

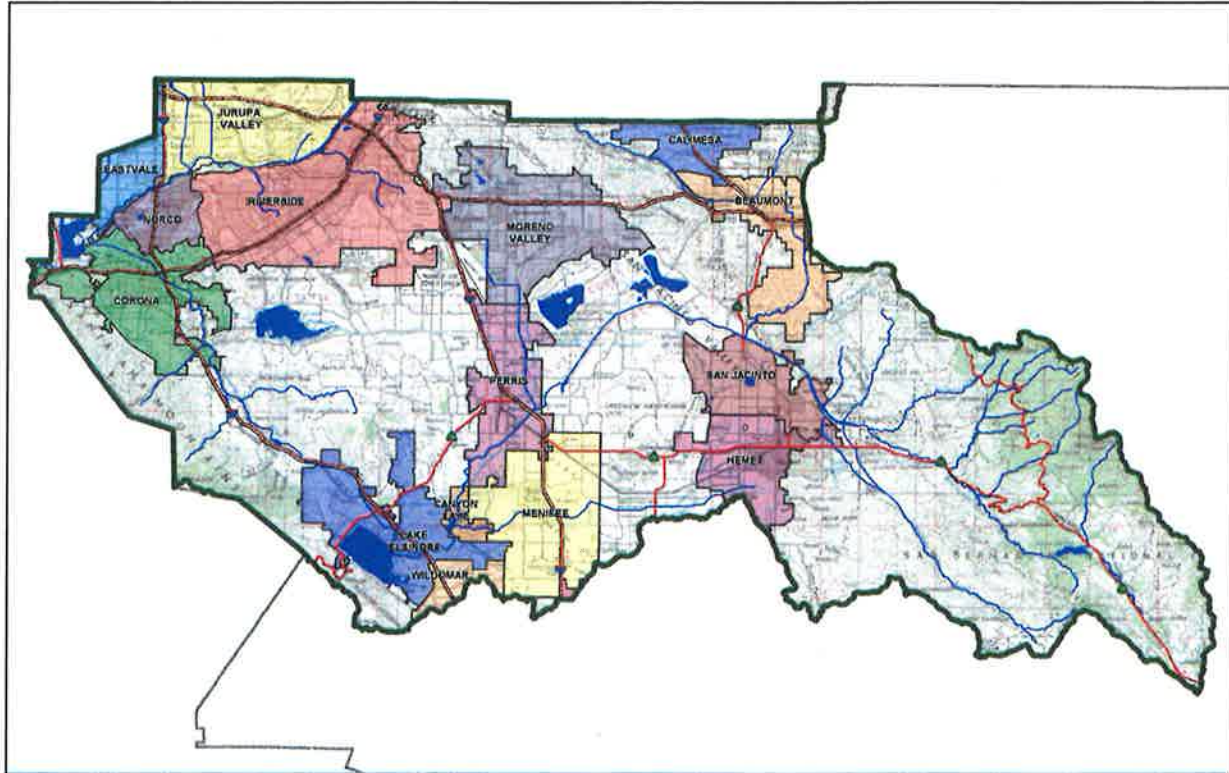
Project Specific Water Quality Management Plan

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

Project Title: MAPES ROAD MARIJUANA PROCESSING AND MANUFACTURING FACILITIES CUP

Development No: DPR #18-00010

Design Review/Case No:



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- ☒ Preliminary
☐ Final

Original Date Prepared: December 6, 2018

Revision Date(s):

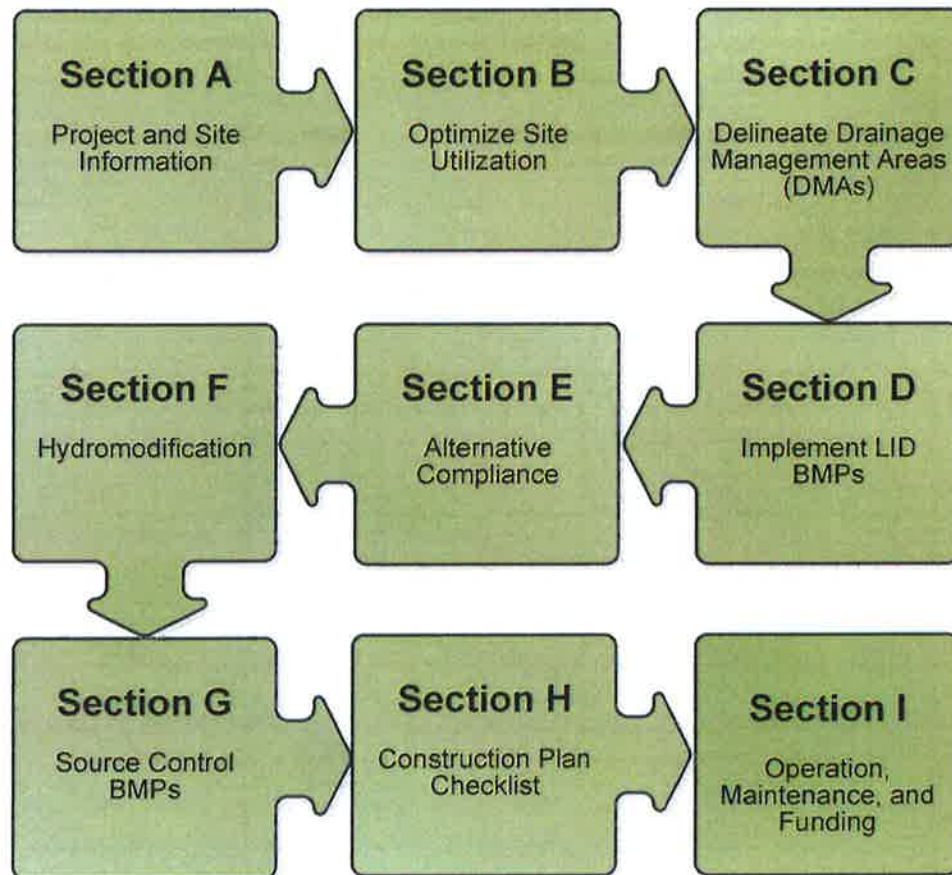
Prepared for Compliance with

*Regional Board Order No. **R8-2010-0033***

Template revised June 30, 2016

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your “how-to” manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Kameron Abraham by Snipes-Dye Associates for the Mapes Road Marijuana Processing & Manufacturing Facilities project.

This WQMP is intended to comply with the requirements of Peris for Water Quality Ordinance 1194 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 City of Perris Water Quality Ordinance (Municipal Code Section 1194).

"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

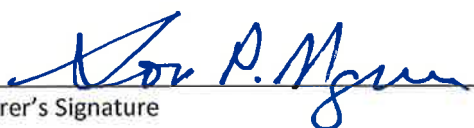
Kameron Abraham
Owner's Printed Name

Date

Owner
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

Son P. Nguyen, P.E.
Preparer's Printed Name

12-7-18
Date

Associate Engineer
Preparer's Title/Position

Preparer's Licensure:



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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial
Planning Area:	Perris Valley Commerce Center Specific Plan
Community Name:	Perris Valley
Development Name:	
PROJECT LOCATION	
Latitude & Longitude (DMS):	33.7875°, -117.2292°
Project Watershed and Sub-Watershed:	Santa Ana River Watershed, Perris Reservoir
Gross Acres:	6.23 acres
APN(s):	330-080-006
Map Book and Page No.:	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial/Commercial
Proposed or Potential SIC Code(s)	1541 Industrial Buildings
Area of Impervious Project Footprint (SF)	150,105
Total Area of <u>proposed</u> Impervious Surfaces within the Project Footprint (SF)/or Replacement	150,105
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 Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
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 (A, B, C and/or D)	B
What is the Water Quality Design Storm Depth for the project?	0.59"

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
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

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
Perris Valley Channel	None	None	Not classified as RARE
San Jacinto River	Nutrients, Pathogens	AGR, MUN, GWR, REC1, REC2, WARM, WILD	Not classified as RARE
Lake Elsinore	PCBs, Organic Compound, Nutrients, Organic Enrichment, Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	Not classified as RARE

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

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 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	☐ Y	☒ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other (please list in the space below as required)	☐ 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.

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.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

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?

Current site topography is relatively flat and gently sloping southeasterly. The runoff from project site is surface flowing southeasterly toward Goetz Road to the east and conveyed in the Perris Valley Channel which connecting to the San Jacinto River eventually to Lake Elsinore.

Post-development drainage system consists of surface runoff collection in biotreatment basin and releasing to the downstream at the same discharge location, flow rate and manner as the pre-development conditions.

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

Current site is a farm land. No native vegetation is present. A biology report has been prepared and submitted for review.

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

An infiltration test was performed by the geotechnical consultant, included in this report. The tested infiltration rate was less than 0.5 inch/hour.

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

Applied the minimum uses of impervious surface in the site design.

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

Site runoff from impervious surface areas is collected the biotreatment basin prior to charging offsite.

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, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, 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) ^{1,2}	Area (Sq. Ft.)	DMA Type
PLNT A	PERVIOUS	50,710	B
ROOF A	IMPERVIOUS	83,300	B
HARDSCAPE	IMPERVIOUS	66,805	B
BMP A	PERVIOUS	9,830	B

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

²If multi-surface provide back-up

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
PERIMETER SLOPE AREA	45,710	GROUND COVER PLANTING	IRRIGATION

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] [C]	Required Retention Depth (inches) [D]

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

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

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

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

DMA Name or ID	BMP Name or ID

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.

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; proceed to section D.3

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 Copermittee 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? If Yes, list affected DMAs:		X
...have any DMAs located within 100 feet of a water supply well? If Yes, list affected DMAs:		X
...have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact? If Yes, list affected DMAs:		X
...have measured in-situ infiltration rates of less than 1.6 inches / hour? If Yes, list affected DMAs: Biotreatment BMP 1	X	
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface? If Yes, list affected DMAs:		x
...geotechnical report identify other site-specific factors that would preclude effective and safe infiltration? Describe here:		x

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 none 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: 1.0 acre

Type of Landscaping (Conservation Design or Active Turf): Perimeter slope ground cover planting

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: 1.9 acres

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: 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: Insert Area (Acres)

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)
Insert Area (Acres)	Insert Area (Acres)

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: Number of daily Toilet Users

Project Type: Enter 'Residential', 'Commercial', 'Industrial' or 'Schools'

- 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: Insert Area (Acres)

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

Enter your TUTIA factor: 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: Required 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)
Insert Area (Acres)	Insert Area (Acres)

Other Non-Potable Use Feasibility

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.

Insert narrative description here.

- 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: Projected Average Daily Use (gpd)

- 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: Insert Area (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: Enter Value

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 gallons per day of non-potable use that would be required.

Minimum required use: Minimum use required (gpd)

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
Minimum use required (gpd)	Projected Average Daily Use (gpd)

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 per Section 3.4.2 of the WQMP Guidance Document.

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	
PLNT A	☐	☐	☐	☒	☐
ROOF A	☐	☐	☐	☒	☐
HARDS CAPE A	☐	☐	☐	☒	☐
BMP A	☐	☐	☐	☒	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

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.

Runoff from DMAs in Table D.2 is routed to the biotreatment basin.

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_r	DMA Runoff Factor	DMA Areas x Runoff Factor	Enter BMP Name / Identifier Here		
	[A]		[B]	[C]	[A] x [C]			
PLNT A	50710	LANDSCAPE	0.1	.11	5578	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
ROOF A	83300	ROOF	1.0	0.81	67473			
HARDSCAPE	66805	HARDSCAPE	1.0	0.81	54112			
BMP A	9830	LANDSCAPE	0.1	.11	1081			
	$A_T = \Sigma[A]$	210645			128244 $\Sigma = [D]$	0.59 [E]	$[F] = \frac{[D] \times [E]}{12}$	6,305 [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

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.

LID BMP is proposed to treat the runoff from the post-development site.

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

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.

Qualifying Project Categories	Credit Percentage ²
<i>Total Credit Percentage¹</i>	

¹Cannot Exceed 50%

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

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 WOMP Guidance Document for further information.

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I _f	DMA Runoff Factor	DMA Area x Runoff Factor	Enter BMP Name / Identifier Here			
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)	Total Storm Water Credit % Reduction	Proposed Volume or Flow on Plans (cubic feet or cfs)
	A _T = Σ[A]				Σ= [D]	[E]	[F] = $\frac{[D] \times [E]}{[G]}$	[F] x (1-[H])	[I]

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[1] 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

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 Ca-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 Copermitttee 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 concentration¹ 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 (min)	N/A	N/A	N/A
Volume (cubic-feet)	N/A	N/A	N/A

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.

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 Susceptibility 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:

INSERT TEXT HERE

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.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

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

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 Location (Lat/Long)

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:

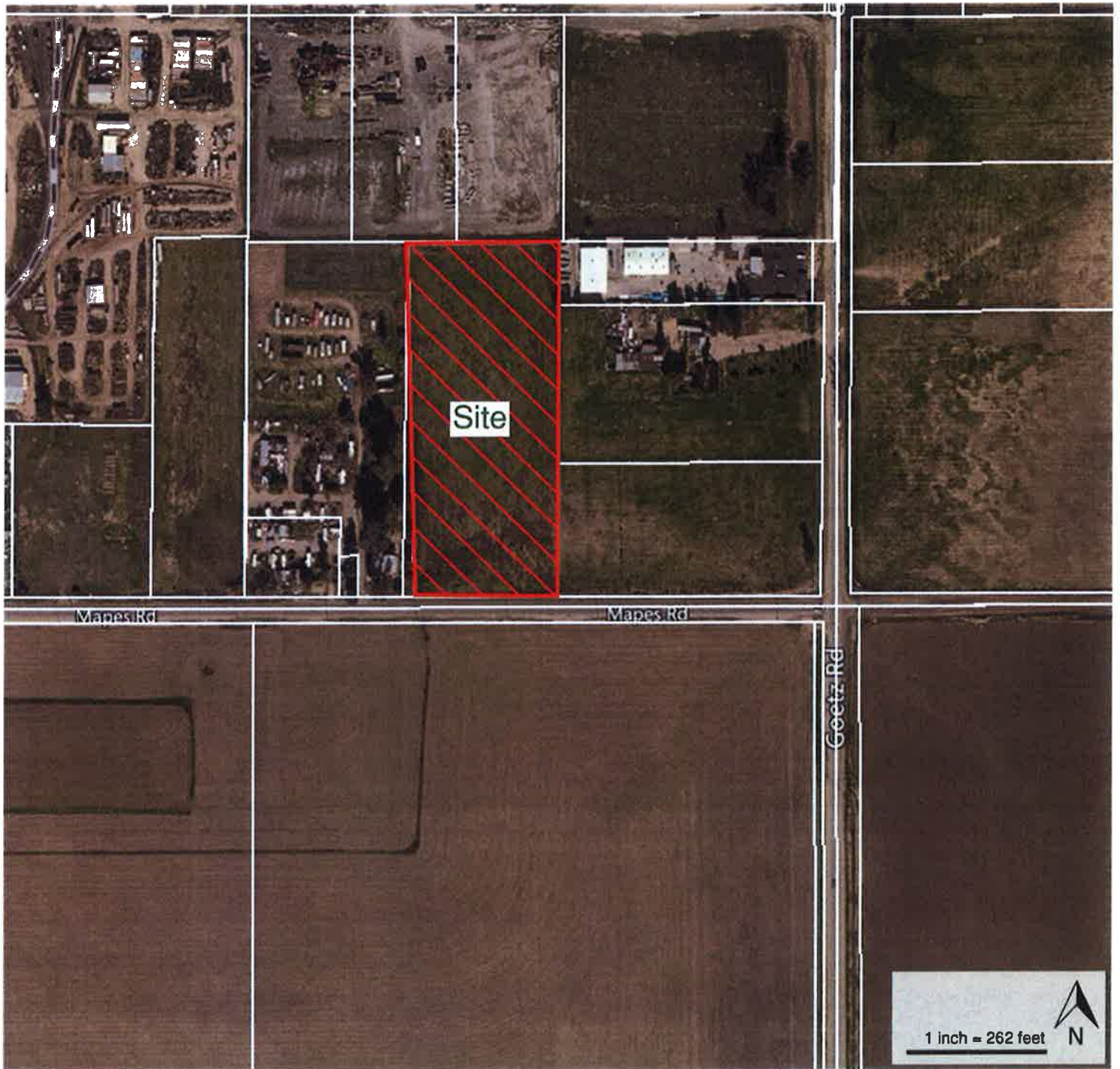
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

