4351	0.18	Q |	|	|	| V|

21+55	1.4362	0.15	Q	|	|	|	V|
22+ 0	1.4372	0.14	Q	|	|	|	V|
22+ 5	1.4383	0.17	Q	|	|	|	V|
22+10	1.4397	0.20	Q	|	|	|	V|
22+15	1.4412	0.21	Q	|	|	|	V|
22+20	1.4424	0.18	Q	|	|	|	V|
22+25	1.4435	0.15	Q	|	|	|	V|
22+30	1.4445	0.14	Q	|	|	|	V|
22+35	1.4454	0.14	Q	|	|	|	V|
22+40	1.4464	0.14	Q	|	|	|	V|
22+45	1.4474	0.14	Q	|	|	|	V|
22+50	1.4484	0.14	Q	|	|	|	V|
22+55	1.4493	0.14	Q	|	|	|	V|
23+ 0	1.4503	0.14	Q	|	|	|	V|
23+ 5	1.4513	0.14	Q	|	|	|	V|
23+10	1.4523	0.14	Q	|	|	|	V|
23+15	1.4532	0.14	Q	|	|	|	V|
23+20	1.4542	0.14	Q	|	|	|	V|
23+25	1.4552	0.14	Q	|	|	|	V|
23+30	1.4562	0.14	Q	|	|	|	V|
23+35	1.4571	0.14	Q	|	|	|	V|
23+40	1.4581	0.14	Q	|	|	|	V|
23+45	1.4591	0.14	Q	|	|	|	V|
23+50	1.4601	0.14	Q	|	|	|	V|
23+55	1.4610	0.14	Q	|	|	|	V|
24+ 0	1.4620	0.14	Q	|	|	|	V|
24+ 5	1.4626	0.08	Q	|	|	|	V|
24+10	1.4627	0.02	Q	|	|	|	V|
24+15	1.4627	0.01	Q	|	|	|	V|

Detention Basin Routing

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 05/27/20

Glen Ivy Senior Living
Detention Basin Routing
HCOC Mitigation
2-year 24-hr storm

Program License Serial Number 4029

********** HYDROGRAPH INFORMATION **********

From study/file name: sh2pr242.rte
**********HYDROGRAPH DATA**********
Number of intervals = 291
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.407 (CFS)
Total volume = 1.463 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 10.000 to Point/Station 11.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 291
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.140	0.170	0.139	0.141
1.500	0.470	0.290	0.469	0.471
2.500	0.840	0.370	0.839	0.841
3.500	1.250	0.440	1.248	1.252
4.500	1.710	15.500	1.657	1.763
5.000	1.930	28.090	1.833	2.027

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.6	1.20	1.81	2.41	Depth (Ft.)
0.083	0.06	0.00	0.000	O	|	|	|	|	0.00
0.167	0.12	0.00	0.001	OI	|	|	|	|	0.00
0.250	0.14	0.00	0.002	OI	|	|	|	|	0.01
0.333	0.17	0.00	0.003	O I	|	|	|	|	0.01

0.417	0.20	0.00	0.004	O I	|	|	|	0.01
0.500	0.21	0.01	0.005	O I	|	|	|	0.02
0.583	0.21	0.01	0.007	O I	|	|	|	0.02
0.667	0.21	0.01	0.008	O I	|	|	|	0.03
0.750	0.21	0.01	0.010	O I	|	|	|	0.03
0.833	0.24	0.01	0.011	O I	|	|	|	0.04
0.917	0.27	0.02	0.013	O I	|	|	|	0.05
1.000	0.28	0.02	0.015	O I	|	|	|	0.05
1.083	0.25	0.02	0.016	O I	|	|	|	0.06
1.167	0.22	0.02	0.018	O I	|	|	|	0.06
1.250	0.22	0.02	0.019	O I	|	|	|	0.07
1.333	0.21	0.02	0.020	O I	|	|	|	0.07
1.417	0.21	0.03	0.022	O I	|	|	|	0.08
1.500	0.21	0.03	0.023	O I	|	|	|	0.08
1.583	0.21	0.03	0.024	O I	|	|	|	0.09
1.667	0.21	0.03	0.026	O I	|	|	|	0.09
1.750	0.21	0.03	0.027	O I	|	|	|	0.10
1.833	0.24	0.03	0.028	O I	|	|	|	0.10
1.917	0.27	0.04	0.030	O I	|	|	|	0.11
2.000	0.28	0.04	0.031	O I	|	|	|	0.11
2.083	0.28	0.04	0.033	O I	|	|	|	0.12
2.167	0.28	0.04	0.035	O I	|	|	|	0.12
2.250	0.28	0.04	0.036	O I	|	|	|	0.13
2.333	0.28	0.05	0.038	O I	|	|	|	0.14
2.417	0.28	0.05	0.040	O I	|	|	|	0.14
2.500	0.28	0.05	0.041	O I	|	|	|	0.15
2.583	0.31	0.05	0.043	O I	|	|	|	0.15
2.667	0.35	0.05	0.045	O I	|	|	|	0.16
2.750	0.35	0.06	0.047	O I	|	|	|	0.17
2.833	0.35	0.06	0.049	O I	|	|	|	0.17
2.917	0.35	0.06	0.051	O I	|	|	|	0.18
3.000	0.35	0.06	0.053	O I	|	|	|	0.19
3.083	0.35	0.07	0.055	O I	|	|	|	0.20
3.167	0.35	0.07	0.057	O I	|	|	|	0.20
3.250	0.35	0.07	0.059	O I	|	|	|	0.21
3.333	0.35	0.07	0.061	O I	|	|	|	0.22
3.417	0.35	0.08	0.063	|O I	|	|	|	0.22
3.500	0.35	0.08	0.065	|O I	|	|	|	0.23
3.583	0.35	0.08	0.066	|O I	|	|	|	0.24
3.667	0.35	0.08	0.068	|O I	|	|	|	0.24
3.750	0.35	0.09	0.070	|O I	|	|	|	0.25
3.833	0.39	0.09	0.072	|O I	|	|	|	0.26
3.917	0.42	0.09	0.074	|O I	|	|	|	0.27
4.000	0.42	0.09	0.077	|O I	|	|	|	0.27
4.083	0.42	0.10	0.079	|O I	|	|	|	0.28
4.167	0.42	0.10	0.081	|O I	|	|	|	0.29
4.250	0.42	0.10	0.083	|O I	|	|	|	0.30
4.333	0.46	0.10	0.086	|O I |	|	|	|	0.31
4.417	0.49	0.11	0.088	|O I |	|	|	|	0.31
4.500	0.49	0.11	0.091	|O I |	|	|	|	0.32
4.583	0.50	0.11	0.093	|O I |	|	|	|	0.33
4.667	0.50	0.12	0.096	|O I |	|	|	|	0.34
4.750	0.50	0.12	0.099	|O I |	|	|	|	0.35
4.833	0.53	0.12	0.101	|O I|	|	|	|	0.36
4.917	0.56	0.13	0.104	|O I|	|	|	|	0.37
5.000	0.56	0.13	0.107	|O I|	|	|	|	0.38
5.083	0.50	0.13	0.110	|O I |	|	|	|	0.39
5.167	0.44	0.14	0.112	|O I |	|	|	|	0.40
5.250	0.43	0.14	0.114	|O I |	|	|	|	0.41
5.333	0.46	0.14	0.116	|O I |	|	|	|	0.42
5.417	0.49	0.14	0.119	|O I |	|	|	|	0.42
5.500	0.49	0.15	0.121	|O I |	|	|	|	0.43
5.583	0.53	0.15	0.124	|O I|	|	|	|	0.44
5.667	0.56	0.15	0.126	| O I|	|	|	|	0.45
5.750	0.56	0.16	0.129	| O I|	|	|	|	0.46
5.833	0.57	0.16	0.132	| O I|	|	|	|	0.47
5.917	0.57	0.16	0.135	| O I|	|	|	|	0.48
6.000	0.57	0.17	0.137	| O I|	|	|	|	0.49
6.083	0.60	0.17	0.140	| O I|	|	|	|	0.50
6.167	0.63	0.17	0.143	| O I	|	|	|	0.51
6.250	0.63	0.17	0.146	| O I	|	|	|	0.52
6.333	0.64	0.17	0.150	| O I	|	|	|	0.53
6.417	0.64	0.17	0.153	| O I	|	|	|	0.54
6.500	0.64	0.18	0.156	| O I	|	|	|	0.55
6.583	0.67	0.18	0.159	| O I	|	|	|	0.56

6.667	0.70	0.18	0.163	O	I				0.57
6.750	0.71	0.18	0.166	O	I				0.58
6.833	0.71	0.18	0.170	O	I				0.59
6.917	0.71	0.18	0.174	O	I				0.60
7.000	0.71	0.18	0.177	O	I				0.61
7.083	0.71	0.18	0.181	O	I				0.62
7.167	0.71	0.19	0.184	O	I				0.63
7.250	0.71	0.19	0.188	O	I				0.65
7.333	0.74	0.19	0.192	O	I				0.66
7.417	0.77	0.19	0.196	O	I				0.67
7.500	0.78	0.19	0.200	O	I				0.68
7.583	0.81	0.19	0.204	O	I				0.69
7.667	0.84	0.19	0.208	O	I				0.71
7.750	0.85	0.20	0.213	O	I				0.72
7.833	0.88	0.20	0.217	O	I				0.73
7.917	0.91	0.20	0.222	O	I				0.75
8.000	0.92	0.20	0.227	O	I				0.76
8.083	0.98	0.20	0.232	O	I				0.78
8.167	1.04	0.21	0.238	O	I				0.80
8.250	1.06	0.21	0.243	O	I				0.81
8.333	1.06	0.21	0.249	O	I				0.83
8.417	1.06	0.21	0.255	O	I				0.85
8.500	1.06	0.21	0.261	O	I				0.87
8.583	1.09	0.22	0.267	O	I				0.88
8.667	1.12	0.22	0.273	O	I				0.90
8.750	1.13	0.22	0.279	O	I				0.92
8.833	1.16	0.22	0.286	O	I				0.94
8.917	1.19	0.23	0.292	O	I				0.96
9.000	1.20	0.23	0.299	O	I				0.98
9.083	1.27	0.23	0.306	O	I				1.00
9.167	1.33	0.23	0.313	O	I				1.02
9.250	1.34	0.24	0.321	O	I				1.05
9.333	1.38	0.24	0.328	O	I				1.07
9.417	1.41	0.24	0.336	O	I				1.10
9.500	1.41	0.24	0.344	O	I				1.12
9.583	1.45	0.25	0.353	O	I				1.14
9.667	1.48	0.25	0.361	O	I				1.17
9.750	1.48	0.25	0.369	O	I				1.20
9.833	1.52	0.26	0.378	O	I				1.22
9.917	1.55	0.26	0.387	O	I				1.25
10.000	1.55	0.26	0.396	O	I				1.27
10.083	1.34	0.27	0.404	O	I				1.30
10.167	1.12	0.27	0.410	O	I				1.32
10.250	1.08	0.27	0.416	O	I				1.34
10.333	1.06	0.27	0.422	O	I				1.35
10.417	1.06	0.27	0.427	O	I				1.37
10.500	1.06	0.28	0.433	O	I				1.39
10.583	1.22	0.28	0.439	O	I				1.40
10.667	1.37	0.28	0.445	O	I				1.43
10.750	1.40	0.28	0.453	O	I				1.45
10.833	1.42	0.29	0.461	O	I				1.47
10.917	1.42	0.29	0.469	O	I				1.50
11.000	1.42	0.29	0.476	O	I				1.52
11.083	1.38	0.29	0.484	O	I				1.54
11.167	1.35	0.29	0.491	O	I				1.56
11.250	1.35	0.30	0.499	O	I				1.58
11.333	1.35	0.30	0.506	O	I				1.60
11.417	1.35	0.30	0.513	O	I				1.62
11.500	1.35	0.30	0.520	O	I				1.64
11.583	1.28	0.30	0.527	O	I				1.65
11.667	1.22	0.30	0.534	O	I				1.67
11.750	1.21	0.31	0.540	O	I				1.69
11.833	1.24	0.31	0.546	O	I				1.71
11.917	1.27	0.31	0.553	O	I				1.72
12.000	1.27	0.31	0.559	O	I				1.74
12.083	1.50	0.31	0.567	O	I				1.76
12.167	1.71	0.31	0.576	O	I				1.79
12.250	1.75	0.31	0.586	O	I				1.81
12.333	1.80	0.32	0.596	O	I				1.84
12.417	1.83	0.32	0.606	O	I				1.87
12.500	1.84	0.32	0.616	O	I				1.90
12.583	1.90	0.32	0.627	O	I				1.92
12.667	1.96	0.33	0.638	O	I				1.95
12.750	1.98	0.33	0.649	O	I				1.98
12.833	2.01	0.33	0.661	O	I				2.02

12.917	2.04	0.33	0.673	| O |	|	|	| I |	2.05
13.000	2.05	0.34	0.684	| O |	|	|	| I |	2.08
13.083	2.21	0.34	0.697	| O |	|	|	| I |	2.11
13.167	2.36	0.34	0.710	| O |	|	|	| I|	2.15
13.250	2.39	0.34	0.724	| O |	|	|	| I|	2.19
13.333	2.41	0.35	0.738	| O |	|	|	| I	2.22
13.417	2.41	0.35	0.752	| O |	|	|	| I	2.26
13.500	2.41	0.35	0.767	| O |	|	|	| I	2.30
13.583	2.06	0.36	0.779	| O |	|	|	| I |	2.34
13.667	1.73	0.36	0.790	| O |	|	| I |	|	2.37
13.750	1.66	0.36	0.799	| O |	|	| I |	|	2.39
13.833	1.63	0.36	0.808	| O |	|	| I |	|	2.41
13.917	1.63	0.36	0.817	| O |	|	| I |	|	2.44
14.000	1.63	0.37	0.825	| O |	|	| I |	|	2.46
14.083	1.76	0.37	0.835	| O |	|	| I|	|	2.49
14.167	1.88	0.37	0.845	| O |	|	| I	|	2.51
14.250	1.90	0.37	0.855	| O |	|	|I	|	2.54
14.333	1.88	0.37	0.865	| O |	|	| I	|	2.56
14.417	1.85	0.38	0.876	| O |	|	| I	|	2.59
14.500	1.84	0.38	0.886	| O |	|	| I	|	2.61
14.583	1.84	0.38	0.896	| O |	|	| I	|	2.64
14.667	1.84	0.38	0.906	| O |	|	| I	|	2.66
14.750	1.84	0.38	0.916	| O |	|	| I	|	2.69
14.833	1.81	0.38	0.926	| O |	|	| I	|	2.71
14.917	1.78	0.39	0.936	| O |	|	| I|	|	2.73
15.000	1.77	0.39	0.945	| O |	|	| I|	|	2.76
15.083	1.74	0.39	0.955	| O |	|	| I|	|	2.78
15.167	1.71	0.39	0.964	| O |	|	| I |	|	2.80
15.250	1.70	0.39	0.973	| O |	|	| I |	|	2.82
15.333	1.67	0.39	0.982	| O |	|	| I |	|	2.85
15.417	1.64	0.40	0.990	| O |	|	| I |	|	2.87
15.500	1.63	0.40	0.999	| O |	|	| I |	|	2.89
15.583	1.50	0.40	1.007	| O |	|	| I |	|	2.91
15.667	1.38	0.40	1.014	| O |	|	| I |	|	2.92
15.750	1.36	0.40	1.021	| O |	|	| I |	|	2.94
15.833	1.35	0.40	1.027	| O |	|	|I |	|	2.96
15.917	1.35	0.40	1.034	| O |	|	|I |	|	2.97
16.000	1.35	0.40	1.040	| O |	|	|I |	|	2.99
16.083	0.87	0.41	1.045	| O |	| I |	|	|	3.00
16.167	0.42	0.41	1.047	| O |	|	|	|	3.00
16.250	0.33	0.41	1.047	| IO |	|	|	|	3.00
16.333	0.28	0.41	1.046	| I O |	|	|	|	3.00
16.417	0.28	0.40	1.045	| I O |	|	|	|	3.00
16.500	0.28	0.40	1.044	| I O |	|	|	|	3.00
16.583	0.25	0.40	1.043	| I O |	|	|	|	3.00
16.667	0.22	0.40	1.042	| I O |	|	|	|	2.99
16.750	0.22	0.40	1.041	| I O |	|	|	|	2.99
16.833	0.21	0.40	1.039	| I O |	|	|	|	2.99
16.917	0.21	0.40	1.038	| I O |	|	|	|	2.98
17.000	0.21	0.40	1.037	| I O |	|	|	|	2.98
17.083	0.28	0.40	1.036	| I O |	|	|	|	2.98
17.167	0.34	0.40	1.035	| IO |	|	|	|	2.98
17.250	0.35	0.40	1.035	| IO |	|	|	|	2.97
17.333	0.35	0.40	1.034	| IO |	|	|	|	2.97
17.417	0.35	0.40	1.034	| IO |	|	|	|	2.97
17.500	0.35	0.40	1.034	| IO |	|	|	|	2.97
17.583	0.35	0.40	1.033	| IO |	|	|	|	2.97
17.667	0.35	0.40	1.033	| IO |	|	|	|	2.97
17.750	0.35	0.40	1.033	| IO |	|	|	|	2.97
17.833	0.32	0.40	1.032	| IO |	|	|	|	2.97
17.917	0.29	0.40	1.031	| I O |	|	|	|	2.97
18.000	0.29	0.40	1.031	| I O |	|	|	|	2.97
18.083	0.28	0.40	1.030	| I O |	|	|	|	2.96
18.167	0.28	0.40	1.029	| I O |	|	|	|	2.96
18.250	0.28	0.40	1.028	| I O |	|	|	|	2.96
18.333	0.28	0.40	1.027	| I O |	|	|	|	2.96
18.417	0.28	0.40	1.027	| I O |	|	|	|	2.96
18.500	0.28	0.40	1.026	| I O |	|	|	|	2.95
18.583	0.25	0.40	1.025	| I O |	|	|	|	2.95
18.667	0.22	0.40	1.024	| I O |	|	|	|	2.95
18.750	0.22	0.40	1.022	| I O |	|	|	|	2.94
18.833	0.18	0.40	1.021	| I O |	|	|	|	2.94
18.917	0.15	0.40	1.019	|I O |	|	|	|	2.94
19.000	0.14	0.40	1.018	|I O |	|	|	|	2.93
19.083	0.17	0.40	1.016	| I O |	|	|	|	2.93

19.167	0.20	0.40	1.015	| I O |	|	|	|	2.93
19.250	0.21	0.40	1.013	| I O |	|	|	|	2.92
19.333	0.24	0.40	1.012	| I O |	|	|	|	2.92
19.417	0.27	0.40	1.011	| I O |	|	|	|	2.92
19.500	0.28	0.40	1.010	| I O |	|	|	|	2.92
19.583	0.25	0.40	1.009	| I O |	|	|	|	2.91
19.667	0.22	0.40	1.008	| I O |	|	|	|	2.91
19.750	0.22	0.40	1.007	| I O |	|	|	|	2.91
19.833	0.18	0.40	1.006	| I O |	|	|	|	2.90
19.917	0.15	0.40	1.004	|I O |	|	|	|	2.90
20.000	0.14	0.40	1.002	|I O |	|	|	|	2.90
20.083	0.17	0.40	1.001	| I O |	|	|	|	2.89
20.167	0.20	0.40	0.999	| I O |	|	|	|	2.89
20.250	0.21	0.40	0.998	| I O |	|	|	|	2.89
20.333	0.21	0.40	0.997	| I O |	|	|	|	2.88
20.417	0.21	0.40	0.995	| I O |	|	|	|	2.88
20.500	0.21	0.40	0.994	| I O |	|	|	|	2.88
20.583	0.21	0.40	0.993	| I O |	|	|	|	2.87
20.667	0.21	0.40	0.992	| I O |	|	|	|	2.87
20.750	0.21	0.40	0.990	| I O |	|	|	|	2.87
20.833	0.18	0.40	0.989	| I O |	|	|	|	2.86
20.917	0.15	0.40	0.987	|I O |	|	|	|	2.86
21.000	0.14	0.39	0.986	|I O |	|	|	|	2.86
21.083	0.17	0.39	0.984	| I O |	|	|	|	2.85
21.167	0.20	0.39	0.983	| I O |	|	|	|	2.85
21.250	0.21	0.39	0.981	| I O |	|	|	|	2.84
21.333	0.18	0.39	0.980	| I O |	|	|	|	2.84
21.417	0.15	0.39	0.978	|I O |	|	|	|	2.84
21.500	0.14	0.39	0.977	|I O |	|	|	|	2.83
21.583	0.17	0.39	0.975	| I O |	|	|	|	2.83
21.667	0.20	0.39	0.974	| I O |	|	|	|	2.83
21.750	0.21	0.39	0.972	| I O |	|	|	|	2.82
21.833	0.18	0.39	0.971	| I O |	|	|	|	2.82
21.917	0.15	0.39	0.969	|I O |	|	|	|	2.82
22.000	0.14	0.39	0.968	|I O |	|	|	|	2.81
22.083	0.17	0.39	0.966	| I O |	|	|	|	2.81
22.167	0.20	0.39	0.965	| I O |	|	|	|	2.80
22.250	0.21	0.39	0.963	| I O |	|	|	|	2.80
22.333	0.18	0.39	0.962	| I O |	|	|	|	2.80
22.417	0.15	0.39	0.961	|I O |	|	|	|	2.79
22.500	0.14	0.39	0.959	|I O |	|	|	|	2.79
22.583	0.14	0.39	0.957	|I O |	|	|	|	2.79
22.667	0.14	0.39	0.955	|I O |	|	|	|	2.78
22.750	0.14	0.39	0.954	|I O |	|	|	|	2.78
22.833	0.14	0.39	0.952	|I O |	|	|	|	2.77
22.917	0.14	0.39	0.950	|I O |	|	|	|	2.77
23.000	0.14	0.39	0.949	|I O |	|	|	|	2.76
23.083	0.14	0.39	0.947	|I O |	|	|	|	2.76
23.167	0.14	0.39	0.945	|I O |	|	|	|	2.76
23.250	0.14	0.39	0.944	|I O |	|	|	|	2.75
23.333	0.14	0.39	0.942	|I O |	|	|	|	2.75
23.417	0.14	0.39	0.940	|I O |	|	|	|	2.74
23.500	0.14	0.39	0.938	|I O |	|	|	|	2.74
23.583	0.14	0.39	0.937	|I O |	|	|	|	2.74
23.667	0.14	0.39	0.935	|I O |	|	|	|	2.73
23.750	0.14	0.39	0.933	|I O |	|	|	|	2.73
23.833	0.14	0.39	0.932	|I O |	|	|	|	2.72
23.917	0.14	0.39	0.930	|I O |	|	|	|	2.72
24.000	0.14	0.39	0.928	|I O |	|	|	|	2.72
24.083	0.08	0.38	0.926	|I O |	|	|	|	2.71
24.167	0.02	0.38	0.924	I O |	|	|	|	2.71
24.250	0.01	0.38	0.922	I O |	|	|	|	2.70
24.333	0.00	0.38	0.919	I O |	|	|	|	2.69
24.417	0.00	0.38	0.916	I O |	|	|	|	2.69
24.500	0.00	0.38	0.914	I O |	|	|	|	2.68
24.583	0.00	0.38	0.911	I O |	|	|	|	2.67
24.667	0.00	0.38	0.908	I O |	|	|	|	2.67
24.750	0.00	0.38	0.906	I O |	|	|	|	2.66
24.833	0.00	0.38	0.903	I O |	|	|	|	2.65
24.917	0.00	0.38	0.901	I O |	|	|	|	2.65
25.000	0.00	0.38	0.898	I O |	|	|	|	2.64
25.083	0.00	0.38	0.895	I O |	|	|	|	2.63
25.167	0.00	0.38	0.893	I O |	|	|	|	2.63
25.250	0.00	0.38	0.890	I O |	|	|	|	2.62
25.333	0.00	0.38	0.888	I O |	|	|	|	2.62

25.417	0.00	0.38	0.885	I	O	|	|	|	|	2.61
25.500	0.00	0.38	0.882	I	O	|	|	|	|	2.60
25.583	0.00	0.38	0.880	I	O	|	|	|	|	2.60
25.667	0.00	0.38	0.877	I	O	|	|	|	|	2.59
25.750	0.00	0.38	0.875	I	O	|	|	|	|	2.58
25.833	0.00	0.38	0.872	I	O	|	|	|	|	2.58
25.917	0.00	0.38	0.869	I	O	|	|	|	|	2.57
26.000	0.00	0.37	0.867	I	O	|	|	|	|	2.57
26.083	0.00	0.37	0.864	I	O	|	|	|	|	2.56
26.167	0.00	0.37	0.862	I	O	|	|	|	|	2.55
26.250	0.00	0.37	0.859	I	O	|	|	|	|	2.55
26.333	0.00	0.37	0.856	I	O	|	|	|	|	2.54
26.417	0.00	0.37	0.854	I	O	|	|	|	|	2.53
26.500	0.00	0.37	0.851	I	O	|	|	|	|	2.53
26.583	0.00	0.37	0.849	I	O	|	|	|	|	2.52
26.667	0.00	0.37	0.846	I	O	|	|	|	|	2.52
26.750	0.00	0.37	0.844	I	O	|	|	|	|	2.51
26.833	0.00	0.37	0.841	I	O	|	|	|	|	2.50
26.917	0.00	0.37	0.839	I	O	|	|	|	|	2.50
27.000	0.00	0.37	0.836	I	O	|	|	|	|	2.49
27.083	0.00	0.37	0.833	I	O	|	|	|	|	2.48
27.167	0.00	0.37	0.831	I	O	|	|	|	|	2.48
27.250	0.00	0.37	0.828	I	O	|	|	|	|	2.47
27.333	0.00	0.37	0.826	I	O	|	|	|	|	2.46
27.417	0.00	0.37	0.823	I	O	|	|	|	|	2.46
27.500	0.00	0.37	0.821	I	O	|	|	|	|	2.45
27.583	0.00	0.37	0.818	I	O	|	|	|	|	2.44
27.667	0.00	0.36	0.816	I	O	|	|	|	|	2.43
27.750	0.00	0.36	0.813	I	O	|	|	|	|	2.43
27.833	0.00	0.36	0.811	I	O	|	|	|	|	2.42
27.917	0.00	0.36	0.808	I	O	|	|	|	|	2.41
28.000	0.00	0.36	0.806	I	O	|	|	|	|	2.41
28.083	0.00	0.36	0.803	I	O	|	|	|	|	2.40
28.167	0.00	0.36	0.801	I	O	|	|	|	|	2.39
28.250	0.00	0.36	0.798	I	O	|	|	|	|	2.39
28.333	0.00	0.36	0.796	I	O	|	|	|	|	2.38
28.417	0.00	0.36	0.793	I	O	|	|	|	|	2.37
28.500	0.00	0.36	0.791	I	O	|	|	|	|	2.37
28.583	0.00	0.36	0.788	I	O	|	|	|	|	2.36
28.667	0.00	0.36	0.786	I	O	|	|	|	|	2.35
28.750	0.00	0.36	0.783	I	O	|	|	|	|	2.35
28.833	0.00	0.36	0.781	I	O	|	|	|	|	2.34
28.917	0.00	0.36	0.779	I	O	|	|	|	|	2.33
29.000	0.00	0.36	0.776	I	O	|	|	|	|	2.33
29.083	0.00	0.36	0.774	I	O	|	|	|	|	2.32
29.167	0.00	0.36	0.771	I	O	|	|	|	|	2.31
29.250	0.00	0.35	0.769	I	O	|	|	|	|	2.31
29.333	0.00	0.35	0.766	I	O	|	|	|	|	2.30
29.417	0.00	0.35	0.764	I	O	|	|	|	|	2.29
29.500	0.00	0.35	0.761	I	O	|	|	|	|	2.29
29.583	0.00	0.35	0.759	I	O	|	|	|	|	2.28
29.667	0.00	0.35	0.757	I	O	|	|	|	|	2.27
29.750	0.00	0.35	0.754	I	O	|	|	|	|	2.27
29.833	0.00	0.35	0.752	I	O	|	|	|	|	2.26
29.917	0.00	0.35	0.749	I	O	|	|	|	|	2.25
30.000	0.00	0.35	0.747	I	O	|	|	|	|	2.25
30.083	0.00	0.35	0.745	I	O	|	|	|	|	2.24
30.167	0.00	0.35	0.742	I	O	|	|	|	|	2.24
30.250	0.00	0.35	0.740	I	O	|	|	|	|	2.23
30.333	0.00	0.35	0.737	I	O	|	|	|	|	2.22
30.417	0.00	0.35	0.735	I	O	|	|	|	|	2.22
30.500	0.00	0.35	0.733	I	O	|	|	|	|	2.21
30.583	0.00	0.35	0.730	I	O	|	|	|	|	2.20
30.667	0.00	0.35	0.728	I	O	|	|	|	|	2.20
30.750	0.00	0.35	0.725	I	O	|	|	|	|	2.19
30.833	0.00	0.34	0.723	I	O	|	|	|	|	2.18
30.917	0.00	0.34	0.721	I	O	|	|	|	|	2.18
31.000	0.00	0.34	0.718	I	O	|	|	|	|	2.17
31.083	0.00	0.34	0.716	I	O	|	|	|	|	2.16
31.167	0.00	0.34	0.714	I	O	|	|	|	|	2.16
31.250	0.00	0.34	0.711	I	O	|	|	|	|	2.15
31.333	0.00	0.34	0.709	I	O	|	|	|	|	2.15
31.417	0.00	0.34	0.706	I	O	|	|	|	|	2.14
31.500	0.00	0.34	0.704	I	O	|	|	|	|	2.13
31.583	0.00	0.34	0.702	I	O	|	|	|	|	2.13

31.667	0.00	0.34	0.699	I	O	|	|	|	|	2.12
31.750	0.00	0.34	0.697	I	O	|	|	|	|	2.11
31.833	0.00	0.34	0.695	I	O	|	|	|	|	2.11
31.917	0.00	0.34	0.692	I	O	|	|	|	|	2.10
32.000	0.00	0.34	0.690	I	O	|	|	|	|	2.09
32.083	0.00	0.34	0.688	I	O	|	|	|	|	2.09
32.167	0.00	0.34	0.685	I	O	|	|	|	|	2.08
32.250	0.00	0.34	0.683	I	O	|	|	|	|	2.08
32.333	0.00	0.34	0.681	I	O	|	|	|	|	2.07
32.417	0.00	0.34	0.679	I	O	|	|	|	|	2.06
32.500	0.00	0.33	0.676	I	O	|	|	|	|	2.06
32.583	0.00	0.33	0.674	I	O	|	|	|	|	2.05
32.667	0.00	0.33	0.672	I	O	|	|	|	|	2.04
32.750	0.00	0.33	0.669	I	O	|	|	|	|	2.04
32.833	0.00	0.33	0.667	I	O	|	|	|	|	2.03
32.917	0.00	0.33	0.665	I	O	|	|	|	|	2.03
33.000	0.00	0.33	0.662	I	O	|	|	|	|	2.02
33.083	0.00	0.33	0.660	I	O	|	|	|	|	2.01
33.167	0.00	0.33	0.658	I	O	|	|	|	|	2.01
33.250	0.00	0.33	0.656	I	O	|	|	|	|	2.00
33.333	0.00	0.33	0.653	I	O	|	|	|	|	2.00
33.417	0.00	0.33	0.651	I	O	|	|	|	|	1.99
33.500	0.00	0.33	0.649	I	O	|	|	|	|	1.98
33.583	0.00	0.33	0.647	I	O	|	|	|	|	1.98
33.667	0.00	0.33	0.644	I	O	|	|	|	|	1.97
33.750	0.00	0.33	0.642	I	O	|	|	|	|	1.96
33.833	0.00	0.33	0.640	I	O	|	|	|	|	1.96
33.917	0.00	0.33	0.638	I	O	|	|	|	|	1.95
34.000	0.00	0.33	0.635	I	O	|	|	|	|	1.95
34.083	0.00	0.33	0.633	I	O	|	|	|	|	1.94
34.167	0.00	0.32	0.631	I	O	|	|	|	|	1.93
34.250	0.00	0.32	0.629	I	O	|	|	|	|	1.93
34.333	0.00	0.32	0.626	I	O	|	|	|	|	1.92
34.417	0.00	0.32	0.624	I	O	|	|	|	|	1.92
34.500	0.00	0.32	0.622	I	O	|	|	|	|	1.91
34.583	0.00	0.32	0.620	I	O	|	|	|	|	1.90
34.667	0.00	0.32	0.617	I	O	|	|	|	|	1.90
34.750	0.00	0.32	0.615	I	O	|	|	|	|	1.89
34.833	0.00	0.32	0.613	I	O	|	|	|	|	1.89
34.917	0.00	0.32	0.611	I	O	|	|	|	|	1.88
35.000	0.00	0.32	0.609	I	O	|	|	|	|	1.87
35.083	0.00	0.32	0.606	I	O	|	|	|	|	1.87
35.167	0.00	0.32	0.604	I	O	|	|	|	|	1.86
35.250	0.00	0.32	0.602	I	O	|	|	|	|	1.86
35.333	0.00	0.32	0.600	I	O	|	|	|	|	1.85
35.417	0.00	0.32	0.598	I	O	|	|	|	|	1.84
35.500	0.00	0.32	0.595	I	O	|	|	|	|	1.84
35.583	0.00	0.32	0.593	I	O	|	|	|	|	1.83
35.667	0.00	0.32	0.591	I	O	|	|	|	|	1.83
35.750	0.00	0.32	0.589	I	O	|	|	|	|	1.82
35.833	0.00	0.32	0.587	I	O	|	|	|	|	1.82
35.917	0.00	0.31	0.585	I	O	|	|	|	|	1.81
36.000	0.00	0.31	0.582	I	O	|	|	|	|	1.80
36.083	0.00	0.31	0.580	I	O	|	|	|	|	1.80
36.167	0.00	0.31	0.578	I	O	|	|	|	|	1.79
36.250	0.00	0.31	0.576	I	O	|	|	|	|	1.79
36.333	0.00	0.31	0.574	I	O	|	|	|	|	1.78
36.417	0.00	0.31	0.572	I	O	|	|	|	|	1.77
36.500	0.00	0.31	0.569	I	O	|	|	|	|	1.77
36.583	0.00	0.31	0.567	I	O	|	|	|	|	1.76
36.667	0.00	0.31	0.565	I	O	|	|	|	|	1.76
36.750	0.00	0.31	0.563	I	O	|	|	|	|	1.75
36.833	0.00	0.31	0.561	I	O	|	|	|	|	1.75
36.917	0.00	0.31	0.559	I	O	|	|	|	|	1.74
37.000	0.00	0.31	0.557	I	O	|	|	|	|	1.73
37.083	0.00	0.31	0.555	I	O	|	|	|	|	1.73
37.167	0.00	0.31	0.552	I	O	|	|	|	|	1.72
37.250	0.00	0.31	0.550	I	O	|	|	|	|	1.72
37.333	0.00	0.31	0.548	I	O	|	|	|	|	1.71
37.417	0.00	0.31	0.546	I	O	|	|	|	|	1.71
37.500	0.00	0.31	0.544	I	O	|	|	|	|	1.70
37.583	0.00	0.31	0.542	I	O	|	|	|	|	1.69
37.667	0.00	0.31	0.540	I	O	|	|	|	|	1.69
37.750	0.00	0.30	0.538	I	O	|	|	|	|	1.68
37.833	0.00	0.30	0.536	I	O	|	|	|	|	1.68