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



Location Map



Sources: USGS 30 Meter DEM;
USGS Digital Line Graph

Figure 4. Receiving Waterbodies

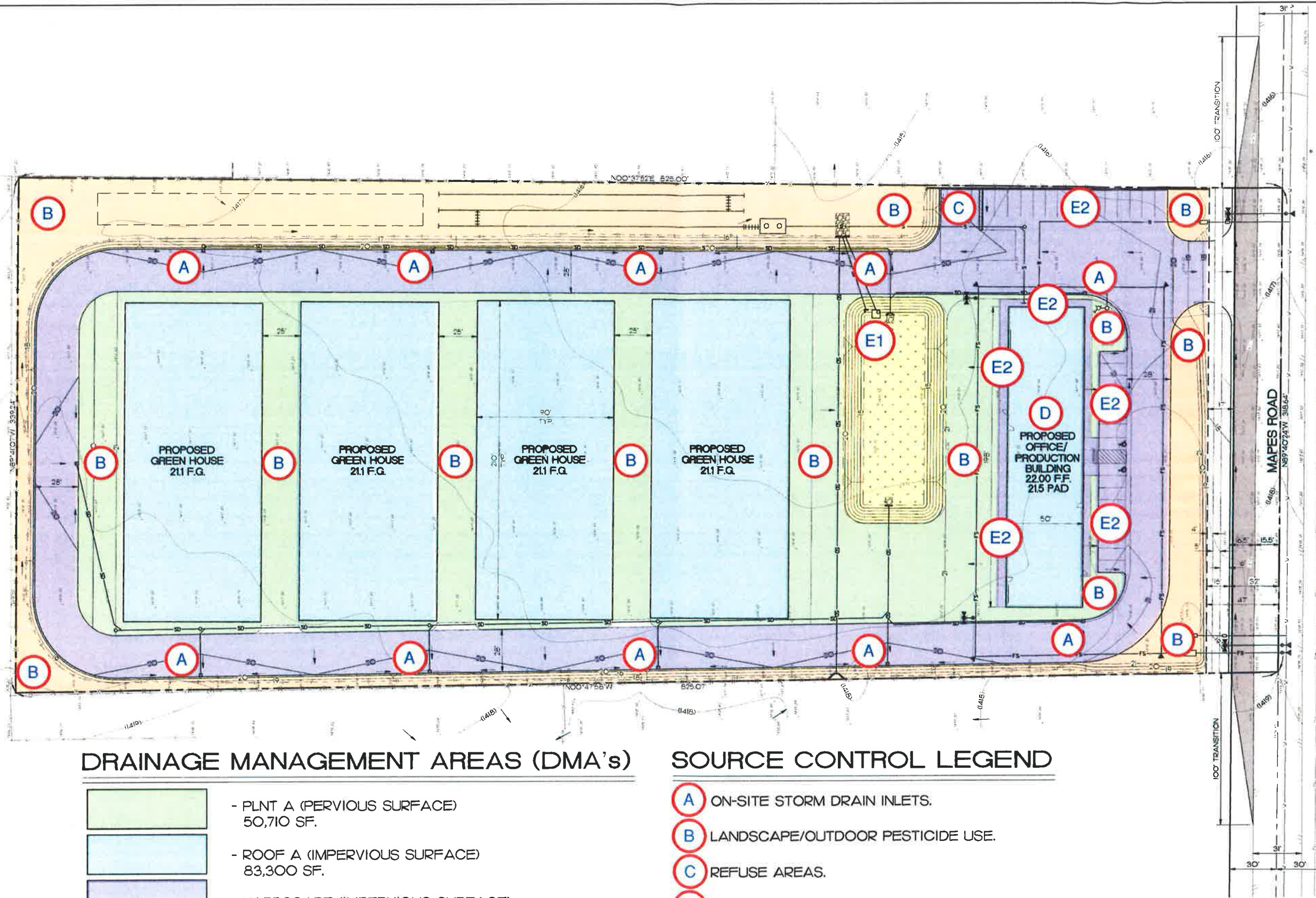


DRAINAGE MANAGEMENT AREAS (DMA's)

	- PLNT A (PERVIOUS SURFACE) 50,710 SF.
	- ROOF A (IMPERVIOUS SURFACE) 83,300 SF.
	- HARDSCAPE (IMPERVIOUS SURFACE) 66,805 SF.
	- BMP A (PERVIOUS SURFACE) 9,830 SF.
	- PERIMETER SLOPE AREA (SELF-TREATING) 45,710 SF.

SOURCE CONTROL LEGEND

- ON-SITE STORM DRAIN INLETS.
- LANDSCAPE/OUTDOOR PESTICIDE USE.
- REFUSE AREAS.
- FIRE SPRINKLER TEST WATER.
- MISCELLANEOUS DRAIN OR WASH WATER OR OTHER SOURCES:
- DRAINAGE SUMPS
- PLAZAS, SIDEWALKS, AND PARKING LOTS.



WQMP SITE PLAN

		RATIONAL METHOD HYDROLOGY MAP MAPES ROAD CANNABIS PRODUCTION FACILITY MAPES ROAD, CITY OF PERRIS RIVERSIDE COUNTY, CA 92570	
		SHEET NO. 12-05-18	DATE 12-05-18
NO. 1	DATE 12-05-18	BY JGF	CHECKED JGF
SNIPES-DYE ASSOCIATES		8348 CENTER DRIVE, SUITE 6, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033	
1		PROC2X	

Appendix 2: Construction Plans

Grading and Drainage Plans

XEROX

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

**Geotechnical Engineering Investigation
Proposed Greenhouse Facility Development
Northwest Corner of Mapes Road and Goetz
Road, in the City of Perris, California**

**Kameron Abraham
6088 Bounty Street
San Diego, California 92120**

**Project Number 20600-18
August 24, 2018**

NorCal Engineering
Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

August 24, 2018

Project Number 20600-18

Kameron Abraham
6088 Bounty Street
San Diego, California 92120

**RE: Geotechnical Engineering Investigation - Proposed Greenhouse
Cultivation Facility Development - Located near the Northwest Corner of
Mapes Road and Goetz Road, in the City of Perris, California**

Dear Mr. Abraham:

Pursuant to your request, this firm has performed a Geotechnical Engineering Investigation in accordance with your authorization of signed proposal dated July 16, 2018 for the above referenced project. The purpose of this investigation is to evaluate the subsurface conditions of the subject site and to provide recommendations for the proposed development.

The scope of work included the following: 1) site reconnaissance; 2) subsurface geotechnical exploration and sampling; 3) laboratory testing; 4) engineering analysis of field and laboratory data; 5) and preparation of a geotechnical engineering report. It is the opinion of this firm that the proposed development is feasible from a geotechnical standpoint provided that the recommendations presented in this report are followed in the design and construction of the project.

Natural: An undisturbed alluvium soil classifying as a brown, sandy CLAY to a fine to coarse grained clayey SAND was encountered directly beneath the fill and observed to be stiff to very stiff and damp.

The overall engineering characteristics of the earth material were relatively uniform with each excavation. No groundwater was encountered to the depth of our trenches and no caving occurred.

4.0 Laboratory Tests

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear, consolidation tests, and to determine in-place moisture/densities. These relatively undisturbed ring samples were obtained by driving a thin-walled steel sampler lined with one-inch long brass rings with an inside diameter of 2.42 inches into the undisturbed soils. Bulk bag samples were obtained in the upper soils for expansion index tests and maximum density tests. All test results are included in Appendix B, unless otherwise noted.

- 4.1 Field moisture content** (ASTM: D 2216) and the dry density of the ring samples were determined in the laboratory. This data is listed on the logs of explorations.
- 4.2 Maximum density tests** (ASTM: D 1557) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.
- 4.3 Expansion index tests** (ASTM: D 4829) were performed on remolded samples of the upper soils. Results of these tests are provided on Table II.
- 4.4 Atterberg Limits** (ASTM: D 4318) consisting of liquid limit, plastic limit and plasticity index were performed on representative soil samples. Results are shown on Table III.

The correction factors CF_t , CF_v and CF_s are given below based on soils in the upper 5 from our field tests.

- a) $CF_t = R_t = 1.0$ for our double ring infiltration test holes.
- b) $CF_v = 1.0$ based on uniform soils encountered in two trenches for infiltration tests.
- c) $CF_s = 3.0$ for long-term siltation, plugging and maintenance. The subsurface soils are likely to have some plugging and regular maintenance of storm water discharge devices is required.

Based upon the results of our testing, the subsurface soils encountered in the proposed on-site drainage disposal system revealed minimal to no water infiltration at the subject site. This infiltration rate is significantly less than 0.3 inch per hour, which is the minimum value for proper seepage design. All systems must meet the latest city and/or county specifications and California Regional Water Quality Control Board (CRWQCB) requirements.

Foundations shall be set back a minimum distance of 10 feet from the drainage disposal system and the bottom of footing shall be a minimum of 10 feet from the expected zone of saturation. The boundary of the zone of saturation may be assumed to project downward from the top of the permeable portion of the disposal system at an inclination of 1 to 1 or flatter, as determined by the soils engineer.

6.0 Seismicity Evaluation

There are no known active or potentially active faults trending toward or through the site. The proposed development lies outside of any Alquist Priolo Special Studies Zone and the potential for damage due to direct fault rupture is considered very remote. The site is located in an area of high regional seismicity and the San Jacinto fault is located about 15 kilometers from the site.

8.0 Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from excessive settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

The following recommendations are based upon geotechnical conditions encountered in our field investigation and laboratory data. Therefore, these surface and subsurface conditions could vary across the site. Variations in these conditions may not become evident until the commencement of grading operations and any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

It is recommended that site inspections be performed by a representative of this firm during all grading and construction of the development to verify the findings and recommendations documented in this report. The following sections present a discussion of geotechnical related requirements for specific design recommendations of different aspects of the project.

8.1 Site Grading Recommendations

Any vegetation and or demolition debris shall be removed and hauled from proposed grading areas prior to the start of grading operations. Existing vegetation shall not be mixed or disced into the soils. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) is removed. Grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations".

8.1.2 **Fill Blanket Recommendations**

Due to the potential for differential settlement of foundations placed on compacted fill and native materials, it is recommended that all foundations including floor slab areas be underlain by a uniform compacted fill blanket at least two feet in thickness. This fill blanket shall extend a minimum of five horizontal feet outside the edges of foundations or equidistant to the depth of fill placed, whichever is greater.

8.2 **Shrinkage and Subsidence**

Results of our in-place density tests reveal that the soil shrinkage will be less than 5% due to excavation and recompaction, based upon the assumption that the fill is compacted to 92% of the maximum dry density per ASTM standards. Subsidence should be 0.2 feet due to earthwork operations. The volume change does not include any allowance for vegetation or organic stripping, removal of subsurface improvements or topographic approximations. Although these values are only approximate, they represent our best estimate of lost yardage which will likely occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field testing using the actual equipment and grading techniques should be conducted.

8.3 **Temporary Excavations**

Temporary unsurcharged excavations in the existing site materials less than 4 feet high may be made at a vertical gradient unless cohesionless soils are encountered. In areas where soils with little or no binder are encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring, slot-cutting, or flatter excavations may be required. The temporary cut slope gradients given do not preclude local raveling and sloughing.

All excavations shall be made in accordance with the requirements of CAL-OSHA and other public agencies having jurisdiction. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase.

8.6 **Lateral Resistance**

The following values may be utilized in resisting lateral loads imposed on the structure. Requirements of the California Building Code should be adhered to when the coefficient of friction and passive pressures are combined.

Coefficient of Friction – 0.40

Equivalent Passive Fluid Pressure = 250 lbs./cu.ft.

Maximum Passive Pressure = 2,500 lbs./cu.ft.

The passive pressure recommendations are valid only for approved compacted fill soils.

8.7 **Retaining Wall Design Parameters**

Active earth pressures against retaining wall will be equal to the pressures developed by the following fluid densities. These values are for **granular backfill material** placed behind the walls at various ground slopes above the walls.

<u>Surface Slope of Retained Materials</u> <u>(Horizontal to Vertical)</u>	<u>Equivalent Fluid</u> <u>Density (lb./cu.ft.)</u>
Level	30
5 to 1	35
4 to 1	38
3 to 1	40
2 to 1	45

Any applicable short-term construction surcharges and seismic forces should be added to the referenced lateral pressure values.

All walls shall be waterproofed as needed and protected from hydrostatic pressure by a reliable permanent subdrain system. The subsurface drainage system shall consist of 4-inch diameter perforated PVC pipe encased with gravel and wrapped with filter fabric. The granular backfill to be utilized immediately adjacent to the walls shall consist of an approved granular soil with a sand equivalency greater than 30. This backfill zone of free draining material shall consist of a wedge beginning a minimum of one horizontal foot from the base of the wall extending upward at an inclination of no less than 3/4 to 1 (horizontal to vertical).

8.9 **Pavement Section Design**

The table below provides a preliminary pavement design based upon an R-Value of 33 for the proposed pavement areas. Final pavement design may need to be based on R-Value testing of the subgrade soils near the conclusion of rough grading to assure that these soils are consistent with those assumed in this preliminary design.

<u>Type of Traffic</u>	<u>Traffic Index</u>	<u>Asphaltic Concrete (in)</u>	<u>Base Material (in)</u>
Automobile Parking Stalls	4.0	3.0	4.0
Light Vehicle Circulation Areas	5.5	3.5	6.5
Heavy Truck Access Areas (GVW < 90,000 lbs; 5-axle)	7.0	4.0	10.0

All concrete slabs to be utilized for pavement for heavy trucks shall be a minimum of seven inches in thickness and placed on approved subgrade soils. The recommendations are based upon estimated traffic loads. Client should submit anticipated traffic loadings, when available, so that pavement sections may be reviewed to determine adequacy to support these loads.

Any approved base material shall consist of a Class II aggregate or equivalent and should be compacted to a minimum of 95% relative compaction. All pavement materials shall conform to the requirements set forth by the City of Perris. The base material and asphaltic concrete should be tested prior to delivery to the site and during placement to determine conformance with the project specifications. A pavement engineer shall designate the specific asphalt mix design to meet the required project specifications.

All pavement areas shall have positive drainage toward an approved outlet from the site. Drain lines behind curbs and/or adjacent to landscape areas should be considered by client and the appropriate design engineers to prevent water from infiltrating beneath pavement. If such infiltration occurs, damage to pavement, curbs and flow lines, especially on sites with expansive soils, may occur during the life of the project.

9.0 Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This geotechnical investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING



Keith D. Tucker
Project Engineer
R.G.E. 841



Scott D. Spensiero
Project Manager

NorCal Engineering

The minimum relative compaction shall be obtained in accordance with accepted methods in the construction industry. The final grade of the structural areas shall be in a dense and smooth condition prior to placement of slabs-on-grade or pavement areas. No fill soils shall be placed, spread or compacted during unfavorable weather conditions. When the grading is interrupted by heavy rains, compaction operations shall not be resumed until approved by the Soils Engineering firm.

Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Soils Engineering firm as deemed necessary. A 24-hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Soils Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.

When expansive soils are compacted during site grading operations, care is taken to place the materials at or slightly above optimum moisture levels and perform proper compaction operations. Any subsequent excessive wetting and/or drying of expansive soils will cause the soil materials to expand and/or contract. These actions are likely to cause distress of foundations, structures, slabs-on-grade, sidewalks and pavement over the life of the structure. ***It is therefore imperative that even after construction of improvements, the moisture contents are maintained at relatively constant levels, allowing neither excessive wetting or drying of soils.***

Evidence of excessive wetting of expansive soils may be seen in concrete slabs, both interior and exterior. Slabs may lift at construction joints producing a trip hazard or may crack from the pressure of soil expansion. Wet clays in foundation areas may result in lifting of the structure causing difficulty in the opening and closing of doors and windows, as well as cracking in exterior and interior wall surfaces. In extreme wetting of soils to depth, settlement of the structure may eventually result. Excessive wetting of soils in landscape areas adjacent to concrete or asphaltic pavement areas may also result in expansion of soils beneath pavement and resultant distress to the pavement surface.

Excessive drying of expansive soils is initially evidenced by cracking in the surface of the soils due to contraction. Settlement of structures and on-grade slabs may also eventually result along with problems in the operation of doors and windows.

Projects located in areas of expansive clay soils will be subject to more movement and "hairline" cracking of walls and slabs than similar projects situated on non-expansive sandy soils. There are, however, measures that developers and property owners may take to reduce the amount of movement over the life the development. The following guidelines are provided to assist you in both design and maintenance of projects on expansive soils:

- Increase the amount of steel reinforcing in concrete slabs, foundations and other structures to resist the forces of expansive soils. The precise amount of reinforcing should be determined by the appropriate design engineers and/or architects.
- Recommendations of the soil report should always be followed in the development of the project. Any recommendations regarding presaturation of the upper subgrade soils in slab areas should be performed in the field and verified by the Soil Engineer.

KEY:

- Indicates 2.5-inch Inside Diameter. Ring Sample.
- ⊗ Indicates 2-inch OD Split Spoon Sample (SPT).
- ◻ Indicates Shelby Tube Sample.
- ▢ Indicates No Recovery.
- ◼ Indicates SPT with 140# Hammer 30 in. Drop.
- ⊞ Indicates Bulk Sample.
- ◻ Indicates Small Bag Sample.
- ◼ Indicates Non-Standard
- ⊗ Indicates Core Run.

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1 - 5%
Few	5 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N -VALUE

COHESIONLESS SOILS		COHESIVE SOILS		
Density	N (blows/ft)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	Very Soft	0 to 2	< 250
Loose	4 to 10	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	Very Stiff	15 to 30	2000 - 4000
		Hard	over 30	> 4000

List of Appendices (in order of appearance)

Appendix A - Log of Excavations

- Log of Trenches T-1 to T-6

Appendix B - Laboratory Tests

- Table I - Maximum Dry Density
 - Table II – Expansion
 - Table III – Atterberg Limits
 - Table IV – Corrosion
- Plate A - Direct Shear
- Plates B and C – Consolidation

Appendix C – Infiltration Study Data

Kameron Abraham
20600-18

Log of Trench T-1

Boring Location: NWC Mapes & Goetz, Perris

Date of Drilling: 8/17/18

Groundwater Depth: None Encountered

Drilling Method: Backhoe

Hammer Weight:

Drop:

Surface Elevation: Not Measured

Depth (feet)	Lith- ology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0		FILL					
		Sandy CLAY to Clayey SAND Brown, soft to loose, damp					
		NATURAL					
		Sandy CLAY to Clayey SAND Brown, stiff to dense, damp					
5		Trench completed at depth of 5'					
10							
15							
20							
25							
30							
35							

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20600-18

Log of Trench T-3

Boring Location: NWC Mapes & Goetz, Perris

Date of Drilling: 8/17/18

Groundwater Depth: None Encountered

Drilling Method: Backhoe

Hammer Weight:

Drop:

Surface Elevation: Not Measured

Depth (feet)	Lith- ology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL Sandy CLAY to Clayey SAND Brown, soft to loose, damp	■		6.0	115.5	
5		NATURAL Sandy CLAY to Clayey SAND Brown, stiff to very stiff, damp	■		5.5	117.0	
10		Trench completed at depth of 10'	■		6.0	114.1	
15							
20							
25							
30							
35							

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Kameron Abraham
20600-18

Log of Trench T-5

Boring Location: NWC Mapes & Goetz, Perris

Date of Drilling: 8/17/18

Groundwater Depth: None Encountered

Drilling Method: Backhoe

Hammer Weight:

Drop:

Surface Elevation: Not Measured

Depth (feet)	Lith- ology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL Sandy CLAY to Clayey SAND Brown, soft to loose, damp					
5		NATURAL Sandy CLAY to Clayey SAND Brown, stiff to very stiff, damp	■		7.4	118.8	
10		Trench completed at depth of 10'	■		7.4	113.7	
15							
20							
25							
30							
35							

NorCal Engineering

August 24, 2018

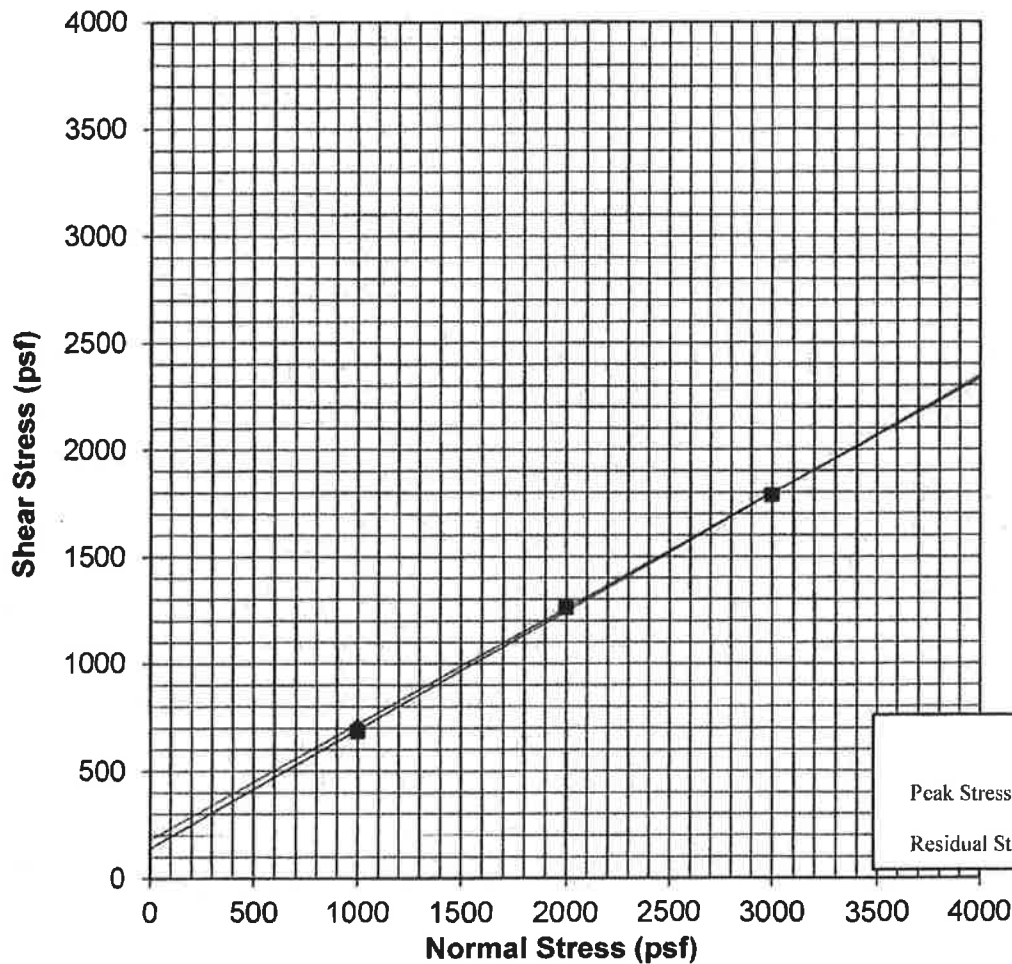
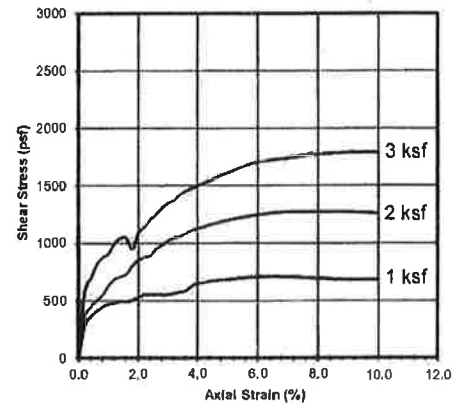
Project Number 20600-18

Appendix B

NorCal Engineering

Sample No. T6@2'
Sample Type: Undisturbed/Saturated
Soil Description: Silty Clay w/ Some Sand

		1	2	3
Normal Stress	(psf)	1000	2000	3000
Peak Stress	(psf)	708	1272	1788
Displacement	(in)	0.150	0.175	0.225
Residual Stress	(psf)	684	1260	1788
Displacement	(in.)	0.250	0.250	0.250
In Situ Dry Density	(pcf)	111.6	111.6	111.6
In Situ Water Content	(%)	8.4	8.4	8.4
Saturated Water Content	(%)	15.3	15.3	15.3
Strain Rate	(in/min)	0.020	0.020	0.020



◆ Peak Stress
■ Residual Stress

	ϕ (Degree)	C (psf)
Peak Stress	28	180
Residual Stress	28	140

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

Kameron Abraham

PROJECT NUMBER: 20600-18

DATE: 8/23/2018

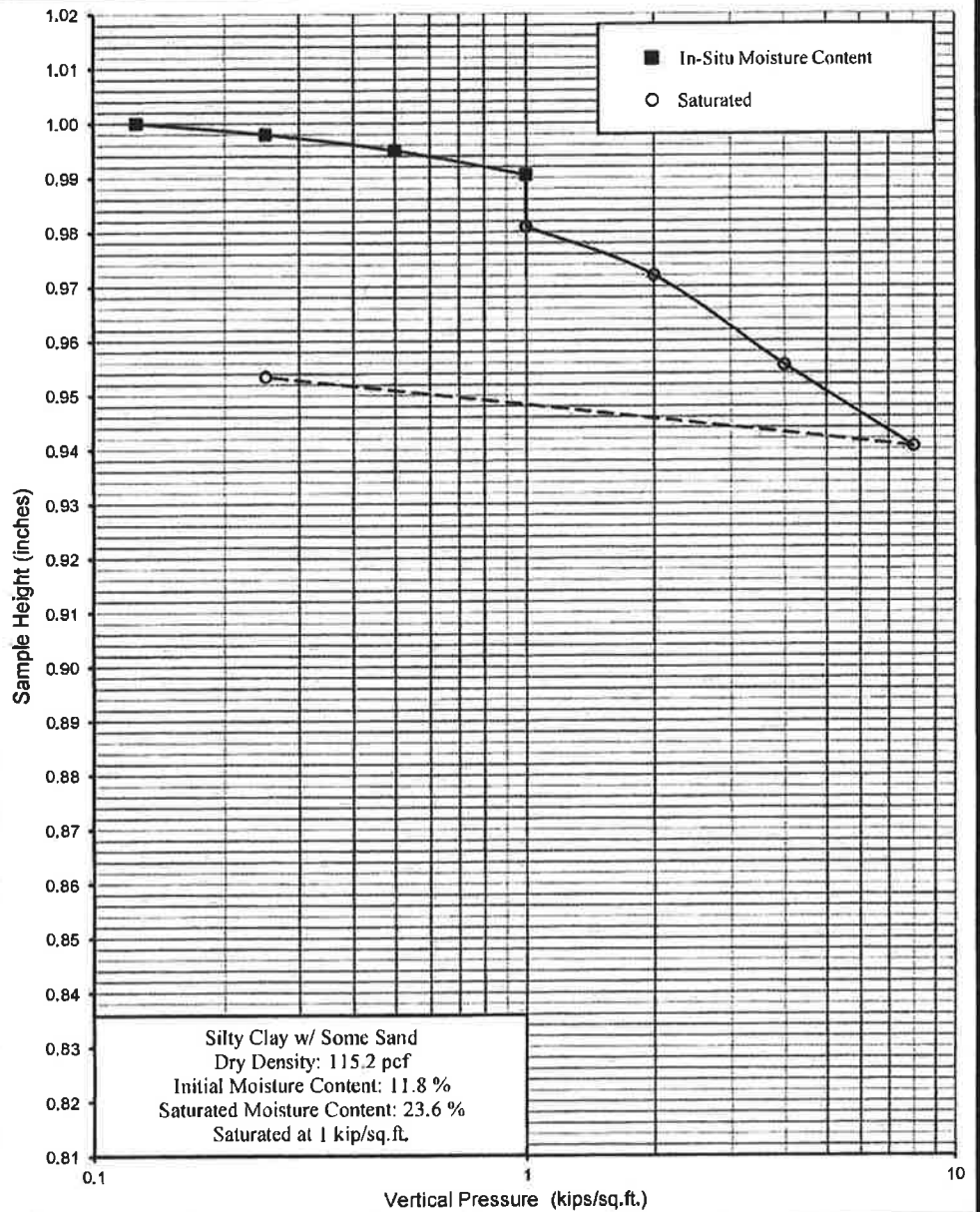
DIRECT SHEAR TEST
ASTM D3080
Plate A

Vertical Pressure (kips/sq.ft.)	Sample Height (inches)	Consolidation (percent)	Sample No.	T6	Depth	10'	Date	8/23/2018
------------------------------------	------------------------	----------------------------	------------	----	-------	-----	------	-----------

0.125	1.0000	0.0
0.25	0.9980	0.2
0.5	0.9950	0.5
1	0.9905	1.0
1	0.9810	1.9
2	0.9720	2.8
4	0.9555	4.5
8	0.9405	6.0
0.25	0.9535	4.7

Saturated

Date Tested: 8/22/2018
Sample: T6
Depth: 10'



NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

Kameron Abraham

PROJECT NUMBER: 20600-18

DATE: 8/23/2018

CONSOLIDATION TEST

ASTM D2435

Plate C



SOILS AND GEOTECHNICAL CONSULTANTS

Project: Kameron Abraham

Project No: 20600-18

Date: 8/17/18

Test No. 1

Depth: 5'

Tested By: J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	7:05			105.6			49.2					
	7:20	15	15	105.6	0.0		49.3	0.1				
2	7:20			105.6			49.3					
	7:35	15	30	105.7	0.1		49.4	0.1				
3	7:35			105.7			49.4					
	7:50	15	45	105.7	0.0		49.4	0.0				
4	7:50			105.7			49.4					
	8:05	15	60	105.7	0.0		49.5	0.1				
5	8:05			105.7			49.5					
	8:20	15	75	105.7	0.0		49.5	0.0				
6	8:20			105.7			49.5					
	8:35	15	90	105.7	0.0		49.5	0.0				
7	8:35			105.7			49.5					
	8:50	15	105	105.7	0.0		49.5	0.0				
8	8:50			105.7			49.5					
	9:05	15	120	105.7	0.0		49.5	0.0				
9	9:05			105.7			49.5					
	9:20	15	135	105.7	0.0		49.5	0.0				
10	9:20			105.7			49.5					
	9:35	15	150	105.7	0.0		49.5	0.0				
11	9:35			105.7			49.5					
	9:50	15	165	105.7	0.0		49.5	0.0				
12	9:50			105.7			49.5					
	10:05	15	180	105.7	0.0		49.5	0.0				