37.917	0.00	0.30	0.533	I	O	|	|	|	|	1.67
38.000	0.00	0.30	0.531	I	O	|	|	|	|	1.67
38.083	0.00	0.30	0.529	I	O	|	|	|	|	1.66
38.167	0.00	0.30	0.527	I	O	|	|	|	|	1.65
38.250	0.00	0.30	0.525	I	O	|	|	|	|	1.65
38.333	0.00	0.30	0.523	I	O	|	|	|	|	1.64
38.417	0.00	0.30	0.521	I	O	|	|	|	|	1.64
38.500	0.00	0.30	0.519	I	O	|	|	|	|	1.63
38.583	0.00	0.30	0.517	I	O	|	|	|	|	1.63
38.667	0.00	0.30	0.515	I	O	|	|	|	|	1.62
38.750	0.00	0.30	0.513	I	O	|	|	|	|	1.62
38.833	0.00	0.30	0.511	I	O	|	|	|	|	1.61
38.917	0.00	0.30	0.509	I	O	|	|	|	|	1.60
39.000	0.00	0.30	0.507	I	O	|	|	|	|	1.60
39.083	0.00	0.30	0.504	I	O	|	|	|	|	1.59
39.167	0.00	0.30	0.502	I	O	|	|	|	|	1.59
39.250	0.00	0.30	0.500	I	O	|	|	|	|	1.58
39.333	0.00	0.30	0.498	I	O	|	|	|	|	1.58
39.417	0.00	0.30	0.496	I	O	|	|	|	|	1.57
39.500	0.00	0.30	0.494	I	O	|	|	|	|	1.57
39.583	0.00	0.29	0.492	I	O	|	|	|	|	1.56
39.667	0.00	0.29	0.490	I	O	|	|	|	|	1.55
39.750	0.00	0.29	0.488	I	O	|	|	|	|	1.55
39.833	0.00	0.29	0.486	I	O	|	|	|	|	1.54
39.917	0.00	0.29	0.484	I	O	|	|	|	|	1.54
40.000	0.00	0.29	0.482	I	O	|	|	|	|	1.53
40.083	0.00	0.29	0.480	I	O	|	|	|	|	1.53
40.167	0.00	0.29	0.478	I	O	|	|	|	|	1.52
40.250	0.00	0.29	0.476	I	O	|	|	|	|	1.52
40.333	0.00	0.29	0.474	I	O	|	|	|	|	1.51
40.417	0.00	0.29	0.472	I	O	|	|	|	|	1.51
40.500	0.00	0.29	0.470	I	O	|	|	|	|	1.50
40.583	0.00	0.29	0.468	I	O	|	|	|	|	1.49
40.667	0.00	0.29	0.466	I	O	|	|	|	|	1.49
40.750	0.00	0.29	0.464	I	O	|	|	|	|	1.48
40.833	0.00	0.29	0.462	I	O	|	|	|	|	1.48
40.917	0.00	0.29	0.460	I	O	|	|	|	|	1.47
41.000	0.00	0.29	0.458	I	O	|	|	|	|	1.46
41.083	0.00	0.28	0.456	I	O	|	|	|	|	1.46
41.167	0.00	0.28	0.454	I	O	|	|	|	|	1.45
41.250	0.00	0.28	0.452	I	O	|	|	|	|	1.45
41.333	0.00	0.28	0.450	I	O	|	|	|	|	1.44
41.417	0.00	0.28	0.448	I	O	|	|	|	|	1.43
41.500	0.00	0.28	0.446	I	O	|	|	|	|	1.43
41.583	0.00	0.28	0.445	I	O	|	|	|	|	1.42
41.667	0.00	0.28	0.443	I	O	|	|	|	|	1.42
41.750	0.00	0.28	0.441	I	O	|	|	|	|	1.41
41.833	0.00	0.28	0.439	I	O	|	|	|	|	1.41
41.917	0.00	0.28	0.437	I	O	|	|	|	|	1.40
42.000	0.00	0.28	0.435	I	O	|	|	|	|	1.39
42.083	0.00	0.28	0.433	I	O	|	|	|	|	1.39
42.167	0.00	0.28	0.431	I	O	|	|	|	|	1.38
42.250	0.00	0.28	0.429	I	O	|	|	|	|	1.38
42.333	0.00	0.27	0.427	I	O	|	|	|	|	1.37
42.417	0.00	0.27	0.425	I	O	|	|	|	|	1.36
42.500	0.00	0.27	0.424	I	O	|	|	|	|	1.36
42.583	0.00	0.27	0.422	I	O	|	|	|	|	1.35
42.667	0.00	0.27	0.420	I	O	|	|	|	|	1.35
42.750	0.00	0.27	0.418	I	O	|	|	|	|	1.34
42.833	0.00	0.27	0.416	I	O	|	|	|	|	1.34
42.917	0.00	0.27	0.414	I	O	|	|	|	|	1.33
43.000	0.00	0.27	0.412	I	O	|	|	|	|	1.33
43.083	0.00	0.27	0.411	I	O	|	|	|	|	1.32
43.167	0.00	0.27	0.409	I	O	|	|	|	|	1.31
43.250	0.00	0.27	0.407	I	O	|	|	|	|	1.31
43.333	0.00	0.27	0.405	I	O	|	|	|	|	1.30
43.417	0.00	0.27	0.403	I	O	|	|	|	|	1.30
43.500	0.00	0.27	0.401	I	O	|	|	|	|	1.29
43.583	0.00	0.26	0.400	I	O	|	|	|	|	1.29
43.667	0.00	0.26	0.398	I	O	|	|	|	|	1.28
43.750	0.00	0.26	0.396	I	O	|	|	|	|	1.28
43.833	0.00	0.26	0.394	I	O	|	|	|	|	1.27
43.917	0.00	0.26	0.392	I	O	|	|	|	|	1.26
44.000	0.00	0.26	0.390	I	O	|	|	|	|	1.26
44.083	0.00	0.26	0.389	I	O	|	|	|	|	1.25

44.167	0.00	0.26	0.387	I	O	|	|	|	|	1.25
44.250	0.00	0.26	0.385	I	O	|	|	|	|	1.24
44.333	0.00	0.26	0.383	I	O	|	|	|	|	1.24
44.417	0.00	0.26	0.382	I	O	|	|	|	|	1.23
44.500	0.00	0.26	0.380	I	O	|	|	|	|	1.23
44.583	0.00	0.26	0.378	I	O	|	|	|	|	1.22
44.667	0.00	0.26	0.376	I	O	|	|	|	|	1.22
44.750	0.00	0.26	0.374	I	O	|	|	|	|	1.21
44.833	0.00	0.25	0.373	I	O	|	|	|	|	1.21
44.917	0.00	0.25	0.371	I	O	|	|	|	|	1.20
45.000	0.00	0.25	0.369	I	O	|	|	|	|	1.19
45.083	0.00	0.25	0.367	I	O	|	|	|	|	1.19
45.167	0.00	0.25	0.366	I	O	|	|	|	|	1.18
45.250	0.00	0.25	0.364	I	O	|	|	|	|	1.18
45.333	0.00	0.25	0.362	I	O	|	|	|	|	1.17
45.417	0.00	0.25	0.361	I	O	|	|	|	|	1.17
45.500	0.00	0.25	0.359	I	O	|	|	|	|	1.16
45.583	0.00	0.25	0.357	I	O	|	|	|	|	1.16
45.667	0.00	0.25	0.355	I	O	|	|	|	|	1.15
45.750	0.00	0.25	0.354	I	O	|	|	|	|	1.15
45.833	0.00	0.25	0.352	I	O	|	|	|	|	1.14
45.917	0.00	0.25	0.350	I	O	|	|	|	|	1.14
46.000	0.00	0.25	0.349	I	O	|	|	|	|	1.13
46.083	0.00	0.25	0.347	I	O	|	|	|	|	1.13
46.167	0.00	0.24	0.345	I	O	|	|	|	|	1.12
46.250	0.00	0.24	0.344	I	O	|	|	|	|	1.12
46.333	0.00	0.24	0.342	I	O	|	|	|	|	1.11
46.417	0.00	0.24	0.340	I	O	|	|	|	|	1.11
46.500	0.00	0.24	0.338	I	O	|	|	|	|	1.10
46.583	0.00	0.24	0.337	I	O	|	|	|	|	1.10
46.667	0.00	0.24	0.335	I	O	|	|	|	|	1.09
46.750	0.00	0.24	0.334	I	O	|	|	|	|	1.09
46.833	0.00	0.24	0.332	I	O	|	|	|	|	1.08
46.917	0.00	0.24	0.330	I	O	|	|	|	|	1.08
47.000	0.00	0.24	0.329	I	O	|	|	|	|	1.07
47.083	0.00	0.24	0.327	I	O	|	|	|	|	1.07
47.167	0.00	0.24	0.325	I	O	|	|	|	|	1.06
47.250	0.00	0.24	0.324	I	O	|	|	|	|	1.06
47.333	0.00	0.24	0.322	I	O	|	|	|	|	1.05
47.417	0.00	0.24	0.320	I	O	|	|	|	|	1.05
47.500	0.00	0.24	0.319	I	O	|	|	|	|	1.04
47.583	0.00	0.23	0.317	I	O	|	|	|	|	1.04
47.667	0.00	0.23	0.316	I	O	|	|	|	|	1.03
47.750	0.00	0.23	0.314	I	O	|	|	|	|	1.03
47.833	0.00	0.23	0.312	I	O	|	|	|	|	1.02
47.917	0.00	0.23	0.311	I	O	|	|	|	|	1.02
48.000	0.00	0.23	0.309	I	O	|	|	|	|	1.01
48.083	0.00	0.23	0.308	I	O	|	|	|	|	1.01
48.167	0.00	0.23	0.306	I	O	|	|	|	|	1.00
48.250	0.00	0.23	0.304	I	O	|	|	|	|	1.00
48.333	0.00	0.23	0.303	I	O	|	|	|	|	0.99
48.417	0.00	0.23	0.301	I	O	|	|	|	|	0.99
48.500	0.00	0.23	0.300	I	O	|	|	|	|	0.98
48.583	0.00	0.23	0.298	I	O	|	|	|	|	0.98
48.667	0.00	0.23	0.297	I	O	|	|	|	|	0.97
48.750	0.00	0.23	0.295	I	O	|	|	|	|	0.97
48.833	0.00	0.23	0.293	I	O	|	|	|	|	0.96
48.917	0.00	0.23	0.292	I	O	|	|	|	|	0.96
49.000	0.00	0.22	0.290	I	O	|	|	|	|	0.96
49.083	0.00	0.22	0.289	I	O	|	|	|	|	0.95
49.167	0.00	0.22	0.287	I	O	|	|	|	|	0.95
49.250	0.00	0.22	0.286	I	O	|	|	|	|	0.94
49.333	0.00	0.22	0.284	I	O	|	|	|	|	0.94
49.417	0.00	0.22	0.283	I	O	|	|	|	|	0.93
49.500	0.00	0.22	0.281	I	O	|	|	|	|	0.93
49.583	0.00	0.22	0.280	I	O	|	|	|	|	0.92
49.667	0.00	0.22	0.278	I	O	|	|	|	|	0.92
49.750	0.00	0.22	0.277	I	O	|	|	|	|	0.91
49.833	0.00	0.22	0.275	I	O	|	|	|	|	0.91
49.917	0.00	0.22	0.274	I	O	|	|	|	|	0.90
50.000	0.00	0.22	0.272	I	O	|	|	|	|	0.90
50.083	0.00	0.22	0.270	I	O	|	|	|	|	0.90
50.167	0.00	0.22	0.269	I	O	|	|	|	|	0.89
50.250	0.00	0.22	0.268	I	O	|	|	|	|	0.89
50.333	0.00	0.22	0.266	I	O	|	|	|	|	0.88

50.417	0.00	0.22	0.265	I	O	|	|	|	0.88
50.500	0.00	0.21	0.263	I	O	|	|	|	0.87
50.583	0.00	0.21	0.262	I	O	|	|	|	0.87
50.667	0.00	0.21	0.260	I	O	|	|	|	0.86
50.750	0.00	0.21	0.259	I	O	|	|	|	0.86
50.833	0.00	0.21	0.257	I	O	|	|	|	0.86
50.917	0.00	0.21	0.256	I	O	|	|	|	0.85
51.000	0.00	0.21	0.254	I	O	|	|	|	0.85
51.083	0.00	0.21	0.253	I	O	|	|	|	0.84
51.167	0.00	0.21	0.251	I	O	|	|	|	0.84
51.250	0.00	0.21	0.250	I	O	|	|	|	0.83
51.333	0.00	0.21	0.248	I	O	|	|	|	0.83
51.417	0.00	0.21	0.247	I	O	|	|	|	0.82
51.500	0.00	0.21	0.246	I	O	|	|	|	0.82
51.583	0.00	0.21	0.244	I	O	|	|	|	0.82
51.667	0.00	0.21	0.243	I	O	|	|	|	0.81
51.750	0.00	0.21	0.241	I	O	|	|	|	0.81
51.833	0.00	0.21	0.240	I	O	|	|	|	0.80
51.917	0.00	0.21	0.238	I	O	|	|	|	0.80
52.000	0.00	0.21	0.237	I	O	|	|	|	0.79
52.083	0.00	0.20	0.236	I	O	|	|	|	0.79
52.167	0.00	0.20	0.234	I	O	|	|	|	0.79
52.250	0.00	0.20	0.233	I	O	|	|	|	0.78
52.333	0.00	0.20	0.231	I	O	|	|	|	0.78
52.417	0.00	0.20	0.230	I	O	|	|	|	0.77
52.500	0.00	0.20	0.229	I	O	|	|	|	0.77
52.583	0.00	0.20	0.227	I	O	|	|	|	0.76
52.667	0.00	0.20	0.226	I	O	|	|	|	0.76
52.750	0.00	0.20	0.224	I	O	|	|	|	0.76
52.833	0.00	0.20	0.223	I	O	|	|	|	0.75
52.917	0.00	0.20	0.222	I	O	|	|	|	0.75
53.000	0.00	0.20	0.220	I	O	|	|	|	0.74
53.083	0.00	0.20	0.219	I	O	|	|	|	0.74
53.167	0.00	0.20	0.218	I	O	|	|	|	0.74
53.250	0.00	0.20	0.216	I	O	|	|	|	0.73
53.333	0.00	0.20	0.215	I	O	|	|	|	0.73
53.417	0.00	0.20	0.213	I	O	|	|	|	0.72
53.500	0.00	0.20	0.212	I	O	|	|	|	0.72
53.583	0.00	0.20	0.211	I	O	|	|	|	0.71
53.667	0.00	0.20	0.209	I	O	|	|	|	0.71
53.750	0.00	0.19	0.208	I	O	|	|	|	0.71
53.833	0.00	0.19	0.207	I	O	|	|	|	0.70
53.917	0.00	0.19	0.205	I	O	|	|	|	0.70
54.000	0.00	0.19	0.204	I	O	|	|	|	0.69
54.083	0.00	0.19	0.203	I	O	|	|	|	0.69
54.167	0.00	0.19	0.201	I	O	|	|	|	0.69
54.250	0.00	0.19	0.200	I	O	|	|	|	0.68
54.333	0.00	0.19	0.199	I	O	|	|	|	0.68
54.417	0.00	0.19	0.197	I	O	|	|	|	0.67
54.500	0.00	0.19	0.196	I	O	|	|	|	0.67
54.583	0.00	0.19	0.195	I	O	|	|	|	0.67
54.667	0.00	0.19	0.194	I	O	|	|	|	0.66
54.750	0.00	0.19	0.192	I	O	|	|	|	0.66
54.833	0.00	0.19	0.191	I	O	|	|	|	0.65
54.917	0.00	0.19	0.190	I	O	|	|	|	0.65
55.000	0.00	0.19	0.188	I	O	|	|	|	0.65
55.083	0.00	0.19	0.187	I	O	|	|	|	0.64
55.167	0.00	0.19	0.186	I	O	|	|	|	0.64
55.250	0.00	0.19	0.184	I	O	|	|	|	0.63
55.333	0.00	0.19	0.183	I	O	|	|	|	0.63
55.417	0.00	0.19	0.182	I	O	|	|	|	0.63
55.500	0.00	0.18	0.181	I	O	|	|	|	0.62
55.583	0.00	0.18	0.179	I	O	|	|	|	0.62
55.667	0.00	0.18	0.178	I	O	|	|	|	0.62
55.750	0.00	0.18	0.177	I	O	|	|	|	0.61
55.833	0.00	0.18	0.176	I	O	|	|	|	0.61
55.917	0.00	0.18	0.174	I	O	|	|	|	0.60
56.000	0.00	0.18	0.173	I	O	|	|	|	0.60
56.083	0.00	0.18	0.172	I	O	|	|	|	0.60
56.167	0.00	0.18	0.171	I	O	|	|	|	0.59
56.250	0.00	0.18	0.169	I	O	|	|	|	0.59
56.333	0.00	0.18	0.168	I	O	|	|	|	0.59
56.417	0.00	0.18	0.167	I	O	|	|	|	0.58
56.500	0.00	0.18	0.166	I	O	|	|	|	0.58
56.583	0.00	0.18	0.164	I	O	|	|	|	0.57