Appendix 4: Historical Site Conditions

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

N/A

Appendix 5: LID Infeasibility

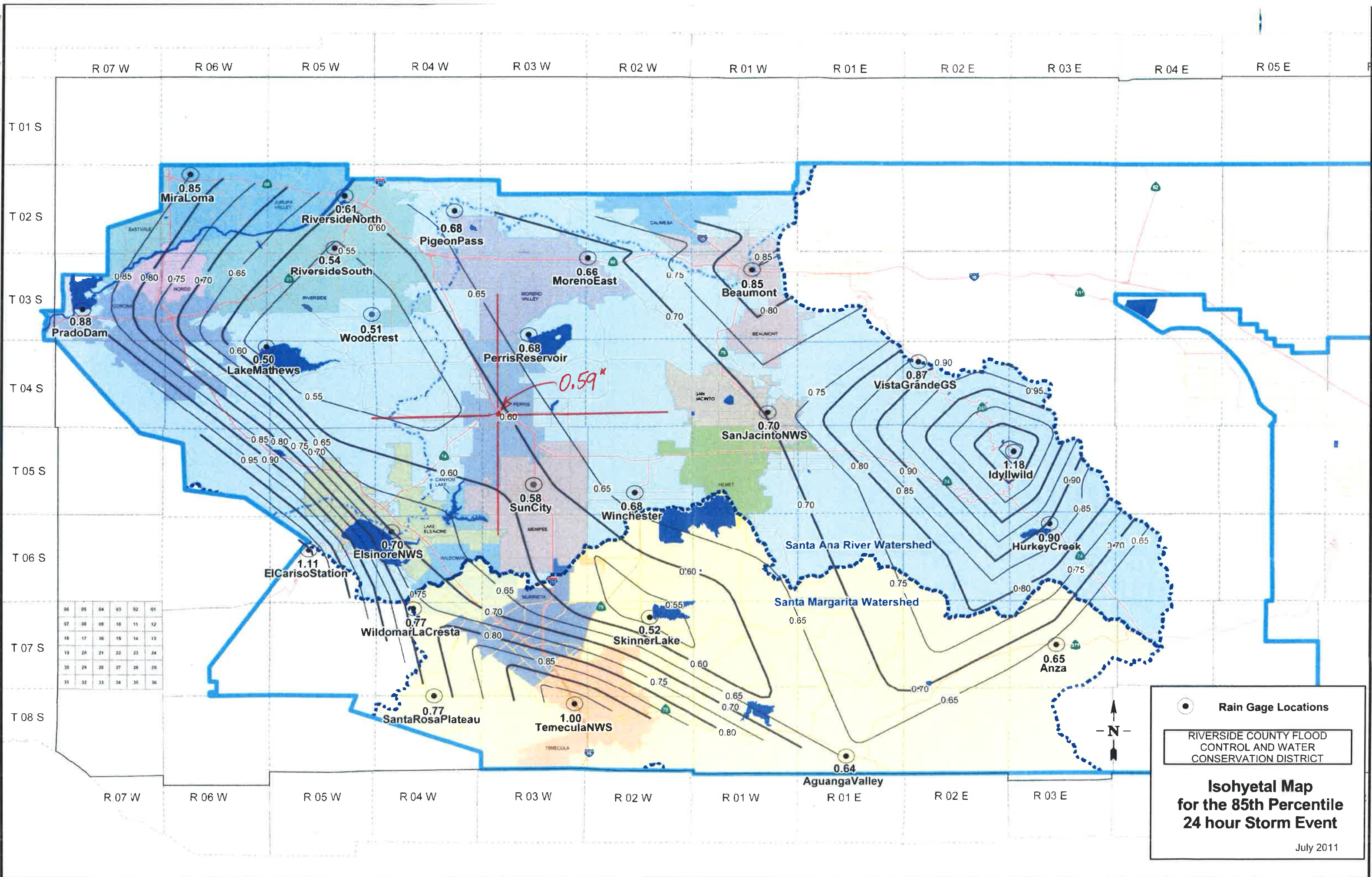
LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Bioretention Facility - Design Procedure		BMP ID 1	Legend:	Required Entries
				Calculated Cells
Company Name:	Snipes-Dye Associates		Date: 12/7/2018	
Designed by:	Son P. Nguyen, P.E.		County/City Case No.: PR 18-00010	
Design Volume				
Enter the area tributary to this feature			$A_T =$	4.84 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	6,305 ft ³
Type of Bioretention Facility Design				
☐ Side slopes required (parallel to parking spaces or adjacent to walkways) ☒ No side slopes required (perpendicular to parking space or Planter Boxes)				
Bioretention Facility Surface Area				
Depth of Soil Filter Media Layer			$d_s =$	1.5 ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	40.0 ft
Total Effective Depth, d_E				
$d_E = [(0.3) \times d_s + (0.4) \times 1] + 0.5$			$d_E =$	1.35 ft
Minimum Surface Area, A_m				
$A_M \text{ (ft}^2\text{)} = \frac{V_{BMP} \text{ (ft}^3\text{)}}{d_E \text{ (ft)}}$			$A_M =$	4,671 ft ²
Proposed Surface Area			$A =$	5,000 ft ²
Minimum Required Length of Bioretention Facility, L			$L =$	116.8 ft
Bioretention Facility Properties				
Side Slopes in Bioretention Facility			$z =$	2 :1
Diameter of Underdrain				6 inches
Longitudinal Slope of Site (3% maximum)				0.5 %
6" Check Dam Spacing				0 feet
Describe Vegetation:			Natural Grasses	
Notes:				



Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Subject site is not located within the HCOC Exemption areas. HCOC Mitigation is required. Due to the increase of impervious cover over the site, the flow time in the post-development site is 5 minutes faster than the flow time in the pre-development site. With the use of the biotreatment basin, the routing of the runoff from the development areas to the biotreatment basin for detaining and slowly discharging to the downstream receiving waterbody, mimicking the pre-development conditions for 2-year, 24-hour rainfall event. The record rainfall data was obtained from the NOAA Atlas 14, Volume 6 for Perris.

Flow time (L):

L (pre-dev) = 19.0 minutes

L (post-dev) = 19.0 minutes

2-Year, 24-Hour Peak Discharge (Q):

Q (pre-dev) = 2.60 cfs

Q (post-dev) = 2.53 cfs

The proposed biotreatment facility is designed to mitigate the pollutants and the hydrologic conditions of concern for to the proposed development.

Untitled Map

Write a description for your map.

Not Susceptible

Susceptible

SITE

Legend

- 0
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Ferrellgas - Perris
- Good Hope Missionary Baptist
- J 5 Hydroponics
- Jim Wallace Skydiving School
- Navigator Yachts
- Orange Empire Railway Museum
- Perris Valley Kia
- Perris Valley Skydiving
- Santa Ana River
- School
- So Cal Oval Karters
- US Post Office

Google Earth

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1 mi



Murrieta Rd

Watson Rd

I St

Phillips St

Margaret St

Sophie St

Fernand St

Betty Rd

Alma St

Mountain Ave

Certude Ave

David-Jones Rd

Steffen St

Burton Rd

Netzel St

Fisher St

Cox Rd

St. Joseph

Belmont Ln

Park Ave

Fernando St

W 10th St

Short St

Patrol St

Commercial St

S Redlands Ave

S 5th St

S 4th St

S 3rd St

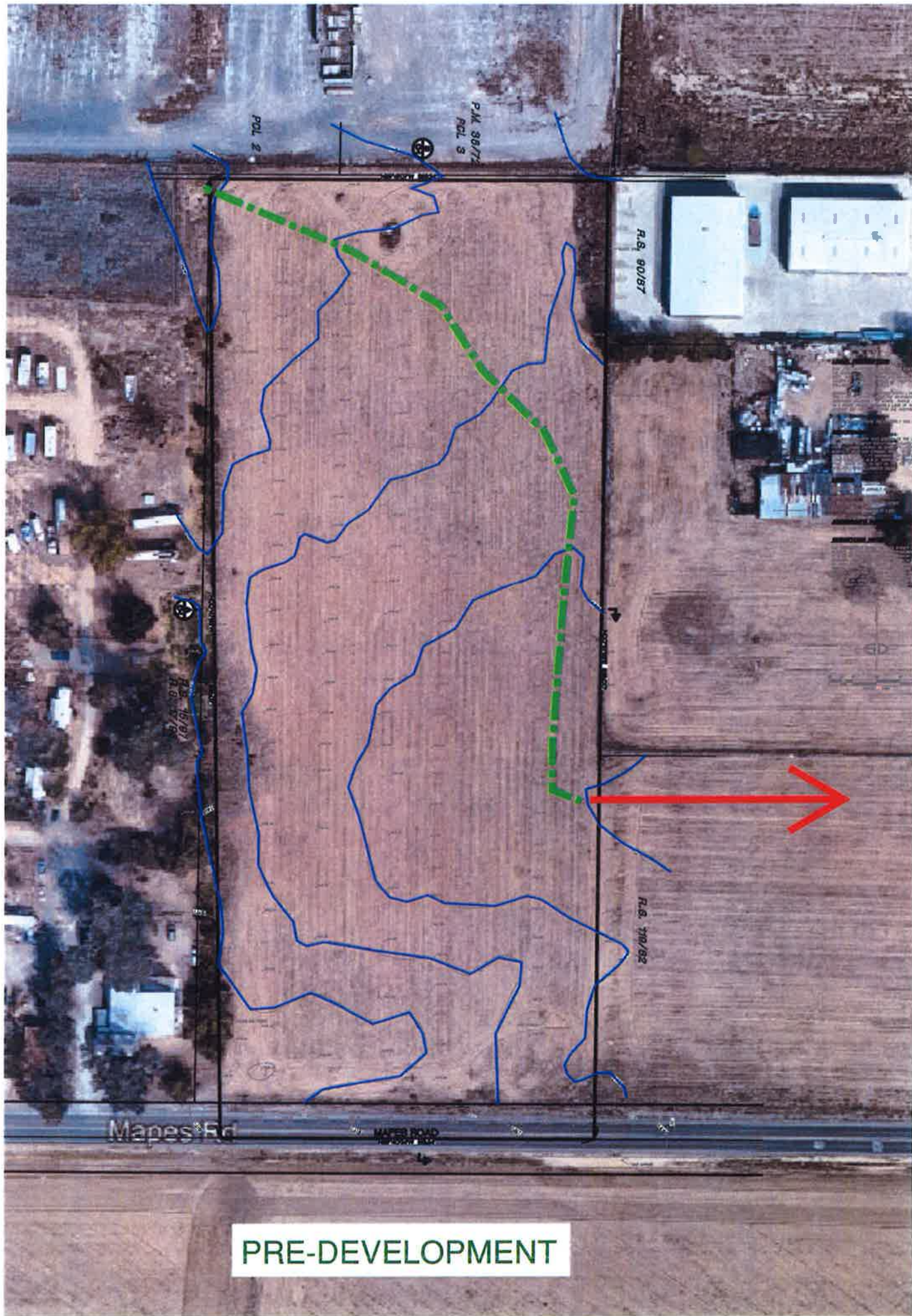
S 2nd St

S 1st St

S 1st St

S 1st St

S 1st St

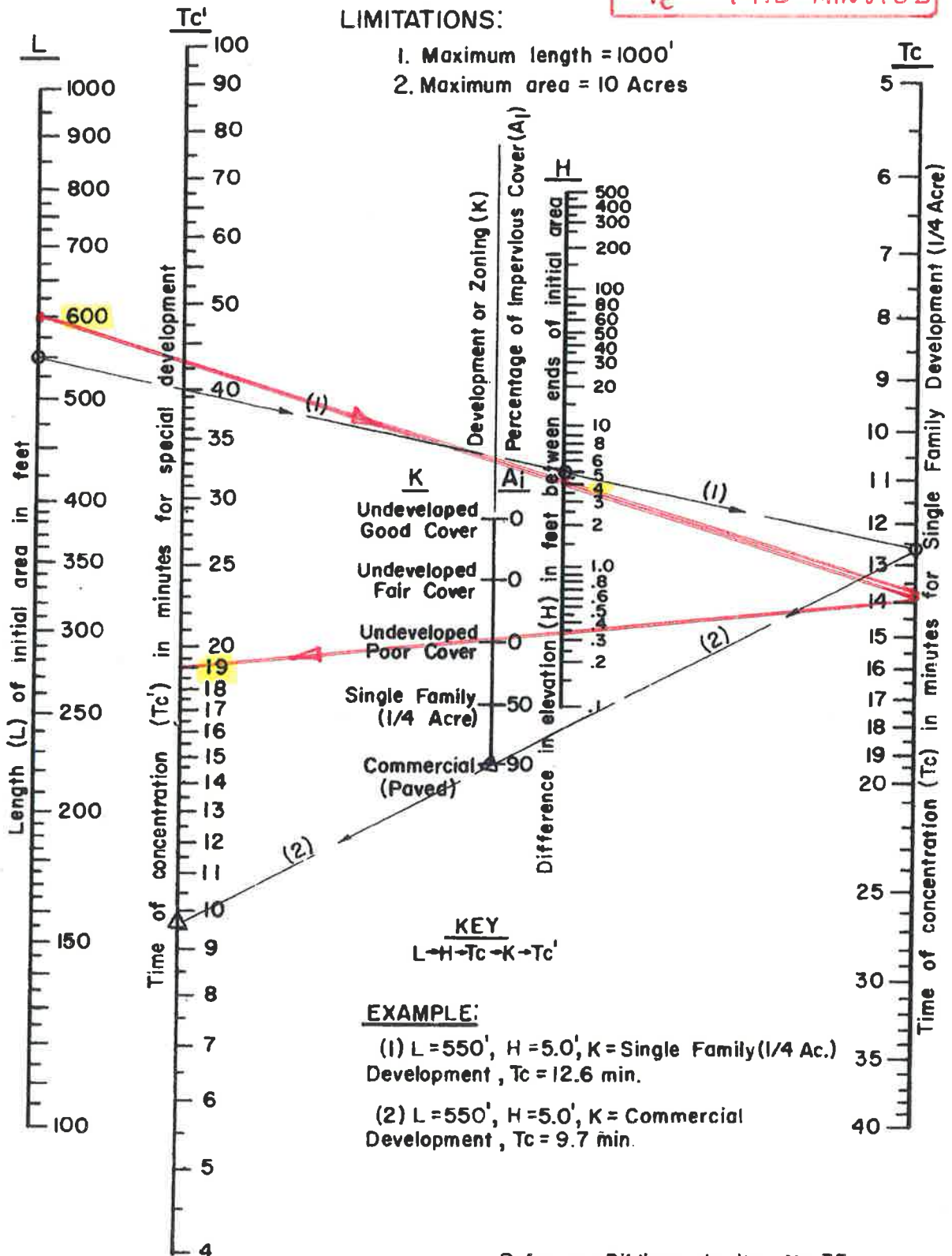


PRE-DEVELOPMENT

$T_c = 19.0$ MINUTES

LIMITATIONS:

1. Maximum length = 1000'
2. Maximum area = 10 Acres



EXAMPLE:

(1) $L = 550'$, $H = 5.0'$, $K = \text{Single Family (1/4 Ac.)}$
 Development, $T_c = 12.6$ min.

(2) $L = 550'$, $H = 5.0'$, $K = \text{Commercial Development}$, $T_c = 9.7$ min.

Reference: Bibliography item No. 35.

RCFC & WCD
 HYDROLOGY MANUAL

**TIME OF CONCENTRATION
 FOR INITIAL SUBAREA**

Hydrograph Plot

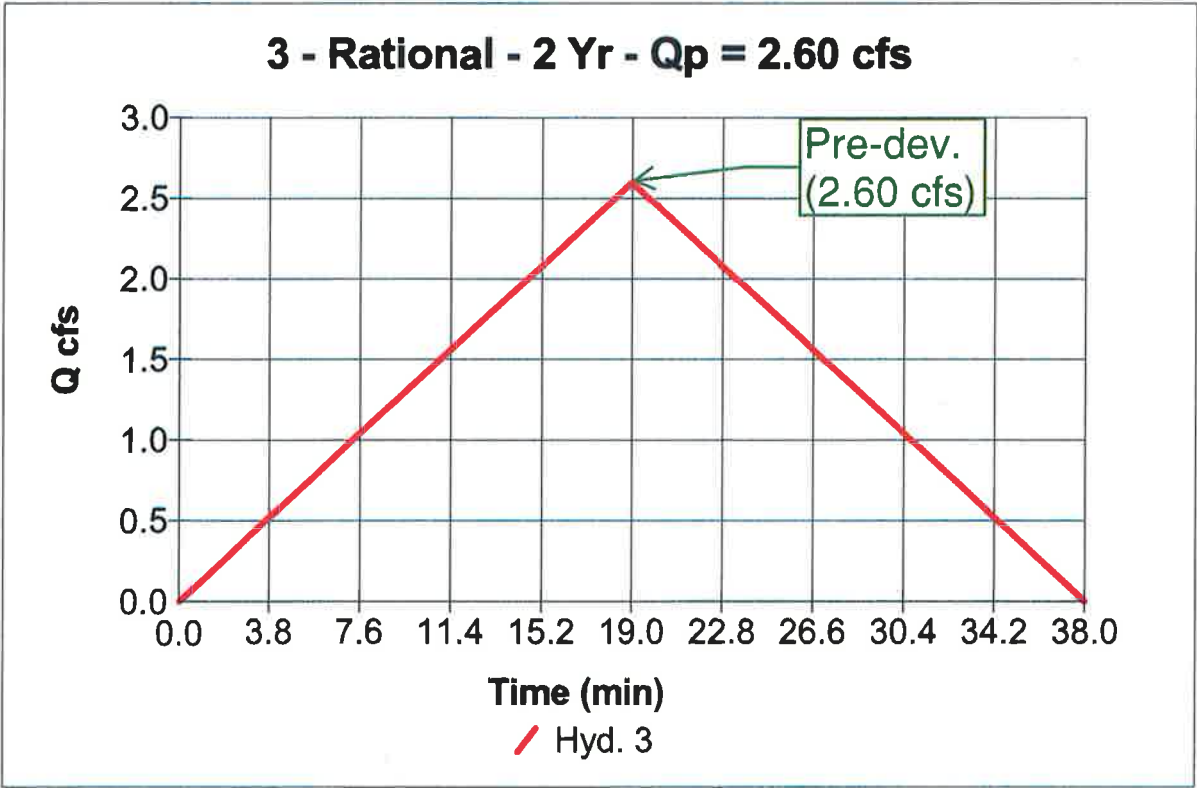
Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Pre-development