56.667	0.00	0.18	0.163	I O	|	|	|	0.57
56.750	0.00	0.18	0.162	I O	|	|	|	0.57
56.833	0.00	0.18	0.161	I O	|	|	|	0.56
56.917	0.00	0.18	0.159	I O	|	|	|	0.56
57.000	0.00	0.18	0.158	I O	|	|	|	0.56
57.083	0.00	0.18	0.157	I O	|	|	|	0.55
57.167	0.00	0.18	0.156	I O	|	|	|	0.55
57.250	0.00	0.18	0.155	I O	|	|	|	0.54
57.333	0.00	0.17	0.153	I O	|	|	|	0.54
57.417	0.00	0.17	0.152	I O	|	|	|	0.54
57.500	0.00	0.17	0.151	I O	|	|	|	0.53
57.583	0.00	0.17	0.150	I O	|	|	|	0.53
57.667	0.00	0.17	0.149	I O	|	|	|	0.53
57.750	0.00	0.17	0.147	I O	|	|	|	0.52
57.833	0.00	0.17	0.146	I O	|	|	|	0.52
57.917	0.00	0.17	0.145	I O	|	|	|	0.52
58.000	0.00	0.17	0.144	I O	|	|	|	0.51
58.083	0.00	0.17	0.143	I O	|	|	|	0.51
58.167	0.00	0.17	0.142	I O	|	|	|	0.50
58.250	0.00	0.17	0.140	I O	|	|	|	0.50
58.333	0.00	0.17	0.139	I O	|	|	|	0.50
58.417	0.00	0.17	0.138	I O	|	|	|	0.49
58.500	0.00	0.17	0.137	I O	|	|	|	0.49
58.583	0.00	0.16	0.136	I O	|	|	|	0.48
58.667	0.00	0.16	0.135	I O	|	|	|	0.48
58.750	0.00	0.16	0.133	I O	|	|	|	0.48
58.833	0.00	0.16	0.132	I O	|	|	|	0.47
58.917	0.00	0.16	0.131	I O	|	|	|	0.47
59.000	0.00	0.16	0.130	I O	|	|	|	0.46
59.083	0.00	0.16	0.129	I O	|	|	|	0.46
59.167	0.00	0.16	0.128	I O	|	|	|	0.46
59.250	0.00	0.15	0.127	I O	|	|	|	0.45
59.333	0.00	0.15	0.126	I O	|	|	|	0.45
59.417	0.00	0.15	0.125	I O	|	|	|	0.45
59.500	0.00	0.15	0.124	IO	|	|	|	0.44
59.583	0.00	0.15	0.123	IO	|	|	|	0.44
59.667	0.00	0.15	0.122	IO	|	|	|	0.43
59.750	0.00	0.15	0.121	IO	|	|	|	0.43
59.833	0.00	0.15	0.120	IO	|	|	|	0.43
59.917	0.00	0.14	0.119	IO	|	|	|	0.42
60.000	0.00	0.14	0.118	IO	|	|	|	0.42
60.083	0.00	0.14	0.117	IO	|	|	|	0.42
60.167	0.00	0.14	0.116	IO	|	|	|	0.41
60.250	0.00	0.14	0.115	IO	|	|	|	0.41
60.333	0.00	0.14	0.114	IO	|	|	|	0.41
60.417	0.00	0.14	0.113	IO	|	|	|	0.40
60.500	0.00	0.14	0.112	IO	|	|	|	0.40
60.583	0.00	0.13	0.111	IO	|	|	|	0.40
60.667	0.00	0.13	0.110	IO	|	|	|	0.39
60.750	0.00	0.13	0.109	IO	|	|	|	0.39
60.833	0.00	0.13	0.108	IO	|	|	|	0.39
60.917	0.00	0.13	0.107	IO	|	|	|	0.38
61.000	0.00	0.13	0.107	IO	|	|	|	0.38
61.083	0.00	0.13	0.106	IO	|	|	|	0.38
61.167	0.00	0.13	0.105	IO	|	|	|	0.37
61.250	0.00	0.13	0.104	IO	|	|	|	0.37
61.333	0.00	0.13	0.103	IO	|	|	|	0.37
61.417	0.00	0.12	0.102	IO	|	|	|	0.36
61.500	0.00	0.12	0.101	IO	|	|	|	0.36
61.583	0.00	0.12	0.100	IO	|	|	|	0.36
61.667	0.00	0.12	0.100	IO	|	|	|	0.36
61.750	0.00	0.12	0.099	IO	|	|	|	0.35
61.833	0.00	0.12	0.098	IO	|	|	|	0.35
61.917	0.00	0.12	0.097	IO	|	|	|	0.35
62.000	0.00	0.12	0.096	IO	|	|	|	0.34
62.083	0.00	0.12	0.096	IO	|	|	|	0.34
62.167	0.00	0.12	0.095	IO	|	|	|	0.34
62.250	0.00	0.11	0.094	IO	|	|	|	0.34
62.333	0.00	0.11	0.093	IO	|	|	|	0.33
62.417	0.00	0.11	0.092	IO	|	|	|	0.33
62.500	0.00	0.11	0.092	IO	|	|	|	0.33
62.583	0.00	0.11	0.091	IO	|	|	|	0.32
62.667	0.00	0.11	0.090	IO	|	|	|	0.32
62.750	0.00	0.11	0.089	IO	|	|	|	0.32
62.833	0.00	0.11	0.089	IO	|	|	|	0.32

62.917	0.00	0.11	0.088	IO					0.31
63.000	0.00	0.11	0.087	IO					0.31
63.083	0.00	0.10	0.086	IO					0.31
63.167	0.00	0.10	0.086	IO					0.31
63.250	0.00	0.10	0.085	IO					0.30
63.333	0.00	0.10	0.084	IO					0.30
63.417	0.00	0.10	0.084	IO					0.30
63.500	0.00	0.10	0.083	IO					0.30
63.583	0.00	0.10	0.082	IO					0.29
63.667	0.00	0.10	0.081	IO					0.29
63.750	0.00	0.10	0.081	IO					0.29
63.833	0.00	0.10	0.080	IO					0.29
63.917	0.00	0.10	0.079	IO					0.28
64.000	0.00	0.10	0.079	IO					0.28
64.083	0.00	0.09	0.078	IO					0.28
64.167	0.00	0.09	0.078	IO					0.28
64.250	0.00	0.09	0.077	IO					0.27
64.333	0.00	0.09	0.076	IO					0.27
64.417	0.00	0.09	0.076	IO					0.27
64.500	0.00	0.09	0.075	IO					0.27
64.583	0.00	0.09	0.074	IO					0.27
64.667	0.00	0.09	0.074	IO					0.26
64.750	0.00	0.09	0.073	IO					0.26
64.833	0.00	0.09	0.072	IO					0.26
64.917	0.00	0.09	0.072	IO					0.26
65.000	0.00	0.09	0.071	IO					0.25
65.083	0.00	0.09	0.071	IO					0.25
65.167	0.00	0.09	0.070	IO					0.25
65.250	0.00	0.08	0.070	IO					0.25
65.333	0.00	0.08	0.069	IO					0.25
65.417	0.00	0.08	0.068	IO					0.24
65.500	0.00	0.08	0.068	IO					0.24
65.583	0.00	0.08	0.067	IO					0.24
65.667	0.00	0.08	0.067	IO					0.24
65.750	0.00	0.08	0.066	IO					0.24
65.833	0.00	0.08	0.066	IO					0.23
65.917	0.00	0.08	0.065	IO					0.23
66.000	0.00	0.08	0.064	IO					0.23
66.083	0.00	0.08	0.064	IO					0.23
66.167	0.00	0.08	0.063	IO					0.23
66.250	0.00	0.08	0.063	IO					0.22
66.333	0.00	0.08	0.062	IO					0.22
66.417	0.00	0.08	0.062	O					0.22
66.500	0.00	0.07	0.061	O					0.22
66.583	0.00	0.07	0.061	O					0.22
66.667	0.00	0.07	0.060	O					0.22
66.750	0.00	0.07	0.060	O					0.21
66.833	0.00	0.07	0.059	O					0.21
66.917	0.00	0.07	0.059	O					0.21
67.000	0.00	0.07	0.058	O					0.21
67.083	0.00	0.07	0.058	O					0.21
67.167	0.00	0.07	0.057	O					0.20
67.250	0.00	0.07	0.057	O					0.20
67.333	0.00	0.07	0.056	O					0.20
67.417	0.00	0.07	0.056	O					0.20
67.500	0.00	0.07	0.055	O					0.20
67.583	0.00	0.07	0.055	O					0.20
67.667	0.00	0.07	0.055	O					0.19
67.750	0.00	0.07	0.054	O					0.19
67.833	0.00	0.07	0.054	O					0.19
67.917	0.00	0.06	0.053	O					0.19
68.000	0.00	0.06	0.053	O					0.19
68.083	0.00	0.06	0.052	O					0.19
68.167	0.00	0.06	0.052	O					0.19
68.250	0.00	0.06	0.051	O					0.18
68.333	0.00	0.06	0.051	O					0.18
68.417	0.00	0.06	0.051	O					0.18
68.500	0.00	0.06	0.050	O					0.18
68.583	0.00	0.06	0.050	O					0.18
68.667	0.00	0.06	0.049	O					0.18
68.750	0.00	0.06	0.049	O					0.17
68.833	0.00	0.06	0.049	O					0.17
68.917	0.00	0.06	0.048	O					0.17
69.000	0.00	0.06	0.048	O					0.17
69.083	0.00	0.06	0.047	O					0.17

69.167	0.00	0.06	0.047	O	|	|	|	0.17
69.250	0.00	0.06	0.047	O	|	|	|	0.17
69.333	0.00	0.06	0.046	O	|	|	|	0.16
69.417	0.00	0.06	0.046	O	|	|	|	0.16
69.500	0.00	0.06	0.045	O	|	|	|	0.16
69.583	0.00	0.05	0.045	O	|	|	|	0.16
69.667	0.00	0.05	0.045	O	|	|	|	0.16
69.750	0.00	0.05	0.044	O	|	|	|	0.16
69.833	0.00	0.05	0.044	O	|	|	|	0.16
69.917	0.00	0.05	0.044	O	|	|	|	0.16
70.000	0.00	0.05	0.043	O	|	|	|	0.15
70.083	0.00	0.05	0.043	O	|	|	|	0.15
70.167	0.00	0.05	0.042	O	|	|	|	0.15
70.250	0.00	0.05	0.042	O	|	|	|	0.15
70.333	0.00	0.05	0.042	O	|	|	|	0.15
70.417	0.00	0.05	0.041	O	|	|	|	0.15
70.500	0.00	0.05	0.041	O	|	|	|	0.15
70.583	0.00	0.05	0.041	O	|	|	|	0.15
70.667	0.00	0.05	0.040	O	|	|	|	0.14
70.750	0.00	0.05	0.040	O	|	|	|	0.14
70.833	0.00	0.05	0.040	O	|	|	|	0.14
70.917	0.00	0.05	0.039	O	|	|	|	0.14
71.000	0.00	0.05	0.039	O	|	|	|	0.14
71.083	0.00	0.05	0.039	O	|	|	|	0.14
71.167	0.00	0.05	0.038	O	|	|	|	0.14
71.250	0.00	0.05	0.038	O	|	|	|	0.14
71.333	0.00	0.05	0.038	O	|	|	|	0.13
71.417	0.00	0.05	0.037	O	|	|	|	0.13
71.500	0.00	0.05	0.037	O	|	|	|	0.13
71.583	0.00	0.04	0.037	O	|	|	|	0.13
71.667	0.00	0.04	0.037	O	|	|	|	0.13
71.750	0.00	0.04	0.036	O	|	|	|	0.13
71.833	0.00	0.04	0.036	O	|	|	|	0.13
71.917	0.00	0.04	0.036	O	|	|	|	0.13
72.000	0.00	0.04	0.035	O	|	|	|	0.13
72.083	0.00	0.04	0.035	O	|	|	|	0.13
72.167	0.00	0.04	0.035	O	|	|	|	0.12
72.250	0.00	0.04	0.034	O	|	|	|	0.12
72.333	0.00	0.04	0.034	O	|	|	|	0.12
72.417	0.00	0.04	0.034	O	|	|	|	0.12
72.500	0.00	0.04	0.034	O	|	|	|	0.12
72.583	0.00	0.04	0.033	O	|	|	|	0.12
72.667	0.00	0.04	0.033	O	|	|	|	0.12
72.750	0.00	0.04	0.033	O	|	|	|	0.12
72.833	0.00	0.04	0.032	O	|	|	|	0.12
72.917	0.00	0.04	0.032	O	|	|	|	0.12
73.000	0.00	0.04	0.032	O	|	|	|	0.11
73.083	0.00	0.04	0.032	O	|	|	|	0.11
73.167	0.00	0.04	0.031	O	|	|	|	0.11
73.250	0.00	0.04	0.031	O	|	|	|	0.11
73.333	0.00	0.04	0.031	O	|	|	|	0.11
73.417	0.00	0.04	0.031	O	|	|	|	0.11
73.500	0.00	0.04	0.030	O	|	|	|	0.11
73.583	0.00	0.04	0.030	O	|	|	|	0.11
73.667	0.00	0.04	0.030	O	|	|	|	0.11
73.750	0.00	0.04	0.030	O	|	|	|	0.11
73.833	0.00	0.04	0.029	O	|	|	|	0.10
73.917	0.00	0.04	0.029	O	|	|	|	0.10
74.000	0.00	0.04	0.029	O	|	|	|	0.10
74.083	0.00	0.03	0.029	O	|	|	|	0.10
74.167	0.00	0.03	0.028	O	|	|	|	0.10
74.250	0.00	0.03	0.028	O	|	|	|	0.10
74.333	0.00	0.03	0.028	O	|	|	|	0.10
74.417	0.00	0.03	0.028	O	|	|	|	0.10
74.500	0.00	0.03	0.027	O	|	|	|	0.10
74.583	0.00	0.03	0.027	O	|	|	|	0.10
74.667	0.00	0.03	0.027	O	|	|	|	0.10
74.750	0.00	0.03	0.027	O	|	|	|	0.10
74.833	0.00	0.03	0.027	O	|	|	|	0.09
74.917	0.00	0.03	0.026	O	|	|	|	0.09
75.000	0.00	0.03	0.026	O	|	|	|	0.09
75.083	0.00	0.03	0.026	O	|	|	|	0.09
75.167	0.00	0.03	0.026	O	|	|	|	0.09
75.250	0.00	0.03	0.025	O	|	|	|	0.09
75.333	0.00	0.03	0.025	O	|	|	|	0.09

75.417	0.00	0.03	0.025	O					0.09
75.500	0.00	0.03	0.025	O					0.09
75.583	0.00	0.03	0.025	O					0.09
75.667	0.00	0.03	0.024	O					0.09
75.750	0.00	0.03	0.024	O					0.09
75.833	0.00	0.03	0.024	O					0.09
75.917	0.00	0.03	0.024	O					0.09
76.000	0.00	0.03	0.024	O					0.08
76.083	0.00	0.03	0.023	O					0.08
76.167	0.00	0.03	0.023	O					0.08
76.250	0.00	0.03	0.023	O					0.08
76.333	0.00	0.03	0.023	O					0.08
76.417	0.00	0.03	0.023	O					0.08
76.500	0.00	0.03	0.022	O					0.08
76.583	0.00	0.03	0.022	O					0.08
76.667	0.00	0.03	0.022	O					0.08
76.750	0.00	0.03	0.022	O					0.08
76.833	0.00	0.03	0.022	O					0.08
76.917	0.00	0.03	0.022	O					0.08
77.000	0.00	0.03	0.021	O					0.08
77.083	0.00	0.03	0.021	O					0.08
77.167	0.00	0.03	0.021	O					0.08
77.250	0.00	0.03	0.021	O					0.07
77.333	0.00	0.03	0.021	O					0.07
77.417	0.00	0.02	0.021	O					0.07
77.500	0.00	0.02	0.020	O					0.07
77.583	0.00	0.02	0.020	O					0.07
77.667	0.00	0.02	0.020	O					0.07
77.750	0.00	0.02	0.020	O					0.07
77.833	0.00	0.02	0.020	O					0.07
77.917	0.00	0.02	0.020	O					0.07
78.000	0.00	0.02	0.019	O					0.07
78.083	0.00	0.02	0.019	O					0.07
78.167	0.00	0.02	0.019	O					0.07
78.250	0.00	0.02	0.019	O					0.07
78.333	0.00	0.02	0.019	O					0.07
78.417	0.00	0.02	0.019	O					0.07
78.500	0.00	0.02	0.018	O					0.07
78.583	0.00	0.02	0.018	O					0.07
78.667	0.00	0.02	0.018	O					0.06
78.750	0.00	0.02	0.018	O					0.06
78.833	0.00	0.02	0.018	O					0.06
78.917	0.00	0.02	0.018	O					0.06
79.000	0.00	0.02	0.017	O					0.06
79.083	0.00	0.02	0.017	O					0.06
79.167	0.00	0.02	0.017	O					0.06
79.250	0.00	0.02	0.017	O					0.06
79.333	0.00	0.02	0.017	O					0.06
79.417	0.00	0.02	0.017	O					0.06
79.500	0.00	0.02	0.017	O					0.06
79.583	0.00	0.02	0.016	O					0.06
79.667	0.00	0.02	0.016	O					0.06
79.750	0.00	0.02	0.016	O					0.06
79.833	0.00	0.02	0.016	O					0.06
79.917	0.00	0.02	0.016	O					0.06
80.000	0.00	0.02	0.016	O					0.06
80.083	0.00	0.02	0.016	O					0.06
80.167	0.00	0.02	0.016	O					0.06
80.250	0.00	0.02	0.015	O					0.06
80.333	0.00	0.02	0.015	O					0.05
80.417	0.00	0.02	0.015	O					0.05
80.500	0.00	0.02	0.015	O					0.05
80.583	0.00	0.02	0.015	O					0.05
80.667	0.00	0.02	0.015	O					0.05
80.750	0.00	0.02	0.015	O					0.05
80.833	0.00	0.02	0.015	O					0.05
80.917	0.00	0.02	0.014	O					0.05
81.000	0.00	0.02	0.014	O					0.05
81.083	0.00	0.02	0.014	O					0.05
81.167	0.00	0.02	0.014	O					0.05
81.250	0.00	0.02	0.014	O					0.05
81.333	0.00	0.02	0.014	O					0.05
81.417	0.00	0.02	0.014	O					0.05
81.500	0.00	0.02	0.014	O					0.05
81.583	0.00	0.02	0.013	O					0.05

81.667	0.00	0.02	0.013	O	|	|	|	|	0.05
81.750	0.00	0.02	0.013	O	|	|	|	|	0.05
81.833	0.00	0.02	0.013	O	|	|	|	|	0.05
81.917	0.00	0.02	0.013	O	|	|	|	|	0.05
82.000	0.00	0.02	0.013	O	|	|	|	|	0.05
82.083	0.00	0.02	0.013	O	|	|	|	|	0.05
82.167	0.00	0.02	0.013	O	|	|	|	|	0.05
82.250	0.00	0.02	0.013	O	|	|	|	|	0.05
82.333	0.00	0.02	0.013	O	|	|	|	|	0.04
82.417	0.00	0.02	0.012	O	|	|	|	|	0.04
82.500	0.00	0.01	0.012	O	|	|	|	|	0.04
82.583	0.00	0.01	0.012	O	|	|	|	|	0.04
82.667	0.00	0.01	0.012	O	|	|	|	|	0.04
82.750	0.00	0.01	0.012	O	|	|	|	|	0.04
82.833	0.00	0.01	0.012	O	|	|	|	|	0.04
82.917	0.00	0.01	0.012	O	|	|	|	|	0.04
83.000	0.00	0.01	0.012	O	|	|	|	|	0.04
83.083	0.00	0.01	0.012	O	|	|	|	|	0.04
83.167	0.00	0.01	0.012	O	|	|	|	|	0.04
83.250	0.00	0.01	0.011	O	|	|	|	|	0.04
83.333	0.00	0.01	0.011	O	|	|	|	|	0.04
83.417	0.00	0.01	0.011	O	|	|	|	|	0.04
83.500	0.00	0.01	0.011	O	|	|	|	|	0.04
83.583	0.00	0.01	0.011	O	|	|	|	|	0.04
83.667	0.00	0.01	0.011	O	|	|	|	|	0.04
83.750	0.00	0.01	0.011	O	|	|	|	|	0.04
83.833	0.00	0.01	0.011	O	|	|	|	|	0.04
83.917	0.00	0.01	0.011	O	|	|	|	|	0.04
84.000	0.00	0.01	0.011	O	|	|	|	|	0.04
84.083	0.00	0.01	0.011	O	|	|	|	|	0.04
84.167	0.00	0.01	0.010	O	|	|	|	|	0.04
84.250	0.00	0.01	0.010	O	|	|	|	|	0.04
84.333	0.00	0.01	0.010	O	|	|	|	|	0.04
84.417	0.00	0.01	0.010	O	|	|	|	|	0.04
84.500	0.00	0.01	0.010	O	|	|	|	|	0.04
84.583	0.00	0.01	0.010	O	|	|	|	|	0.04
84.667	0.00	0.01	0.010	O	|	|	|	|	0.04
84.750	0.00	0.01	0.010	O	|	|	|	|	0.04
84.833	0.00	0.01	0.010	O	|	|	|	|	0.03
84.917	0.00	0.01	0.010	O	|	|	|	|	0.03
85.000	0.00	0.01	0.010	O	|	|	|	|	0.03
85.083	0.00	0.01	0.010	O	|	|	|	|	0.03
85.167	0.00	0.01	0.009	O	|	|	|	|	0.03
85.250	0.00	0.01	0.009	O	|	|	|	|	0.03
85.333	0.00	0.01	0.009	O	|	|	|	|	0.03
85.417	0.00	0.01	0.009	O	|	|	|	|	0.03
85.500	0.00	0.01	0.009	O	|	|	|	|	0.03
85.583	0.00	0.01	0.009	O	|	|	|	|	0.03
85.667	0.00	0.01	0.009	O	|	|	|	|	0.03
85.750	0.00	0.01	0.009	O	|	|	|	|	0.03
85.833	0.00	0.01	0.009	O	|	|	|	|	0.03
85.917	0.00	0.01	0.009	O	|	|	|	|	0.03
86.000	0.00	0.01	0.009	O	|	|	|	|	0.03
86.083	0.00	0.01	0.009	O	|	|	|	|	0.03
86.167	0.00	0.01	0.009	O	|	|	|	|	0.03
86.250	0.00	0.01	0.008	O	|	|	|	|	0.03
86.333	0.00	0.01	0.008	O	|	|	|	|	0.03
86.417	0.00	0.01	0.008	O	|	|	|	|	0.03
86.500	0.00	0.01	0.008	O	|	|	|	|	0.03
86.583	0.00	0.01	0.008	O	|	|	|	|	0.03
86.667	0.00	0.01	0.008	O	|	|	|	|	0.03
86.750	0.00	0.01	0.008	O	|	|	|	|	0.03
86.833	0.00	0.01	0.008	O	|	|	|	|	0.03
86.917	0.00	0.01	0.008	O	|	|	|	|	0.03
87.000	0.00	0.01	0.008	O	|	|	|	|	0.03
87.083	0.00	0.01	0.008	O	|	|	|	|	0.03
87.167	0.00	0.01	0.008	O	|	|	|	|	0.03
87.250	0.00	0.01	0.008	O	|	|	|	|	0.03
87.333	0.00	0.01	0.008	O	|	|	|	|	0.03
87.417	0.00	0.01	0.008	O	|	|	|	|	0.03
87.500	0.00	0.01	0.007	O	|	|	|	|	0.03
87.583	0.00	0.01	0.007	O	|	|	|	|	0.03
87.667	0.00	0.01	0.007	O	|	|	|	|	0.03
87.750	0.00	0.01	0.007	O	|	|	|	|	0.03
87.833	0.00	0.01	0.007	O	|	|	|	|	0.03

87.917	0.00	0.01	0.007	O					0.03
88.000	0.00	0.01	0.007	O					0.03
88.083	0.00	0.01	0.007	O					0.03
88.167	0.00	0.01	0.007	O					0.02
88.250	0.00	0.01	0.007	O					0.02
88.333	0.00	0.01	0.007	O					0.02
88.417	0.00	0.01	0.007	O					0.02
88.500	0.00	0.01	0.007	O					0.02
88.583	0.00	0.01	0.007	O					0.02
88.667	0.00	0.01	0.007	O					0.02
88.750	0.00	0.01	0.007	O					0.02
88.833	0.00	0.01	0.007	O					0.02
88.917	0.00	0.01	0.006	O					0.02
89.000	0.00	0.01	0.006	O					0.02
89.083	0.00	0.01	0.006	O					0.02
89.167	0.00	0.01	0.006	O					0.02
89.250	0.00	0.01	0.006	O					0.02
89.333	0.00	0.01	0.006	O					0.02
89.417	0.00	0.01	0.006	O					0.02
89.500	0.00	0.01	0.006	O					0.02
89.583	0.00	0.01	0.006	O					0.02
89.667	0.00	0.01	0.006	O					0.02
89.750	0.00	0.01	0.006	O					0.02
89.833	0.00	0.01	0.006	O					0.02
89.917	0.00	0.01	0.006	O					0.02
90.000	0.00	0.01	0.006	O					0.02
90.083	0.00	0.01	0.006	O					0.02
90.167	0.00	0.01	0.006	O					0.02
90.250	0.00	0.01	0.006	O					0.02
90.333	0.00	0.01	0.006	O					0.02
90.417	0.00	0.01	0.006	O					0.02
90.500	0.00	0.01	0.006	O					0.02
90.583	0.00	0.01	0.005	O					0.02
90.667	0.00	0.01	0.005	O					0.02
90.750	0.00	0.01	0.005	O					0.02
90.833	0.00	0.01	0.005	O					0.02
90.917	0.00	0.01	0.005	O					0.02
91.000	0.00	0.01	0.005	O					0.02
91.083	0.00	0.01	0.005	O					0.02
91.167	0.00	0.01	0.005	O					0.02
91.250	0.00	0.01	0.005	O					0.02
91.333	0.00	0.01	0.005	O					0.02
91.417	0.00	0.01	0.005	O					0.02
91.500	0.00	0.01	0.005	O					0.02
91.583	0.00	0.01	0.005	O					0.02
91.667	0.00	0.01	0.005	O					0.02
91.750	0.00	0.01	0.005	O					0.02
91.833	0.00	0.01	0.005	O					0.02
91.917	0.00	0.01	0.005	O					0.02
92.000	0.00	0.01	0.005	O					0.02
92.083	0.00	0.01	0.005	O					0.02
92.167	0.00	0.01	0.005	O					0.02
92.250	0.00	0.01	0.005	O					0.02
92.333	0.00	0.01	0.005	O					0.02
92.417	0.00	0.01	0.005	O					0.02
92.500	0.00	0.01	0.005	O					0.02
92.583	0.00	0.01	0.004	O					0.02
92.667	0.00	0.01	0.004	O					0.02
92.750	0.00	0.01	0.004	O					0.02
92.833	0.00	0.01	0.004	O					0.02
92.917	0.00	0.01	0.004	O					0.02
93.000	0.00	0.01	0.004	O					0.02
93.083	0.00	0.01	0.004	O					0.02
93.167	0.00	0.01	0.004	O					0.02
93.250	0.00	0.01	0.004	O					0.01
93.333	0.00	0.01	0.004	O					0.01
93.417	0.00	0.00	0.004	O					0.01
93.500	0.00	0.00	0.004	O					0.01
93.583	0.00	0.00	0.004	O					0.01
93.667	0.00	0.00	0.004	O					0.01
93.750	0.00	0.00	0.004	O					0.01
93.833	0.00	0.00	0.004	O					0.01
93.917	0.00	0.00	0.004	O					0.01
94.000	0.00	0.00	0.004	O					0.01
94.083	0.00	0.00	0.004	O					0.01

94.167	0.00	0.00	0.004	O	|	|	|	|	0.01
94.250	0.00	0.00	0.004	O	|	|	|	|	0.01
94.333	0.00	0.00	0.004	O	|	|	|	|	0.01
94.417	0.00	0.00	0.004	O	|	|	|	|	0.01
94.500	0.00	0.00	0.004	O	|	|	|	|	0.01
94.583	0.00	0.00	0.004	O	|	|	|	|	0.01
94.667	0.00	0.00	0.004	O	|	|	|	|	0.01
94.750	0.00	0.00	0.004	O	|	|	|	|	0.01
94.833	0.00	0.00	0.004	O	|	|	|	|	0.01
94.917	0.00	0.00	0.004	O	|	|	|	|	0.01
95.000	0.00	0.00	0.004	O	|	|	|	|	0.01
95.083	0.00	0.00	0.003	O	|	|	|	|	0.01
95.167	0.00	0.00	0.003	O	|	|	|	|	0.01
95.250	0.00	0.00	0.003	O	|	|	|	|	0.01
95.333	0.00	0.00	0.003	O	|	|	|	|	0.01
95.417	0.00	0.00	0.003	O	|	|	|	|	0.01
95.500	0.00	0.00	0.003	O	|	|	|	|	0.01
95.583	0.00	0.00	0.003	O	|	|	|	|	0.01
95.667	0.00	0.00	0.003	O	|	|	|	|	0.01
95.750	0.00	0.00	0.003	O	|	|	|	|	0.01
95.833	0.00	0.00	0.003	O	|	|	|	|	0.01
95.917	0.00	0.00	0.003	O	|	|	|	|	0.01
96.000	0.00	0.00	0.003	O	|	|	|	|	0.01
96.083	0.00	0.00	0.003	O	|	|	|	|	0.01
96.167	0.00	0.00	0.003	O	|	|	|	|	0.01
96.250	0.00	0.00	0.003	O	|	|	|	|	0.01
96.333	0.00	0.00	0.003	O	|	|	|	|	0.01
96.417	0.00	0.00	0.003	O	|	|	|	|	0.01
96.500	0.00	0.00	0.003	O	|	|	|	|	0.01
96.583	0.00	0.00	0.003	O	|	|	|	|	0.01
96.667	0.00	0.00	0.003	O	|	|	|	|	0.01
96.750	0.00	0.00	0.003	O	|	|	|	|	0.01
96.833	0.00	0.00	0.003	O	|	|	|	|	0.01
96.917	0.00	0.00	0.003	O	|	|	|	|	0.01
97.000	0.00	0.00	0.003	O	|	|	|	|	0.01
97.083	0.00	0.00	0.003	O	|	|	|	|	0.01
97.167	0.00	0.00	0.003	O	|	|	|	|	0.01
97.250	0.00	0.00	0.003	O	|	|	|	|	0.01
97.333	0.00	0.00	0.003	O	|	|	|	|	0.01
97.417	0.00	0.00	0.003	O	|	|	|	|	0.01
97.500	0.00	0.00	0.003	O	|	|	|	|	0.01
97.583	0.00	0.00	0.003	O	|	|	|	|	0.01
97.667	0.00	0.00	0.003	O	|	|	|	|	0.01
97.750	0.00	0.00	0.003	O	|	|	|	|	0.01
97.833	0.00	0.00	0.003	O	|	|	|	|	0.01
97.917	0.00	0.00	0.003	O	|	|	|	|	0.01
98.000	0.00	0.00	0.003	O	|	|	|	|	0.01
98.083	0.00	0.00	0.003	O	|	|	|	|	0.01
98.167	0.00	0.00	0.003	O	|	|	|	|	0.01
98.250	0.00	0.00	0.003	O	|	|	|	|	0.01
98.333	0.00	0.00	0.003	O	|	|	|	|	0.01
98.417	0.00	0.00	0.002	O	|	|	|	|	0.01
98.500	0.00	0.00	0.002	O	|	|	|	|	0.01
98.583	0.00	0.00	0.002	O	|	|	|	|	0.01
98.667	0.00	0.00	0.002	O	|	|	|	|	0.01
98.750	0.00	0.00	0.002	O	|	|	|	|	0.01
98.833	0.00	0.00	0.002	O	|	|	|	|	0.01
98.917	0.00	0.00	0.002	O	|	|	|	|	0.01
99.000	0.00	0.00	0.002	O	|	|	|	|	0.01
99.083	0.00	0.00	0.002	O	|	|	|	|	0.01
99.167	0.00	0.00	0.002	O	|	|	|	|	0.01
99.250	0.00	0.00	0.002	O	|	|	|	|	0.01
99.333	0.00	0.00	0.002	O	|	|	|	|	0.01
99.417	0.00	0.00	0.002	O	|	|	|	|	0.01
99.500	0.00	0.00	0.002	O	|	|	|	|	0.01
99.583	0.00	0.00	0.002	O	|	|	|	|	0.01
99.667	0.00	0.00	0.002	O	|	|	|	|	0.01
99.750	0.00	0.00	0.002	O	|	|	|	|	0.01
99.833	0.00	0.00	0.002	O	|	|	|	|	0.01
99.917	0.00	0.00	0.002	O	|	|	|	|	0.01
100.000	0.00	0.00	0.002	O	|	|	|	|	0.01
100.083	0.00	0.00	0.002	O	|	|	|	|	0.01
100.167	0.00	0.00	0.002	O	|	|	|	|	0.01
100.250	0.00	0.00	0.002	O	|	|	|	|	0.01
100.333	0.00	0.00	0.002	O	|	|	|	|	0.01