Hydrograph type	= Rational	Peak discharge	= 2.60 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 5.7 ac	Runoff coeff.	= 0.59
Intensity	= 0.775 in/hr	Time of conc. (Tc)	= 19 min
IDF Curve	= Mapes Rd 2YR 24HR.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 2,960 cuft



Hydrograph Report

Page 1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Pre-development

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 5.7 ac
Intensity = 0.775 in/hr
IDF Curve = Mapes Rd 2YR 24HR.idf

Peak discharge = 2.60 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Time of conc. (Tc) = 19 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,960 cuft

Hydrograph Discharge Table

Time -- Outflow (min cfs)	Time -- Outflow (min cfs)
------------------------------	------------------------------

1 0.14	35 0.41
2 0.27	36 0.27
3 0.41	37 0.14

4 0.55

5 0.68

6 0.82

7 0.96

8 1.09

9 1.23

10 1.37

11 1.50

12 1.64

13 1.78

14 1.91

15 2.05

16 2.19

17 2.32

18 2.46

19 2.60

20 2.46

21 2.32

22 2.19

23 2.05

24 1.91

25 1.78

26 1.64

27 1.50

28 1.37

29 1.23

30 1.09

31 0.96

32 0.82

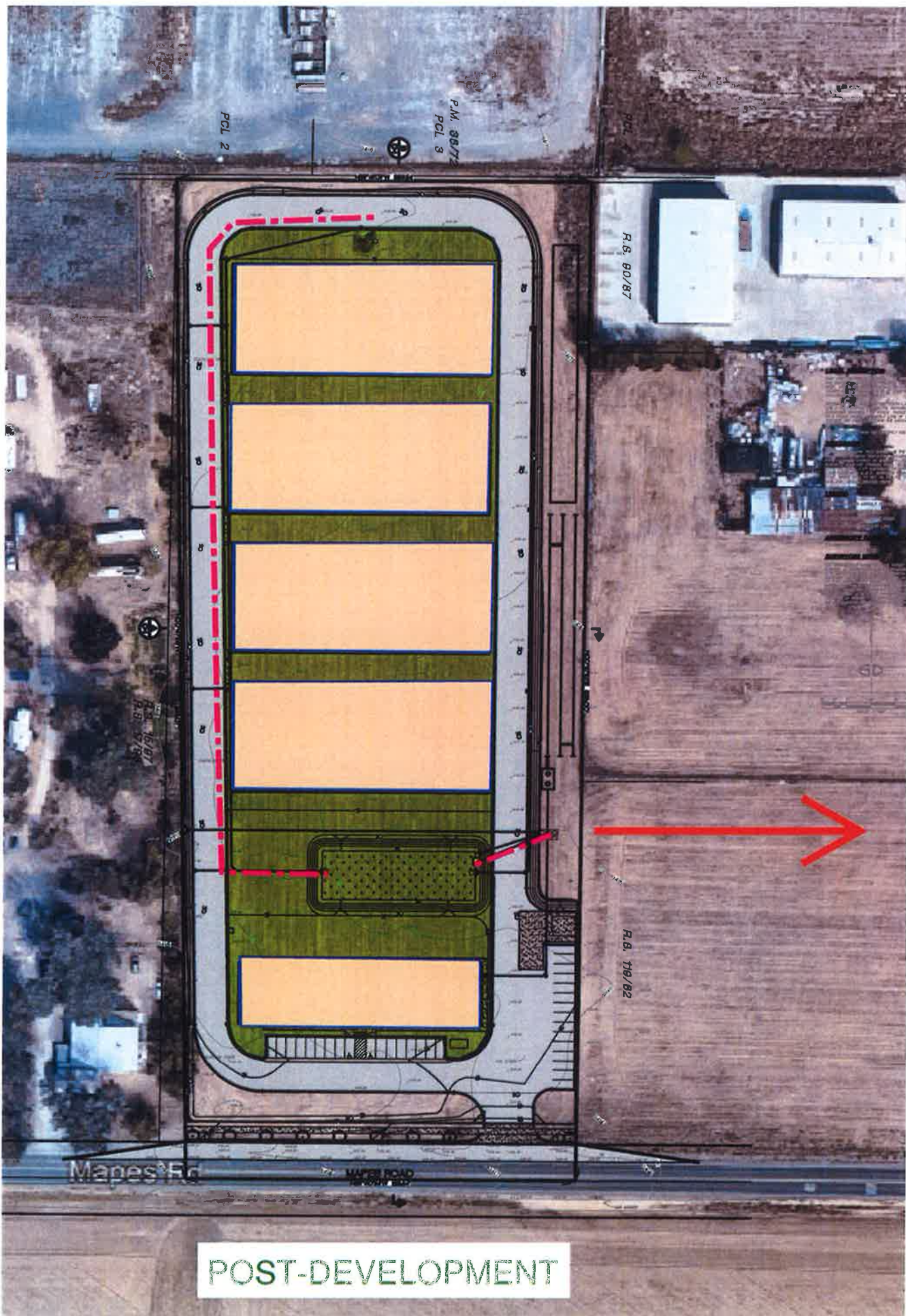
33 0.68

34 0.55

...End

Pre-dev. Tc
(19 min)

Pre-dev.
(2.60 cfs)



POST-DEVELOPMENT

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

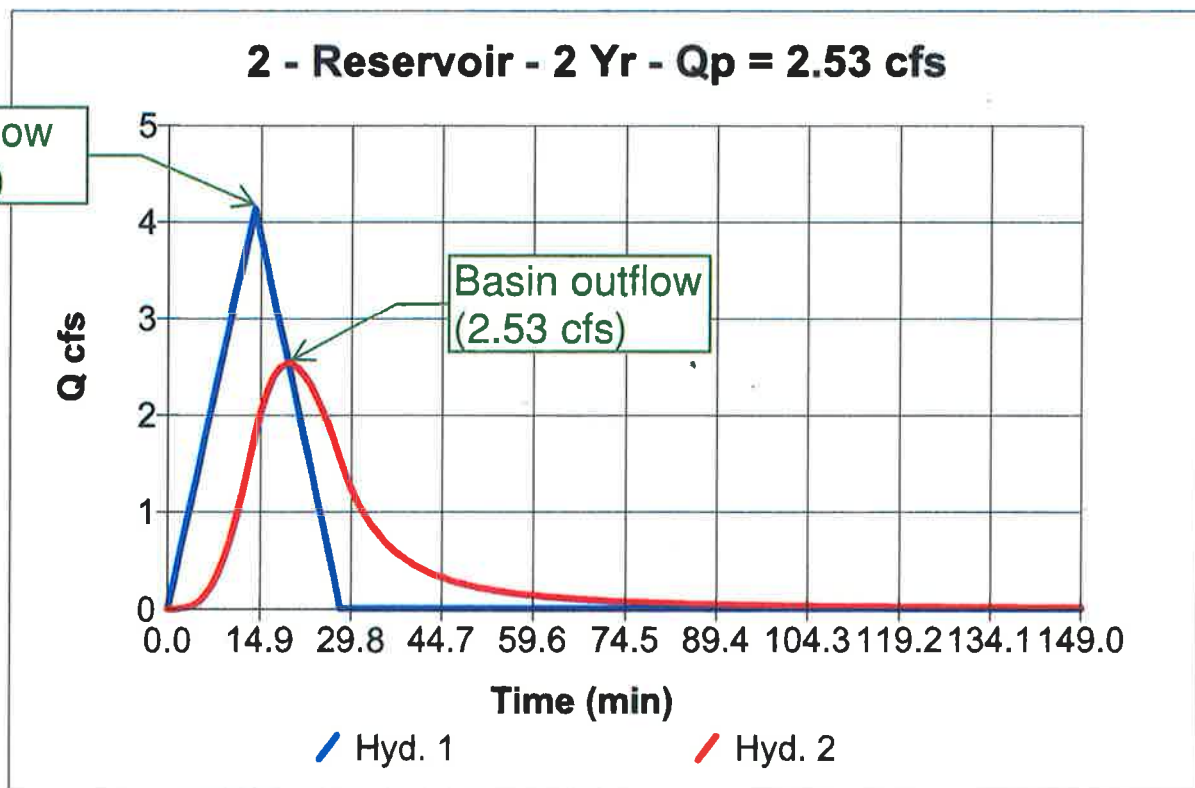
biotreatment basin 1

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Max. Elevation = 14.36 ft

Peak discharge = 2.53 cfs
Time interval = 1 min
Reservoir name = Biotreatment BM
Max. Storage = 1,676 cuft

Storage Indicellon method used.

Hydrograph Volume = 3,454 cuft



Hydrograph Report

Page 1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

biotreatment basin 1

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Max. Elevation = 14.36 ft

Peak discharge = 2.53 cfs
Time interval = 1 min
Reservoir name = Biotreatment BMP
Max. Storage = 1,676 cuft

Storage Indication method used.

Outflow hydrograph volume = 3,454 cuft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4	1.18	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
5	1.47	14.05	0.04	----	----	----	0.03	----	----	----	----	0.07
6	1.77	14.07	0.08	----	----	----	0.06	----	----	----	----	0.14
7	2.06	14.09	0.14	----	----	----	0.09	----	----	----	----	0.23
8	2.36	14.11	0.23	----	----	----	0.13	----	----	----	----	0.36
9	2.65	14.14	0.34	----	----	----	0.17	----	----	----	----	0.52
10	2.95	14.17	0.48	----	----	----	0.23	----	----	----	----	0.71
11	3.24	14.20	0.65	----	----	----	0.29	----	----	----	----	0.94
12	3.54	14.23	0.84	----	----	----	0.36	----	----	----	----	1.20
13	3.83	14.26	1.05	----	----	----	0.43	----	----	----	----	1.48
14	4.13	14.29	1.27	----	----	----	0.51	----	----	----	----	1.77
15	3.83	14.31	1.47	----	----	----	0.58	----	----	----	----	2.05
16	3.54	14.33	1.62	----	----	----	0.63	----	----	----	----	2.25
17	3.24	14.34	1.73	----	----	----	0.67	----	----	----	----	2.40
18	2.95	14.35	1.79	----	----	----	0.70	----	----	----	----	2.49
19	2.65	14.36 <<	1.82	----	----	----	0.71	----	----	----	----	2.53 <<
20	2.36	14.36	1.82	----	----	----	0.71	----	----	----	----	2.52
21	2.06	14.35	1.79	----	----	----	0.69	----	----	----	----	2.48
22	1.77	14.35	1.74	----	----	----	0.68	----	----	----	----	2.41
23	1.47	14.34	1.66	----	----	----	0.65	----	----	----	----	2.31
24	1.18	14.32	1.57	----	----	----	0.62	----	----	----	----	2.18
25	0.88	14.31	1.46	----	----	----	0.58	----	----	----	----	2.04
26	0.59	14.30	1.34	----	----	----	0.54	----	----	----	----	1.88
27	0.29	14.28	1.21	----	----	----	0.49	----	----	----	----	1.70
28	0.00	14.26	1.08	----	----	----	0.44	----	----	----	----	1.52
29	0.00	14.24	0.95	----	----	----	0.40	----	----	----	----	1.35
30	0.00	14.23	0.84	----	----	----	0.36	----	----	----	----	1.20
31	0.00	14.21	0.74	----	----	----	0.32	----	----	----	----	1.07
32	0.00	14.20	0.66	----	----	----	0.30	----	----	----	----	0.96
33	0.00	14.19	0.59	----	----	----	0.27	----	----	----	----	0.86
34	0.00	14.18	0.53	----	----	----	0.25	----	----	----	----	0.78
35	0.00	14.17	0.48	----	----	----	0.23	----	----	----	----	0.71
36	0.00	14.16	0.44	----	----	----	0.21	----	----	----	----	0.65
37	0.00	14.15	0.40	----	----	----	0.19	----	----	----	----	0.59
38	0.00	14.14	0.36	----	----	----	0.18	----	----	----	----	0.54
39	0.00	14.14	0.33	----	----	----	0.17	----	----	----	----	0.50
40	0.00	14.13	0.30	----	----	----	0.16	----	----	----	----	0.46
41	0.00	14.13	0.28	----	----	----	0.15	----	----	----	----	0.42

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
42	0.00	14.12	0.26	----	----	----	0.14	----	----	----	----	0.39
43	0.00	14.11	0.24	----	----	----	0.13	----	----	----	----	0.37
44	0.00	14.11	0.22	----	----	----	0.12	----	----	----	----	0.34
45	0.00	14.11	0.20	----	----	----	0.12	----	----	----	----	0.32
46	0.00	14.10	0.19	----	----	----	0.11	----	----	----	----	0.30
47	0.00	14.10	0.18	----	----	----	0.10	----	----	----	----	0.28
48	0.00	14.09	0.16	----	----	----	0.10	----	----	----	----	0.26
49	0.00	14.09	0.15	----	----	----	0.09	----	----	----	----	0.25
50	0.00	14.09	0.14	----	----	----	0.09	----	----	----	----	0.23
51	0.00	14.09	0.13	----	----	----	0.08	----	----	----	----	0.22
52	0.00	14.08	0.13	----	----	----	0.08	----	----	----	----	0.21
53	0.00	14.08	0.12	----	----	----	0.08	----	----	----	----	0.19
54	0.00	14.08	0.11	----	----	----	0.07	----	----	----	----	0.18
55	0.00	14.08	0.11	----	----	----	0.07	----	----	----	----	0.17
56	0.00	14.07	0.10	----	----	----	0.07	----	----	----	----	0.17
57	0.00	14.07	0.09	----	----	----	0.06	----	----	----	----	0.16
58	0.00	14.07	0.09	----	----	----	0.06	----	----	----	----	0.15
59	0.00	14.07	0.08	----	----	----	0.06	----	----	----	----	0.14
60	0.00	14.07	0.08	----	----	----	0.06	----	----	----	----	0.14
61	0.00	14.06	0.08	----	----	----	0.05	----	----	----	----	0.13
62	0.00	14.06	0.07	----	----	----	0.05	----	----	----	----	0.12
63	0.00	14.06	0.07	----	----	----	0.05	----	----	----	----	0.12
64	0.00	14.06	0.07	----	----	----	0.05	----	----	----	----	0.11
65	0.00	14.06	0.06	----	----	----	0.05	----	----	----	----	0.11
66	0.00	14.06	0.06	----	----	----	0.04	----	----	----	----	0.10
67	0.00	14.06	0.06	----	----	----	0.04	----	----	----	----	0.10
68	0.00	14.05	0.05	----	----	----	0.04	----	----	----	----	0.10
69	0.00	14.05	0.05	----	----	----	0.04	----	----	----	----	0.09
70	0.00	14.05	0.05	----	----	----	0.04	----	----	----	----	0.09
71	0.00	14.05	0.05	----	----	----	0.04	----	----	----	----	0.09
72	0.00	14.05	0.05	----	----	----	0.04	----	----	----	----	0.08
73	0.00	14.05	0.04	----	----	----	0.04	----	----	----	----	0.08
74	0.00	14.05	0.04	----	----	----	0.03	----	----	----	----	0.08
75	0.00	14.05	0.04	----	----	----	0.03	----	----	----	----	0.07
76	0.00	14.05	0.04	----	----	----	0.03	----	----	----	----	0.07
77	0.00	14.04	0.04	----	----	----	0.03	----	----	----	----	0.07
78	0.00	14.04	0.04	----	----	----	0.03	----	----	----	----	0.07
79	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.06
80	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.06
81	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.06
82	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.06
83	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.06
84	0.00	14.04	0.03	----	----	----	0.03	----	----	----	----	0.05
85	0.00	14.04	0.03	----	----	----	0.02	----	----	----	----	0.05
86	0.00	14.04	0.03	----	----	----	0.02	----	----	----	----	0.05
87	0.00	14.04	0.03	----	----	----	0.02	----	----	----	----	0.05
88	0.00	14.04	0.02	----	----	----	0.02	----	----	----	----	0.05
89	0.00	14.04	0.02	----	----	----	0.02	----	----	----	----	0.05
90	0.00	14.04	0.02	----	----	----	0.02	----	----	----	----	0.04
91	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
92	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
93	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
94	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
95	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
96	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
97	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
98	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
99	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.04
100	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
101	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
102	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
103	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
104	0.00	14.03	0.02	----	----	----	0.02	----	----	----	----	0.03
105	0.00	14.03	0.01	----	----	----	0.02	----	----	----	----	0.03
106	0.00	14.03	0.01	----	----	----	0.02	----	----	----	----	0.03
107	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03
108	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03
109	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03
110	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03
111	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03
112	0.00	14.03	0.01	----	----	----	0.01	----	----	----	----	0.03