100.417	0.00	0.00	0.002	O	|	|	|	|	0.01
100.500	0.00	0.00	0.002	O	|	|	|	|	0.01
100.583	0.00	0.00	0.002	O	|	|	|	|	0.01
100.667	0.00	0.00	0.002	O	|	|	|	|	0.01
100.750	0.00	0.00	0.002	O	|	|	|	|	0.01
100.833	0.00	0.00	0.002	O	|	|	|	|	0.01
100.917	0.00	0.00	0.002	O	|	|	|	|	0.01
101.000	0.00	0.00	0.002	O	|	|	|	|	0.01
101.083	0.00	0.00	0.002	O	|	|	|	|	0.01
101.167	0.00	0.00	0.002	O	|	|	|	|	0.01
101.250	0.00	0.00	0.002	O	|	|	|	|	0.01
101.333	0.00	0.00	0.002	O	|	|	|	|	0.01
101.417	0.00	0.00	0.002	O	|	|	|	|	0.01
101.500	0.00	0.00	0.002	O	|	|	|	|	0.01
101.583	0.00	0.00	0.002	O	|	|	|	|	0.01
101.667	0.00	0.00	0.002	O	|	|	|	|	0.01
101.750	0.00	0.00	0.002	O	|	|	|	|	0.01
101.833	0.00	0.00	0.002	O	|	|	|	|	0.01
101.917	0.00	0.00	0.002	O	|	|	|	|	0.01
102.000	0.00	0.00	0.002	O	|	|	|	|	0.01
102.083	0.00	0.00	0.002	O	|	|	|	|	0.01
102.167	0.00	0.00	0.002	O	|	|	|	|	0.01
102.250	0.00	0.00	0.002	O	|	|	|	|	0.01
102.333	0.00	0.00	0.002	O	|	|	|	|	0.01
102.417	0.00	0.00	0.002	O	|	|	|	|	0.01
102.500	0.00	0.00	0.002	O	|	|	|	|	0.01
102.583	0.00	0.00	0.002	O	|	|	|	|	0.01
102.667	0.00	0.00	0.002	O	|	|	|	|	0.01
102.750	0.00	0.00	0.002	O	|	|	|	|	0.01
102.833	0.00	0.00	0.002	O	|	|	|	|	0.01
102.917	0.00	0.00	0.002	O	|	|	|	|	0.01
103.000	0.00	0.00	0.002	O	|	|	|	|	0.01
103.083	0.00	0.00	0.002	O	|	|	|	|	0.01
103.167	0.00	0.00	0.002	O	|	|	|	|	0.01
103.250	0.00	0.00	0.002	O	|	|	|	|	0.01
103.333	0.00	0.00	0.002	O	|	|	|	|	0.01
103.417	0.00	0.00	0.002	O	|	|	|	|	0.01
103.500	0.00	0.00	0.001	O	|	|	|	|	0.01
103.583	0.00	0.00	0.001	O	|	|	|	|	0.01
103.667	0.00	0.00	0.001	O	|	|	|	|	0.01
103.750	0.00	0.00	0.001	O	|	|	|	|	0.01
103.833	0.00	0.00	0.001	O	|	|	|	|	0.01
103.917	0.00	0.00	0.001	O	|	|	|	|	0.01
104.000	0.00	0.00	0.001	O	|	|	|	|	0.01
104.083	0.00	0.00	0.001	O	|	|	|	|	0.01
104.167	0.00	0.00	0.001	O	|	|	|	|	0.00
104.250	0.00	0.00	0.001	O	|	|	|	|	0.00
104.333	0.00	0.00	0.001	O	|	|	|	|	0.00
104.417	0.00	0.00	0.001	O	|	|	|	|	0.00
104.500	0.00	0.00	0.001	O	|	|	|	|	0.00
104.583	0.00	0.00	0.001	O	|	|	|	|	0.00
104.667	0.00	0.00	0.001	O	|	|	|	|	0.00
104.750	0.00	0.00	0.001	O	|	|	|	|	0.00
104.833	0.00	0.00	0.001	O	|	|	|	|	0.00
104.917	0.00	0.00	0.001	O	|	|	|	|	0.00
105.000	0.00	0.00	0.001	O	|	|	|	|	0.00
105.083	0.00	0.00	0.001	O	|	|	|	|	0.00
105.167	0.00	0.00	0.001	O	|	|	|	|	0.00
105.250	0.00	0.00	0.001	O	|	|	|	|	0.00
105.333	0.00	0.00	0.001	O	|	|	|	|	0.00
105.417	0.00	0.00	0.001	O	|	|	|	|	0.00
105.500	0.00	0.00	0.001	O	|	|	|	|	0.00
105.583	0.00	0.00	0.001	O	|	|	|	|	0.00
105.667	0.00	0.00	0.001	O	|	|	|	|	0.00
105.750	0.00	0.00	0.001	O	|	|	|	|	0.00
105.833	0.00	0.00	0.001	O	|	|	|	|	0.00
105.917	0.00	0.00	0.001	O	|	|	|	|	0.00
106.000	0.00	0.00	0.001	O	|	|	|	|	0.00
106.083	0.00	0.00	0.001	O	|	|	|	|	0.00
106.167	0.00	0.00	0.001	O	|	|	|	|	0.00
106.250	0.00	0.00	0.001	O	|	|	|	|	0.00
106.333	0.00	0.00	0.001	O	|	|	|	|	0.00
106.417	0.00	0.00	0.001	O	|	|	|	|	0.00
106.500	0.00	0.00	0.001	O	|	|	|	|	0.00
106.583	0.00	0.00	0.001	O	|	|	|	|	0.00

106.667	0.00	0.00	0.001	O	|	|	|	|	0.00
106.750	0.00	0.00	0.001	O	|	|	|	|	0.00
106.833	0.00	0.00	0.001	O	|	|	|	|	0.00
106.917	0.00	0.00	0.001	O	|	|	|	|	0.00
107.000	0.00	0.00	0.001	O	|	|	|	|	0.00
107.083	0.00	0.00	0.001	O	|	|	|	|	0.00
107.167	0.00	0.00	0.001	O	|	|	|	|	0.00
107.250	0.00	0.00	0.001	O	|	|	|	|	0.00
107.333	0.00	0.00	0.001	O	|	|	|	|	0.00
107.417	0.00	0.00	0.001	O	|	|	|	|	0.00
107.500	0.00	0.00	0.001	O	|	|	|	|	0.00
107.583	0.00	0.00	0.001	O	|	|	|	|	0.00
107.667	0.00	0.00	0.001	O	|	|	|	|	0.00
107.750	0.00	0.00	0.001	O	|	|	|	|	0.00
107.833	0.00	0.00	0.001	O	|	|	|	|	0.00
107.917	0.00	0.00	0.001	O	|	|	|	|	0.00
108.000	0.00	0.00	0.001	O	|	|	|	|	0.00
108.083	0.00	0.00	0.001	O	|	|	|	|	0.00
108.167	0.00	0.00	0.001	O	|	|	|	|	0.00
108.250	0.00	0.00	0.001	O	|	|	|	|	0.00
108.333	0.00	0.00	0.001	O	|	|	|	|	0.00
108.417	0.00	0.00	0.001	O	|	|	|	|	0.00
108.500	0.00	0.00	0.001	O	|	|	|	|	0.00
108.583	0.00	0.00	0.001	O	|	|	|	|	0.00
108.667	0.00	0.00	0.001	O	|	|	|	|	0.00
108.750	0.00	0.00	0.001	O	|	|	|	|	0.00
108.833	0.00	0.00	0.001	O	|	|	|	|	0.00
108.917	0.00	0.00	0.001	O	|	|	|	|	0.00
109.000	0.00	0.00	0.001	O	|	|	|	|	0.00
109.083	0.00	0.00	0.001	O	|	|	|	|	0.00
109.167	0.00	0.00	0.001	O	|	|	|	|	0.00
109.250	0.00	0.00	0.001	O	|	|	|	|	0.00
109.333	0.00	0.00	0.001	O	|	|	|	|	0.00
109.417	0.00	0.00	0.001	O	|	|	|	|	0.00
109.500	0.00	0.00	0.001	O	|	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 1314
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.405 (CFS)
Total volume = 1.462 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Source Control BMPs

Potential Sources of Runoff Pollutants	Permanent Controls—Show on WQMP Drawings	Permanent Controls—List in WQMP Table and Narrative	Operational BMPs—Include in WQMP Table and Narrative
☒ A. On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater 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 Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ 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."
☐ B. Interior floor drains and elevator shaft sump pumps		☐ 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		☐ 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		☐ Note building design features that discourage entry of pests.	☐ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ D2. Landscape/ Outdoor Pesticide Use	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining	State that final landscape plans will accomplish all of the following. ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at

	landscape areas, if any. ☒ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☒ Provide IPM information to new owners, lessees and operators.
☒ E. Pools, spas, ponds, decorative fountains, and other water features.	☒ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee 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 "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☒ F. Food service **Cafeteria style maybe proposed in the proposed Cummunity Areas (to be determined in final stage)**	☒ 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	☒ 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 insure that the largest items can be accommodated. **Cafeteria maybe proposed in the proposed Commercial Areas (to be**	☒ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators. **Cafeteria maybe proposed in the proposed Commercial Areas (to be determined in final**

	discharging to the sanitary sewer. **Cafeteria maybe proposed in the proposed Commercial Areas (to be determined in final stage)**	**determined in final stage)**	**stage)**
☒ G. Refuse areas	☒ 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 runon and show locations of berms to prevent runoff from the area. ☒ Any drains from dumpsters, compactors, and tallow bin areas shall 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 Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ H.Industrial processes.	☐ Show process area.	☐ If industrial processes are to be located on site, 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-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/
☐ I. Outdoor storage of equipment or materials. (See rows J and K for	☐ Show any outdoor storage areas, including how materials	Include a detailed description of materials to be stored, storage	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33,

source control measures for vehicle cleaning, repair, and maintenance.)	will be covered. Show how areas will be graded and bermed to prevent runon or run-off from area. ☐ Storage of non-hazardous liquids shall 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.	areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ☐ Hazardous Waste Generation ☐ Hazardous Materials Release Response and Inventory ☐ California Accidental Release (CalARP) ☐ Aboveground Storage Tank ☐ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ☐ Underground Storage Tank www.cchealth.org/groups/hazmat/	"Outdoor Storage of Raw Materials" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ J. Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall 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 shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shutoff to discourage such use).	☐ If a car wash area is not provided, describe any measures taken to discourage on-site 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 shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater ☐ Car dealerships and similar may rinse cars with water only.

	(3) Washing areas for cars, vehicles, and equipment shall 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 shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.		
☐ K. Vehicle/Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ☐ 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 shall 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	☐ 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 Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☐ No person shall 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 shall 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 shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops,

	pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.		Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/
☐ L. Fuel Dispensing Areas	☐ Fueling areas[6] shall have impermeable floors (i.e., Portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☐ Fueling areas shall 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 area[1].] The canopy [or cover] shall not drain onto the fueling area.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ M. Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and

	Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall 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.		Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☒ N. Fire Sprinkler Test Water		☒ 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 Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ☐ Condensate drain lines ☒ Rooftop equipment		☐ Boiler drain lines shall 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	☒ Drain to landscaping areas. See D2 for landscape area maintenance.

☐ Drainage sumps ☒ Roofing, gutters, and trim. ☐ Other sources		lines may not discharge to the storm drain system. ☒ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall 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. ☐ Include controls for other sources as specified by local reviewer.	
☒ P. Plazas, sidewalks, and parking lots.			☒ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Maintenance Responsibility

With the project site being in the private property within the County of Riverside limits, both the POA will have ongoing maintenance responsibilities.
Site design and treatment BMPs have been designed to keep maintenance efforts in line with Glen Ivy Hot Springs Resort project maintenance activities.

POA Maintenance Responsibilities: LID BMPs include pre-treatment Catch Basin Inserts, Stormwater Filtration BMPs, Underground Infiltration Pipes, landscape maintenance of common areas, landscape and open spaces.

General Operation and Maintenance Activities

Operation and maintenance (O&M) activities are described below. The categories of O&M activities are "routine" and "major" where routine refer to activity conducted on a regular schedule, whereas major refers to infrequent activities triggered mainly by need. Each category and its respective activities are described in the following sections.

<u>Routine Operation and Maintenance Activities</u>
O&M responsibility, initially by Developer/Builder until the establishment of POA. O&M, normally performed by Glen Ivy Hot Springs POA maintenance crews as part of normal/scheduled maintenance activities.

Site Inspection
The storm drain inlets will be inspected on a regular, scheduled basis to ensure that the facility is operating properly, to record observations, and to initiate any actions that may be required. While the frequency of site inspections may vary depending on the season, it will typically be on a monthly basis.

Trash & Debris Removal
Litter may be picked up at any time during site visits for other purposes. Regular, scheduled trash/debris removal will be performed at all sites on a quarterly basis and/or after storm events that result in heavy trash accumulations.

Minor Vegetation Removal/Thinning
Vegetation growth will be inspected annually, and removed or thinned as necessary. Vegetation at inlets and outlets will be manually or mechanically removed if vegetation is found to be clogging or otherwise affecting the operation of the facility. Access roads will remain clear of vegetation and obstructions. Significant vegetation removal is covered under the major maintenance activities section below.

Snag Removal
This work typically includes the removal of sticks, dead branches, brush, and small trees that block water flow or otherwise interfere with the operations. This work may be performed as needed on a quarterly basis.

Minor Sediment Removal
It is expected that there will be a minor amount of sediment deposition at points within the storm drain inlet, primarily in forebay(s) near the inlet(s). When such deposits obstruct water flow, the deposits will be removed.

Major Operation and Maintenance Activities

Operation and maintenance (O&M) requirements for all Source Control and LID BMPs shall be identified within this report. The O&M shall include the following:

- Description and Schedule
- Inspection & Monitoring requirements
- Identification of Responsible Parties

The owner of the property, and its successors and assigns is responsible for implementation of this WQMP or BMPs for the project site.

O&M MAINTENANCE/FREQUENCY MATRIX		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY**	**MAINTENANCE REPAIR PROGRAM**
Source Control BMPs		
1. Education For Property owner, tenants and occupants, Maintenance staffs, contracted maintenance crews.	Training and education program must be provided within 6 months of hire date and annually thereafter. Materials are included in the Project WQMP.	Educational materials and training will be provided to Property owner, tenants and occupants, Maintenance staff members, and contracted maintenance crews if any, including education materials and restrictions to reduce pollutants from reaching the storm drain system.
2. Activity Restriction	Daily activity of Operation	The project will establish the following policies prohibiting activities during operations: - Prohibit discharge of fertilizer, pesticide, or animal waste to street or storm drain. - Prohibit blowing or sweeping of debris (leaf litter, grass clippings, litter, etc.) into street or storm drain. - Require dumpster lid to be closed at all times. - Prohibit discharge of paint or masonry waste to street or storm drain. - Prohibit vehicle washing, maintenance or repair on premises.
3. Common Area Landscape Management	Quarterly, as seasonal changes.	The HOA management shall direct maintenance staff to employ landscaping practices be consistent with the City of Lake Elsinore requirements for use of fertilizer, pesticides, and City ordinances for water conservation.

4. Drainage Facility Inspection and Maintenance	Inspect semiannually for beginning (October) and end of the wet season (April).	Maintenance personnel shall remove debris/sediments if necessary within the inlet area. .
5. MS4 Stenciling and Signage	As needed to clearly depict signage.	Replace or repaint as needed.
6. Protect Slopes and Channels	Inspect semiannually and before and after storm events.	Repair BMP and slopes as needed.
LID BMPs		
7. Catch Basin Inserts, Infiltration/Detention Basin.	Inspect semiannually for beginning (October) and end of the wet season (April).	Maintenance personnel shall repair underground basins surface as needed and remove debris/sediments if necessary.

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

3.1 INFILTRATION BASIN

Type of BMP	LID - Infiltration
Treatment Mechanisms	Infiltration, Evapotranspiration (when vegetated), Evaporation, and Sedimentation
Maximum Treatment Area	50 acres
Other Names	Bioinfiltration Basin

Description

An Infiltration Basin is a flat earthen basin designed to capture the design capture volume, V_{BMP}. The stormwater infiltrates through the bottom of the basin into the underlying soil over a 72 hour drawdown period. Flows exceeding V_{BMP} must discharge to a downstream conveyance system. Trash and sediment accumulate within the forebay as stormwater passes into the basin. Infiltration basins are highly effective in removing all targeted pollutants from stormwater runoff.

Figure 1 – Infiltration Basin

Table 1 - Inspection and Maintenance

Schedule	Inspection and Maintenance Activity

Ongoing including just before annual storm seasons and following rainfall events.	• Maintain vegetation as needed. Use of fertilizers, pesticides and herbicides should be strenuously avoided to ensure they don't contribute to water pollution. If appropriate native plant selections and other IPM methods are used, such products shouldn't be needed. If such projects are used,
	  ○ Products shall be applied in accordance with their labeling, especially in relation to application to water, and in areas subjected to flooding.
	  ○ Fertilizers should not be applied within 15 days before, after, or during the rain season.
	• Remove debris and litter from the entire basin to minimize clogging and improve aesthetics.
	• Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water.
	• Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed.
	• Revegetate side slopes where needed.

Annually. If possible, schedule these inspections within 72 hours after a significant rainfall.	• Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check for erosion, slumping and overgrowth. Repair as needed. • Check basin depth for sediment build up and reduced total capacity. Scrape bottom as needed and remove sediment. Restore to original cross-section and infiltration rate. Replant basin vegetation. • Verify the basin bottom is allowing acceptable infiltration. Use a disc or other method to aerate basin bottom only if there is actual significant loss of infiltrative capacity, rather than on a routine basis[1]. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.

1. CA Stormwater BMP Handbook for New Development and Significant Redevelopment

The Ocean Begins at Your Front Door

Never allow pollutants to enter the street, gutter or storm drain!

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate- free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance

- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden

- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile

- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

Did You Know?

- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called "non-point source" pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.
- A little water from a garden hose or rain can also send materials into storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.

The Effect on the Ocean

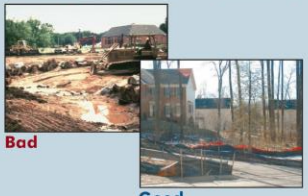
Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.

Stormwater and the Construction Industry

Protect Natural Features

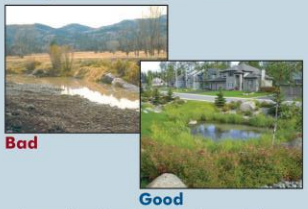


- Minimize clearing.
- Minimize the amount of exposed soil.
- Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
- Protect streams, stream buffers, wild woodlands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.

Construction Phasing

- Sequence construction activities so that the soil is not exposed for long periods of time.
- Schedule or limit grading to small areas.
- Install key sediment control practices before site grading begins.
- Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.

Vegetative Buffers



- Protect and install vegetative buffers along waterbodies to slow and filter stormwater runoff.
- Maintain buffers by mowing or replanting periodically to ensure their effectiveness.

Silt Fencing

- Inspect and maintain silt fences after each rainstorm.
- Make sure the bottom of the silt fence is buried in the ground.
- Securely attach the material to the stakes.
- Don't place silt fences in the middle of a waterway or use them as a check dam.
- Make sure stormwater is not flowing around the silt fence.

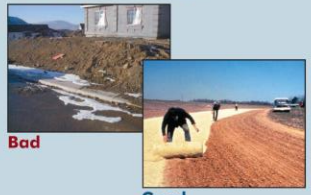
Maintain your BMPs!

IN RIVERSIDE COUNTY....Call 1-800-506-2555
TO REPORT ILLEGAL STORMDRAIN DISPOSAL

E-mail: Flood.fcnpdes@co.riverside.ca.us
Visit our website: www.floodcontrol.co.riverside.ca.us

Brought to you by the Storm Water/Clean Water Pollution Protection Program.....
REMEMBER, ONLY RAIN IN THE STORMDRAIN!