...End

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

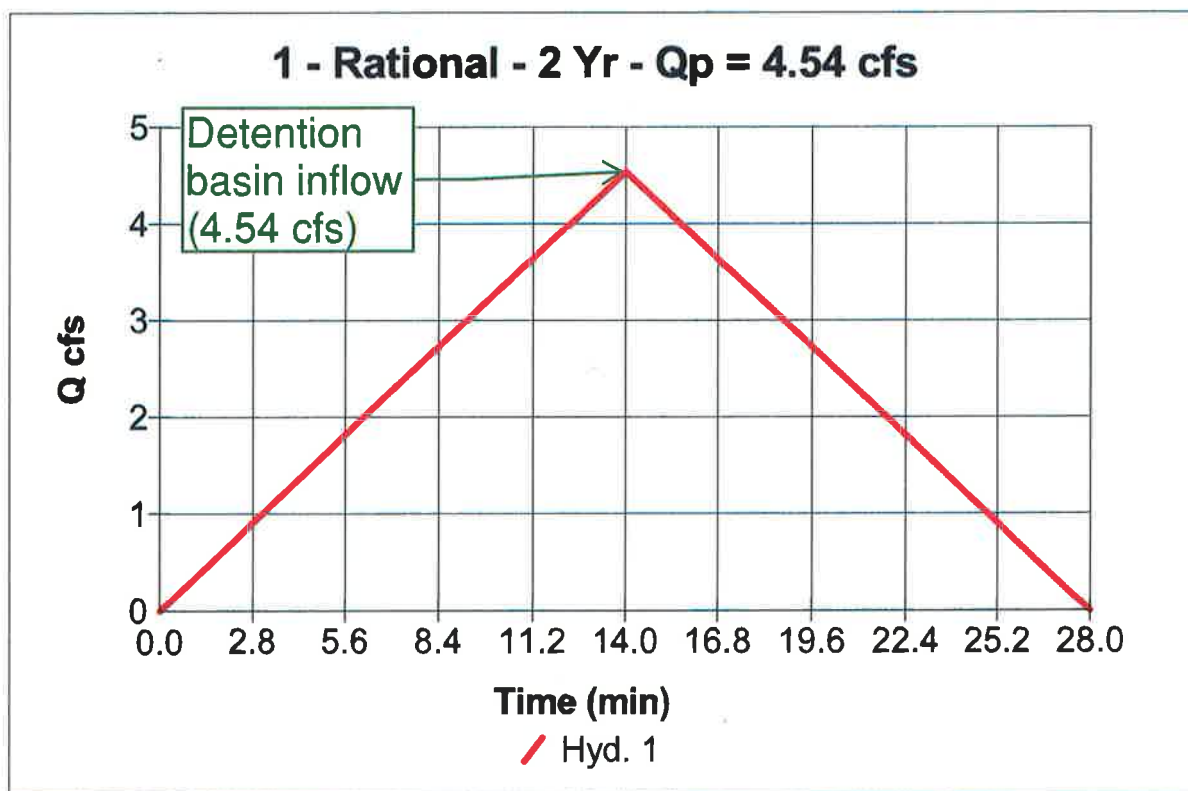
Hyd. No. 1

basin 1

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 5.7 ac
Intensity = 0.897 in/hr
IDF Curve = Mapes Rd 2YR 24HR.idf

Peak discharge = 4.54 cfs
Time interval = 1 min
Runoff coeff. = 0.89
Time of conc. (Tc) = 14 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 3,810 cuft



Hydrograph Report

Page 1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

basin 1

Hydrograph type	= Rational	Peak discharge	= 4.54 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 5.7 ac	Runoff coeff.	= 0.89
Intensity	= 0.897 in/hr	Time of conc. (Tc)	= 14 min
IDF Curve	= Mapes Rd 2YR 24HR.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 3,810 cuft

Hydrograph Discharge Table

Time -- Outflow
(min cfs)

1	0.32
2	0.65
3	0.97
4	1.30
5	1.62
6	1.94
7	2.27
8	2.59
9	2.92
10	3.24
11	3.56
12	3.89
13	4.21
14	4.54 <<
15	4.21
16	3.89
17	3.56
18	3.24
19	2.92
20	2.59
21	2.27
22	1.94
23	1.62
24	1.30
25	0.97
26	0.65
27	0.32

Detention
basin inflow
(4.54 cfs)

...End

Reservoir Report

Page 1

Reservoir No. 1 - Biotreatment BMP 1

Hydraflow Hydrographs by Intelisolve

Pond Data

Bottom LxW = 115.0 x 40.0 ft Side slope = 2.0:1 Bottom elev. = 14.00 ft Depth = 1.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	14.00	4,600	0	0
0.05	14.05	4,631	231	231
0.10	14.10	4,662	232	463
0.15	14.15	4,693	234	697
0.20	14.20	4,725	235	932
0.25	14.25	4,756	237	1,169
0.30	14.30	4,787	239	1,408
0.35	14.35	4,819	240	1,648
0.40	14.40	4,851	242	1,890
0.45	14.45	4,882	243	2,133
0.50	14.50	4,914	245	2,378
0.55	14.55	4,946	246	2,625
0.60	14.60	4,978	248	2,873
0.65	14.65	5,010	250	3,122
0.70	14.70	5,042	251	3,374
0.75	14.75	5,074	253	3,627
0.80	14.80	5,106	255	3,881
0.85	14.85	5,139	256	4,137
0.90	14.90	5,171	258	4,395
0.95	14.95	5,203	259	4,654
1.00	15.00	5,236	261	4,915

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 6.0	12.0	0.0	0.0
Span in	= 6.0	12.0	0.0	0.0
No. Barrels	= 6	1	0	0
Invert El. ft	= 14.00	16.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 1.00	8.00	0.00	0.00
Crest El. ft	= 14.00	16.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	14.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
0.01	23	14.01	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
0.01	46	14.01	0.00	0.00	---	---	0.00	0.00	---	---	---	0.01
0.02	69	14.02	0.00	0.00	---	---	0.01	0.00	---	---	---	0.01
0.02	92	14.02	0.01	0.00	---	---	0.01	0.00	---	---	---	0.02
0.03	115	14.03	0.01	0.00	---	---	0.01	0.00	---	---	---	0.03
0.03	138	14.03	0.02	0.00	---	---	0.02	0.00	---	---	---	0.03
0.04	162	14.04	0.02	0.00	---	---	0.02	0.00	---	---	---	0.04
0.04	185	14.04	0.03	0.00	---	---	0.03	0.00	---	---	---	0.06
0.04	208	14.05	0.04	0.00	---	---	0.03	0.00	---	---	---	0.07
0.05	231	14.05	0.05	0.00	---	---	0.04	0.00	---	---	---	0.08
0.06	254	14.06	0.06	0.00	---	---	0.04	0.00	---	---	---	0.10
0.06	277	14.06	0.07	0.00	---	---	0.05	0.00	---	---	---	0.12
0.07	300	14.07	0.08	0.00	---	---	0.06	0.00	---	---	---	0.13
0.07	324	14.07	0.09	0.00	---	---	0.06	0.00	---	---	---	0.15
0.08	347	14.08	0.10	0.00	---	---	0.07	0.00	---	---	---	0.17
0.08	370	14.08	0.12	0.00	---	---	0.08	0.00	---	---	---	0.19

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.09	393	14.09	0.13	0.00	---	---	0.08	0.00	---	---	---	0.21
0.09	417	14.09	0.15	0.00	---	---	0.09	0.00	---	---	---	0.24
0.10	440	14.10	0.16	0.00	---	---	0.10	0.00	---	---	---	0.26
0.10	463	14.10	0.18	0.00	---	---	0.11	0.00	---	---	---	0.29
0.11	486	14.11	0.20	0.00	---	---	0.11	0.00	---	---	---	0.31
0.11	510	14.11	0.22	0.00	---	---	0.12	0.00	---	---	---	0.34
0.12	533	14.12	0.24	0.00	---	---	0.13	0.00	---	---	---	0.37
0.12	557	14.12	0.26	0.00	---	---	0.14	0.00	---	---	---	0.39
0.13	580	14.13	0.28	0.00	---	---	0.15	0.00	---	---	---	0.42
0.13	603	14.13	0.30	0.00	---	---	0.16	0.00	---	---	---	0.46
0.14	627	14.14	0.32	0.00	---	---	0.17	0.00	---	---	---	0.49
0.14	650	14.14	0.34	0.00	---	---	0.17	0.00	---	---	---	0.52
0.15	674	14.15	0.37	0.00	---	---	0.18	0.00	---	---	---	0.55
0.15	697	14.15	0.39	0.00	---	---	0.19	0.00	---	---	---	0.59
0.16	721	14.16	0.42	0.00	---	---	0.20	0.00	---	---	---	0.62
0.16	744	14.16	0.44	0.00	---	---	0.21	0.00	---	---	---	0.66
0.17	768	14.17	0.47	0.00	---	---	0.22	0.00	---	---	---	0.69
0.17	791	14.17	0.50	0.00	---	---	0.23	0.00	---	---	---	0.73
0.18	815	14.18	0.52	0.00	---	---	0.24	0.00	---	---	---	0.77
0.18	838	14.18	0.55	0.00	---	---	0.25	0.00	---	---	---	0.81
0.19	862	14.19	0.58	0.00	---	---	0.26	0.00	---	---	---	0.85
0.19	885	14.19	0.61	0.00	---	---	0.28	0.00	---	---	---	0.89
0.20	909	14.20	0.64	0.00	---	---	0.29	0.00	---	---	---	0.93
0.20	932	14.20	0.67	0.00	---	---	0.30	0.00	---	---	---	0.97
0.21	956	14.21	0.70	0.00	---	---	0.31	0.00	---	---	---	1.01
0.21	980	14.21	0.73	0.00	---	---	0.32	0.00	---	---	---	1.05
0.22	1,004	14.22	0.77	0.00	---	---	0.33	0.00	---	---	---	1.10
0.22	1,027	14.22	0.80	0.00	---	---	0.34	0.00	---	---	---	1.14
0.23	1,051	14.23	0.83	0.00	---	---	0.36	0.00	---	---	---	1.19
0.23	1,075	14.23	0.87	0.00	---	---	0.37	0.00	---	---	---	1.23
0.24	1,098	14.24	0.90	0.00	---	---	0.38	0.00	---	---	---	1.28
0.24	1,122	14.24	0.93	0.00	---	---	0.39	0.00	---	---	---	1.32
0.25	1,146	14.25	0.97	0.00	---	---	0.40	0.00	---	---	---	1.37
0.25	1,169	14.25	1.00	0.00	---	---	0.42	0.00	---	---	---	1.42
0.26	1,193	14.26	1.04	0.00	---	---	0.43	0.00	---	---	---	1.47
0.26	1,217	14.26	1.08	0.00	---	---	0.44	0.00	---	---	---	1.52
0.27	1,241	14.27	1.11	0.00	---	---	0.45	0.00	---	---	---	1.57
0.27	1,265	14.27	1.15	0.00	---	---	0.47	0.00	---	---	---	1.62
0.28	1,289	14.28	1.19	0.00	---	---	0.48	0.00	---	---	---	1.67
0.28	1,313	14.28	1.22	0.00	---	---	0.49	0.00	---	---	---	1.72
0.29	1,336	14.29	1.26	0.00	---	---	0.51	0.00	---	---	---	1.77
0.29	1,360	14.29	1.30	0.00	---	---	0.52	0.00	---	---	---	1.82
0.30	1,384	14.30	1.34	0.00	---	---	0.53	0.00	---	---	---	1.87
0.30	1,408	14.30	1.38	0.00	---	---	0.55	0.00	---	---	---	1.93
0.31	1,432	14.31	1.42	0.00	---	---	0.56	0.00	---	---	---	1.98
0.31	1,456	14.31	1.46	0.00	---	---	0.57	0.00	---	---	---	2.03
0.32	1,480	14.32	1.50	0.00	---	---	0.59	0.00	---	---	---	2.08
0.32	1,504	14.32	1.53	0.00	---	---	0.60	0.00	---	---	---	2.14
0.33	1,528	14.33	1.57	0.00	---	---	0.62	0.00	---	---	---	2.19
0.33	1,552	14.33	1.61	0.00	---	---	0.63	0.00	---	---	---	2.25
0.34	1,576	14.34	1.65	0.00	---	---	0.65	0.00	---	---	---	2.30
0.34	1,600	14.34	1.69	0.00	---	---	0.66	0.00	---	---	---	2.35
0.35	1,624	14.35	1.74	0.00	---	---	0.67	0.00	---	---	---	2.41
0.35	1,648	14.35	1.77	0.00	---	---	0.69	0.00	---	---	---	2.46
0.36	1,672	14.36	1.81	0.00	---	---	0.70	0.00	---	---	---	2.52
0.36	1,697	14.36	1.86	0.00	---	---	0.72	0.00	---	---	---	2.58
0.37	1,721	14.37	1.90	0.00	---	---	0.73	0.00	---	---	---	2.63
0.37	1,745	14.37	1.94	0.00	---	---	0.75	0.00	---	---	---	2.69
0.38	1,769	14.38	1.98	0.00	---	---	0.76	0.00	---	---	---	2.74
0.38	1,793	14.38	2.02	0.00	---	---	0.78	0.00	---	---	---	2.80
0.39	1,817	14.39	2.06	0.00	---	---	0.80	0.00	---	---	---	2.85
0.39	1,842	14.39	2.10	0.00	---	---	0.81	0.00	---	---	---	2.91
0.40	1,866	14.40	2.14	0.00	---	---	0.83	0.00	---	---	---	2.96
0.40	1,890	14.40	2.18	0.00	---	---	0.84	0.00	---	---	---	3.02
0.41	1,914	14.41	2.22	0.00	---	---	0.86	0.00	---	---	---	3.07
0.41	1,939	14.41	2.26	0.00	---	---	0.87	0.00	---	---	---	3.13
0.42	1,963	14.42	2.29	0.00	---	---	0.89	0.00	---	---	---	3.18
0.42	1,987	14.42	2.33	0.00	---	---	0.91	0.00	---	---	---	3.24
0.43	2,012	14.43	2.37	0.00	---	---	0.92	0.00	---	---	---	3.29
0.43	2,036	14.43	2.41	0.00	---	---	0.94	0.00	---	---	---	3.35

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.44	2,060	14.44	2.44	0.00	---	---	0.96	0.00	---	---	---	3.40
0.44	2,085	14.44	2.48	0.00	---	---	0.97	0.00	---	---	---	3.45
0.45	2,109	14.45	2.52	0.00	---	---	0.99	0.00	---	---	---	3.50
0.45	2,133	14.45	2.55	0.00	---	---	1.01	0.00	---	---	---	3.56
0.46	2,158	14.46	2.59	0.00	---	---	1.02	0.00	---	---	---	3.61
0.46	2,182	14.46	2.62	0.00	---	---	1.04	0.00	---	---	---	3.66
0.47	2,207	14.47	2.65	0.00	---	---	1.06	0.00	---	---	---	3.71
0.47	2,231	14.47	2.68	0.00	---	---	1.07	0.00	---	---	---	3.76
0.48	2,256	14.48	2.71	0.00	---	---	1.09	0.00	---	---	---	3.80
0.48	2,280	14.48	2.74	0.00	---	---	1.11	0.00	---	---	---	3.85
0.49	2,305	14.49	2.77	0.00	---	---	1.12	0.00	---	---	---	3.89
0.49	2,329	14.49	2.79	0.00	---	---	1.14	0.00	---	---	---	3.94
0.50	2,354	14.50	2.82	0.00	---	---	1.16	0.00	---	---	---	3.98
0.50	2,378	14.50	2.84	0.00	---	---	1.18	0.00	---	---	---	4.01
0.51	2,403	14.51	2.86	0.00	---	---	1.20	0.00	---	---	---	4.06
0.51	2,427	14.51	2.89	0.00	---	---	1.21	0.00	---	---	---	4.10
0.52	2,452	14.52	2.92	0.00	---	---	1.23	0.00	---	---	---	4.15
0.52	2,477	14.52	2.95	0.00	---	---	1.25	0.00	---	---	---	4.20
0.53	2,501	14.53	2.97	0.00	---	---	1.27	0.00	---	---	---	4.24
0.53	2,526	14.53	3.00	0.00	---	---	1.28	0.00	---	---	---	4.29
0.54	2,551	14.54	3.03	0.00	---	---	1.30	0.00	---	---	---	4.33
0.54	2,575	14.54	3.05	0.00	---	---	1.32	0.00	---	---	---	4.38
0.55	2,600	14.55	3.08	0.00	---	---	1.34	0.00	---	---	---	4.42
0.55	2,625	14.55	3.11	0.00	---	---	1.36	0.00	---	---	---	4.46
0.56	2,649	14.56	3.13	0.00	---	---	1.38	0.00	---	---	---	4.51
0.56	2,674	14.56	3.16	0.00	---	---	1.40	0.00	---	---	---	4.55
0.57	2,699	14.57	3.18	0.00	---	---	1.41	0.00	---	---	---	4.60
0.57	2,724	14.57	3.21	0.00	---	---	1.43	0.00	---	---	---	4.64
0.58	2,749	14.58	3.23	0.00	---	---	1.45	0.00	---	---	---	4.69
0.58	2,774	14.58	3.26	0.00	---	---	1.47	0.00	---	---	---	4.73
0.59	2,798	14.59	3.28	0.00	---	---	1.49	0.00	---	---	---	4.77
0.59	2,823	14.59	3.31	0.00	---	---	1.51	0.00	---	---	---	4.82
0.60	2,848	14.60	3.33	0.00	---	---	1.53	0.00	---	---	---	4.86
0.60	2,873	14.60	3.36	0.00	---	---	1.55	0.00	---	---	---	4.90
0.61	2,898	14.61	3.38	0.00	---	---	1.57	0.00	---	---	---	4.95
0.61	2,923	14.61	3.40	0.00	---	---	1.59	0.00	---	---	---	4.99
0.62	2,948	14.62	3.43	0.00	---	---	1.61	0.00	---	---	---	5.03
0.62	2,973	14.62	3.45	0.00	---	---	1.63	0.00	---	---	---	5.08
0.63	2,998	14.63	3.47	0.00	---	---	1.65	0.00	---	---	---	5.12
0.63	3,023	14.63	3.50	0.00	---	---	1.67	0.00	---	---	---	5.16
0.64	3,048	14.64	3.52	0.00	---	---	1.69	0.00	---	---	---	5.20
0.64	3,073	14.64	3.54	0.00	---	---	1.70	0.00	---	---	---	5.25
0.65	3,097	14.65	3.56	0.00	---	---	1.72	0.00	---	---	---	5.29
0.65	3,122	14.65	3.59	0.00	---	---	1.75	0.00	---	---	---	5.33
0.66	3,148	14.66	3.61	0.00	---	---	1.77	0.00	---	---	---	5.37
0.66	3,173	14.66	3.63	0.00	---	---	1.79	0.00	---	---	---	5.42
0.67	3,198	14.67	3.65	0.00	---	---	1.81	0.00	---	---	---	5.46
0.67	3,223	14.67	3.68	0.00	---	---	1.83	0.00	---	---	---	5.50
0.68	3,248	14.68	3.70	0.00	---	---	1.85	0.00	---	---	---	5.54
0.68	3,273	14.68	3.72	0.00	---	---	1.87	0.00	---	---	---	5.59
0.69	3,298	14.69	3.74	0.00	---	---	1.89	0.00	---	---	---	5.63
0.69	3,323	14.69	3.76	0.00	---	---	1.91	0.00	---	---	---	5.67
0.70	3,349	14.70	3.78	0.00	---	---	1.93	0.00	---	---	---	5.71
0.70	3,374	14.70	3.80	0.00	---	---	1.95	0.00	---	---	---	5.76
0.71	3,399	14.71	3.83	0.00	---	---	1.97	0.00	---	---	---	5.80
0.71	3,424	14.71	3.85	0.00	---	---	1.99	0.00	---	---	---	5.84
0.72	3,450	14.72	3.87	0.00	---	---	2.01	0.00	---	---	---	5.88
0.72	3,475	14.72	3.89	0.00	---	---	2.03	0.00	---	---	---	5.92
0.73	3,500	14.73	3.91	0.00	---	---	2.06	0.00	---	---	---	5.96
0.73	3,525	14.73	3.93	0.00	---	---	2.08	0.00	---	---	---	6.01
0.74	3,551	14.74	3.95	0.00	---	---	2.10	0.00	---	---	---	6.05
0.74	3,576	14.74	3.97	0.00	---	---	2.12	0.00	---	---	---	6.09
0.75	3,601	14.75	3.99	0.00	---	---	2.14	0.00	---	---	---	6.13
0.75	3,627	14.75	4.01	0.00	---	---	2.16	0.00	---	---	---	6.17
0.76	3,652	14.76	4.03	0.00	---	---	2.18	0.00	---	---	---	6.22
0.76	3,678	14.76	4.05	0.00	---	---	2.21	0.00	---	---	---	6.26
0.77	3,703	14.77	4.07	0.00	---	---	2.23	0.00	---	---	---	6.30
0.77	3,728	14.77	4.09	0.00	---	---	2.25	0.00	---	---	---	6.34
0.78	3,754	14.78	4.11	0.00	---	---	2.27	0.00	---	---	---	6.38
0.78	3,779	14.78	4.13	0.00	---	---	2.29	0.00	---	---	---	6.42

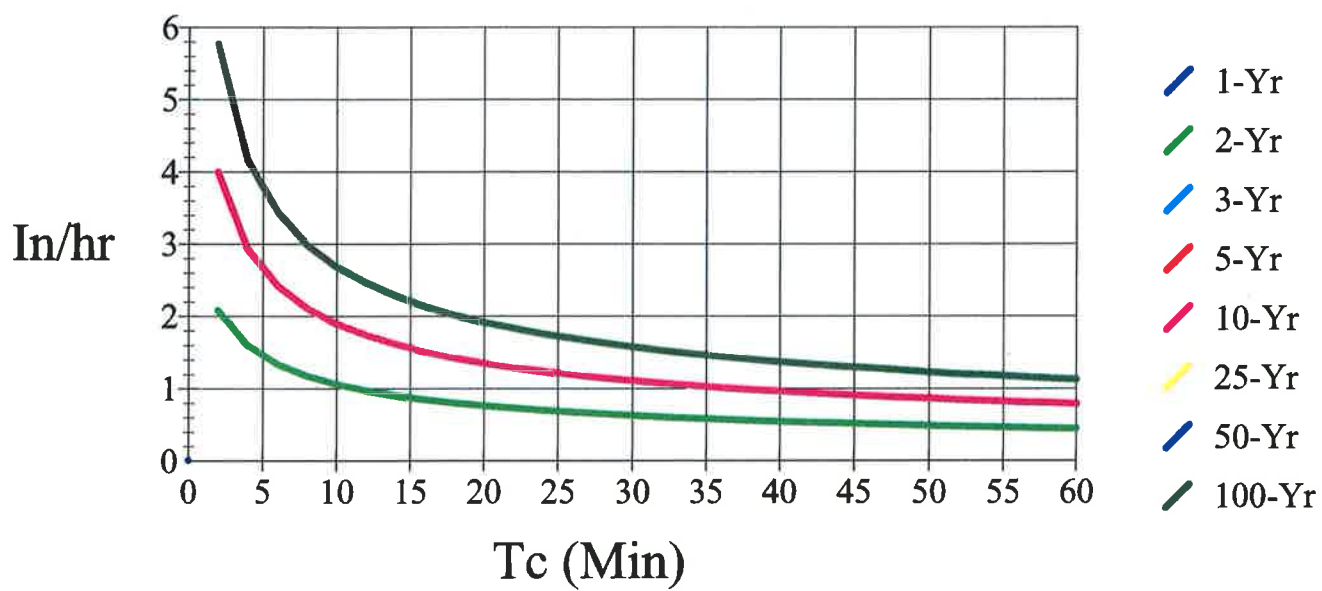
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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.79	3,805	14.79	4.15	0.00	---	---	2.32	0.00	---	---	---	6.46
0.79	3,830	14.79	4.17	0.00	---	---	2.34	0.00	---	---	---	6.51
0.80	3,856	14.80	4.19	0.00	---	---	2.36	0.00	---	---	---	6.55
0.80	3,881	14.80	4.21	0.00	---	---	2.38	0.00	---	---	---	6.59
0.81	3,907	14.81	4.23	0.00	---	---	2.41	0.00	---	---	---	6.63
0.81	3,932	14.81	4.24	0.00	---	---	2.43	0.00	---	---	---	6.67
0.82	3,958	14.82	4.26	0.00	---	---	2.45	0.00	---	---	---	6.71
0.82	3,984	14.82	4.28	0.00	---	---	2.47	0.00	---	---	---	6.75
0.83	4,009	14.83	4.30	0.00	---	---	2.50	0.00	---	---	---	6.80
0.83	4,035	14.83	4.32	0.00	---	---	2.52	0.00	---	---	---	6.84
0.84	4,060	14.84	4.34	0.00	---	---	2.54	0.00	---	---	---	6.88
0.84	4,086	14.84	4.36	0.00	---	---	2.56	0.00	---	---	---	6.92
0.85	4,112	14.85	4.38	0.00	---	---	2.59	0.00	---	---	---	6.96
0.85	4,137	14.85	4.39	0.00	---	---	2.61	0.00	---	---	---	7.00
0.86	4,163	14.86	4.41	0.00	---	---	2.63	0.00	---	---	---	7.04
0.86	4,189	14.86	4.43	0.00	---	---	2.66	0.00	---	---	---	7.09
0.87	4,215	14.87	4.45	0.00	---	---	2.68	0.00	---	---	---	7.13
0.87	4,240	14.87	4.47	0.00	---	---	2.70	0.00	---	---	---	7.17
0.88	4,266	14.88	4.48	0.00	---	---	2.73	0.00	---	---	---	7.21
0.88	4,292	14.88	4.50	0.00	---	---	2.75	0.00	---	---	---	7.25
0.89	4,318	14.89	4.52	0.00	---	---	2.77	0.00	---	---	---	7.29
0.89	4,343	14.89	4.54	0.00	---	---	2.80	0.00	---	---	---	7.33
0.90	4,369	14.90	4.56	0.00	---	---	2.82	0.00	---	---	---	7.37
0.90	4,395	14.90	4.57	0.00	---	---	2.84	0.00	---	---	---	7.42
0.91	4,421	14.91	4.59	0.00	---	---	2.87	0.00	---	---	---	7.46
0.91	4,447	14.91	4.61	0.00	---	---	2.89	0.00	---	---	---	7.50
0.92	4,473	14.92	4.63	0.00	---	---	2.91	0.00	---	---	---	7.54
0.92	4,499	14.92	4.64	0.00	---	---	2.94	0.00	---	---	---	7.58
0.93	4,525	14.93	4.66	0.00	---	---	2.96	0.00	---	---	---	7.62
0.93	4,551	14.93	4.68	0.00	---	---	2.99	0.00	---	---	---	7.66
0.94	4,577	14.94	4.69	0.00	---	---	3.01	0.00	---	---	---	7.70
0.94	4,602	14.94	4.71	0.00	---	---	3.03	0.00	---	---	---	7.75
0.95	4,628	14.95	4.73	0.00	---	---	3.06	0.00	---	---	---	7.79
0.95	4,654	14.95	4.75	0.00	---	---	3.08	0.00	---	---	---	7.83
0.96	4,680	14.96	4.76	0.00	---	---	3.11	0.00	---	---	---	7.87
0.96	4,707	14.96	4.78	0.00	---	---	3.13	0.00	---	---	---	7.91
0.97	4,733	14.97	4.80	0.00	---	---	3.16	0.00	---	---	---	7.95
0.97	4,759	14.97	4.81	0.00	---	---	3.18	0.00	---	---	---	7.99
0.98	4,785	14.98	4.83	0.00	---	---	3.21	0.00	---	---	---	8.04
0.98	4,811	14.98	4.85	0.00	---	---	3.23	0.00	---	---	---	8.08
0.99	4,837	14.99	4.86	0.00	---	---	3.26	0.00	---	---	---	8.12
0.99	4,863	14.99	4.88	0.00	---	---	3.28	0.00	---	---	---	8.16
1.00	4,889	15.00	4.90	0.00	---	---	3.31	0.00	---	---	---	8.20
1.00	4,915	15.00	4.91	0.00	---	---	3.33	0.00	---	---	---	8.24

...End

I-D-F Curve - Mapes Rd Intensity Duration Curve.idf



Hydraflow IDF Report

Return Period (Yrs)	Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	3.4916	0.8000	0.5043	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	6.0454	0.3000	0.4995	-----
25	0.0000	0.0000	0.0000	-----
50	0.0000	0.0000	0.0000	-----
100	8.2811	0.1000	0.4884	-----

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Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (In/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.44	1.05	0.87	0.76	0.68	0.62	0.57	0.54	0.51	0.48	0.46	0.44
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	2.63	1.89	1.55	1.34	1.20	1.10	1.02	0.95	0.90	0.85	0.81	0.78
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	3.74	2.68	2.20	1.91	1.72	1.57	1.46	1.36	1.29	1.22	1.17	1.12

Tc = time in minutes

NOAA Atlas 14, Volume 6, Version 2 PERRIS
CDF

Station ID: 90-0152
Location name: Perris, California, USA*
Latitude: 33.7875°, Longitude: -117.2292°
Elevation:
Elevation (station metadata): 1452 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 & aeriels](#)