Site Stabilization



- Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.

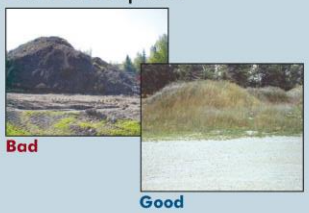
Construction Entrances

- Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
- Properly size entrance BMPs for all anticipated vehicles.
- Make sure that the construction entrance does not become buried in soil.

Slopes

- Rough grade or terrace slopes.
- Break up long slopes with sediment barriers, or under drain, or divert stormwater away from slopes.

Dirt Stockpiles



- Cover or seed all dirt stockpiles.

Storm Drain Inlet Protection

- Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
- Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
- If you use inlet filters, maintain them regularly.

www.epa.gov/npdes/menuofbmps

3.1 INFILTRATION BASIN

Type of BMP	LID - Infiltration
Treatment Mechanisms	Infiltration, Evapotranspiration (when vegetated), Evaporation, and Sedimentation
Maximum Treatment Area	50 acres
Other Names	Bioinfiltration Basin

Description

An Infiltration Basin is a flat earthen basin designed to capture the design capture volume, V_{BMP}. The stormwater infiltrates through the bottom of the basin into the underlying soil over a 72 hour drawdown period. Flows exceeding V_{BMP} must discharge to a downstream conveyance system. Trash and sediment accumulate within the forebay as stormwater passes into the basin. Infiltration basins are highly effective in removing all targeted pollutants from stormwater runoff.

Figure 1 – Infiltration Basin

See Appendix A, and Appendix C, Section 1 of *Basin Guidelines*, for additional requirements.

Siting Considerations

The use of infiltration basins may be restricted by concerns over ground water contamination, soil permeability, and clogging at the site. See the applicable WQMP for any specific feasibility considerations for using infiltration BMPs. Where this BMP is being used, the soil beneath the basin must be thoroughly evaluated in a geotechnical report since the underlying soils are critical to the basin's long term performance. To protect the basin from erosion, the sides and bottom of the basin must be vegetated, preferably with native or low water use plant species.

In addition, these basins may not be appropriate for the following site conditions:

- Industrial sites or locations where spills of toxic materials may occur
- Sites with very low soil infiltration rates
- Sites with high groundwater tables or excessively high soil infiltration rates, where pollutants can affect ground water quality
- Sites with unstabilized soil or construction activity upstream
- On steeply sloping terrain
- Infiltration basins located in a fill condition should refer to Appendix A of this Handbook for details on special requirements/restrictions

Setbacks

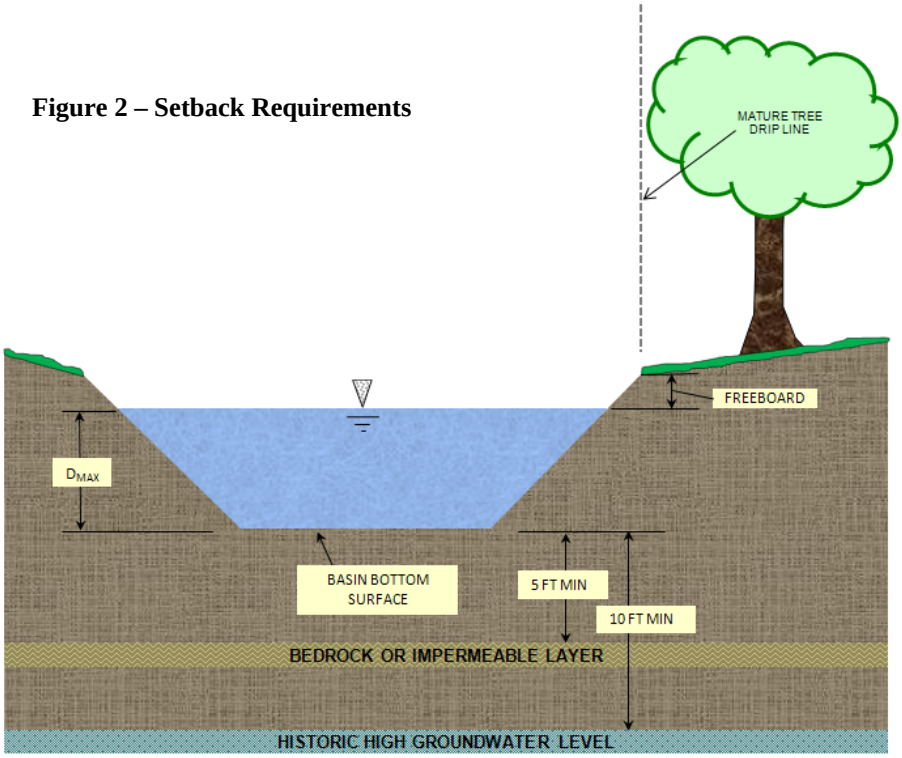
Always consult your geotechnical engineer for site specific recommendations regarding setbacks for infiltration trenches. Recommended setbacks are needed to protect buildings, existing trees, walls, onsite or nearby wells, streams, and tanks. Setbacks should be considered early in the design process since they can affect where infiltration facilities may be placed and how deep they are allowed to be. For instance, depth setbacks can dictate fairly shallow facilities that will have a larger footprint and, in some cases, may make an infiltration basin infeasible. In that instance, another BMP must be selected.

Infiltration basins typically must be set back:

- 10 feet from the historic high groundwater (measured vertically from the bottom of the basin, as shown in Figure 2)
- 5 feet from bedrock or impermeable surface layer (measured vertically from the bottom of the basin, as shown in Figure 2)
- From all existing mature tree drip lines as indicated in Figure 2 (to protect their root structure)
- 100 feet horizontally from wells, tanks or springs

Setbacks to walls and foundations must be included as part of the Geotechnical Report. All other setbacks shall be in accordance with applicable standards of the District's *Basin Guidelines* (Appendix C).

Figure 2 – Setback Requirements



Forebay

A concrete forebay shall be provided to reduce sediment clogging and to reduce erosion. The forebay shall have a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall / berm. Full height notch-type weir(s), offset from the line of flow from the basin inlet to prevent short circuiting, shall be used to outlet the forebay. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 2).

Overflow

Flows exceeding V_{BMP} must discharge to an acceptable downstream conveyance system. Where an adequate outlet is present, an overflow structure may be used. Where an embankment is present, an emergency spillway may be used instead. Overflows must be placed just above the design water surface for V_{BMP} and be near the outlet of the system. The overflow structure shall be similar to the District's Standard Drawing CB 110. Additional details may be found in the District's *Basin Guidelines* (Appendix C).

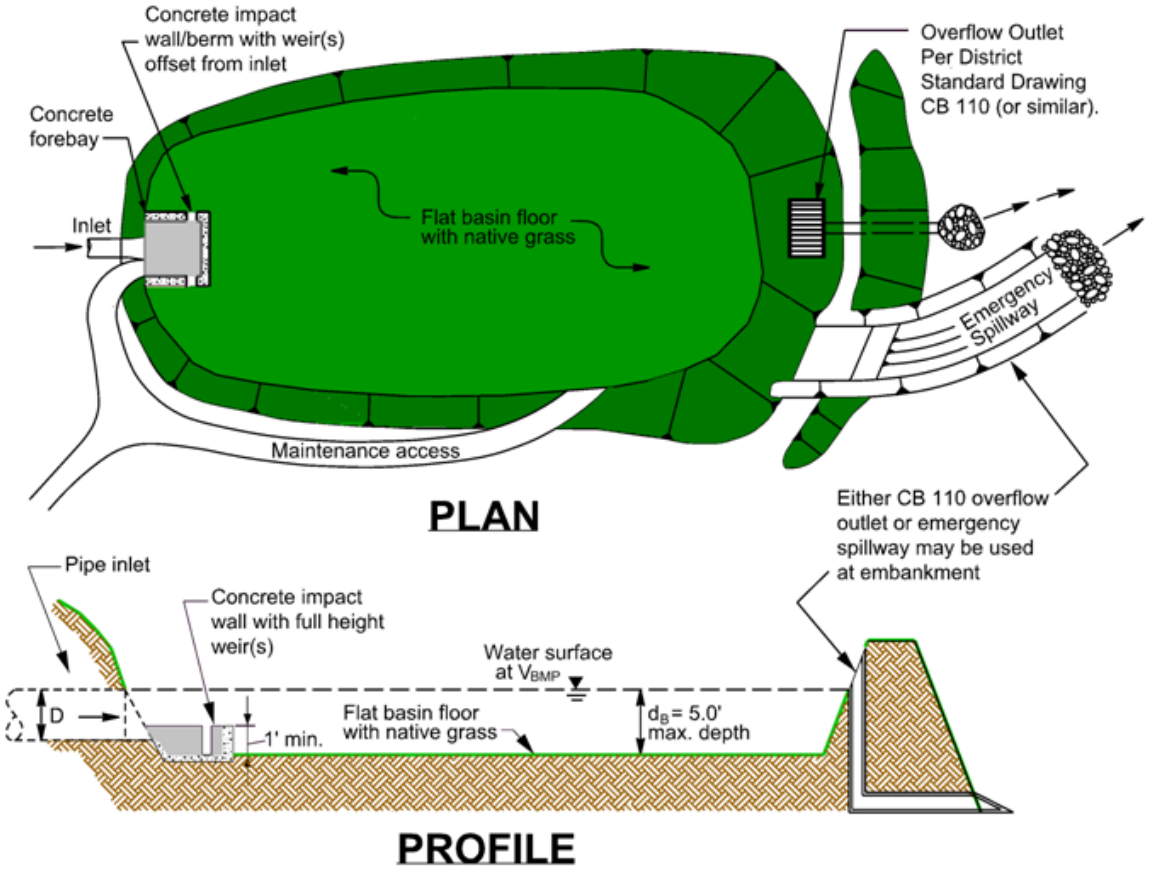


Figure 3 – Infiltration Basin

Landscaping Requirements

Basin vegetation provides erosion protection, improves sediment removal and assists in allowing infiltration to occur. The basin surface and side slopes shall be planted with native grasses. Proper landscape management is also required to ensure that the vegetation does not contribute to water pollution through pesticides, herbicides, or fertilizers. Landscaping shall be in accordance with County of Riverside Ordinance 859 and the District's *Basin Guidelines* (Appendix C), or other guidelines issued by the Engineering Authority.

Maintenance

Normal maintenance of an infiltration basin includes the maintenance of landscaping, debris and trash removal from the surface of the basin, and tending to problems associated with standing water (vectors, odors, etc.). Significant ponding, especially more than 72 hours after an event, may indicate that the basin surface is no longer providing sufficient infiltration and requires aeration. See the District's *Basin Guidelines* (Appendix C) for additional requirements (i.e., fencing, maintenance access, etc.).

Table 1 - Inspection and Maintenance

Schedule	Inspection and Maintenance Activity
Ongoing including just before annual storm seasons and following rainfall events.	• Maintain vegetation as needed. Use of fertilizers, pesticides and herbicides should be strenuously avoided to ensure they don't contribute to water pollution. If appropriate native plant selections and other IPM methods are used, such products shouldn't be needed. If such projects are used, o Products shall be applied in accordance with their labeling, especially in relation to application to water, and in areas subjected to flooding. o Fertilizers should not be applied within 15 days before, after, or during the rain season. • Remove debris and litter from the entire basin to minimize clogging and improve aesthetics. • Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water. • Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed. • Revegetate side slopes where needed.
Annually. If possible, schedule these inspections within 72 hours after a significant rainfall.	• Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check for erosion, slumping and overgrowth. Repair as needed. • Check basin depth for sediment build up and reduced total capacity. Scrape bottom as needed and remove sediment. Restore to original cross-section and infiltration rate. Replant basin vegetation. • Verify the basin bottom is allowing acceptable infiltration. Use a disc or other method to aerate basin bottom only if there is actual significant loss of infiltrative capacity, rather than on a routine basis[1]. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.

1. **CA Stormwater BMP Handbook for New Development and Significant Redevelopment**

Table 2 - Design and Sizing Criteria for Infiltration Basins

Design Parameter	Infiltration Basin
Design Volume	V_{BMP}
Forebay Volume	0.5% V_{BMP}
Drawdown time (maximum)	72 hours
Maximum tributary area	50 acres [2]
Minimum infiltration rate	Must be sufficient to drain the basin within the required Drawdown time over the life of the BMP. The WQMP may include specific requirements for minimum tested infiltration rates.
Maximum Depth	5 feet
Spillway erosion control	Energy dissipators to reduce velocities[1]
Basin Slope	0%
Freeboard (minimum)	1 foot [1]
Historic High Groundwater Setback (max)	10 feet
Bedrock/impermeable layer setback (max)	5 feet
Tree setbacks	Mature tree drip line must not overhang the basin
Set back from wells, tanks or springs	100 feet
Set back from foundations	As recommended in Geotechnical Report

1. **Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures**
2. **CA Stormwater BMP Handbook for New Development and Significant Redevelopment**

Note: The information contained in this BMP Factsheet is intended to be a summary of design considerations and requirements. Additional information which applies to all detention basins may be found in the District's Basin Guidelines (Appendix C). In addition, information herein may be superseded by other guidelines issued by the co-permittee.

INFILTRATION BASIN SIZING PROCEDURE

1. Find the Design Volume, V_{BMP}.
   a) Enter the Tributary Area, $A_{T.}$
   b) Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.
2. Determine the Maximum Depth.
   a) Enter the infiltration rate. The infiltration rate shall be established as described in Appendix A: "Infiltration Testing".
   b) Enter the design Factor of Safety from Table 1 in Appendix A: "Infiltration Testing".
   c) The spreadsheet will determine D_1, the maximum allowable depth of the basin based on the infiltration rate along with the maximum drawdown time (72 hours) and the Factor of Safety.

$$D_1 = [(t) \times (I)] / 12s$$

Where I = site infiltration rate (in/hr)
s = safety factor
t = drawdown time (maximum 72 hours)

d) Enter the depth of freeboard.

e) Enter the depth to the historic high groundwater level measured from the top of the basin.

f) Enter the depth to the top of bedrock or other impermeable layer measured from the finished grade.

g) The spreadsheet will determine D_2, the total basin depth (including freeboard, if used) of the basin, based on restrictions to the depth by groundwater and an impermeable layer.

D_2 = Depth to groundwater – (10 + freeboard) (ft);

or

D_2 = Depth to impermeable layer – (5 + freeboard) (ft)

Whichever is least.

h) The spreadsheet will determine the maximum allowable effective depth of basin, D_{MAX}, based on the smallest value between D_1 and D_2. D_{MAX} is the maximum depth of water only and does not include freeboard. D_{MAX} shall not exceed 5 feet.

3. Basin Geometry

a) Enter the basin side slopes, z (no steeper than 4:1).

b) Enter the proposed basin depth, d_B excluding freeboard.

c) The spreadsheet will determine the minimum required surface area of the basin:

$$A_s = V_{BMP} / d_B$$

Where A_s = minimum area required (ft^2)
V_{BMP} = volume of the infiltration basin (ft^3)
d_B= proposed depth not to exceed maximum allowable depth, D_{MAX} (ft)

d) Enter the proposed bottom surface area. This area shall not be less than the minimum required surface area.

4. Forebay

A concrete forebay with a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall shall be provided. Full-height rectangular weir(s) shall be used to outlet the forebay. The weir(s) must be offset from the line of flow from the basin inlet. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 2).

a) The spreadsheet will determine the minimum required forebay volume based on 0.5% V_{BMP}.

b) Enter the proposed depth of the forebay berm/splashwall (1foot minimum).

c) The spreadsheet will determine the minimum required forebay surface area.

d) Enter the width of rectangular weir to be used (minimum 1.5 inches). Weir width should be established based on a 5 minute drawdown time.

Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

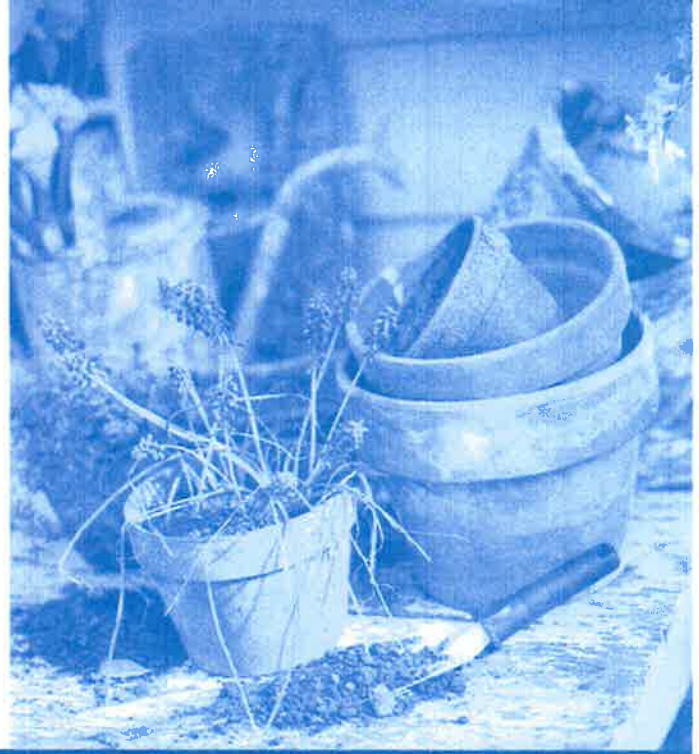
The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

...Only Rain Down ...the Storm Drain

What you should know for... Landscape and Gardening

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators

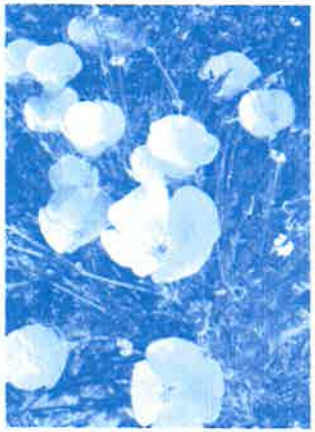


Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.



- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.
- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:
  - **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
  - **Biological Controls** - Use predatory insects to control harmful pests.
  - **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

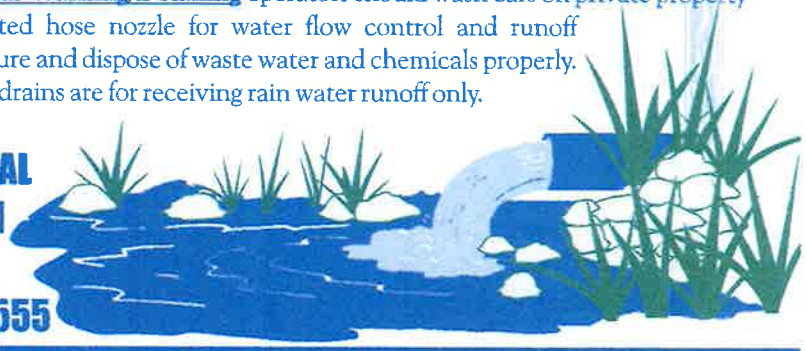
Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

For Information:

For more information on the General Industrial Storm Water Permit contact:

State Water Resources Control Board (SWRCB)
(916) 657-1146 or www.swrcb.ca.gov/ or, at your Regional Water Quality Control Board (RWQCB).

Santa Ana Region (8)
California Tower
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
(909) 782-4130

San Diego Region (9)
9771 Clairemont Mesa Blvd., Ste. A
San Diego, CA 92124
(619) 467-2952

Colorado River Basin Region (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491

SPILL RESPONSE AGENCY:	
HAZ-MAT:	(909) 358-5055
HAZARDOUS WASTE DISPOSAL:	(909) 358-5055
RECYCLING INFORMATION:	1-800-366-SAVE
TO REPORT ILLEGAL DUMPING OR A CLOGGED STORM DRAIN:	1-800-506-2555

To order additional brochures or to obtain information on other pollution prevention activities, call: (909) 955-1111.

StormWater
CleanWater
PROTECTION PROGRAM

Riverside County gratefully acknowledges the State Water Quality Control Board and the American Public Works Association, Storm Water Quality Task Force for the information provided in this brochure.

DID YOU KNOW . . .

YOUR FACILITY MAY NEED A STORM WATER PERMIT?

Many industrial facilities and manufacturing operations must obtain coverage under the Industrial Activities Storm Water General Permit

FIND OUT IF YOUR FACILITY MUST OBTAIN A PERMIT

StormWater Pollution . . . What you should know

Riverside County has two drainage systems - sanitary sewers and storm drains. The storm drain system is designed to help prevent flooding by carrying excess rainwater away from streets. Since the storm drain system does not provide for water treatment, it also serves the *unintended* function of transporting pollutants directly to our waterways

Unlike sanitary sewers, storm drains are not connected to a treatment plant - they flow directly to our local streams, rivers and lakes.

In recent years, awareness of the need to protect water quality has increased. As a result, federal, state, and local programs have been established to reduce polluted stormwater discharges to our waterways. The emphasis of these programs is to prevent stormwater pollution since it's much easier, and less costly, than cleaning up "after the fact."

National Pollutant Discharge Elimination System (NPDES)

In 1987, the Federal Clean Water Act was amended to establish a framework for regulating industrial stormwater discharges under the NPDES permit program. In California, NPDES permits are issued by the State Water Resources Control Board (SWRCB) and the nine (9) Regional Water Quality Control Boards (RWQCB). In general, certain industrial facilities and manufacturing operations must obtain coverage under the Industrial Activities Storm Water General Permit if the type of facilities or operations falls into one of the several categories described in this brochure.

How Do I Know If I Need A Permit?

Following are ***general descriptions*** of the industry categories types that are regulated by the Industrial Activities Storm Water General Permit. Contact your local Region Water Quality Control Board to determine if your facility/operation requires coverage under the Permit.

➜ Facilities such as cement manufacturing; feedlots; fertilizer manufacturing; petroleum refining; phosphate manufacturing; steam electric power generation; coal mining; mineral mining and processing; ore mining and dressing; and asphalt emulsion;

➜ Facilities classified as lumber and wood products (except wood kitchen cabinets); pulp, paper, and paperboard mills; chemical producers (except some pharmaceutical and biological products); petroleum and coal products; leather production and products; stone, clay and glass products; primary metal industries; fabricated structural metal; ship and boat building and repairing;

➜ Active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations;

➜ Hazardous waste treatment, storage, or disposal facilities;

➜ Landfills, land application sites and open dumps that receive or have received any industrial waste; unless there is a new overlying land use such as a golf course, park, etc., and there is no discharge associated with the landfill;

➜ Facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards;

➜ Steam electric power generating facilities, facilities that generate steam for electric power by combustion;

➜ Transportation facilities that have vehicle maintenance shops, fueling facilities, equipment cleaning operations, or airport deicing operations. This includes school bus maintenance facilities operated by a school district;

➜ Sewage treatment facilities;

➜ Facilities that have areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water.

How do I obtain coverage under the Industrial Activities Storm Water General Permit?

Obtain a permit application package from your local Regional Water Quality Control Board listed on the back of this brochure or the State Water Resources Control Board (SWRCB). Submit a completed Notice of Intent (NOI) form, site map and the appropriate fee ($250 or $500) to the SWRCB. Facilities must submit an NOI thirty (30) days prior to beginning operation. Once you submit the NOI, the State Board will send you a letter acknowledging receipt of your NOI and will assign your facility a waste discharge identification number (WDID No.). You will also receive an annual fee billing. These billings should roughly coincide with the date the State Board processed your original NOI submittal.

What are the requirements of the Industrial Activities Storm Water General Permit?

The basic requirements of the Permit are:

1. The facility must eliminate any non-stormwater discharges or obtain a separate permit for such discharges.

2. The facility must develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must identify sources of pollutants that may be exposed to stormwater. Once the sources of pollutants have been identified, the facility operator must develop and implement Best Management Practices (BMPs) to minimize or prevent polluted runoff.

   Guidance in preparing a SWPPP is available from a document prepared by the California Storm Water Quality Task Force called the California Storm Water Best Management Practice Handbook.

3. The facility must develop and implement a Monitoring Program that includes conducting visual observations and collecting samples of the facility's storm water discharges associated with industrial activity. The General Permit requires that the analysis be conducted by a laboratory that is certified by the State of California.

4. The facility must submit to the Regional Board, every July 1, an annual report that includes the results of its monitoring program.

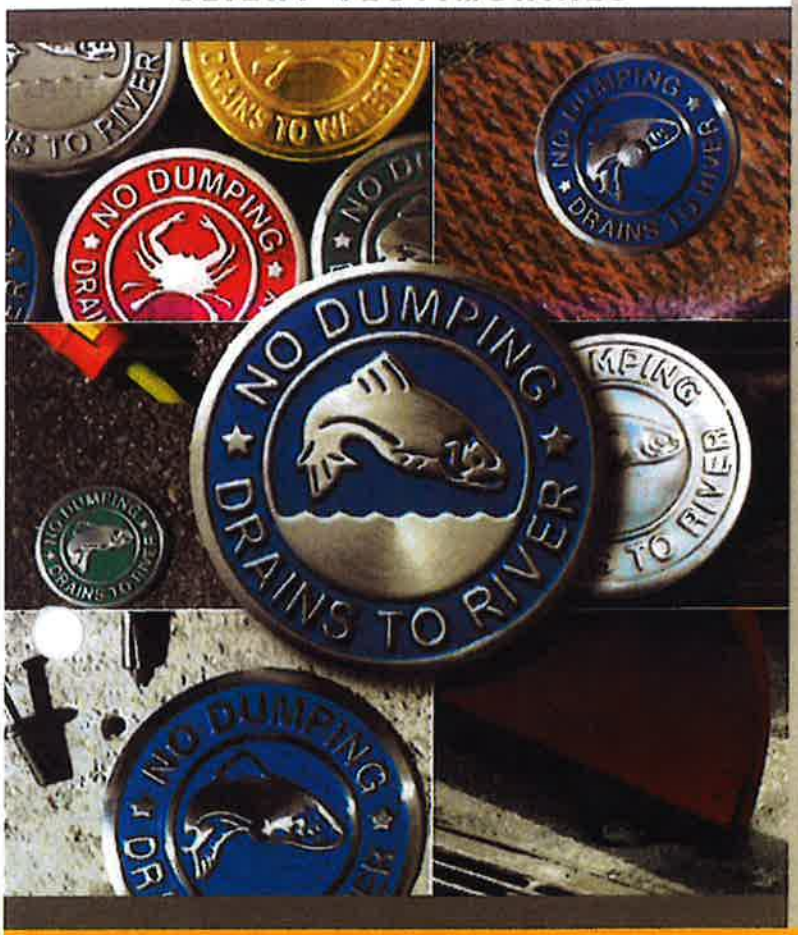
A Non-Storm Water Discharge is... *any discharge to a storm drain system that is not composed entirely of storm water. The following non-storm water discharges are authorized by the General Permit: fire hydrant flushing; potable water sources, including potable water related to the operation, maintenance, or testing of potable water systems; drinking fountain water; atmospheric condensates including refrigeration, air conditioning, and compressor condensate; irrigation drainage; landscape watering; springs; non-contaminated ground water; foundation or footing drainage; and sea water infiltration where the sea waters are discharged back into the sea water source.*

A BMP is . . . *a technique, process, activity, or structure used to reduce the pollutant content of a storm water discharge. BMPs may include simple, non-structural methods such as good housekeeping, staff training and preventive maintenance. Additionally, BMPs may include structural modifications such as the installation of berms, canopies or treatment control (e.g. setting basins, oil/water separators, etc.)*

WARNING: *There are significant penalties for non-compliance: a minimum fine of $5,000 for failing to obtain permit coverage, and, up to $10,000 per day, per violation plus $10 per gallon of discharge in excess of 1,000 gallons.*

STORM DRAIN MARKERS

CLIENT TESTIMONIALS



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You Identify With Us

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"Almetek has been great to work with and the quality of their product is excellent. We will use them again."

- JOSH WINTERS
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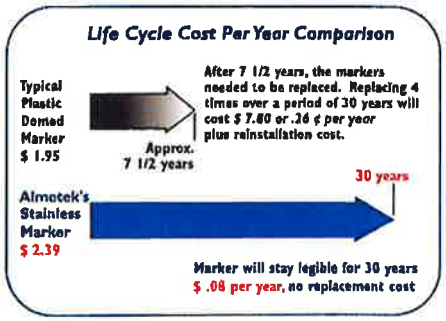
Almetek's Markers last a lifetime and are cost effective

Our attractive 4" Disc, 3-D embossed, metal, Storm Drain Markers will last for decades. They may even last a lifetime. These markers are so strong that they are virtually indestructible.

The Perfect Marker!
Almetek's metal markers have been engineered to perfection. They install easily, quickly and will remain permanently in place. Our patent pending sub-surface mounting installation with the turned down edges will ensure against theft and snow plow displacement. Our markers can be installed on the roadway, curb, storm drain grate or head. We are so sure of this product and its installation process that we will replace any missing marker with a brand new one, totally ***FREE OF CHARGE.****

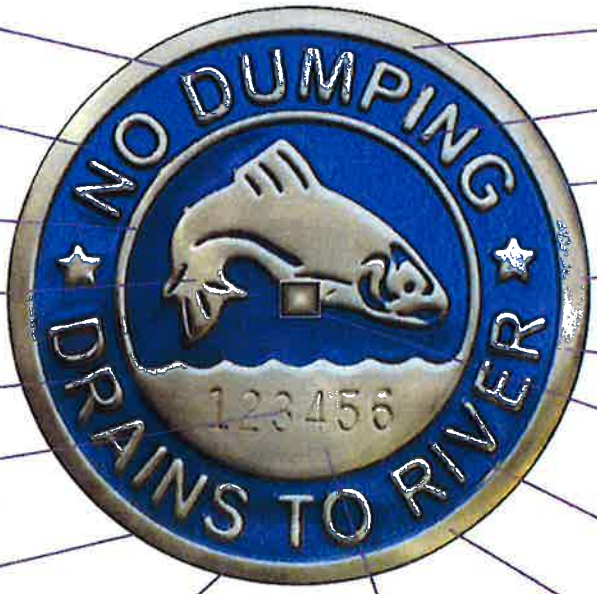
The Price is Right!
The price for stainless is less expensive than you think. A plastic marker may be pennies less initially, but in the long term, it will be more than three times expensive. Look at the facts.

Plastic isn't as durable as stainless steel. The estimated life of a domed marker is approximately 7 1/2 years and some customers are telling us that the plastic markers are failing after two years. During the span of 30 years, with a domed marker, you may need to replace it, at least, 4 times. The typical cost of a domed marker of $1.95 and replacing 4 times, will cost you, without inflation and re-installation cost, $7.80. Our stainless steel marker will only cost $2.39 (500 order) and no replacement cost for 30-years. *The final fact:* you will save at least $5.40 per marker with Almetek's Stainless Steel Marker.



Now you know the facts.
Go ahead and compare our Storm Drain Marker's advantages.

Our Storm Drain Marker's Advantages



- ***All metal, deep 3-D embossed***
- ***UV baked enamel paint, 1-2 colors option or natural***
- ***Virtually indestructible***
  Heavy .0625" thick metal
- ***9 different symbols***
- ***10 different legends***
- ***Deep-stamped, permanent sequential numbering option or stamp name of city or town***
- ***Easy-to-install, 2 adhesives, 2 different fasteners***
- ***Install into new or existing concrete***
- ***Prismatic finish***
- ***Up to 30-year warranty*****
- ***Attractive, high visibility***
- ***Theft-resistant with turned down edges*** *(Patent Pending)*
- ***Snow plow proof*** *(with sub-surface installation)*
- ***Lowest cost, .08¢per year with Stainless Steel***
- ***Square center hole option for fastener***
- ***Custom designs available***
- ***Install on either top or side of drain, grate, curb or roadway, in any weather***

Patent pending sub-surface mounting.
See back page for all installation options.

BACK VIEW
Back has cavities for better adhesion.

CUSTOM IMPRINT
Optional: Engrave your City or Town or GPS location

* Provided that you have purchased our fastener, adhesive & sub-surface installation tool and followed all installation instructions.
** Stainless & Brass- 30-years, Aluminum and Anodized Aluminum, 15-years. Call for Almetek's Metal Storm Drain Warranty Certificate.

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

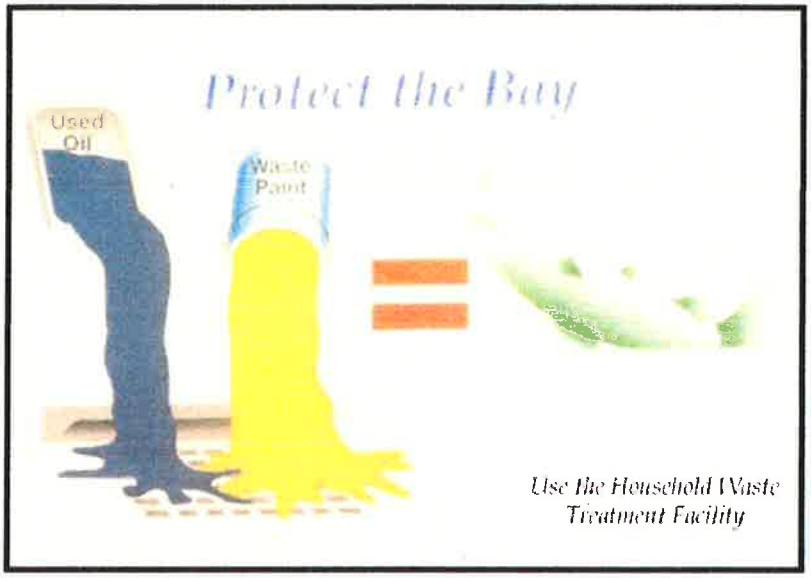
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

CASQA California Stormwater Quality Association

Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Waste Handling & Disposal SC-34

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing runon and runoff.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Pollution Prevention

- Reduction in the amount of waste generated can be accomplished using the following source controls such as:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater runon and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Place waste containers under cover if possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be

disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Runon/Runoff Prevention

- Prevent stormwater runon from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent the waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff pollution prevention measures and proper disposal methods.
- Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.
- Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations

- Hazardous waste cannot be re-used or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

- Capital and operation and maintenance costs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

- Minimize the runoff of polluted stormwater from land application of municipal waste on-site by:
  - Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, there is a closed drainage system.
  - Avoiding application of waste to the site when it is raining or when the ground is saturated with water.
  - Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
  - Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
  - Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins.
  - Performing routine maintenance to ensure the erosion control or site stabilization measures are working.

References and Resources

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Associations (BASMAA). On-line: http://www.basmaa.org

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.
- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in he catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.
- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.
- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.
- Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Follow manufacturers' recommendations and label directions. Pesticides must never be applied if precipitation is occuring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.
- Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

- Apply pesticides only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Overall costs should be low in comparison to other BMPs.

Maintenance

- Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASSMA) http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook).
- Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

- Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- If water is used follow the procedures below:
  - Block the storm drain or contain runoff.
  - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- When cleaning heavy oily deposits:
  - Use absorbent materials on oily spots prior to sweeping or washing.
  - Dispose of used absorbents appropriately.

Surface Repair

- Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.
- Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, nad implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

SC-43 Parking/Storage Area Maintenance

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

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Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

CASQA California Stormwater Quality Association

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

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