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	0.087 (0.072-0.105)	0.121 (0.101-0.146)	0.170 (0.142-0.207)	0.214 (0.177-0.262)	0.279 (0.222-0.353)	0.333 (0.260-0.431)	0.392 (0.298-0.521)	0.458 (0.338-0.627)	0.556 (0.393-0.794)	0.666 (0.454-0.986)
10-min	0.124 (0.104-0.150)	0.173 (0.145-0.210)	0.244 (0.203-0.296)	0.307 (0.253-0.375)	0.399 (0.318-0.506)	0.477 (0.372-0.618)	0.562 (0.428-0.747)	0.657 (0.485-0.898)	0.797 (0.563-1.14)	0.954 (0.651-1.41)
15-min	0.150 (0.126-0.181)	0.210 (0.175-0.254)	0.295 (0.246-0.358)	0.371 (0.306-0.454)	0.483 (0.385-0.612)	0.577 (0.450-0.747)	0.680 (0.517-0.903)	0.794 (0.586-1.09)	0.963 (0.681-1.38)	1.15 (0.787-1.71)
30-min	0.240 (0.201-0.290)	0.336 (0.281-0.406)	0.473 (0.394-0.574)	0.594 (0.491-0.726)	0.774 (0.617-0.980)	0.924 (0.721-1.20)	1.09 (0.828-1.45)	1.27 (0.939-1.74)	1.54 (1.09-2.20)	1.85 (1.26-2.74)
60-min	0.317 (0.265-0.383)	0.443 (0.370-0.536)	0.624 (0.520-0.756)	0.783 (0.647-0.958)	1.02 (0.813-1.29)	1.22 (0.951-1.58)	1.44 (1.09-1.91)	1.68 (1.24-2.30)	2.04 (1.44-2.91)	2.44 (1.66-3.61)
2-hr	0.480 (0.401-0.579)	0.647 (0.541-0.782)	0.877 (0.731-1.06)	1.07 (0.886-1.31)	1.35 (1.08-1.71)	1.58 (1.23-2.04)	1.82 (1.38-2.42)	2.08 (1.53-2.84)	2.44 (1.73-3.49)	2.74 (1.87-4.06)
3-hr	0.590 (0.494-0.712)	0.784 (0.655-0.948)	1.05 (0.873-1.27)	1.27 (1.05-1.55)	1.58 (1.26-2.00)	1.83 (1.43-2.37)	2.08 (1.59-2.77)	2.36 (1.74-3.22)	2.74 (1.94-3.91)	3.05 (2.08-4.51)
6-hr	0.845 (0.707-1.02)	1.11 (0.927-1.34)	1.46 (1.22-1.77)	1.75 (1.45-2.14)	2.15 (1.71-2.72)	2.46 (1.92-3.18)	2.78 (2.11-3.69)	3.11 (2.30-4.25)	3.57 (2.52-5.10)	3.93 (2.68-5.81)
12-hr	1.16 (0.971-1.40)	1.52 (1.27-1.84)	2.00 (1.66-2.42)	2.38 (1.97-2.92)	2.91 (2.32-3.69)	3.32 (2.59-4.30)	3.74 (2.84-4.96)	4.17 (3.08-5.70)	4.75 (3.36-6.78)	5.20 (3.55-7.70)
24-hr	1.56 (1.38-1.80)	2.07 (1.83-2.39)	2.73 (2.41-3.16)	3.27 (2.86-3.82)	4.01 (3.40-4.84)	4.59 (3.80-5.64)	5.17 (4.19-6.51)	5.77 (4.55-7.46)	6.58 (4.99-8.87)	7.22 (5.29-10.1)
2-day	1.78 (1.57-2.05)	2.40 (2.12-2.77)	3.24 (2.85-3.75)	3.93 (3.44-4.59)	4.90 (4.15-5.91)	5.67 (4.70-6.97)	6.46 (5.23-8.14)	7.29 (5.75-9.44)	8.45 (6.40-11.4)	9.37 (6.86-13.1)
3-day	1.88 (1.66-2.17)	2.57 (2.27-2.97)	3.52 (3.10-4.07)	4.32 (3.77-5.04)	5.45 (4.61-6.57)	6.36 (5.27-7.82)	7.31 (5.92-9.21)	8.33 (6.57-10.8)	9.76 (7.40-13.2)	10.9 (8.00-15.2)
4-day	1.99 (1.76-2.30)	2.75 (2.43-3.17)	3.78 (3.33-4.38)	4.67 (4.08-5.45)	5.93 (5.02-7.15)	6.95 (5.76-8.54)	8.02 (6.50-10.1)	9.17 (7.23-11.9)	10.8 (8.19-14.6)	12.2 (8.90-16.9)
7-day	2.18 (1.93-2.52)	3.02 (2.67-3.49)	4.19 (3.69-4.85)	5.18 (4.53-6.05)	6.60 (5.58-7.95)	7.74 (6.42-9.52)	8.95 (7.25-11.3)	10.3 (8.09-13.3)	12.1 (9.17-16.3)	13.6 (9.98-19.0)
10-day	2.28 (2.01-2.63)	3.17 (2.80-3.67)	4.41 (3.88-5.11)	5.46 (4.78-6.38)	6.97 (5.90-8.41)	8.20 (6.80-10.1)	9.49 (7.69-12.0)	10.9 (8.58-14.1)	12.9 (9.75-17.3)	14.5 (10.6-20.2)
20-day	2.67 (2.36-3.07)	3.77 (3.33-4.35)	5.32 (4.68-6.16)	6.66 (5.82-7.78)	8.62 (7.29-10.4)	10.2 (8.48-12.6)	12.0 (9.68-15.1)	13.8 (10.9-17.9)	16.6 (12.6-22.3)	18.8 (13.8-26.2)
30-day	3.02 (2.67-3.49)	4.30 (3.80-4.96)	6.12 (5.39-7.08)	7.72 (6.75-9.01)	10.1 (8.55-12.2)	12.1 (10.0-14.9)	14.3 (11.5-18.0)	16.7 (13.1-21.6)	20.2 (15.3-27.2)	23.2 (17.0-32.3)
45-day	3.46 (3.06-4.00)	4.92 (4.34-5.68)	7.04 (6.20-8.15)	8.95 (7.83-10.5)	11.9 (10.0-14.3)	14.3 (11.9-17.6)	17.1 (13.9-21.5)	20.2 (16.0-26.2)	25.0 (18.9-33.6)	29.1 (21.3-40.5)
60-day	3.88 (3.43-4.48)	5.46 (4.83-6.31)	7.83 (6.90-9.07)	10.00 (8.74-11.7)	13.4 (11.3-16.1)	16.3 (13.5-20.0)	19.6 (15.9-24.7)	23.5 (18.5-30.4)	29.4 (22.2-39.6)	34.6 (25.3-48.2)

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

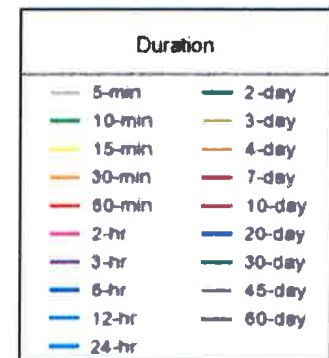
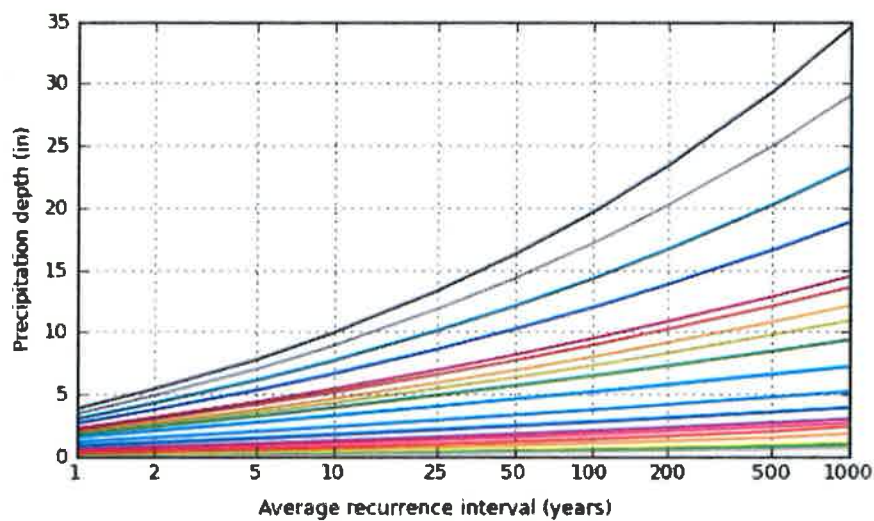
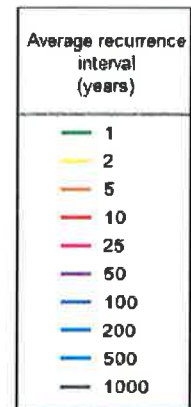
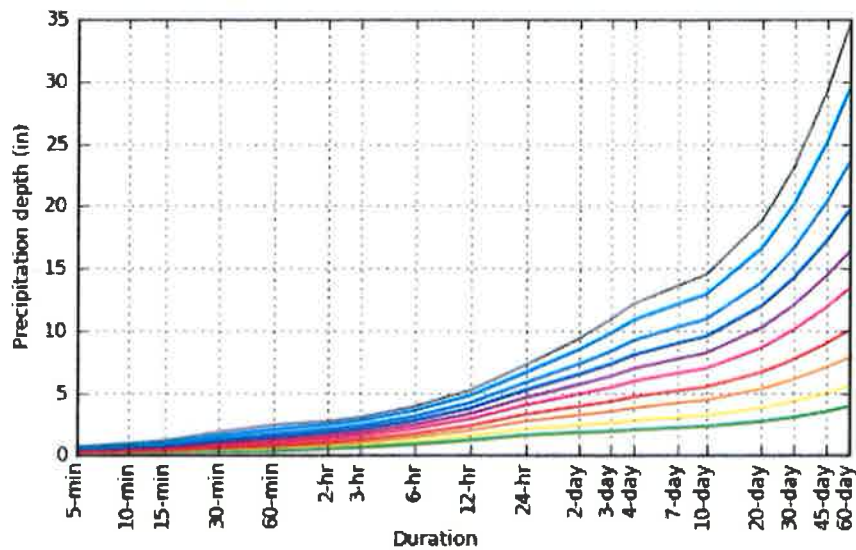
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 33.7875°, Longitude: -117.2292°



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Created (GMT): Fri Dec 7 22:46:23 2018

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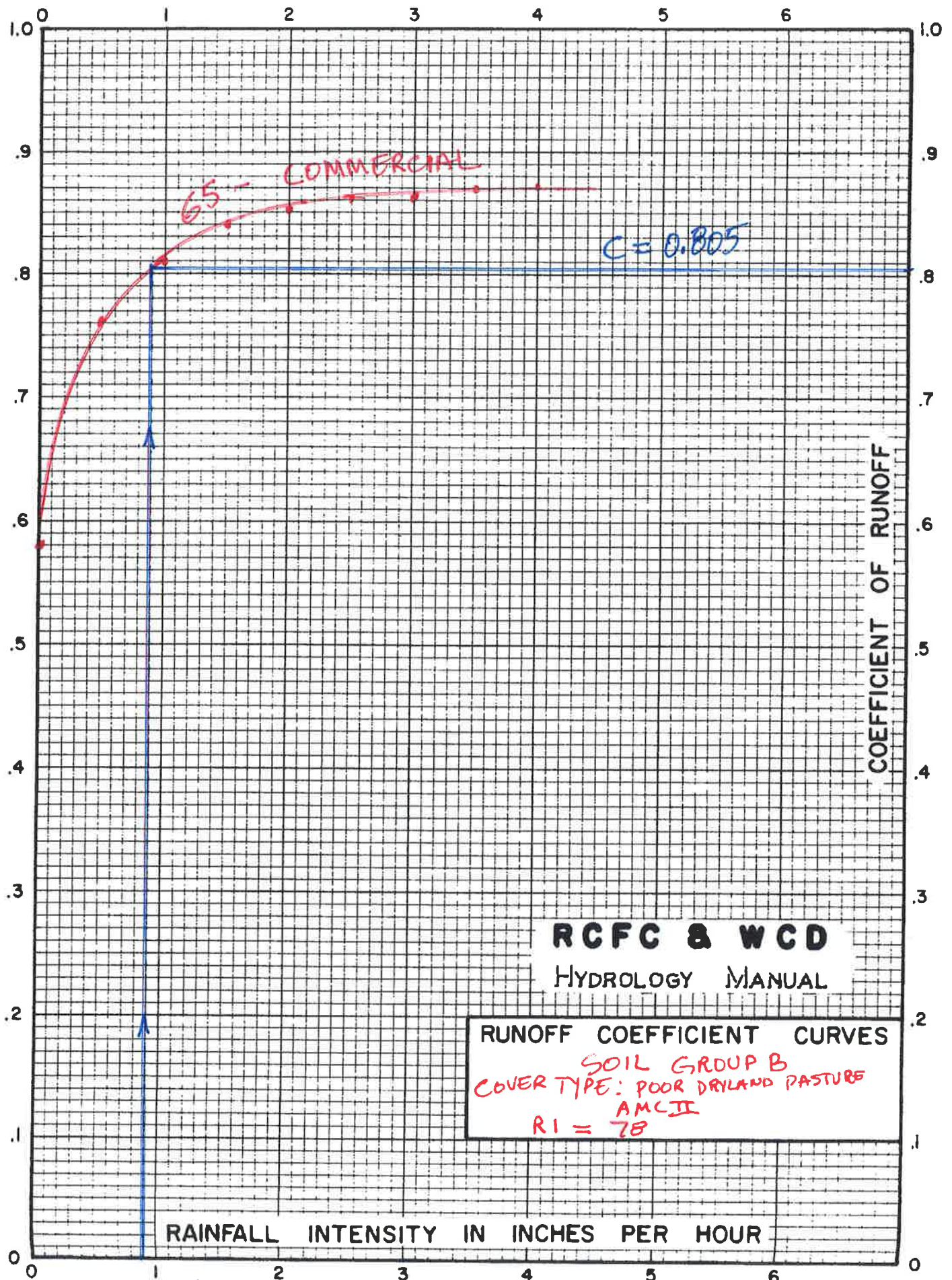
Maps & aerals**Small scale terrain****Large scale terrain****Large scale map**

Large scale aerial

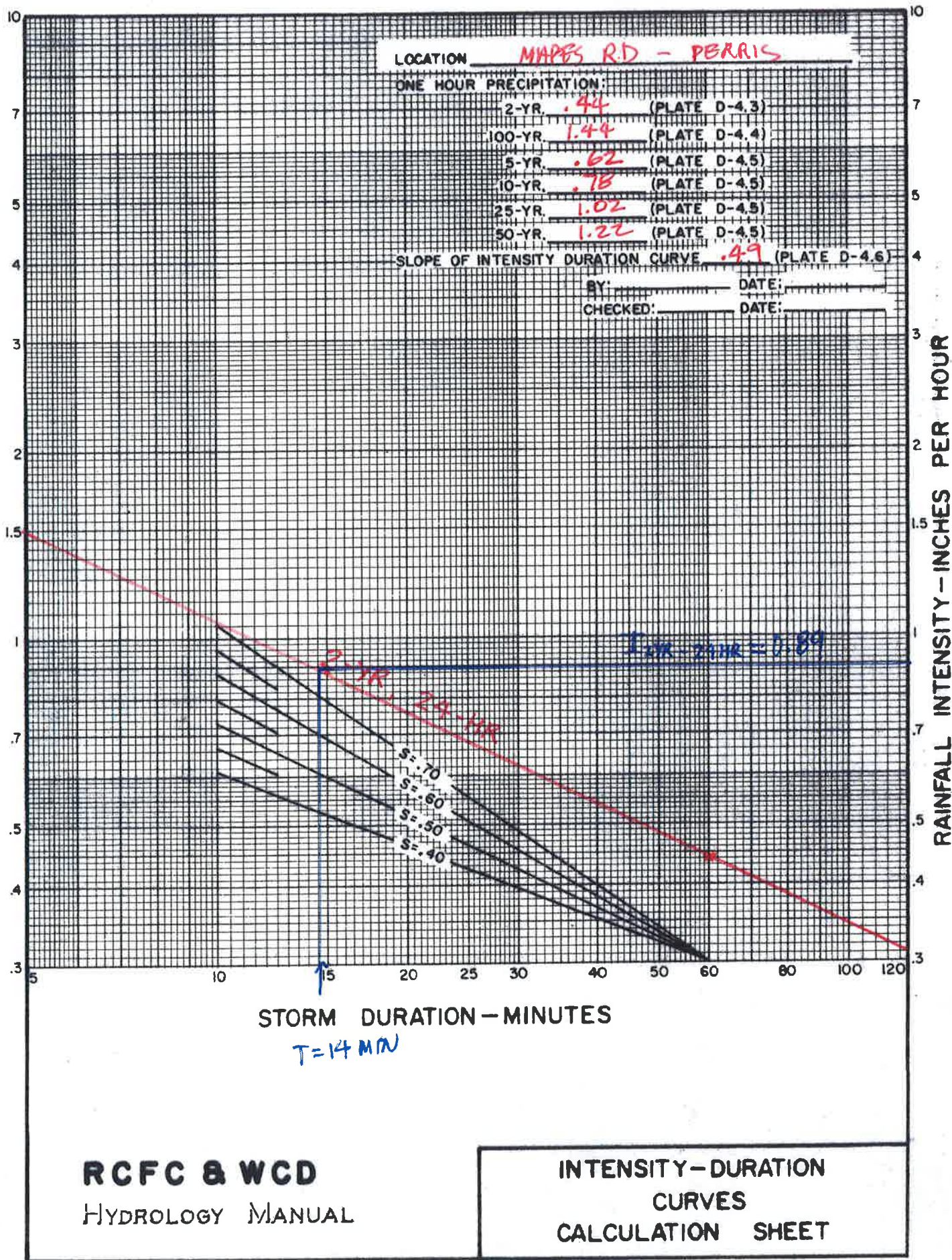
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$I = 0.89 \text{ inch/hr}$



Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1 on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...		... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1	2	3	4	
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.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ 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 landscape areas, if any. ☐ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	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 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.	☒ Maintain landscaping using minimum or no pesticides. ☐ See applicable operational BMPs in “What you should know for....Landscape and Gardening” at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☐ Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE			
1 IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ 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	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ 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.
☒ 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 runoff 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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE			
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative	
☐ 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/	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

1 IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent runoff 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.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of 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/	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings		
3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative		
☐ 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 shut-off to discourage such use). (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.	☐ 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): ☐ Wastewater 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.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE			
1	2	3	4
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
☐ 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 pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the 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, 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/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE			
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ 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.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Fact Sheet SD-30, "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

⁶ The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

1 IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ M. Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. 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.		☐ 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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...		... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE	
1	2	3	4
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
☒ 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 ☒ Drainage sumps ☐ Roofing, gutters, and trim. ☐ Other sources		☐ 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 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.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE			
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative	
☒ 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

WILL PROVIDE WITH THE FINAL DOCUMENT.

Appendix 10: Educational Materials

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

WILL PROVIDE WIT THE FINAL DOCUMENT